

National
TOUR GUIDE
TRAINING PROGRAM



2007

ACKNOWLEDGEMENTS

With the current revision of the National Tour Guide Trainers Manual, we have a number of people to acknowledge for their input, support, and constructive feedback. We are very much appreciative of their valuable time and efforts rendered throughout the revision of this manual. This is quite evident with the addition of the new chapter on basic swimming, snorkeling, water safety/survival skills, non-swimming rescue and boating safety.

Firstly, we would like to thank the authors of the original Tour and Travel Guiding Services Training Program. Their initial contribution to the tour guide training program in Belize gave us a very strong foundation on which to build. We would like to gratefully acknowledge: Valdemar Andrade, Rodolfo Burgos, Sebastian Cayetano, Thomas Greenwood, Anna Hoare, Lita Krohn, Myrna Manzanares, Osmany Salas, and Terry Wright. With the current revisions of this manual we also utilized other knowledgeable and dedicated professionals such as Mrs. Nora Bradley, Mr. Rudolfo Burgos, Mr. Mike Panton, and Ms. Froyla Salam. The cover and the desktop publishing were done by Idealab Studios.

Secondly, we would like to thank all of the key players within the Tourism Industry who actively played a vital role in the revision of this manual. Without their contributions and active participation, this manual would not be possible today.

Finally, we would like to thank the authors, who gave generously of their time and knowledge in the revision of each of the chapters and also with the addition of the new chapter on basic swimming, snorkeling, water safety/survival skills, non-swimming rescue and boating safety. This revision allows for a more user friendly, informative, and enjoyable manual. The support of the BTB and the Tour Guide Association are of paramount importance in the revision of this manual and cannot be overlooked.

We look forward to the continued development and improvement of Tour Guiding in Belize as this sector's participants continue to dominate the industry in their lasting impressions on our visitors.

Dr. Vincent Palacio

PREFACE

Tours are an essential part of our country's tourism network, given their direct interaction with the many visitors to our country. The work of our tour guides is, therefore, crucial to the viability and long term sustainability of our tourism industry. At some point during their stay in Belize, nearly all visitors make use of the services of tour guides—from their arrival at our port of entries, to participating in selected day tours and multi-day itineraries throughout the country.

The training of our tour guides is a critical component of ensuring the sustainability of the tourism industry. It is important for us to make sure that our tour guides can conduct professional tours—from the information they share, to the visitor services they provide and the impression of our country that they convey. This revised training program is designed to provide tour guides with up to date and user friendly information for them to conduct professional and memorable tours in Belize.

In our efforts to continuously improve standards, the Belize Tourism Board presents this revised and upgraded National Tour Guide Training Program, part of our on-going efforts to build the capacity of tourism personnel to meet the needs of our tourism industry, today and tomorrow. This program is intended to be a rigorous program that once completed will lead to certification.

You will need to work hard to complete this program. But, we are confident that when you do complete it, you will have the skills necessary to be a proud ambassador for Belize as a Tour Guide.

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This manual is intended to be used by the participants of the introductory National Tour Guide Training Program course. It provides material on six content areas, each focusing on a different aspect of the knowledge and skills needed to become a successful tour guide. Exercises are included, throughout the manual, that allow and encourage trainees to practice knowledge and skills as they are learned. The internship component, included at the end of the program, allows each trainee to apply their newly acquired skills in the field, with a practiced tour guide as a mentor, before beginning to lead tours on their own. Also included in each chapter is a list of recommended readings and a bibliography, to be used as a reference resource, and to encourage trainees to enhance their knowledge and skills beyond the training program.

National Tour Guide Training Program (Level I – Introductory)

A seven-part training program, followed by a required internship. Each content area includes a workshop training component, and an assessment component.

Content Area	Workshop	Assessment	Total Time
Chapter 1: The Tour Guide	5 days	1 day	6 days
Chapter 2: Belize Today	1 day	1 day	2 days
Chapter 3: Natural History of Belize			
• Terrestrial Resources	2 days	1 day	3 days
• Marine Resources and Protected Areas	2 days	1 day	3 days
Chapter 4: History and Culture of Belize	3 days	1 day	4 days
Chapter 5: The World of the Maya	2 days	1 days	3 days
Chapter 6: Basic Swimming, Snorkeling, Water Safety Survival Skills, Non-Swimming Rescue and Boating Safety	4 days	2 days	6 days
Chapter 7: Field Experience and Internship		1 day + internship	1 day + internship
Total:	21 days	7 days	28 days + internship

Internship: In addition to the one day Field Experience assessment, tour guide trainees will be required to undertake an internship with a recognized, licensed tour operator and/or tour guide as a mentor. During the course of this internship, the mentor will evaluate the trainee on a field guiding experience. The trainee will have up to three months to complete the internship component.

Assessment: Upon (i) satisfactory completion of each Content Area of the training course, with a minimum grade of at least 70 on each assessment, and (ii) satisfactory completion of the internship component, with a minimum of a Satisfactory rating on the field experience evaluation, the trainee will receive a Tour Guide License – Level I, which will be valid for a period of 1 year.



CHAPTER 1: THE EFFECTIVE TOUR GUIDE

INTRODUCTION:

At the end of this chapter, participants will be able to give basic and effective presentations therefore being able to facilitate memorable experiences to visitors to Belize. This will be based on their knowledge of the tourism industry and taking into consideration the needs of visitor and country.

OBJECTIVES:

Participants will understand that and learn how:

1. Travel fulfills very specific needs in humans.
2. Tour guides facilitate certain travelers' needs
3. Tour guides have very specific responsibilities to both the tourism industry and more specifically to the visitor
4. Tourism is a business based on high visitor satisfaction
5. Tour guides have to adapt presentations to the types of visitors
6. Very specific tour segments are common to all effective tours
7. Effective tour guides have certain characteristics & personalities
8. Effective tour guides develop special abilities to be able to make effective presentations
9. Effective tour guides utilize very specific methods when making any presentation
10. Different types of tours and destinations require specialized presentations

ASSESSMENT:

1. During course, participants will take part in group discussions of presented as well as published material.
2. At intervals participants will make presentations utilizing techniques acquired.
3. On completion of course, participants will take part in a written assessment of entire course. Assessment will be given at a mid high school writing level. Assessment will be conducted by an entity other than the course presenter/facilitator
4. On completion of course, participants will take part in an oral assessment of presentation techniques as presented in this course segment. The oral assessment will consist of the preparation of a partial "Tour Plan/Blueprint" and an actual presentation.

AT A GLANCE

- Unit 1: Why People Travel
- Unit 2: Responsibilities of an Effective Guide
- Unit 3: Tour Guide Personalities and Characteristics
- Unit 4: Methods & Techniques for Presenter

UNIT 1: WHY PEOPLE TRAVEL

People travel in order to fulfill very specific needs. The business of tourism is based on creating profits from the delivery of services which fulfill these needs. Tour Guides have to acquire very specific skills in order to manage the Belize tourism experience. Great tourism experiences are really the fulfillment of these needs and exceeding the expectation of our customers, the tourists. Great experiences result in long lasting positive memories. Great memories translate into increased long-term successful tourism businesses.

TOPICS COVERED:

1. Travel fulfills very specific needs in humans.
2. Tour guides facilitate certain travelers' needs
3. Tourism is a business based on high visitor satisfaction
4. Expectations of visitors
5. Tourism ethics

AT A GLANCE

1. Understanding Tourism (The Industry)
2. What makes each individual "Special?"
3. Understanding Tourism (The Visitor)



UNDERSTANDING TOURISM (THE INDUSTRY)

INTRODUCTION

A village business person kept noticing that tourists and tour guides continued showing up in his village shop, usually stopping to buy a cold soft drink before continuing on their tour. They sometimes had questions relating to distances, availability of meals and on occasion, accommodations. He began thinking of how to maximise a potential business opportunity. He decided to build a small room adjacent to his home and make it available to overnight guests.

After a year, the realisation set in that not a single tourist had used his guest room and that his investment was wasted. He was confused. Tourists were active in his community and the surrounding countryside; he felt left out and upset with an industry in which he was an outsider.

Why did no one use these services? He did not understand why and how tourism occurs.

One thing he understood was that the weather was generally warm and that everyone needed refreshment at sometime or another. That is why he kept his icebox filled with cold soft drinks all the time and was able to sell them.

UNDERSTANDING THE “TOURISM BUSINESS”

Tourism has to be understood as a business. All businesses occur because there is product to be sold. This means that the visitor purchases something and then takes it back home or actually possesses it. What does the visitor take back home?

In order to fully understand the “Real Tourism Product” certain comparisons have to be made. Tourism is like going to a football game. What activities are involved in the actual seeing the football game? These include:

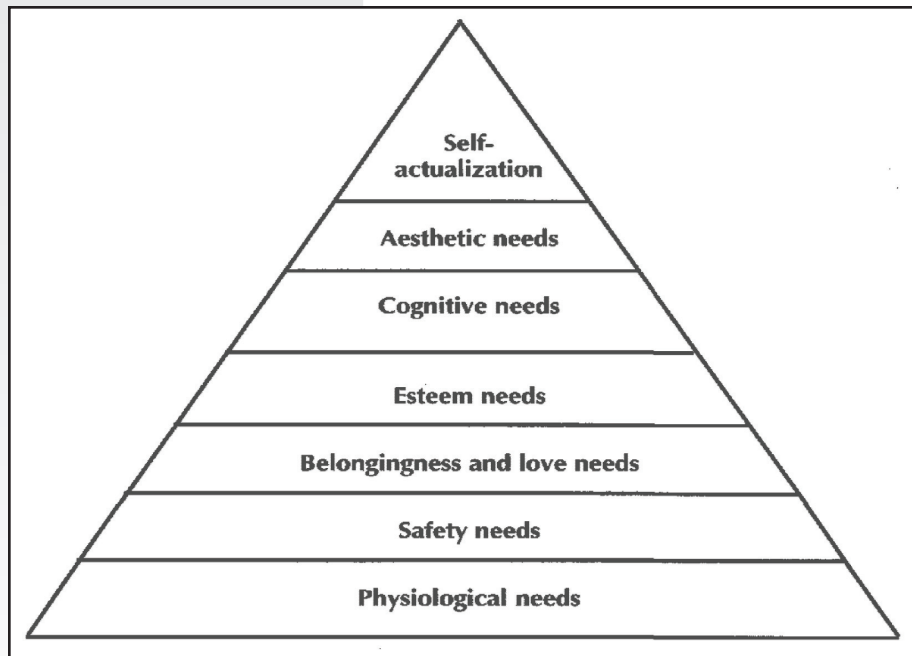
1. Discovery - finding out that there will be a football game
2. Decision - deciding to go, including deciding whether resources are available in order to go
3. Anticipation - all the emotions involved before seeing the game
4. Preparation - purchasing and planning separate activities and components required in order to actually see the game. This includes traveling to and from the game
5. Actually experiencing the game: Three possibilities:
 - a. Very good experience
 - b. Just OK/perfect experience
 - c. Very Bad experience
6. Remembering the experience.

In order to create the good experiences there has to be an understanding of basic human needs. Fulfilling these human needs, as they relate to the tourism industry has to be exceeded all the time in order for tourism to be successful.

WHAT ARE THE BASIC NEEDS OF PEOPLE EVERYWHERE?

Everyone has needs. The main reason why people have to work is to earn a salary that is utilised for purchasing items and paying for services needed in order to survive and fulfil their needs.

Why is this? Are all our needs alike? Is earning money just to cover food and shelter enough? According to Maslow, human needs can be placed systematically like the rungs of a ladder. The higher you go up this ladder the more contented you are as an individual. Anyone involved in any aspect of tourism needs to realise that tourism is a business that makes its money from the fulfilment of all human needs.



Physiological Needs

These are the basic requirements for our bodies to function. If these needs are not satisfied, we will suffer hunger, thirst, nakedness and exposure to the elements. Any one of these needs if not attended to will result in death. Hotels and restaurants at this very basic level fulfil this particular need but so do vehicles, food and drink supplied to visitors while on tour.

Safety Needs

Everyone wants to feel safe. When participating in what may seem dangerous and of great risk to life, the visitor has to have knowledge of or assurance that there are systems in place to counter any risk involved in their activities. Hotels and restaurants supply safe shelter that is sturdy and sheltered from criminal intent. Restaurants have to present food that has been prepared from safe sources and cooked properly in order to avoid people getting sick. Tour operators as well as tour guides fulfill safety needs by providing properly serviced and operated late model or new vehicles. Activity oriented tours have to ensure that equipment is properly service and operated.

Affiliation Needs

Culture unites many individuals as well as groups of people together. People belong to groups in order to be accepted for who they are. This need for affiliation and belongingness includes the family group and the union of husbands, wives and friendships. As professional hosts, the Belize Tourism industry, at all levels is required to be genuinely hospitable. The success of any tourism

activity, whether sitting down for a meal or listening to a safety brief for a caving tour depends heavily on the attitudes among personnel managing and delivering the experience. Return business as well as word of mouth advertisement depends heavily on the memories of visitors to Belize.

Esteem Needs

The next step is to be accepted not just as a regular human being but also as someone who is “special” and/or “different” in comparison to the others within the same group and even extending to other groups. A perceptive tour guide will adapt his entire tour to individual special needs and interests. Remember that special needs do not necessarily refer to handicaps or disabilities.

Cognitive Needs

In order to keep our self-esteem, people need to remain informed on what continues making him/her belong or be accepted within groups. It is common for people to socialise based on the collective knowledge of the entire group. Therefore then a need arises for knowledge, comprehension as well as a need to explore and investigate. Is not this why visitors come to Belize? Well-informed, well-read and knowledgeable tour guides fulfil this need.

Aesthetic Needs

The acquisition of knowledge brings about a desire for order and symmetry. In other words, we all have the need for the beautiful things in life. Beauty appeals to all our senses. An analogy would be that a person would drink from a dirty city drain if dying of thirst but once all the previous needs are met, that same person will demand purified chilled water served by a suited waiter in a gold chalice.

Self-Actualisation

With all our needs fulfilled, it is very easy to feel very comfortable with one’s self. At this top stage of human needs, people are realizing their own potential and abilities. At this stage, many feel the need for spirituality and religion. It is of note that self-actualization is always on-going.

DEFINING TOURISM

Looking back at our own experiences and needs, reasons for travel fall into two main categories:

Obligatory (You have to travel)	Nonobligatory (You do not have to travel)
Medical Emergencies & Scheduled	Holiday/Vacation
Business Trips	Following up on special interests
Conferences	Taking part in special activities
Family Affairs	Accompanying someone
Meetings	Special Events
Education	Sports
Shopping	Fairs
Job Related (Pilots, Captains, Drivers, etc.)	Other

Travel and tourism will occur for the above reasons or “motivations.” Note also that the terms “travel” and “tourism” are two different but related concepts. Here are a few definitions of the term “tourism.”

Tourism is travel for pleasure. The act of visiting places for the purpose of enjoyment.

OR

Occupation of providing local services such as entertainment, accommodation and catering for tourists; the business of providing services to tourists; a group of businesses that provides services and facilities for consumption by tourists

OR

Tourism is a service based industry comprising a number of tangible and intangible components. The tangible elements include transport, foods and beverages, tours, souvenirs and accommodation, while the intangible elements involve education, culture, adventure or simply escape and relaxation

OR

Tourists are people who “travel to and stay in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited”.

Reference: World Tourism Organization

WHAT MAKES EACH INDIVIDUAL “SPECIAL?”

The effective interpretive tour guide realizes that there is no such thing as a “general audience” or “common type visitor.” Very quickly tour guides realize that they have to be constantly aware of individual needs, desires and expectations. In this respect, all groups can be considered as “special.”

Considerations for placing individuals or groups in “special” categories include the following:

- A. Travel motivations
- B. Marketing demographics
- C. Special academic/professional/hobby/recreational interests
- D. Age of individuals
- E. Cultural considerations
- F. Abilities/disabilities/handicaps
- G. Large Groups

A. Travel motivations & Marketing affect Choice of destination/itinerary/tour

The Belize Tourism Board, the private sector as well as foreign entities all work in many different ways to create and affect the Belize Tourism industry. Marketing the Belize Tourism product has become much more sophisticated in the last few years because of the fact that greater efforts are made in obtaining very specific statistics. With these statistics marketing can be very specific. Statistics tell marketers that people are motivated to travel to Belize because of the following attractions:

Five Categories of Attractions of Belize

I. Marine Attractions

Nature has given the country of Belize natural bounty in the form of a tropical coral reef. Our marine areas include the main shoreline where mangrove forests are found, the coastal zones where tourism as well as residential developments exist, sea grass beds, lagoons and estuaries. In addition, the marine biodiversity is amazingly beautiful. A shallow inner lagoon with its sea grass beds separates the mainland from the barrier reef and islands. Beyond the main barrier reef there are three atolls.

2. People/Culture

Our Belizean Culture includes much more than our diverse racial or genetic make up. In times past, our races may have been easier to separate and identify. Today, it is not as easy as Belizean Society has many areas of uncertain cultural identity. Our society has now evolved into a single “Belizean Cultural Identity.” Food and music preferences are no longer confined to single cultural groups. People from other places want to experience the way other people live. The way others live may not be better or worse. The attraction is that it is different than what visitors experience back in their places of residence and work.

3. Maya Archaeology

Almost every community in Belize can boast of some proximity to old, abandoned structures and areas once used by the Maya. Some areas are more spectacular in size and uniqueness of architecture and layout. Visiting these “Maya Sites” can be the highlight of any tourism experience in Belize.

4. Rainforest

Throughout the world people are learning of the importance of tropical rainforests. This is where new medicines originate as well as vital products such as rubber. Present here also are vast amounts of creatures. These are the earth’s lungs which supply oxygen, vital for human survival. People in industrialized countries become aware of this through the media. When deciding to visit places like Belize, they are expecting to experience in person what was only experienced through colorful magazines, television program and web sites.

5. Wildlife

Similar in expectations to Rainforests, wildlife on its own is also a major attraction. For many, a simple tour to the Belize Zoo is enough. Others may want much more. Our wild animals need not to be seen for the experience to be complete. Being in the same vicinity or knowing that they are in an area where they exist in healthy numbers is acceptable. Bird watching stands out as a particular past time where actually seeing the wildlife is very important. The same can be said for snorkeling experiences or catch and release fishing.

B. Researchers have also separated visitors based on their motivations for travel to Belize into the following groups:

Researchers tell us that four major types of visitors come to Belize. These are descriptions of each type of visitor and preferred attractions and therefore experiences:

Nature Escapists appreciate solitude in wild areas. They are often times willing to accept very basic amenities in order to experience nature. Being in places with many people spoils the enjoyment of nature for this type of visitor. Rural settings with minimal investments sometimes manage to attract this type of visitor providing that natural areas are accessible. This type of visitor many times surprise natives in that they are very knowledgeable of where they are visiting and can actually keep up with native guides when accessing wild areas.

Eco-tourists enjoy both nature and culture. Rural settings are appropriate, especially when the human element is added. They will visit your community and stay there for both the village and the protected area. Experiences have to be a mixture of both Belize’s natural and social environment. Their resultant memories from Belize include as much nature appreciation and social interaction with Belizeans.

Comfortable Naturalists are very similar to the above groups with the exception that the levels of amenities are more exacting and more sophisticated comforts are expected. Their experiences must include easier and more comfortable components of travel. This factor also tells us that they are willing to spend more in order to get these services. The greater number of visitors today falls within this group.

Passive Players are those who accompany any visitor in above categories. They would not have chosen Belize as their preferred destination. Their major reason for being in Belize is that they want to be along with their friend, spouse or part of a group such as family or cultural group. Keeping this type of visitor in mind compels service providers to be flexible in their tourism product design therefore maximizing their potential for generating income. Tour guides who are able to discern who are the passive players and figure out what may be their personal interests can adapt presentations so that they too may fully participate in the Belize experience.

C. Special academic/professional/hobby/recreational interests

Because of the diversity of the Belize tourism product, there are many tourism activity specialties. These include fishing, scuba diving, bird watching, caving, and many others. Groups often travel together because they may all belong to a same society such as churches, businesses, professions, sports clubs, family reunions, specialized communities and many others.

Observant guides will quickly become aware of these common threads binding groups and take advantage of this knowledge when making any presentation.

D. Age of individuals

Older Adults constitute the larger portion of our visitors to Belize, particularly cruise tourism. At retirement there is increased leisure time, diminished physical ability (mobility, hearing, and sight), a vast experience base, less inhibition, and more sociability. Their 'special needs' should include opportunities to interact with others their age.

Often, these are returning visitors. They many times prefer to spend more time at park or center. Avoid long or fast paced walks. Sight and hearing are often diminishing, so depth perception and listening activities can become a problem. Many tour guides learn to rely on their vast experience, previous visits to the same site or similar destinations. This is done by encouraging interaction and sharing.

With younger adults, the tour pace can be faster. With these groups, guides need to increase interpretive stops in order to fulfill the allotted tour time. Longer trails, higher structures and more activity/trill oriented experiences are the norm. Tour personnel need to be alert for greater risk taking and more independent wandering.

E. Cultural considerations

Non-English Speaker Visitors & Nontraditional Caucasian present many challenges to the tour guide. Tour guides must be sensitive to the cultural etiquette of each nationality and be cognizant of their language abilities. Avoid colloquial expressions. Speak slowly and deliberately. Take extra time to learn of their special interests. Never assume the "common" isn't worth pointing out.

Many nontraditional groups are frequently alienated from parks, natural areas, and historic sites which tend to over-represent majority traditions. Predominate ethnic minorities in U.S. are Native Americans, Afro-Americans, Hispanics, Chinese, Japanese. The interpreter must assume responsibility for learning about each minority group and how their values and traditions are represented at each site.

F. Abilities/disabilities/handicaps

Visually Impaired visitors range from those whose vision has been corrected by glasses to those who “see” by hearing and touch. Address these visitors directly, not through another person. Provide descriptions of objects, scenes, etc. Involve via handling of objects. Ask what help they care for if you are uncertain.

The Hearing Impaired consists of almost 4% of the earth’s population. Generally, assume that older people will have some difficulty hearing. They need to see the face of the interpreter as well as to see objects and be given visual outlines. Keep hands away from mouth when speaking. Face visitor. Repeat important points and questions. Speak slowly.

Ambulatory Limited Visitors are those who must use a wheelchair, crutches, leg braces, or walkers and canes in moving. Their special needs include limited walks to areas that are accessible. Avoid steep slopes and rough terrain.

G. Large Groups

Families can sometimes travel in larger groups. These groups tend to consist of wide age and ability ranges. Many times the greater challenge is identifying the passive players within the group so as to apply special techniques thus avoiding conflicts later in the tour. Successful family tours result from guides taking extra care to find out individual needs and expectations and exceeding them. Families require time to interact as a family unit. Learning is secondary to sharing time together. Special care is taken in dealing with age group extremes.

Then there are the programs that attract especially large groups, perhaps thirty or more. Maintaining the interest of large numbers of people is a skill that comes with practice. Cruise ship passengers fall into this category. With these large groups the guide must be the visible leader. The group should resemble the orderly flight formation of pelicans, not the random flocking of pigeons in a city park. Large groups require assertive leadership.

Wait for everyone to arrive at the stop before interpreting. When you interpret, speak audibly. Be sure that everyone can see both you and the object of attention. Often talking from a “stage” will accomplish this. Stages can include walking into a stream, stepping off a trail, standing on a rock or an incline of an ancient archaeological structure. Always look for “natural stages” to use on site.

Another technique in leading large groups is to lead half the group past the object to be interpreted. When you return to the object, the observers form a natural arc around it. Walks usually combine planned and spontaneous interpretation. A firm understanding of the site, combined with enthusiasm, will help you create an enjoyable program.

Adapted from: Regnier, Kathleen, Michael Gross and Ron Zimmerman. “The Interpreter’s Guidebook: Techniques for Programs and Presentations.” UW-SP Foundation Press, Inc. University of Wisconsin, Copyright © 1992

Note: While some groups come neatly segregated by age, interests or any other category, the reality is that most of the times groups can be very mixed.

In conclusion it is important to state that travel fulfills every human need. All travel consists of the movement of people; however, tourism involves the aspects of pleasure and the stimulation of the human senses. Tourism, therefore, in order to be successful, is the business of satisfying human needs to visitors.

UNDERSTANDING TOURISM (THE VISITOR)

Understanding of the tourism industry is knowing the visitor. The visitor which consumes the product of this industry has some very clear expectations from tourism personnel particularly, tour guides.

Visitor expectations

Knowing visitor expectations and consequently being able to deliver a memorable product starts with the realization that the group of persons standing before or following a tour guide is very different from a group of students sitting in front of a lecturer or a school teacher. Whereas a classroom environment is designed for captive audiences, tour participants are non-captive audiences.

Captive audiences attend learning sessions based on the expectation of a diploma or certification at the end of a set period in order to prove excellence and perhaps qualify for certain types of labor. Major motivations are the expectation being hired and consequently being compensated or the increase of such compensation.

Captive audiences are found in classrooms, seminars, courses required for licenses and job training sessions. In such situations participants would much rather be somewhere else but attends, participates, pays attention and accepts a formal and more academic approach to presentations. Teachers, facilitators and lecturers in these situations major goal is to present information or teach a skill.

Non-captive audiences' motivations are very different from classroom students or seminar participants. These audiences will choose to participate, pay attention or listen to a presenter based on their own personal interests, desire to be entertained, special interests, emotional and personal needs. Like someone holding the remote control of a television set, programming will be changed or turned off. Tour guides have then to develop peculiar skills and techniques in order to hold the attention of the tour participant. The classroom situations involve a process where students receive instruction and information from the spoken word and texts. Tour guides also give information, give instructions and describe processes; however the mode of presentations is based on the management of situations on tour.

Visitors' expectations always include the following:

1. meeting tourism personnel who are delighted to have them as guests
2. having person(s) who have the right personality, attitudes and aptitude for attending to their needs
3. having persons at destinations who have a strong passion for conservation of the natural as well as the cultural environment
4. having the advertised and sold itinerary actually delivered or served
5. having personnel with keen attention to their well-being and strong ethics.
 - a. respect for the individuality of the visitor; the feeling of the guest should be one that their experience is unique and personal
 - b. professional attention is given to all as situations demand; emotional, romantic, sexual attention is definitely not part of the services rendered.
 - c. added charges or payments be included for the sake of added sales and commissions
 - d. non-use of deceptive techniques on the acquisition of gratuities/tips
 - e. non-participation of illegal activities such as illegal drug sales/consumption, prostitution, dishonest acquisition of added services.
 - f. interference with other tourism personnel with regards to sales of any goods and services.

CONCLUSION

In conclusion it must be stressed that tour guides must be aware of the needs of the individual visitor in order to provide experiences that result in extra special memories. Very satisfied tourists do not always return but they do tell others of the very bad, very good or just plain ordinary Belize experiences.

SKILL CHECK

EXERCISE 1

1. Make a list on paper of “things to do” for any one of the following activities. Any one of these activities involves the taking of your family, another person only, a group of similar minded persons:

- a. A sporting event in a rural village
- b. A week end trip to Chetumal, Mexico
- c. A picnic at a inland swimming area or caye
- d. A class trip to a local museum or visitors’ centre

Prepare to discuss the following questions:

- a. What human needs are fulfilled by participating in this trip?
- b. What human needs will be fulfilled that are not mentioned in your prepared list?

2. Look at the list of suggested tours (located at the end of Chapter 7 Unit 5.) What categories of attractions have motivated these tour participants? What needs are being fulfilled?

3. Discuss the importance of tour guide ethics using items listed in the text.

EXERCISE 2

1. What are the six activities involved in completing a full experience?

- | | |
|------------|-----------|
| i. _____ | iv. _____ |
| ii. _____ | v. _____ |
| iii. _____ | vi. _____ |

2. List and describe three basic human needs in the correct order.

3. List five reasons for travel and indicate which are obligatory and nonobligatory.

4. Write one definition of the term “tourism”.

5. Name three considerations for placing individual travelers in special categories.

6. What are the five categories of attractions in Belize?

7. Give your own definition of the following types of traveler:
Nature Escapist, Eco-tourist, Comfortable Naturalist/Passive Player

8. What do you understand by the terms captive audience/non-captive audience?

9. Name four visitors' expectations.

10. List and describe three ethics tour guides should adhere to.

11. What is the real product the tourist takes back home?

UNIT 2: RESPONSIBILITIES OF AN EFFECTIVE GUIDE

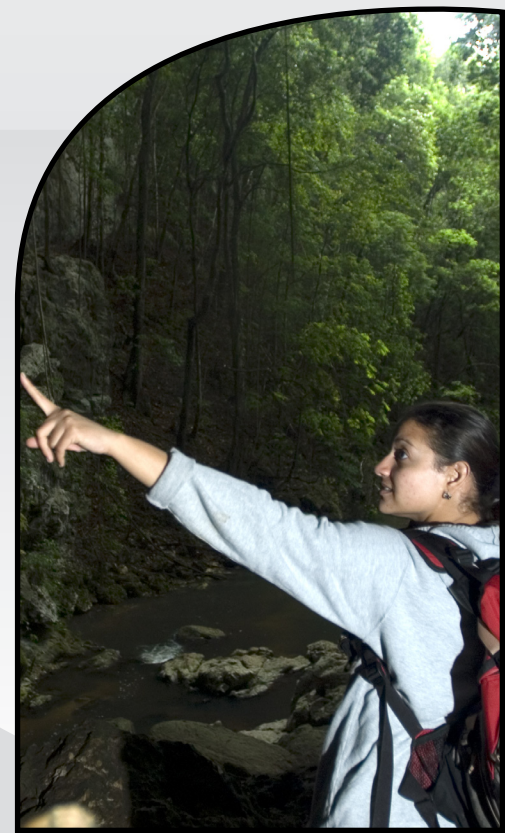
Tour Guides have three very distinctive “bosses”. The general Belizean community as well as government and private sectors have very high expectations that all aspects of Belize is presented in accurate, positive tones. Regulations and policies also have to be respected. Employers, who may be representing formidable layers of wholesalers and behind the scenes service providers, also have to be properly and professionally represented. Then there is the visitor with known and not too obvious needs and expectations. Tour guides have very specific responsibilities to all three groups.

TOPICS COVERED:

1. Tour guides have very specific responsibilities to both the tourism industry and more specifically to the visitor
2. Tourism is a business based on high visitor satisfaction
3. Tour guides have to adapt presentations to the types of visitors

AT A GLANCE

1. Tour Guide Responsibilities
 2. What Is Interpretation?
 3. Types of presentations
- Tour Guide Responsibilities



TOUR GUIDE RESPONSIBILITIES

INTRODUCTION

Presentations are exactly what the word says: to present. What is it we are all presenting? We introduce our friends to other people; state a point of view, try to sell or acquire something or convince someone of a point of view. Sometimes we are presenting ourselves to others as in a job interview or to someone we have an interest in, as in trying to align ourselves in a clique, circle, party or special interest group. All presentations have much in common.

THE JOB/RESPONSIBILITIES OF THE PRESENTER (TOUR GUIDE) IS:

1. To be Familiar with the “Tourism Product”

This includes:

- a. to be totally convinced of the validity of his/her presentation.
- b. Know that deep inside your mind/heart that the subject theme/objective presented is the right thing to do.
- c. to be totally familiar with subject presented, this includes knowledge of opinions & bias other than your own.
- d. to be prepared by researching as much as is humanly possible on subject matter.
- e. to be as familiar as possible of visitors' background, motivations, culture
- f. to be as familiar as possible of ALL aspects of the tourism industry
- g. to be as familiar as possible with ALL aspects of Belize society and nature

NOTE: This major responsibility covers the individual tour guide attitude toward the preservation of our natural environment and the overall betterment of Belizean society.

2. To be Professional

This includes:

- a. being aware that visitors are expecting value for their money
- b. that the item being delivered is “fresh,” recently upgraded

3. To be responsible for the safety & well-being of their guests

This includes:

- a. safety checks on all equipment (*Note: All specialised activities such as scuba, rappelling, caving, etc.* will have very specific safety checks and presentations)
- b. “attitude” checks on every one involved especially YOU!
 - i. attitudes in regards to conservation and the environment
 - ii. attitudes in regards to personal social responsibility
 - iii. attitudes in maintaining a high quality tourism product overall
- c. having a high level of maturity resulting in having strong sense of responsibility and caring for visitors.

4. To deliver the “tourism item” (itinerary) as it was advertised and sold

This includes:

- a. The “tourism item” (itinerary) is actually delivered based on the visitor’s expectations as sold or agreed upon
- b. Delivering the “tourism item” by means of a series of connected presentations

Recalling that tourism involves people that are away from their normal places of activity, their homes and work environments, we are hosts to strangers to our homes and communities. The tour guide therefore has to take up the role of “Presenter” of the country to these “Strangers.” Very much like introducing friends, tour guides have to “introduce/present” the host country/community/national park/other to our newly acquired “friends”, that is our visitors.

The role of the tour guide is not just of simply that of a host. Tour guides manage the time the visitor spends, activities conducted and information the visitors receive. This is done by the “art of interpretation.”

WHAT IS INTERPRETATION?

Interpretation is the term used to describe communication activities designed to improve understanding at parks, zoos, museums, nature centers, and aquaria. Freeman Tilden in his classic book, *Interpreting Our Heritage*, provides the following definition:

“An educational activity which aims to reveal meanings and relationships through the use of original objects, by firsthand experience, and by illustrative media, rather than simply to communicate factual information.” - Freeman Tilden, 1957

Interpretation serves as an important bridge between people and our natural and cultural resources. Interpretation involves translating ideas and concepts into a format that attracts, interests and inspires visitors. Essentially, quality interpretation enhances people’s understanding and enjoyment of the places they visit. Interpretation can also be as an informational and inspirational process designed to enhance understanding, appreciation and protection of our natural and cultural legacy. In tour guiding, technical information, hard-to-understand theories and the unique stories of our sites has to be made relevant and personal for our visitors.

Interpretation, when done well, is entertaining, educational, informative, recreational, inspirational and provokes further thought and/or action.

Visitors remember:

- 10% of what they hear,
- 30% of what they read,
- 50% of what they see,
- 90% of what they do.

Reference: <http://www.in.gov> (Indiana Department of Natural Resources)

In conclusion, it must be stressed that If delivering the “Itinerary” is the major responsibility of a tour guide, an interpretive guide is responsible:

1. to make the unfamiliar familiar
2. to make the technical non-technical
3. to give accurate and up-to-date information
4. to entertain
5. to make anything presented relevant to the visitors

TYPES OF PRESENTATIONS

Any connection a tour guide or escort has with a visitor will result in a type of tour delivered. A tour can be as short as a few minutes and as long the presenter can and the audience tolerates. All tours have one thing in common: oral presentations. All tours consist of a continuous cycle of oral presentations.

Presentations types include the following:

1. briefings
2. orientations
3. exhibit presentations
4. site presentations
 - a. historical Sites
 - b. archaeological sites
 - c. city, town, village, community tours
 - d. national parks, reserves, national monuments
 - e. activity at site
5. wrap-ups
6. farewells

Most presentations fall into one of three distinct segments of the tour. While these sections should be recognizable, they very often repetitive and merge with each other and the dividing lines can be blurry. These are the “Welcome & tour Brief,” the “Destination Presentations” and the “Tour Wrap-up & Farewells.”

A. THE WELCOME & TOUR BRIEF

Our visitors need to establish in their minds very fast that they will be getting the services they paid for. This does not only include the fact that they will be visiting a particular site later on that day or will be doing some specialized activity as part of the programme of events. The visitor needs to feel that the person actually making the delivery is competent, able and eagerly so. The guide and supporting staff has to appear that they have authority of any situation, know what is happening during the entire progression of the tour.

A good tour brief does exactly this. There are guides who are very good at their particular fields of expertise but fall short of excellence in their services by not delivering a good welcome and tour brief.

The following is a template for most welcomes and tour briefs:

1. General greeting and time of the day
2. Orientation: Where the visitor is physically/geographically at the moment
3. Introduce yourself by stating your name and/or preference on how you wished to be addressed. You can give an association to your name or nickname in order to facilitate remembering.
4. Introduce the staff: associate/assistant guides, bus/boat captains, their assistants, tour assistants such as ‘herders’ who may be present at the time.
5. Give a two-sentence (**positive**) biography
6. Name the tour by the title under which it was sold.
 - a. Summarize the tour
 - b. State distances in Miles/Time/Comfort level

7. Establish/reinstate visitor, guest and guide expectations and behaviour based on:
 - a. Advertised itinerary
 - b. Weather expectations
 - c. Guest AND guide abilities & limitations
 - d. Environmental limitations
 - e. Equipment availability and limitations
8. Establish guest behavioral guidelines, use of safety equipment and other safety procedures
(*Note: Specialised activities and certain specific destinations do require very specific safety briefings. Wherever and whenever specialised equipment is utilised specialised briefings will be required.*)
9. Establish expected guest attitudes on environmental and cultural conservation.
Remember that whatever attitudes the guide portrays on tour will be reacted upon negatively or positively by visitors.”
10. Promise of delivery of itinerary beyond guest expectations
11. Philosophize: Be upbeat; say something nice; say some deep truth, other

Note that the order of the above presentation can be creatively reorganized as the situation permits. Depending on the actual tour, some of these items may need expansion and added emphasis.

B. DESTINATION PRESENTATIONS

Identifying and separating the main tour from the rest of the tour can be difficult and next to impossible. Although the tour has been sold as “going to...” and/or “doing...” the experience really commences upon embarkation on the transfer vehicle and does not really end until the tour guide releases the visitor to another segment of the tourism industry such as a hotel, transfer company, another tour operator or even another guide.

The assumption must be made that the visitor bought this particular tour because there was at least a fleeting interest on matters concerning this destination and/or activity. The assumption, however, should not be made that the visitor’s interest is solely or totally locked down on the advertised destination/activity. The guide has to then decide what aspect of the destination and activity will be highlighted and how this will be presented.

It is obvious then, that the tour guide is expected to be articulate, well-read and therefore be prepared for very specific questions as well as questions which may seem to have absolutely no relevance to the destination or activity.

Deciding what to present

When deciding what to present also hinges on the needs and motivations of the visitor. Keep in mind that the visitors’ experience with the tour guide will result in either an easily forgotten or long-lasting (positive or negative) memory.

Deciding how to present

From the first hello, the guide has to figure out who is on the tour and what motivation caused an actual purchase resulting in being a willing (or sometimes unwilling) participant of this particular group. In considering what to present, the special interests of the group as well as the individual comes into play. Other considerations are group size, group make-up, weather, trail conditions, other environmental situations, physical limitations and time limits. The guide who really wants to give the best possible service has to be able to decipher the needs and motivations of the visitor in order to decide on the method of delivery of the tour.

The following are very basic instructions for giving effective presentations:

1. Do not lecture. Always keep a lively conversation running.
2. Avoid using sentences such as: “This is...” or “That is...”
3. Tell a story (Theme). Keep linking experiences
4. Use facts to assist with the story. Facts alone are boring!
5. Create a series of questions that need to be answered in order to keep the story going.
6. Remember that the guide is answering questions about what they are experiencing as they listen to the story.
7. Use the tools of the trade: these are the props and techniques used by the tour guide.

Remember that visitors have many questions that they are not asking. A look of wonder, surprise or any emotion is actually a question that is begging a reaction. Remember also that not all questions need to be answered. Sometimes it is good to keep such emotions going. Giving fast answers to questions may spoil the moment.

Always keep in mind the focus of the tour. The focus may be related to nature or to people.

Never keep the presentations very focused only on nature; sprinkle some people interests on the nature-based presentations. Similarly, with people-oriented presentations, color it with some nature interests.

C. THE TOUR WRAP-UP & LAST FAREWELL

An entire perfect day’s experience can be spoiled by ending it the wrong way. Inversely, a day’s experience that did not go too well can be repaired very well by making a very good tour wrap-up. Unfortunately, human psychology many times recalls and reacts to our more recent experiences rather than earlier experiences. A well thought out good-bye, like a well wrapped up gift can mask even the worst of times.

These make up an ideal tour wrap-up and farewell:

1. Announce/advise of the most recent major activity
2. Orient. Announce/advise where “we” are at this particular moment.
3. Summarize/list programme of experiences occurring up to this point. Cite specific highlights particularly as it related to the published itinerary.
4. De-brief. Elicit responses from the visitors on particular occurrences during the day.
5. Show/tell gratitude for:
 - a. their participation
 - b. their attention
 - c. their “obedience”
 - d. coming to Belize

6. Highlight (by name) staff participation during the day and their particular contributions to the success of the day.
7. Issue final instructions:
 - a. Safety procedures - Be very specific activities and destination
 - b. Disembarkation procedures
 - c. Check for possessions that may be left inadvertently behind.
 - d. Check for company's equipment
 - e. Check for guests' equipment
 - f. Advise of further shopping/touring opportunities (as well as the lack of such opportunities)
 - g. Advise of time limitations
 - h. Advise of "check-in," hotel & airline transfers expected, transfer schedules (particularly cruise ship tenders), location of particular docks and piers.)
8. Invite to return to this particular destination for same or different activities.
9. Philosophize: be upbeat; say something nice; say some deep truth, other.

Note that the order of the above presentation can be creatively reorganized as the situation permits or demands. Depending on the actual tour, some of these items may need expansion and added emphasis.

CONCLUSIONS

Most if not all tours are advertised and sold as destination or activity specific. The Interpretive Tour Guide has to always remember that the entire "tour experience" starts with the first greeting and does not really end until the last good-bye.

All successful presentations involve the surrendering or giving up of our inner selves to unknown forces. What are presenters giving up? A point of view that may not be acceptable or palatable to the listeners; a cultural perspective different from previously held notions on a cultural group; and the great possibility that the listener may end up increasing prejudices held concerning the cultural grouping and ethnicity of the people of the destination visited.

Fortunately, once the decision is made to participate in a destination's activities, these same visitors many times come with open minds wanting to have new experiences and therefore learning and accepting new or different concepts other than their own. This makes jobs such as tour guiding extremely rewarding in that audiences tend to react positively. The challenge of making effective and powerful presentations remains.

The great challenge is to keep improving personal skills constantly and consistently evolving these skills to an art form.

SKILL CHECK

EXERCISE 1

1. Prepare a short presentation explaining the following terms:
 - a. Familiar with the tourism Product
 - b. Professionalism
 - c. Safety and well-being of the guest
 - d. Delivery of itinerary

2. Present a welcome and tour brief based on a tour to either a nearby Maya ruin, Nature Center, or Caye. The presentation must follow the outline given.

3. Present a wrap-up and farewell based on a tour to either a nearby Maya ruin, Nature Center, or Caye. The presentation must follow the outline given.

4. Prepare a specialised brief based on one of the following activities: Boat transfer between a public dock and a snorkelling/scuba site, cave tubing, rappelling, zip lining, hiking through a rainforest/ancient site. (Students may need to do some personal research before doing this exercise.)

EXERCISE 2

1. What are the responsibilities of the tour guide to the tourism industry?

2. What are the responsibilities of the tour guide as an interpreter?

3. Name and describe two types of presentations.

4. What are some factors in determining what to present?

5. What are some factors in determining how to present?

6. Why is a good welcome and tour brief necessary?

7. Why is a good tour wrap-up and good-bye necessary?

8. What are some basic instructions for giving good presentations?

UNIT 3: TOUR GUIDE PERSONALITIES & CHARACTERISTICS

Managing visitor experiences requires certain skills which can only be acquired by special individuals. These special individuals all have some very common traits. People generally like being around them and when they speak, people actually listen and react positively. Character and personality weigh heavily in successful tour guiding careers. Many argue that character and personality are more important than actual factual knowledge of a destination.

TOPICS COVERED

1. Effective tour guides have certain characteristics & personalities
2. Effective tour guides develop special abilities to be able to make effective presentations
3. Very specific tour segments are common to all effective tours

AT A GLANCE

1. The Ideal Tour Guide
2. Types of Tour Guides



THE IDEAL TOUR GUIDE

INTRODUCTION

At times, the tour guiding profession is perceived as an occupation for those who have failed at everything else. Because junior was fired from his last job due to discipline problems or lack of academic qualifications, the choice would then be tour guiding. After all, “all you have to do is to take people here and there.” “How hard can that be?” The reality is that the tour guiding profession can be very complex.

Three areas in personal development affect achieving excellence in the tour guiding profession. These are personality, attitude and aptitude.

Personality is, for our purposes, the very complex set of characteristics that separates one person from another. To another person, these characteristics manifest themselves in the way the individual thinks, behaves and displays emotions. A person has a great, bad or boring personality when spoken of by his friends and enemies.

Attitude is the way a person’s outlook on life and the way one handles or approaches situations. A person’s mind-set, thoughts, point of view will affect behavior and therefore acceptance within different communities.

Aptitude is very similar to attitude and many times are synonymous. Aptitude is the consequence of personality and attitude. A person tendencies and inclinations lead to certain abilities and talents that may seem inborn. A person’s personality and attitude also affects the ability to acquire knowledge or learn new skills.

Personality = “Tell me who you are.”

Attitude = “Tell me what kind of person you are.”

Aptitude = “Tell me what you can do or achieve.”

The following questions come to mind: Are these qualities in born or teachable? If these qualities are lacking, can the individual improve them? How?

SUCCESSFUL TOUR GUIDES

Very successful tour guides like being around people. Race, ethnicity, religion, personal dispositions, diverse points of views will not curb a strong desire to provide constant excellence in services. Strong positive ethic is a major requirement. Personal hygiene and careful attire provide shows commitment to all concerned.

The other side of the ideal tour guide personality is having knowledge and critical thinking. Tour guides are always reading something. Guides that do not read will not succeed. This leads to a constant enlargement of their knowledge base resulting in constant adjustment to their presentations. Because of this, tour guides have strong opinions and develop tendencies to become involved with the lay side of scientific disciplines. Many tour guides become involved with local, national and even international conservation societies.

TYPES OF TOUR GUIDES

Sometimes persons with interests in certain disciplines volunteer their involvement in the daily activities of national parks, museums, visitor's centers, historical sites and local neighborhoods. Many of these persons are the ones that make presentations to visitors on a voluntary basis. This type of guide is a Docent. Docents sometimes move on to become full time professional guides.

1. Site Guides are similar to docents in the fact that they work strictly within a particular site. The major difference is that they are hired by the site or are independent but are available to the visitor for professional guide services. These guides, for many reasons, have chosen to dedicate their careers to one particular site. Reasons may include the fact that they have intimate knowledge of the site acquired by working alongside scientists studying there, they may also have acquired very specific skills that can best be utilized in that particular site. Sometimes, however, due to a lack of academic qualifications, local residents may encounter difficulty in being hired by regular tour operators and one option is offer services to non-accompanied visitors.

2. Specialized Guides are similar to site guides; the major difference is that the work is based on skill instead of site. Such specialties include Caves, Rock Climbing, Fishing, Scuba Diving, Snorkeling, Trekking, Bird Watching, Archaeology and Natural History.

3. General Guides are the most employable of all types. A strong working knowledge in one or a few related disciplines and at least some curiosity in many more ensure that presentations remain interesting. Most general guides while being able to do most tours and feel very comfortable in most situations will admit to certain biases in their quest for knowledge. Consequently, these "biases" become specialties.

4. Escorts are those who accompany visitors from destination to destination. Certain tour destinations have in-house guide personnel to who escorts hand over groups for the delivery of advertised activities. Many times escorts have to be very knowledgeable and experienced tour guides to be able to tie together multi-destination components. Multi-country tours may have escorts or accompanying lecturers originating from the visitors' country and if necessary speaking the visitor's native language.

When in a good restaurant a waiter will sit you and your group down at a table before proceeding to take on any order. What if the waiter is not familiar with the type of food being served, or where restrooms, the kitchen, equipment storage areas are located? Would you or anyone in your group feel comfortable placing orders? Suppose the waiter is perceived by anyone in the group to be inappropriately dressed? Or one person sees dirty nails, sweaty clothing and even strong body odor?

If the visitor for any reason has difficulty in accepting the tour guide, then it is almost impossible to present any aspect of a tour effectively. To be accepted by the visitor there are a few very basic considerations:

Personal Physical Preparation

1. Physical ability to deliver
2. Personal hygiene: general cleanliness, body odor, clean nails, hair combed/styled/trimmed, oral hygiene
3. Attire: clean freshly laundered clothing, culturally acceptable clothing, clothing and footwear appropriate to the type of tour to be delivered
4. Personal equipment: specialized equipment for specialized tour activities, first aid kits, cell phone, radio, other
5. Documentation, licenses, authorizations, other

Personal Mental Preparation

1. Familiarity/Knowledge of destination
2. Familiarity/Knowledge of equipment
3. Attitude adjustments

CONCLUSIONS:

The major aspiration of a tour guide should be:

To be accepted by his/her audience resulting in successful tour presentations.

SKILL CHECK

EXERCISE 1

1. List on paper 20 or more qualities desirable in tour guides. Separate them into three columns: Personality, Aptitude, and Attitude. Privately compare your own qualities to the list.

2. Make a list for discussion on the following:
a. Items for personal physical preparation
b. Items for Personal mental preparation

EXERCISE 2

1. What are the three areas in personal development which affect tour guides?

2. What makes an ideal tour guide?

3. Name and describe two types of tour guides.

4. List three items for a tour guide's personal preparation.

5. List three items for a tour guide's mental preparation.

6. What should be the major aspiration of a tour guide and why?

UNIT 4: METHODS & TECHNIQUES FOR PRESENTERS

Basic presentations skills require effective public speaking. A well designed oral presentations has identifiable sections. The use of specific public speaking techniques at the appropriate sections of any presentations will result in long lasting memories

TOPICS COVERED

1. very specific tour segments are common to all effective tours
2. effective tour guides utilize very specific methods when making any presentation
3. different types of tours and destinations require specialized presentations

AT A GLANCE

1. Effective Public Speaking
2. Basic Presentation Techniques
3. Interpreting the Belizean Tourism Product



EFFECTIVE PUBLIC SPEAKING

Memorable public speakers have certain common qualities:

1. They speak the language of the audience

The vast majority of tours conducted in Belize have to be done in the English Language. English is the country's official language and statistically our visitors originate from English speaking countries. A good working knowledge of English is compulsory if employment is desired.

Technical language has to be interpreted for most audiences. Tour guides have to have the capacity to understand technical language within specific disciplines but when making presentations this has to be "interpreted" to the language of the audience.

2. Audiences like them

The conclusion in Unit 3 was that the tour guide's ultimate goal is to be accepted by his/her audience resulting in successful tour presentations.

3. They look natural in the presentation environment

An effective tour guide does not have to be a highly polished orator to be an effective speaker. It is very difficult to hide one's true personality. The more you act like yourself the better speaker you are going to be. A good speaker talks to a group in about the same manner he will talk to one or two of his friends in a natural conversation. Start out by realizing you are not going to have to become an entirely different person when stand in front of any group.

4. They sound like they really know their subject matter

In Unit 3, part of personal preparation is to be knowledgeable with the tour destination. This is accomplished by constant research in libraries, the internet, conferences and a personal library. Knowledge is never static and updates have to be frequent even if just to confirm previously held knowledge. A strong knowledge base results in lively and enthusiastic presentations. This also results in the more "natural" presentations.

5. They seem to be talking directly to you

As discussed in Chapter 1, everyone has needs. Tour guides fulfil many of these needs. Presentations cannot be effective if some of these needs are not addressed. Speakers include everyone in their "conversations" by empathising with their audiences. A presenter has to use techniques that make audiences feel accepted and welcome and feel special.

6. They seem to be running a normal conversation with the entire audience

Tour guides are always in non-classroom settings. Presentations seem to be impromptu. Tour guides that read from notes, or sound like reciting memorized scripts, are never effective losing the respect and acceptance of audiences very quickly.

BASIC PRESENTATION TECHNIQUES

Attitudes

Your attitude is extremely important. Don't slouch or drag as you walk to the speaker's position. Force yourself to assume a friendly, confident, enthusiastic attitude. Enthusiasm is contagious - it is caught; not taught. Remember, there is no substitute for sincerity. You must be sold yourself.

Do not apologize. A common tendency of inexperienced speakers is to start out with, "I'm not very well prepared" or "I don't know very much about this subject." Whose fault is it that you are not adequately prepared? Most of the time audience will never know that you are not prepared unless you tell them.

Do not shoot the bull. Get down to facts. Hit the nail on the head. Do your presentation. If you don't know an answer, say "I don't know".

Do not try to avoid your audience. Try to look at every person. Look at individual persons directly in the eyes. Not at the wall behind them or the empty space next to them or their ears. Look at them in the eyes. These are real people. Look at them as warm, friendly, interesting human beings, for they are, whether you think so or not.

Personal mannerisms many times distract more than help presentations. While presentations need to be as natural as possible, the natural tendencies to slouch, pace, weight-shifting, fidgeting, playing with a button, pencil, shoe-shuffling, hand-hiding, conspicuously look at your watch, taking glasses off and putting them back on repeatedly, are sure to distract. Gestures should be smooth, free and easy, natural and used to help convey the meaning of the spoken word.

Smoking, consuming alcoholic beverages and chewing gum while presenting, should definitely not be a part of any presentation.

Keep all presentations compact. It is always good to stop while you still have interest. Finish presentations with memorable quotes, punch lines, exclamations or philosophical statements. Summarize your talk and finish up clearly with a good punch line. Keep it short and simple!

Basic Voice Techniques

Knowledgeable tour guides cannot expect audience acceptance if their very well prepared presentations are ineffectively said. A good speaking voice is:

Expressive: It is capable of portraying various shades of meaning and feeling.

Pleasant in tone: Carries a sense of friendliness.

Natural: It reflects the personality of the speaker. It has an honest sound.

Vital: It has life, force, and strength, even though it may not be a "Big Voice."

Breathing: A pleasant voice comes from a relaxed condition and controlled, disciplined breathing. Choir singing, solo singing, and band participation may be of help. Short sentences will help you put the pauses and period where they belong in relation to your breathing habits.

Pitch: Pitch is the level of speech. Have someone help you get the right amount of variety for a pleasing effect. To help hear yourself stand facing the corner of a room so that you can hear your tones bounce back at you from that corner. Place stress on different levels of pitch to hear the difference.

Vocal Climax: Emphasis, force, and feeling rise steadily in power, until they reach a point where the strongest appeal is made. In a short speech perhaps only one vocal climax should be planned.

Pronunciation: Look up the correct pronunciation of words in the dictionary. Watch words such as names of Maya ruins, place names and alternative names used in science.

Articulation: Enunciation: Pronounce and speak so that the audience hears all the words. Whenever possible, use words whose meaning is clear. Tongue-twisters are good practice, and will help you to pronounce all the vowels, but cut difficult words and phrases out of your prepared speech.

Rate: The rate of speaking is the number of words spoken per minute. Most people speak 120 to 180 words a minute. Let us compare a good speaker to a good automobile driver. If a man drives at a very high rate of speed continuously, he may lose control of the car, but if he drives according to conditions of the highway he will drive slowly, then occasionally more rapidly, as the need arises. Few drive at the same monotonous speed and may speak that way also.

Quality: Words that describe the good quality in a speaker's voice might be mellow, clear, stable or steady, or pleasingly deep. Undesirable qualities might be: Thin, husky or harsh, nasal, guttural, or shaky.

Pause: Just as the stop signs give a pause in our driving pattern, so the effective pause helps in our speaking pattern. Do not confuse the effective pause with a memory lag.

Force is varied mostly for emphasis. Avoid explosive use of force.

INTERPRETING THE BELIZEAN TOURISM PRODUCT

Tourism is travel for recreation, that is, travel which should produce positive memories. Memories are produced by experiences. The most memorable experiences of any travel time are those which went extremely well or extremely bad. The ones that went just as expected are usually the ones that are forgotten the easiest.

The following are powerful “tools/props” for the interpretive guide:

These can be seen as the glue, nails and staples that hold together interpretive presentations. Giving information in an interpretive manner require “techniques” that are entertaining, thought provoking and highly memorable. These are the basic “tools” or “props” which interpretive guides have to keep developing:

A well-placed *question(s)* has the ability to frame information in such a way that visitors start analyzing information before you even state it. This works particularly well with complex information which may have philosophical or emotional considerations.

Similarly, *exclamations* can very quickly draw attention to very specific feelings about aesthetic and passionate issues. A well-placed exclamatory remark is many times more that enough to present information. The visitor in his/her mind provides his/her own information.

The use of *personal experiences* and/or *contrived situations* has been mentioned as a method of presenting nature previously. This, however, works in almost any situation.

When using *Storytelling*, select stories that mean something to you and that you like to tell. Good stories relate to a group's common experiences. Good stories pose a problem that causes listeners to anticipate a resolution. They must be relevant to your interpretive goals. Research the facts of the story. You have to know your subject to do more than simply entertain. Select a

point of view. Will you tell the story from an omniscient perspective in the third person or in the first person as if it happened to you? Sometimes you can refresh a stale story by retelling it from a different vantage point. Picture the key images you want to share. When telling the story, keep the listener's imagination engaged with sequential images:

- a. Use voice inflection that fits the action.
- b. Use gestures to paint images.
- c. Recreate sounds for dramatic effect:
- d. The “crrreak” of a door, the “zzzzzt” of a mosquito landing on someone's nose.
- e. Create distinct characters and have them speak to each other. Use dialects, if appropriate.
- f. Misuse of cultural dialects can be insulting to others.
- g. Use frequent pauses so the imagery can unfold.
- h. Avoid going more than 10-12 syllables without a pause. However, do so at random so there is no distracting pattern.
- i. Hold pauses longer to create suspense.

Storytelling is an intimate medium. Everyone should feel that you are talking directly to them. Stick to the point. Avoid over-illustrating and telling too many details.

What are the **differences and/or similarities** between two items of interest? How are they related? This technique may be utilized in a wide variety of applications. Flora and fauna may be different or similar. How? Geological formation and habitats may be similar or different. How? Cities, communities, buildings cultures may be similar or different. How?

Give your visitors a **demonstration of a procedure**. Second best would be to relate or instruct how to do something. How does the cashew evolves from a seed on a fruit on a tree to a salted nut on a bar's counter?

Humor is a great fall back for many presenters. However, humor has to be relevant to the situation, place and time of the experience being managed. When using humor the interpreter has to be very cautious in not being insulting to ethnic groups, cultures religious groups and political philosophies. Avoid dirty jokes and stories you would not tell your own children or parents.

In making a presentation relevant to the known experience of the visitor the **use of analogies** is always effective. The interpreter has to take something familiar to the visitor and draw comparisons with concept being discussed.

Comparing sizes - Height/width/depth/etc.: People like to know what things cause other things to happen. Try to show direct relationships between causes and their effects. Exaggerate Size: “If we were small enough to actually walk inside of a wasp's nest, you'd be amazed at what you'd see.” Exaggerate Time Scale also: “If time were speeded up so that a thousand years went by every second, you'd be able to stand right here and watch continental drift for yourself.”

Use of active/passive verbs. Verbs are the power in any language. Don't take away their power by making them passive (e.g., “The bat pollinated the tree,” not “The tree was pollinated by the bat.”) Academic writing stresses passive verbs too much. Use powerful, active verb forms.

Showing cause and effect: People like to know what things causes other things to happen. Try to show direct relationships between causes and their effects.

Use a “Visual Metaphors” to Describe Complex Ideas: A visual metaphor is an illustration which shows visually what might be difficult to describe convincingly with words alone.

Use a Contrived Situation: Make-up/invent an individual. Explaining the wonders of a medicinal plant or how to prepare a local dish is far more interesting if the origin is an invented grandmother, an imaginary old wise man you met deep the wild jungles.

Use Personification: Give selected human qualities to nonhuman things (e.g., “What trees say if they could talk?” or “How might ants view humans?”). Walt Disney made personification famous in his many movies about animals and stories in which the audience experience certain adventures through the eyes of the animal characters. This technique has been criticized (sometimes rightly and sometimes not) by biologists, because it involves giving humanities to animals that are not human. Be careful when using personification. Do not imply that animals and plants really think and act like humans.

Link Science to Human History: Research shows that non-scientists are more interested in science if it can be related to people from a different time. For example, weaving information about plants into a story of how indigenous people utilized those plants in their diets, art, religion, etc., may be more entertaining than the same information would be by itself. Telling about any aspect of a natural or physical science through the eyes of those who explored it, discovered it, described it, wondered about it, overcame it, succumbed to it, worried about it, died from it, were saved by it, empowered by it, hindered by it, or who otherwise affected or were affected by the thing in question, will generally make it more interesting to nonscientists.

Reference: Adapted from Environmental Interpretation, Sam Ham

SKILL CHECK

EXERCISE 1

Prepare and present (2 minutes/3-5 sentences) on any one of the following “Belizean” items and experiences:

1. National Symbols
2. A favorite dish
3. A favorite sport
4. A memorable childhood experience at a natural place

Presentation method should incorporate at least two of the interpretive tools/props discussed above.

EXERCISE 2

1. List and describe three things that very effective public speakers have in common.

2. What are three things that a public speaker should never do?

3. What are four basic voice techniques?

4. List and describe six powerful “tools” / “props” for the interpretive guide.

5. What makes you believe that you can be a tour guide?

31. What in your opinion are some factors which will cause a prospective tour guide to fail in the workplace/field? Why?

UNIT 5: ORAL ASSESSMENT FOR CHAPTER ONE

ASSESSMENT EXERCISE:

Participants will be assigned or will choose an itinerary from list in Chapter Seven Unit Five and prepare and present in a classroom setting to fellow course participants:

(A) A welcome and tour brief AND (B) A wrap-up and farewell

Participants will be required to follow presentation outlines as listed in manual. Participants will be allowed to use cue cards and written outlines. Participants will not be allowed to read from a fully written presentation.

ASSESSMENT SHEET

Student Name: _____ Contact information: _____

#	Assessment Point	Very Good	Good	Fair	Not at all	Comment
The Tour Guide						
1	Proper/appropriate dress for tour?					
2	Seems happy/pleased to be on tour?					
3	Make good first impression?					
4	Is the presenter enjoying him/herself?					
5	How is nervousness handled?					
6	Spoke better than adequate English?					
7	Clear understandable voice?					
8	Was personable & well-received?					
The Tour Presentation						
9	Uses appropriate opening?					
10	Uses appropriate closing?					
11	Used presentation techniques effectively?					
12	Used prescribed models?					
13	Use of time in presenting?					
Overall Commentary:						

Facilitator/Assessor: _____ Date: _____

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CHAPTER 2: BELIZE TODAY

INTRODUCTION:

Belize today is a product of the dynamic influences of its past history. As our young nation looks to its future, the sustainable use of its resources becomes a key issue in securing that future. Tourism is regarded as one way to use those resources sustainably, while contributing dynamically to the growth of the country's economy. In recent years the growth of tourism has encouraged the country to pay greater attention to its potential, and invest more in the resources that sustain the industry and in the people and services who make the industry function from the transportation infrastructure to the accommodation facility.

As a tour guide, you play a critically important role in the tourism industry, for it is you who interacts most directly and most extensively with the visitor. The impression you convey about our country is the impression that the visitors will take home with them, and share with their friends and family. Your knowledge, attitudes and skills, therefore, have a profound impact on the visitor and Belize's ability to continue to attract potential visitors.

OBJECTIVES:

At the end of this chapter, you will be able to outline and present:

1. Basic facts about Belize, including its location, geography, history, government and economy.
2. The importance of tourism to the economy of Belize
3. Belize's strategic vision for tourism development
4. The dynamics of the local tourism network and your role within the network
5. The main tourism activities offered throughout the country

ASSESSMENT

The assessment will comprise a written test as well as an oral presentation. You will be asked to complete a question and answer test as well as to prepare and deliver a five minute presentation that provides an introduction to Belize.

AT A GLANCE:

- Unit 1: Introduction to Belize
- Unit 2: Modern Belize
- Unit 3: Tourism Activities

UNIT 1: INTRODUCTION TO BELIZE

In this unit, we will learn basic facts and statistics about Belize. As a tour guide, you are expected to be able to respond to basic information questions about our country, and to include this information as part of your tour presentations. This unit will, therefore, provide you with an overview of important facts and statistics on Belize. Please note that much of the information covered in this unit will be expanded on in subsequent chapters.

OBJECTIVE:

At the end of this Unit, you will be able to deliver a presentation that includes basic information such as: location, geography, climate, history and national symbols of Belize.

AT A GLANCE:

1. Location and Population of Belize
2. Geography of Belize
3. Climate and Rainfall of Belize
4. Overview of History of Belize
5. National Symbols of Belize



LOCATION & POPULATION OF BELIZE

Belize is located on the east coast of Central America, on the Yucatan Peninsula. It is bounded to the north by Mexico, to the west and south by Guatemala, and to the east by the Caribbean Sea. Belize occupies the area from approximately Latitude 15 degrees N. to 18 degrees N., and Longitude 88 degrees W. to 91 degrees W. From north to south, the country runs approximately 280 kilometers (180 miles). From east to west, it is approximately 109 kilometers (68 miles) at its widest point. Belize's total land area is comprised of 22,923 square kilometers (8,867 square miles) of land, including more than 200 offshore cayes.

The current population of Belize is approximately 311,480 with the main ethnic groups being Mestizo, Creole, Maya, and Garifuna. Smaller populations of Chinese, Arabs, German, Dutch, and East Indians contribute to the makeup of our society.

For a small country, Belize has a wide diversity of environments, a product of its geography and its location. The most striking features of Belize are the extent (over 70 percent) that it is still dominated by natural vegetation, and the relatively low population density over large tracts of the country. Of the total population of 311,480, 51 percent is urban. The overall population density is 9.3 people per square kilometer. Population density in the countryside averages 5.2 persons per square kilometer, but is concentrated in the northern plain, southern coastal plain, Belize Valley, and Stann Creek Valley. Agricultural activity is also concentrated in these areas. This distribution pattern also conforms to the distribution of good agricultural land, which is distinctly limited in extent. Some 66 percent of Belize consists of land that is marginal and land that is inappropriate for agricultural development.

The main landscape features of Belize can be divided into the four broad categories the Coastal Zone, the Northern Lowlands, the Maya Mountains and Southern Belize. Let's take a closer look at each of these landscape features.

The Coast

Belize's coast runs 280 kilometers (174 miles) along the Caribbean Sea. The Coastal Zone includes old coastal terraces, the low plain along Belize's coast, the inner lagoon, the Belize Barrier Reef (part of the Mesoamerican Barrier Reef, a World Heritage Site), hundreds of islands and three atolls: Lighthouse Reef, Glover's Reef and the Turneffe Islands.

The Mesoamerican Barrier Reef, which stretches from northern Quintana Roo in Mexico and along the entire length of Belize's coast, is the longest barrier reef in the Western Hemisphere, and the second longest barrier reef in the world (after Australia's Great Barrier Reef). The reef is an important tourist destination, where many people go to see and explore the rich variety of marine life (corals and fishes) through a variety of activities.

Mangroves cover many of the cayes and coastal lowlands that form part of the Coastal Zone. Mangroves provide a rich habitat for birds, insects, reptiles, and marine life. Many marine organisms begin their life cycle within the protection of the mangroves.

The Northern Lowlands

The northern half of Belize is a broad coastal plain, a swampy area of transition between the sea and higher land areas. Coastal lagoons, mangrove swamps, hardwood forests, and savannas are all found in this area of Belize, along with a wide diversity of birds and wildlife. Large parts of the northern lowlands have been cleared and used for sugar cane agriculture as well as for the production of other crops such as corn and beans.

The Maya Mountains

Rising from the coastal plain is a narrow area of savanna which quickly gives way to the dramatic rise in altitude that forms the Maya Mountains; ie: the areas called Mountain Pine Ridge and the Cockscomb Range. The highest peak in Belize is Victoria Peak, at 1,120 meters (3,680 feet). A plateau known as Doyle's Delight is the highest area of the Maya Mountains, at 1,124 meters (3,692 feet). The highest waterfall in Central America Foot Falls (490 meters/1,600 feet) is also found in the Maya Mountains. Most of Belize's important rivers are formed in the Maya Mountains, flowing down from the high altitude to the sea. These rivers historically provided the main means of transportation into and throughout the country. Today, they continue to be extremely important to the livelihood of the local people. The Macal River and the Mopan River join together to form the headwaters of the Belize River (also Galled the Old River), Belize's most important river. This river journeys east to the Caribbean Sea, where it empties at Belize City. The Sibun River is also found in Central Belize. Dramatic cave systems, rapids, and the opportunity to view wildlife make them attractive to many tourists, as well.

Southern Belize

Southern Belize falls away from the southeast of the Maya Mountains to foothills and then to the coastal plain. This area of the country receives the most rainfall, and has been developed for agriculture primarily citrus, and bananas. Short, rapid rivers, such as the Monkey River, drain from the mountains to the sea. Much of Southern Belize is still covered with tropical moist forest, including broadleaf and cohune palm forests.

Belize's location on the globe (especially latitude) places it in the subtropics, moving towards the tropics from north to south. The climate is subtropical, with a brisk prevailing wind from the Caribbean Sea. Locally, the climate is largely determined by altitude. and by proximity to the sea. As the land rises moving inland, temperatures are generally higher during the day and cooler at night than experienced along the coast, where the prevailing winds have a tempering effect. The coastal temperature ranges from about 10 degrees C. (50 degrees F.) to 36 degrees C. (96 degrees F.), with a greater range inland. The mean low and high temperatures are approximately 24.29 degrees C. (76 degrees/85 degrees F.) with an average humidity of 85%. The seawater temperature ranges from approximately 24.29 degrees C. (75.84 degrees F.) Being located in the northern hemisphere, the hottest time of the year, and the longest daylight hours, are experienced during the summer months of June to August. Cooler temperatures and shorter days are experienced during December to February.

Belize generally experiences a rainy season from June-November, and a dry season from December-May. The heaviest rain usually falls from September to October. coinciding with the Atlantic hurricane season (officially June-November). Rainfall varies considerably in the country, with the north receiving about 130 centimeters (50 inches) annually and the south receiving about 445 centimeters (170 inches) annually. As worldwide weather patterns change, these patterns become less predictable.

Belize will get a modern weather radar system that will provide an early warning system for hurricanes. This will help to lessen loss of life and property when hurricanes do strike. Belize has suffered its share of devastation from hurricanes over the last century. In 1931, a powerful hurricane struck on September 10, during the celebration of the holiday of St. George's Cave, which destroyed much of Belize City and killed many people. Since 1955 seven hurricanes have struck Belize.

The most significant of these occurred on October 31, 1961, when Hurricane Hattie struck Belize, heavily damaging much of Belize City, thereby prompting the decision to move the capital of the country inland to Belmopan in 1970. Hurricane Greta in 1978 caused extensive damage. In 1998, Hurricane Mitch hovered just off the coast, eventually striking further south in Honduras and Nicaragua, but still causing significant damage to coastal areas, and particularly to the barrier reef. In September 2000, Hurricane Keith struck Belize directly, severely damaging Ambergris Caye and Caye Caulker, and causing widespread flooding on mainland Belize.

The Ancient Maya

As new archeological sites are discovered, excavated, and analyzed, information about the human settlement of Belize continues to increase, and our understanding of its ancient history continues to grow. A more detailed review of the Ancient Maya occurs in Chapter 5: The World of the Maya. This is a brief overview.

Although little is known of the peoples who occupied Belize prior to the Maya, archeological artifacts from approximately 11,000 years ago, belonging to a culture called Clovis, have been found in the Orange Walk District. Subsequently, nomadic groups of hunters began to domesticate plant life, and gradually establish a way of life that was settled, and primarily agricultural. These people were broadly known as Proto Maya,

The Maya people are known, from archeological record, to have inhabited Belize from around 2000 B.C. The height of Maya civilization in Belize appears to have been in what is known as the Classic Period, from around 500 A.D. to 900 A.D. Numerous city-states flourished during this time, with an extensive network of trade links with other Maya city-states in Mexico and Guatemala. At its height, the population of Belize is estimated to have been as high as 12 million people.

The collapse of the Maya civilization, beginning around 900 A.D., appears to have followed a period of increased rivalry between the city-states, broken alliances, and wars, although some cities continued to flourish (Lamanai is one example). By 1000 A.D., however, most of the Maya city-states had been abandoned, and the population scattered into small villages and family groups. Much of the intricate knowledge of astronomy, mathematics, the writing system that had been developed, and the religious system was lost.

European Settlement

In the early 1500s, Spanish explorers visited the coast of Belize. Christopher Columbus sailed into and named the Bay of Honduras in 1502. A small group of Spanish sailors was shipwrecked along the southern Yucatan coast in 1511. As the Spanish intensified their efforts to conquer and subdue the Yucatan, their incursions against the Maya were felt in the area of Belize, as well. For example, in 1570, the Spanish established a church at Lamanai. However, continuing resistance by the Maya to Spanish subjugation made the area very volatile during this period.

British buccaneers and privateers trying to plunder Spanish treasure ships enroute from Mexico to Europe began to take refuge along the Belize coast in the 1600's, but the first recorded European settlement was established in 1638 by shipwrecked British sailors. Joined by other settlers who cut logwood (used for dye) and mahogany to ship to Europe, this small settlement was often left to its own devices over the ensuing century. The settlers became known as the Baymen. Their settlement was minimally supported by England, and periodically

attacked by Spain in an attempt to reclaim sovereignty over the area. A series of treaties over the course of the 1700's between England and Spain, and largely due to conflicts over other territories, established the right of the Baymen to remain and to cut logwood, although sovereignty over the area remained in Spanish hands.

In 1798, a battle between the Spanish and the Baymen, with the support of British forces, was fought at St. George's Caye, part of an outbreak of war between Spain and Britain. Against unfavorable odds, the Baymen defeated the Spanish. Although the territory still remained in Spanish hands, they never tried to gain control over Belize again, and Britain gradually assumed more control over the settlement. The Battle of St. George's Caye is still celebrated annually in Belize, on September 10, as a National Holiday.

From an early date, the settlers had governed themselves by Public Meeting, a simple form of democracy. As Britain became more involved with the settlement, a Superintendent was appointed to oversee the settlement's affairs. In 1853, a Legislative Assembly replaced the Public Meeting. And in 1862, the settlement became the Colony of British Honduras. In 1871, a Crown Colony system of government was introduced, with a Legislative Council and a Lieutenant Governor. The colony was initially administered from Jamaica, another British colony, until this relationship was severed in 1884, and British Honduras was then governed by a Governor,

MODERN HISTORY

As a result of European persecution, about 5,000 Garifuna people were forced to migrate from St. Vincent and Dominica to the Bay Islands off the coast of Honduras, and later coastal areas of Nicaragua, Honduras, Guatemala and Southern Belize, in the late 1700's. By 1802, there were 150 Garifuna settlers in Stann Creek. The British confined their occupation to Southern Belize by a strict, Belize Town (i.e. Belize City) visitation ticketing procedure. On November 19, 1832, many more Garifuna, fleeing civil warfare in Honduras, landed in Belize. This day is commemorated as Garifuna Settlement Day, a national holiday.

The peopling of Belize grew in 1847 with the arrival of thousands of Maya and Mestizos fleeing the Caste War of Yucatan. The Caste War of Yucatan was led by the Maya against the Spanish, who were in control of their land. The War lasted until the turn of the century.

Although slavery officially ended in 1834, conditions for many in British Honduras who arrived as slaves working under the Baymen, continued to be deplorable. As the century turned the colony continued to function much as it always had, with a wealthy cadre of (mainly white) landowners and desperately poor (mainly black) workers. Severe riots in Belize City in 1919, at the end of World War I, fueled the beginnings of Black Consciousness, propelled by Marcus Garvey in Jamaica and others, and the long march to independence. In 1951, a new constitution was implemented, followed in 1954 by a general election, with universal adult suffrage for the first time.

In 1964, the colony became self-governing, with a National Assembly consisting of a Senate and a House of Representatives. The name Belize was reclaimed in 1973, anticipating impending independence. However, a historical territorial dispute with Guatemala led to a delay in the granting of full independence. The 1970's marked the internationalization of Belize's cause to gain full independence. After many years of intensive efforts to garner support for Belize's full independence among member countries of the United Nations, Belize achieved its independence on September 21, 1981. It is a member of the British Commonwealth of Nations, with the Queen of England as the Head of State, and led by its own Prime Minister and Government.

Since independence, one of Belize's two main political parties, the Peoples' United Party (PUP), and the United Democratic Party (UDP), has governed the country. Elections have been held every five years, with the most recent election in February 2008. The current government is headed by Honorable Dean Barrow Prime Minister of Belize and Leader of the UDP

TERRITORIAL DISPUTE WITH GUATEMALA

The dispute over the territory of Belize dates back to the early history of the Baymen's settlement, when Spain continued to hold sovereignty over the area. When Guatemala became independent of Spain in 1821, it claimed all of the territory that Spain held at that time as its own. Because Spain held sovereignty over Belize in name, although not in fact, Guatemala claimed Belize as part of their own country. A treaty was signed between Britain and Guatemala in 1859 to settle the dispute.

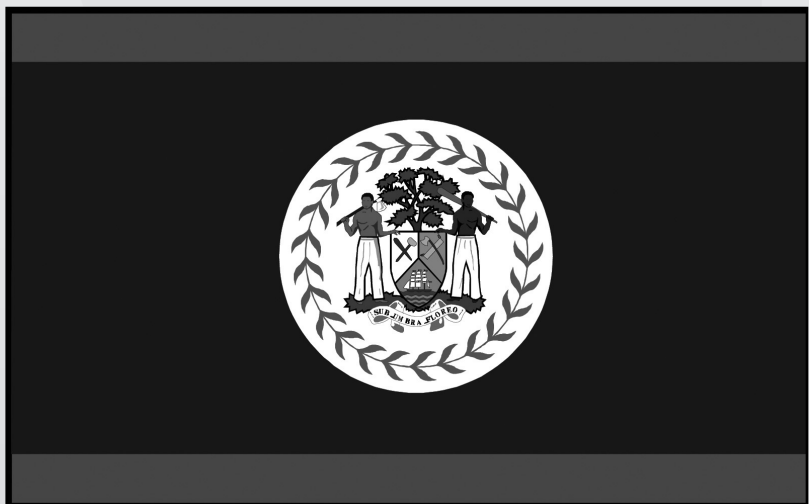
Article 7 of the treaty stated that in return for Guatemala dropping its claim to Belize, Britain would build a road from Guatemala City to the Atlantic coast. If the road was not built, the territory would revert to Guatemala. The road was never built, and over the nearly 150 years since, the issue has continued to cause difficulties, including the threat of invasion from Guatemala to "reclaim" its territory on several occasions in the 1970's. Relations between Belize and Guatemala have improved, but tension flares up occasionally. The issue continues to be discussed, but has not been completely resolved.

In May 2000, technical talks were held at the Organization of American States Headquarters in Washington, D.C. Both Governments agreed upon the concept of facilitators to move toward resolving the century old territorial dispute. Each country selected a facilitator to work initially for a one year period. The facilitators will be able to request Belize and Guatemala to: submit reports on incidents; make recommendations on specific measures, mechanisms or processes with the aim of resolving the dispute; establish target dates for the implementation of recommendations, and monitor the implementation and execution of recommendations. Both countries are confident that this process will result in a final resolution of the territorial dispute. As with all countries, Belize has identified national symbols which represent important aspects of its heritage.

NATIONAL SYMBOLS

THE FLAG

The red, white and blue flag of Belize is a symbol of the unity of our nation. The flag is royal blue with one horizontal red stripe at the top, one at the bottom, and a white circle with the Coat of Arms in the center.

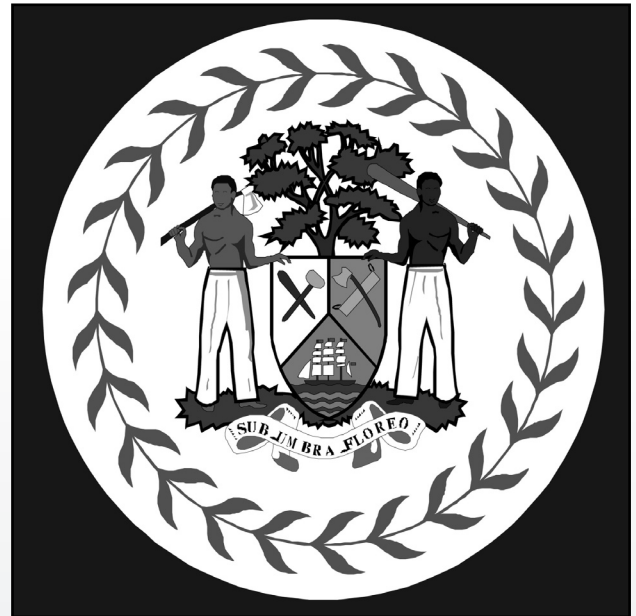


THE COAT OF ARMS

The Coat of Arms embodies an important aspect of the history of Belize, as the mahogany industry formed the basis of Belize's economy in the 18th and 19th centuries.

The shield of the Coat of Arms is divided into three sections by a vertical line and an inverted V. The base section represents a ship in full sail on waves of the sea. The two upper sections show tools of the timber industry in Belize: a paddle and a squaring axe in the right section and a saw and a beating axe in the left section.

Supporting the shield are two woodcutters, the one on the right holding a beating axe over his shoulder in his right hand, and the one on the left holding a paddle over his shoulder in his left hand. Above the shield rises a mahogany tree. Below the shield is the motto scroll. The national motto, "Sub Umbra Floreo" is a Latin phrase meaning, "Under the shade we flourish." A wreath of leaves encircles the Coat of Arms.



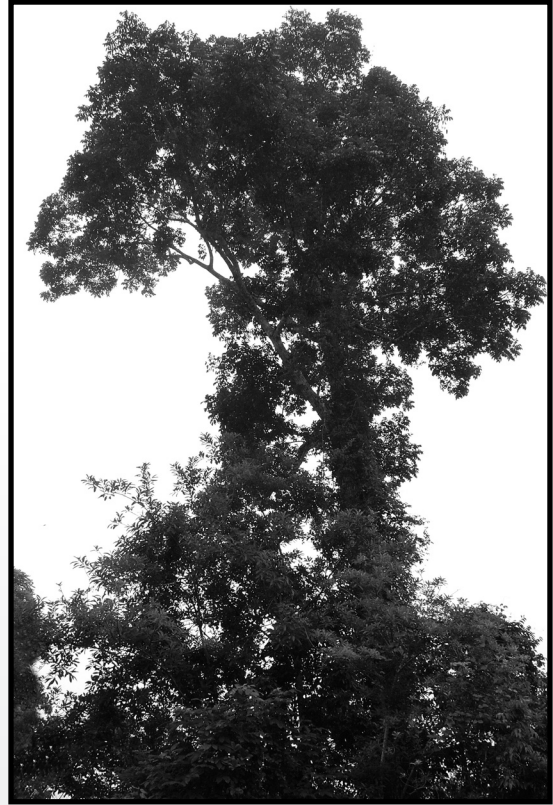
THE NATIONAL FLOWER

The Black Orchid (*Encyclia Cochleatum*) is the national flower of Belize. This orchid grows on trees in damp areas, and flowers nearly all year round. Its clustered bulblike stems vary in size up to six inches long and carry two or three leaves. The black orchid flower has greenish yellow petals and sepals with purple blotches near the base. The "lip" (one petal of special construction, which is the flower's showiest) is shaped like a valve of a clam shell (hence the name *Encyclia Cochleatum*) and is deep purplebrown, almost black, with conspicuous radiating purple veins.



THE NATIONAL TREE

The Mahogany Tree (*Swietenia Macrophylla*) is one of the magnificent giants of the forest. Rising straight and tall to over a hundred feet from great buttresses at the roots, it emerges above the canopy of the surrounding trees with a crown of large, shining green leaves. In the early months of the year, when the leaves fall and new redbrown growth appears, the tree can be spotted from a great distance. The tree puts out a great flush of small whitish flowers which develops into pearshaped fruits about six inches long. When the fruits mature they split into five valves, freeing large winged seeds that are carried away by the wind. They fall on the 'shaded protection of the forest floor and germinate to begin a new life cycle. The mahogany tree matures over a 60 to 80 year period. British settlers exploited Belize's forests for mahogany, beginning about the mid 17th century. The wood was originally exported to the United Kingdom in the form of squared logs, but exportation now consists mainly of sawn lumber.



THE NATIONAL BIRD

The Keel Billed Toucan (*Ramphastos Solifurantus*) is the national bird of Belize. It is noted for its great, canoes shaped bill and brightly colored green, blue, red and orange feathers. The bird is about 20 inches in overall length. It is mostly black with bright yellow cheeks and chest, red under the tail and a distinctive white patch at the base of the tail.

Toucans are found in open areas of the country with large trees. They make a monotonous froglike croak. Toucans like fruits, and eat by cutting with the serrated edge of their bills. Toucans nest in holes in trees, using natural holes or holes made by woodpeckers, often enlarging the cavity by removing soft, rotten wood. They lay two to four eggs which are incubated by both parents. The nesting stage lasts from six to seven weeks.



THE NATIONAL ANIMAL

The Tapir or Mountain Cow (Tapirello Bairdil) is the largest land mammal of the American tropics. The tapir is a stoutly built animal with short legs, about the size of a donkey. It weighs up to 600 pounds. Its general color is dusty brown with a white fringe around the eyes and lips, white tipped ears and occasional white patches of fur on the throat and chest. In spite of its local name, the tapir is not a cow, it is closely related to the horse and is also kin to the rhinoceros. The tapir is a vegetarian. It spends much of its



time in water or mud shallows, and is a strong swimmer. The National Animal is protected under the wildlife protection laws of Belize, thus the hunting of the tapir is illegal.

SKILL CHECK

This Skill Check is designed to prepare you for the assessment that will be administered at the end of the chapter.

EXERCISE 1:

On the blank timeline provided below, fill in three important dates for each of the following periods of Belize's history:

(a) Ancient Belize

(b) The Maya

(b) European Settlement

(c) Modern History

EXERCISE 2:

Provide responses to the following questions.

1. Where is Belize located? Provide as much descriptive information as you can.

2. What is the population of Belize, and what are the main population groups?

3. (a) What are the four main geographic areas of Belize?

- 1. _____ 2. _____
- 3. _____ 4. _____

(b) Give two to three characteristics of each of the geographic areas listed above.

- 1. (a) _____, (b) _____
(c) _____
- 2. (a) _____, (b) _____
(c) _____
- 3. (a) _____, (b) _____
(c) _____
- 4. (a) _____, (b) _____
(c) _____

4. When is Hurricane Season in Belize?

5. Name three important hurricanes that have affected Belize and briefly outline how they affected the country.

_____, _____, _____

6. What is a national symbol?

7. Describe the Belizean flag.

8. Name the national:

- (a) Flower: _____
- (b) Tree: _____
- (c) Bird: _____
- (d) Animal: _____

UNIT 2: MODERN BELIZE

The information presented in this unit will provide you with an overview of how Belize functions as a country today its government, infrastructure and economy. This unit also discusses the 'importance of tourism to Belize's economy as well as the infrastructure that enables tourism development.

OBJECTIVE:

At the end of this unit, you will be able to:

1. Explain Belize's system of government, both national and local
2. Outline the social services provided to the people
3. Discuss the most important contributors to Belize's economy

AT A GLANCE:

1. Government of Belize
2. Belize's Infrastructure and Social Services
3. The Economy of Belize



GOVERNMENT OF BELIZE

OUR CONSTITUTION

Belize's constitution was passed a day before its independence, on September 20, 1981. The constitution, which is also the supreme law of Belize, affirms that the nation of Belize shall be founded upon principles which take into consideration the supremacy of God. Faith in human rights and fundamental freedoms, the position of the family in a society of free people, and the dignity of the human person. The constitution provides for three branches of government: the legislative, the executive and the judiciary.

THE LEGISLATIVE BRANCH

The constitution provides for a bicameral Legislature, which means that it has two legislative chambers. The legislature is called the National Assembly, and is comprised of a House of Representatives and a Senate. This system is operated on the principles of Parliamentary Democracy, based on the British System.

The House of Representatives presently consists of 31 members, who are all elected by the people in a general election that takes place every five years. The electoral divisions or constituencies are currently distributed as follows: four (4) each for the districts of Corozal and Orange Walk. Cayo has six (6); two (2) each for the districts of Stann Creek and Toledo: ten (10) for Belize City; and three (3) for rural Belize District. The House of Representatives is presided over during their meetings by a Speaker, elected by the members from among themselves, or from outside the House.

The Senate is made up of 12 appointed members known as Senators and one (1) President. They are appointed by the Governor General as follows: six (6) appointed on the advice of the Prime Minister, three (3) appointed on the advice of the Leader of the Opposition, one (1) on the advice of the Belize council of Churches and Evangelical Association of Churches, one (1) on the advice of the Belize Chamber of Commerce and Industry and the Belize Business Bureau, and one (1) on the advice of the National Trade Union Congress and Civil Society Steering Committee. The most important function of the Senate is to ratify and confirm bills or laws after they have been passed by the House of Representatives.

THE EXECUTIVE BRANCH

The executive authority of Belize is vested in Her Majesty Queen Elizabeth II, and this authority may be exercised in Belize on behalf of the Queen by the Governor General. The Queen appoints the Governor General, who must be a Belizean. The first Governor General, appointed at independence, was the Right Honorable Dame Minita Gordon, who served from 1981 to 1993. The current Governor General, who has served since 1993, is Sir Colville Young.

The head of the government is the Prime Minister. The Cabinet, which is the chief policy making body in the Government, is made up of persons who formulate the policy and program of the Government. The Cabinet is appointed by and headed by the Prime Minister. The Ministers are drawn from the National Assembly. Ministries change, depending on the needs and programs emphasized by the government.

THE JUDICIAL BRANCH

The judicial system of our country is independent of any political partisanship in the execution of their legal judgements. The Supreme Court is the highest instrument of justice in Belize, The judges of the Supreme Court are the Chief Justice and other judges known as Puisne Judges. An appeal of the decision of the Supreme Court can be made to the Court of Appeals, comprised of three visiting Justices.

The Chief Justice is appointed by the Governor General, acting in accordance with the advice of the Prime Minister, given after consultation with the Leader of the Opposition. The Puisne Judges are appointed by the Governor General, acting in accordance with the advice of the judicial and Legal Service Section of the Public Service Commission and with the concurrence of the Prime Minister, given after consultation with the Leader of the Opposition.

There is also a Magistrate's Court, referred to as the "Lower Court," with locations in every district capital. In Belize City, there are four Magistrate's Courts.

ELECTIONS AND POLITICAL PARTIES

General Elections

General Elections are held at intervals of no longer than five years. Voters must be at least 18 years of age. The Prime Minister has the right to advise the Governor General to dissolve the National Assembly and so determine the date of the next General Elections.

City Council

The Belize City Council elections are held every three years. Prior to elections held in 1999, nine officers were elected, from which a mayor was appointed. For the 1999 elections, the Mayor was elected directly, along with ten councilors. The name of the current mayor of Belize City is Zenaida Moya.

In 2000, the Belmopan City Council Act was passed. This calls for elections every three years to elect a Mayor and six councilors for the city of Belmopan. Mr. Simeon Lopez is the current mayor of Belmopan.

Town Council

The Town Councils also hold elections every three years to elect six councilors and a Mayor. Town councils exist in Corozal, Orange Walk, San Ignacio, Benque Viejo del Carmen, Dangriga and Punta Gorda.

Village Council

A new Village Council Act of 2000 calls for elections every three years to elect six councilors and a chairman for each village.

There are two major political parties, the Peoples United Party (PUP) and the United Democratic Party (UDP). There are four minor parties, , We the People Reform Movement, Vision Inspired by the People (VIP), The People's National Party (PNP), and the National Reform Party (NRP). The UDP has been head of the government since the last election in 2008.

LOCAL GOVERNMENT: BELIZE'S SIX DISTRICTS

Administratively, Belize is divided into six districts:

COROZAL

This is Belize's northernmost and smallest district, and the gateway to Mexico in the north. Corozal Town is its major administrative town, located approximately 135 kilometers (90 miles) north of Belize City, along the Northern Highway. Corozal District has a population of 36,365, predominantly Yucatec Mayas and Mestizo. Corozal District covers 1,860 square kilometers (718 square miles).

Corozal District is best known for the Corozal Bay area, where water activities such as swimming and fishing are available. It is also known for the archeological ruins at Santa Rita and Cerros. From Corozal, there is easy access to Chetumal, Mexico where some Belizeans go shopping during festive seasons. Cancun is approximately six hours' drive from Corozal.

ORANGE WALK

Orange Walk is the second largest district in Belize, with a population of 47,145. Orange Walk Town is the administrative town, located approximately 80 kilometers (54 miles) from Belize City along the Northern Highway. Orange Walk Town has a population of 15,990. The people in this district are mainly Mestizos, who settled in the area during the Caste Wars of the Yucatan (1849-1872). The Tower Hill Sugar factory, which is located a mile out of town, has attracted an influx of other ethnic groups migrating from other parts of the country.

There are two Mennonite communities in this district, Ship Yard and Blue Creek, who produce furniture and vegetables. Orange Walk District covers 4,737 square kilometers (1,829 square miles). Orange Walk is best known for the ruins of Lamanai, located along the New River. Other ruins in the district are Cuello and La Milpa.

BELIZE DISTRICT

Belize District has the largest population in the country. With a total population of 93,215, This includes Belize City, the main city in Belize, with a population of 63,670. Belize City is the main port of entry into Belize, via the Philip S.W. Goldson international Airport and the Belize Port, Authority. Belize District also includes San Pedro Town on Ambergris Caye, with a population of 10,445. The predominant ethnic group in the district is Creole, a people who have mixed European and African ancestry. Although English is Belize's official and first language, the Creole dialect, a blend of English with, Spanish, African and created words and phrases, is spoken throughout the country, Belize District has a landmass of 4,204 square kilometers (1,623 square miles).

Belize City sits in the center of the country and has easy access to almost all most visitors enter the country here. In addition to the cayes, which attract many visitors interested marine activities, Altun Ha, a Mayan ruin, is found in Belize District, as is the Belize Zoo, and Crooked Tree Wildlife Sanctuary.

CAYO DISTRICT

Cayo is Belize's largest district, and the gateway to Guatemala via Benque Viejo Del Carmen. The district has a population of 73,325, comprised mostly of Mestizo and Yucatec Maya. The capital of the country, Belmopan, is located in Cayo, 80 kilometers (53 miles) west of Belize City along the Western Highway. It has a population of 16,435. San Ignacio is the largest town in the district, with a population of 18,265 (including Santa Elena). San Ignacio is located 35 kilometers (23 miles) west of Belmopan, along the banks of the Macal River. Cayo District as a whole covers 5,338 square kilometers (2,061 square miles).

The numerous attractions in this district make it one of the most visited inland destinations in the country. Xunantunich, Caracol, and Cahal Pech are a few of the Mayan sites that are found in this district. Also found in this district is Mountain Pine Ridge with its many waterfalls, mountain pools and caves. Many small guest houses, lodges, and hotels are available for visitors in Cayo District.

STANN CREEK

Stann Creek District lies south of Belize District along the coast of Belize. Its total population numbers 32,180. The administrative center, and largest town, is Dangriga, with a population of 11,600. Access to the Stann Creek District is via the Hummingbird Highway, which runs southward from the Western Highway at Belmopan to Dangriga, and then the Southern Highway, running south from Dangriga to Placencia and Punta Gorda. The Coastal Road also runs south from Belize City to Dangriga. The district is the center for the citrus industry in Belize. Stann Creek District and Dangriga, in particular, are home to the Garifuna people, descendants of Carib Indians and African slaves who trace their history to the island of St. Vincent in the eastern Caribbean. The district covers 2,176 square kilometers (840 square miles).

In addition to a number of offshore cayes which attract visitors. Stann Creek District has Placencia peninsula, a growing center of tourism in the country and the Cockscomb Basin Wildlife Sanctuary.

TOLEDO

Toledo District is the southernmost district in Belize, with Guatemala bordering it to the south. The population of the district is 29,250, mostly Mopan and Kekchi Maya. The administrative center is Punta Gorda Town, with a mixed population of 5,225. The Southern Highway from Dangriga ends in Punta Gorda. The district has the smallest population and has had the least access to development efforts in the country. However, there are attractions of interest to visitors, such as the Mayan ruins at Lubaantun and Nim Li Punit, the Blue Creek caves, and some of the offshore cayes. The district covers 4,648 square kilometers (1,795 square miles).

BELIZE'S INFRASTRUCTURE AND SOCIAL SERVICES

ROADS

There are four main highways which connect all districts in Belize. The Northern Highway runs from Belize City through the towns Orange Walk and Corozal to Chetumal on the Mexican border. The Western Highway connects Belize City with Belmopan. The capital, and continues on to San Ignacio, Benque Viejo del Carmen and Melchor de Mencos on the Guatemalan border. The Hummingbird Highway, which is in the process of being paved, connects Belmopan with Dangriga in the south. From there, the Southern Highway links Dangriga with the Toledo District. This road is scheduled to be paved over the next three years.

Regular bus services are available that connect the main towns along the highways, as well as smaller towns and villages. The main bus lines are Novelo's, which runs along the Northern and Western Highways; Venus, which runs along the Northern Highway, James Line, which links Belize District with the Toledo District; and ZLine, which services the Hummingbird and Southern Highways. Information about exact bus routes, times of departure, fares, etc. are available from these bus lines.

Two US carriers serve Belize daily – American Airlines that flies to/from Miami and Dallas, and Continental Airlines that flies to/from Houston. TACA services the Central American region. Several other regional airlines also connect Belize with the Caribbean and with Central America.

Domestic air services are provided by Tropic Air and Maya Island Air. Local destinations and airports include the municipal airport in Belize City, San Pedro, Caye Caulker, San Ignacio, Belmopan, Dangriga, Placencia, Punta Gorda, and Corozal. Daily scheduled flights are available. Reliable charter services are also available.

SEA TRANSPORTATION

Belize has three ports: Belize City, Commerce Bight, and Big Creek. Belize City is the major port of the country, and has deep water port facilities able to load and unload container ships.

Commerce Bight primarily services the citrus factories of Stann Creek District, and exports citrus and bananas. Big Creek is also primarily an agricultural port, used to ship Belize produce to the U.K.

A number of international cruise lines call at Belize with their passengers. This is a growing sector of the tourism industry, and its growth has generated some controversy.

Local water taxi services are available linking several of the larger coastal towns with outlying cayes. In Belize City, water taxi services are available from Marine Terminal and Courthouse Wharf to Ambergris Caye, Caye Caulker (with stops at St. George's Caye and Caye Chapel on request), and south to Placencia, continuing on to San Pedro Sula in Honduras. In Dangriga, water taxi services are available to Glover's Reef, South Water Caye, and to Tobacco Caye, and to Puerto Cortes in Honduras. From Punta Gorda, boat service is available to Puerto Barrios in Guatemala.

TELECOMMUNICATIONS

The Office of Telecommunications acts on behalf of the Government of Belize in monitoring and regulating all telecommunication services within Belize, including the assignment of frequencies.

The Belize Telemedia Ltd. (BTL), a private company, provides telecommunications services throughout Belize, including telephone, cellular telephone, paging, email and internet services, direct dial and international direct dial, throughout the country, regionally, and internationally.

BROADCASTING AND THE PRESS

Belize has three local television stations (Channels 5, 7 and 11) and five main radio stations. Cable television service is also available, offering a mix of programming (North American, British, Mexican, Chinese, East Indian and Arabic). Four newspapers are published weekly in Belize City, Amandala, the Belize Times, The Guardian and Reporter. A number of other towns also publish local newspapers.

SOCIAL SERVICES

HEALTH

Health services are provided by the Government through a network of seven district hospitals which are divided into four regions (Northern Region - Orange Walk and Corozal Districts, Central Region - Belize District, Western Region - Cayo District and Southern Region - Stann Creek and Toledo Districts), and the Karl Huesner Memorial Hospital in Belize City, which serves as the national referral hospital. Extension services are also provided through regular mobile clinics. An infirmary in Belize City provides care for geriatric and chronically ill patients. Private medical services are also available, particularly in the larger towns.

Training for nurses and midwives is available at the University of Belize School of Allied Health. Most medical doctors in Belize are trained at the University of the West Indies, or in Cuba, Guatemala, Mexico or Costa Rica.

Many people make use of traditional healing knowledge, passed down through the generations, which relies on the medicinal properties of the local flora.

Diseases that will be of particular concern to visitors are malaria, dengue fever, and intestinal upsets. Malaria and dengue are both caused by mosquitoes, although by different species. Mosquitoes carrying malaria generally are active from dusk to dawn, while those carrying dengue fever are active during the day. Precautions include protective clothing, using bug spray, and for malaria, taking preventative medication if traveling to high malaria areas.

Precautions for visitors to avoid intestinal diseases include drinking bottled or filtered water, eating cooked foods, or fresh fruits and vegetables that can be peeled.

EDUCATION

Education is compulsory in Belize between the ages of 6 and 14 years, which constitute the primary school grades (Infant I Standard VI). Education is an important focus of the Government of Belize, and significant government expenditure is put towards the education of our children. In 1997, there were 53,110 pupils enrolled in 280 primary schools, 10,912 students in 30 secondary schools: and 2,500 in postsecondary education Institutions.

Primary education is tuition free in Belize, and the education system is a dual system of Church state involvement. Some schools are entirely government run. Others are run by church denominations primarily Roman Catholic and also supported by the government. Preschools are also available for children ages 3-5, and attendance at preschool is being encouraged by the Government. Each district has one facility to accommodate special needs children, and there is a school in Belize City, the Stella Morris School, which accommodates children with disabilities. *(Research PSLE)*

At the end of primary school, all students must take the Primary School Leaving Examination (PSLE), which determines their eligibility for secondary school admission.

Postsecondary education is also available in Belize at the University of Belize (formerly the University College of Belize) and St. John's Junior College. The University of the West Indies also offers courses through its School of Continuing Education.

For those who wish to explore alternate educational opportunities, there are several different avenues for those who do not complete secondary school: Centres for Employment Training and Belize Youth Development Centre.

A library system services the country, with 74 service points scattered across the country, and mobile library services reaching remote areas.

THE ECONOMY OF BELIZE

CURRENCY AND BANKING

The currency of Belize is the Belize dollar. Bill denominations include \$100, \$50, \$20, \$10, \$5, and \$2 bills, with \$1, \$.50, \$.25, \$.10, \$.5 and \$.01 coins. The rate of exchange is fixed with the U.S. dollar at BZ \$2 = US \$1. Both Belize and United States currency are accepted throughout the country. Traveler's checks and credit cards are also widely accepted.

Banks serving the country are Atlantic Bank, Belize Bank, Bank of Nova Scotia, Alliance Bank of Belize, and First Caribbean Bank. Banking hours are generally Monday to Thursday, 8:00 a.m. 1:00 p.m., Friday, 8:00 a.m. 4:30 p.m. The Central Bank of Belize is the monetary authority of the country.

As a young nation with globalization as a backdrop, Belize has been struggling with the challenge of transforming its economy from a highly vulnerable, mono crop economic (i.e. traditionally sugar) system into an economy with a well diversified export sector that can compete in the international market. To achieve this, the Government of Belize (GOB) has adopted a policy of initially boosting public sector spending on infrastructure and housing, reducing taxes and aggressively promoting tourism and direct foreign investment.

The primary sector of the country's economy is focused on the exportation of agricultural (i.e. citrus and banana), fisheries, and forestry products. Exports from Belize are dominated by six major items: sugar, citrus concentrate, garments, marine products, bananas and forestry products. Agricultural exports account for 75 percent of total export earnings, with sugar, citrus and bananas constituting 65 percent of the total agricultural exports. In 1999, real growth in the primary sector surged by an impressive 11.5 percent, propelled by strong growth in exportation of agricultural and fisheries products. (*Research Statistical Institute of Belize*)

Although the primary sector has led economic performance over the years, the GOB recognizes that this sector is vulnerable to price fluctuations on the international markets. Trade liberalization, natural disasters and unpredictable oil prices. It is therefore fully engaged in the task of reengineering the domestic economy to make it more diversified, export driven and investor friendly so as to reduce the country's reliance on this increasingly vulnerable sector. Over the past year, new nontraditional crops were promoted to increase foreign exchange. There are currently eleven nontraditional crop projects being implemented. Examples of these nontraditional crop projects include: a hot pepper seed project, the fruit and root crop project, a soybean project and a project to export dehydrated fruit like papaya, mangos and pineapple.

The secondary sector of Belize's economy includes the manufacturing, garment, and construction industries. The manufacturing sector is quite small, though tax concessions and other incentives have encouraged the development of plywood and veneer manufacture, matches, beer, rum, soft drinks, furniture, boat building, and battery assembly. The secondary sector grew by 4.6 percent in 1999, as compared to a 1.2 percent decline in 1998. This was primarily due to a sharp upswing in the construction sub-sector, which was dominated by residential construction.

The services sector of Belize's economy includes the trade and tourism industries, public administration, and transportation and communication industries. The growth experienced in this sector in 1999 is attributed to strong economic activity in the trade, restaurants and hotels sub-sectors as a result of record high tourist arrivals, as well as high capital investments in the transport and telecommunications industries.

Having provided an overview of Belize's economy, let's take a closer look at the main sectors of Belize's economy.

TOURISM

Tourism in Belize is the largest single contributor to Belize's economic growth. It represents: 18 percent of the National Gross Domestic Product (GDP), 25 percent of total foreign exchange earnings, and supports 1 in every 4 jobs. It is the fastest growing industry in Belize.

Over the past few years tourist arrivals have increased substantially, lured by Belize's marine and terrestrial attractions and rich cultural heritage. In 1999, stay over bonafide tourist arrivals rose by 2.1 percent, to 167,000 per year, with a 5.7 percent increase in arrivals at the Phillip Goldson International Airport. The two main markets, the United States and Europe, accounted for 56.4 percent and 15.3 percent respectively of total tourist arrivals. Belizeans living abroad who returned home for visits represented another 4.4 percent.

An increase in the number of cruise lines visiting the country caused cruise ship arrivals to more than double in 1999 when compared to 1998. Cruise ship arrivals grew from 34,000 in 1999 to 58,131 in 2000. One of the world's largest cruise ship companies, Carnival Cruises, recently signed an agreement to visit Belize year round starting in 2001. This is one of the main reasons why the GOB has been pushing forward the construction of a passenger cruise terminal at the proposed tourist village at the Fort Point in Belize City. This aspect of tourism growth has generated controversy within the tourism sector.

The GOB's efforts to transform Belize's local economy into a diversified, investment-friendly economy clearly include the implementation of an aggressive marketing strategy to promote tourism as a key priority. The GOB's commitment to the continued expansion of tourism is reflected in its allocation of \$4.6 million to the Belize Tourism Board for the year 2000. This figure represents the biggest investment ever in promoting Belize's tourism industry.

(Check BTB's Statistical Info)

AGRICULTURE

The agriculture sector demonstrated strong growth. 7.4 percent in 1999, This growth was due to increased production of citrus and bananas, while the production of sugar remained relatively stable. Sugarcane deliveries for the 1998/99 crop showed an increase of 0.3 percent over the 1997/98 crop. Citrus showed a 16.6 percent increase over the 1997/98 crop. Orange and grapefruit deliveries rose by 17.2 percent and 14.9 percent respectively, representing exportation of 4.4 and 1.3 million boxes respectively, Banana production during 1999 outperformed 1998 with a 10.4 percent increase in yields, to 56,000 tons. During 1999, approximately 452 acres of papayas were also under cultivation.

Production of all other major agricultural commodities rose during 1999. Output of basic grains expanded, with significant increases of 25.8 percent in rice, and 23.6 percent in beans. This sector continues to seek out niche markets for other nontraditional agricultural products such as exotic fruits and spices. The local market need for these products is growing because of the growing tourism industry. There is a major drive to improve the packaging and quality of these products.

(Statistical Institute of Belize)

FISHERIES

The export of marine products increased from 4.3 million pounds in 1998 to 5.7 million pounds in 1999. This translates to approximately 56 million Belize dollars. For the second consecutive year, production of farmed shrimp achieved another significant expansion, as new acreages were harvested. The lobster catch was bigger during 1999 as compared to that of the previous year, but the conch catch was noticeably smaller.

The Fisheries Department, with support from the Coastal Zone Management Institute/Authority, continues to legislate the different catching seasons so as to ensure that the industry remains sustainable. The Fishermen's Cooperatives continue to equip their members to better supply the ever growing need for fisheries products, both locally and internationally.

FORESTRY AND MINING

Intensive logging in the past has reduced the abundance of primary species in Belize's forests. As a result, forestry's contribution to the economy continued to decline, with a 6.9 percent contraction during 1999. Efforts at developing a strong export market for secondary woods have not met with much success, which has caused a reduction in the amount that is exported.

The mining sub-sector doubled its output from real growth of 3.4 percent in 1998 to 6.7 percent in 1999, fuelled by booming growth in the construction sector. Limestone quarrying for construction materials is the main mining activity. The removal of sand and gravel from riverbeds has also been practiced, but this is being discouraged because of the harmful environmental impacts it has on the watershed in the area.

SKILL CHECK

EXERCISE 1:

Answer the following questions:

1. How many members make up the House of Representatives? _____
2. How many members make up the Senate? _____
3. In the House of Representatives, how many electoral divisions are present in:
 - (a) Corozal: _____
 - (b) Orange Walk: _____
 - (c) Cayo District: _____
4. In the House of Representatives, how many electoral divisions are present in Belize City? _____
5. In the House of Representatives, how many electoral divisions are present in:
 - (a) Stann Creek; _____
 - (b) Toledo: _____

6. How are the Senators selected?

EXERCISE 2:

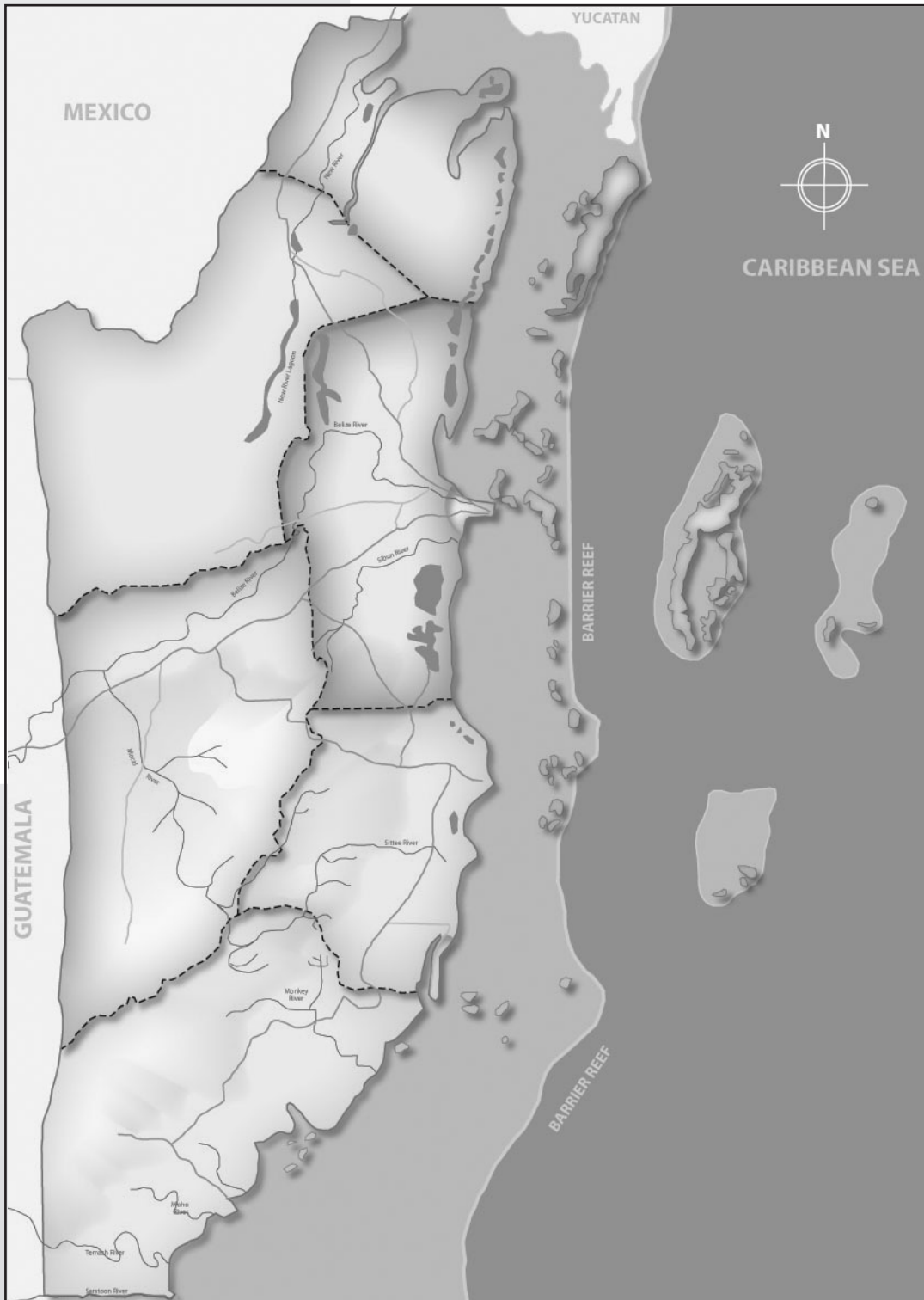
Mark TRUE or FALSE beside each statement.

1. Whenever there is a change of government a new Judicial team is appointed by the new government. _____
2. The Supreme Court is the highest court in Belize. _____
3. The Supreme Court is headed by a Puisne Judge and has several other judges called Chief Justices. _____
4. The Chief Justice is appointed by the Governor General, acting in accordance with the advice of the Prime Minister given after consultation with the Leader of the Opposition. _____
5. Magistrate's Court or Lower Court has locations in every district capital. _____

EXERCISE 3:

On the blank map provided, label the following:

- (a) Each district,
- (b) Population of each district, and
- (c) Major highways found throughout Belize.



UNIT 3: TOURISM ACTIVITIES

This unit will provide you with an overview of Belize's national tourism strategy, the local tourism network and your role in it, and outline tourism activities offered throughout the country. As tourism continues to grow in importance and takes its place as a major developmental focus for the government, it is important to understand what type of tourism Belize is developing, where those developments are taking place, and the types of activities that attract visitors to our country.

OBJECTIVE:

At the end of this unit, you will be able to outline and discuss Belize's national tourism strategy, the local tourism network and major tourism activities in Belize.

AT A GLANCE:

1. Strategic Vision for Tourism
2. The Local Tourism Network
3. Tourism Activities and Sites



INTRODUCTION

Tourism is the most important industry in Belize's services sector, providing jobs, financial returns and opportunities for micro business development. The months of January to July 2000 saw a 23.1 percent increase in tourist arrivals compared to the same period in 1999. The growth that the tourism industry has experienced over the past few years is an integral part of the Government of Belize's (GOB) strategy to transform the local economy into a more diversified, export driven and investor friendly economy.

To sustain this rapid growth in tourism, the government is therefore investing in those areas likely to yield the best results for the industry. In August 2000, the government signed a \$28 million agreement with the IDB to improve major archaeological sites across the country. A grant of \$1.4 million was also obtained from the IDB to be invested in a tourist training program to keep improving the quality of services in the industry. Furthermore, a Border Management Authority was established in early 2000 to oversee improvements at the northern (Mexican) and western (Guatemalan) borders.

As part of its strategy to transform the economy into one that is more investor friendly, the GOB offers special investment incentives and concessions to facilitate local and foreign investment in tourism. Over the past two years, these investments have already produced significant growth and many positive indicators. Strong investment from the private sector is reflected in the construction of 250 new hotel rooms, underway throughout the country, along with plans for major hotel and tourism development in the Free Zones.

It is clear, therefore, that the GOB's vision in the new millennium is to develop the tourism sector as a national priority. According to the Ministry of Tourism (MTE) and the Belize Tourism Board (BTB), the GOB has adopted a policy focused on responsible tourism aimed at marine activities, natural history and adventure markets. The target markets for the Belize Tourism Board's marketing efforts include those interested in marine activities (i.e. diving, snorkeling, fishing), soft adventure (i.e. archaeology, hiking, birding, caving, natural history) and gaming activities, families; retirees; cruise ship passengers; and honeymoon/wedding parties.

Responsible tourism is considered the key guiding principle for tourism development now and in the future. The MTE and BTB define responsible tourism as a way of carrying out tourism policy, planning and development, rather than a certain type of tourism, such as ecotourism. Responsible tourism is being viewed as a policy, planning and development principle that will ensure the equitable distribution of economic benefits, among stakeholders, as well as ensure the proper management of tourism resources. The GOB has committed itself to sustainably managing the natural resources on which tourism is built.

To that end, Belize has installed a national tourist departure fee of \$7.00, which is earmarked for a Protected Areas Conservation Trust. Through this trust, Belize directly ties tourism dollars to conservation. Belize is the only country in the world that has established such a national trust.

Although much progress has been made in tourism development, many challenges still lie ahead. A few of these challenges include: the need to strategically develop and upgrade Belize's product; the need to maintain the pristine quality of its environment, the need to market effectively to high yield, niche markets; and the need to forge stronger linkages between the public and private sectors, nongovernmental organizations and communities throughout the country. The Belize Tourism Board, as the implementing arm of the government's tourism strategy, will bear responsibility for helping Belize to meet these challenges.

THE LOCAL TOURISM NETWORK

As a tour guide, you are part of an important network both inside and outside of Belize: the tourism network. This network of many people and providers sustains the tourism industry. To understand where you fit in this complex network, the chart below shows the main components of the tourism industry in Belize with whom you may come into contact in your work.

Local Tourism Network	Belize Tourism Industry
Ministry of Tourism	Belize Tourism Board
Tourism Related Associations	Tour Operator Tour Wholesaler
Transportation Providers Association	Travel Agencies
SERVICE LEVEL	Hotels and Guest Houses
Restaurants	Waiter/Waitress
Taxi Driver	Hotel Receptionist
TOUR GUIDE	Other Service Providers

TOURISM POLICY DEVELOPMENT & IMPLEMENTATION

MINISTRY OF TOURISM

The Ministry of Tourism is the governmental body responsible for tourism policy and activities in the country. In implementing the national tourism policy the Ministry of Tourism works closely with other ministries and governmental departments. Several of these ministries and departments include the Department of Archaeology, the Ministry of Natural Resources and the Environment, and the Ministry of Agriculture and Fisheries.

BELIZE TOURISM BOARD

The Belize Tourism Board is a statutory body within the Ministry of Tourism, which represents a strategic partnership between government and the private sector to develop, market, and implement tourism programs that will fulfill the emerging needs of our local industries and the international tourism marketplace for the benefit of Belize and Belizeans.

BELIZE TOURISM INDUSTRY ASSOCIATION

The Belize Tourism Industry Association is the private sector membership association that acts as an intermediary between government and the private sector as well as private sector and national and international organizations. The four hundred member strong association boasts of representation on every government, legislative, advisory, consultative and licensing committee, which in itself is proof of its continued commitment to national development.

The Belize Tourism Industry Association (BTIA) is comprised of representatives from: The Belize Hotel Association (BHA), The Belize National Tour Operator's Association (BNTOA), The Belize Tour Guides Association (BTGA), The Belize Water Taxi Association Along with local destination representatives from: Corozal, Orange Walk, Cayo, Belize District, San Pedro, Caye Caulker, Stann Creek, Placencia, and Toledo.

BELIZE NATIONAL TOURISM COUNCIL

The Belize National Tourism Council is a legislated advisory body to the Ministry of Tourism on tourism policy. The council consists of both public and private sector representatives of the tourism industry that meets quarterly. This advisory council serves as the highest advisory body to the Ministry of Tourism.

TOURISM RELATED ASSOCIATIONS

Tourism related associations gather specific sectors of the tourism industry together to advocate and work on issues of common concern. Examples are: the Belize Hotel Association, the Belize National Tour Operators Association, the Belize Tour Guides Association, and the Belize Ecotourism Association.

SERVICE PROVIDERS LEVEL 1

TOUR OPERATOR/TOUR WHOLESALER

Tour Operators/Tour Wholesalers play an important role in 'the network. Tour operators put together packages and itineraries for individual visitors; in country and international travel agencies, coordinating all services to provide a complete package to the visitors.

TRAVEL AGENCIES

Travel agencies provide comprehensive travel services, including airline bookings, accommodations and the sale of tour packages.

SERVICE PROVIDERS LEVEL 2

Hotels and Guest Houses

Hotels and guest houses are providers of accommodations to visitors. Services provided by hotels and guest houses can also include organizing local and countrywide tour.

Transportation Providers (taxi, boat, airlines)

Transportation Providers render local transportation services to individual visitors, as well as through tour operators and tour wholesalers as part.

Restaurants

Restaurants are providers of meals and food services to visitors and locals alike.

FRONTLINE PERSONNEL

Service personnel, also known as frontline personnel, are individuals who interact directly with visitors, and are the most visible part of the tourism sector. Tour guides are considered frontline personnel. Other frontline personnel include customs and immigration officials, ground transporters (i.e. taxicab drivers), hotel front desk personnel, waiters and waitresses. Frontline personnel hold a very important role within the tourism network because they are in a position to impact whether a visitor has a great time in Belize and, therefore, choose to return again or tell others about Belize.

Interestingly, Belize Tourism Board's statistics show that the majority of tourists visiting Belize, chose Belize as their vacation destination as a result of the recommendations from friends/relatives. This finding confirms the enormous influence that frontline personnel have on the visitor's experience, given that it is they who spend the most direct time with visitors.

Taxi Driver

Frontline service personnel who greet visitors, provide initial information, and respond to direct questions from visitors.

Waiter/Waitress

Frontline service personnel who provide food service and represent the restaurant and/or hotel that they work for.

Hotel Reception

Frontline service personnel who greet visitors upon arrival at the hotel, provide support and information about locally available services.

Tour Guide

Tour guides are frontline personnel who accompany visitors to different sites and activities. They provide interpretation about that site or activity to enhance the visitor's learning, understanding and appreciation of that activity, as well as of the country overall. Tour guides manage the visitor's experience ensuring that all goes well.

The manner in which the tour guide leads tours impacts significantly on the response that tourists have to our culture and natural resources. which, in turn, impacts on the type of experience that visitors walk away with and, ultimately, the sustainability of Belize's tourism industry.

As a tour guide, you carry an important responsibility not just to the visitor and to the people you work with, but also to all the other parts of the tourism network that work behind the scenes to make tourism successful, too.

VISITORS TO BELIZE

Visitors are the key to tourism, keeping the entire tourism network working. Their actions, attitudes, and experiences play a critical role in sustainability for Belize, both in terms of the economy and in terms of the ecological health of the natural resources on which tourism largely depends.

As will be discussed in Chapter 2, it is important for the tour guide to have general knowledge of who the tourists are that visit Belize, and the activities that they participate in during their stay in Belize. The Belize Tourism Board's 1997 Visitor Expenditure and Motivation, Survey provides some interesting information, as shown below.

There are many sectors that contribute to the tourism network behind the scene, both inside and outside of Belize. For instance, other people who contribute to the tourism network in Belize include the farmers who grow food to provide to the hotels, bank officials who process traveler's checks, gasoline station attendants who provide petrol to transportation suppliers, construction workers who build new hotels and guest houses, and customs officials who stamp passports at the airport. Outside of Belize, there are the travel agencies and tour wholesalers that sell Belize as a destination, the international airlines that transport passengers to/from Belize, and the various Belizean consulates and embassies throughout the world that provide information on Belize.

TOURISM ACTIVITIES AND SITES

Swimming

The calm, clear waters of the Western Caribbean beckon many visitors to Belize. Most swimming areas are protected within the barrier reef, and thus there are no rough surf conditions. The warm water temperatures, ranging from 24 degrees 29 degrees C. (75 degrees 84 degrees F). mean swimming is pleasant year round.

Scuba diving

Scuba diving is one of Belize's main tourism attractions. The Belize Barrier Reef, second largest in the world after Australia's Great Barrier Reef, provides numerous opportunities for all levels of diving, from novice through advanced. Three atolls that lie beyond the reef Glover's Reef, the Turneffe Islands, and Lighthouse Reef also offer spectacular diving.

Scuba diving should be undertaken with the guidance of a licensed dive shop and experienced dive master. Licensed dive facilities are available around Belize at the major diving centers. Several live-aboard dive/cruise operations also operate in Belize, from Belize City and San Pedro.

Scuba Diving Sites

Northern Main Reef:

Arnbergris Caye Mexico Rocks	Tunnels of Mata
Hol Chan/Shark Ray Alley	Caulker Cut
Central Main Reef	Goffs Caye Grooves
St. George's Slope	Turneffe islands
Northern Turneffe	N,W. Hauger Wall
Rendezvous Point	Vicente
Cockroach Slope	N.E. Slope
Southern Turneffe	Calabash Wall
Elbow	The Abyss
Sarbo Wreck	Tres Cabasas West Point
North Long Caye Wall	Half Moon Caye Wall
Glover's Reef	Northeast Caye Wall
Middle Caye wall	Southeast Caye Wall
Glovers West Wall	The Blue Hole (Belize's most famous dive site)

Southern Main Reef:

South Cut	South Water Wall
Laughing Bird	Queen Caye
Tarpurn	

Licensed dive operators can be found in Belize City, Ambergris Caye, Caye Caulker, Dangriga, Placencia, Punta Gorda, and on some off shore cayes and atolls that are popular dive destinations.

Snorkeling

Like diving, snorkeling is a very popular tourist pastime in Belize, particularly since it requires much less training and equipment. All of the above sites offer snorkeling as well.

Fishing

Fishing is a very popular reason for choosing Belize as a tourism destination. A multitude of fishing experiences and species are available to the angler, from rivers to flats to reef to offshore fishing.

River fishing

Many of the rivers in Belize offer calm, productive sports fishing. Popular species are Tarpon, Snook, Cubera Snapper, and Jewfish (a type of Grouper).

“Flats” fishing

Fishing in the sea grass beds that lie between the coast and the reef for Bonefish, Permit, and Tarpon is popular with fly fishermen, as well as with spin tackle anglers. Catching and landing one of each in one day earns the fisherman a coveted Grand Slam.

Reef fishing

The variety of species that lives along the barrier reef provides for exciting reef fishing. Grouper, many varieties of Snapper, Jack Crevalle, and Barracuda are all easily caught while reef fishing.

Deep sea fishing/Blue water fishing

Species such as Tuna, Wahoo, Kingfish, Mackerel, Sailfish, and Marlin are all caught in the offshore waters of Belize. Sailfish and Marlin are not plentiful, but they are caught regularly.

Boating

Boating is a popular pastime in Belize, with its generally calm and protected seas, warm waters, and warm air temperatures as well. Chartering has become popular in Belize, with both crewed and bare boat chartering available. Small craft to large catamarans and multiple masted schooners are available. Prime chartering locations are Belize City and Ambergris Caye.

Other marine activities

Windsurfing sea kayaking, jet skiing, and other water activities are available through hotels and dive shops around Belize.

TERRESTRIAL ACTIVITIES

Canoeing/Kayaking/River Rafting - Many of Belize's rivers are navigable by small boat, and offer excellent opportunities for exploration of riverine ecosystems. Fishing, bird watching, and discovering Belize's other flora and fauna are all possible from her rivers, which traditionally were the means of transport through the country. The calm waters off many of the cayes also provide opportunities for sea kayaking.

From North to South, navigable rivers for boating are:

North: New River

Central: Sibun River, Belize River, Mopan River, Macal River, Manatee River

South: Monkey River, Temash River, Sarstoon River, Moho River, Rio Grande

Many hotels and lodges in the interior offer canoeing as an optional activity, with canoes available to rent by the hour or longer. Guided canoe trips are available in the San Ignacio area, from day to weeklong paddles extending all the way to Belize City. The “La Ruta Maya” canoe race is a yearly event held in early March in which about fifty teams paddle from San Ignacio to Belize City for the coveted winning prize of this nationally recognized event.

Hiking

Hiking is allowed in all national park areas of Belize and is an attraction to many tourists. As a guide, you will need to make sure your guests are properly prepared for hiking in the forested environment of most parks, with good footwear, ample water, bug repellent, and appropriate clothing for the heat and sun.

Biking

Bicycle rentals are available at many of the main tourist centers in the country, for ease of getting around locally. Other tourists do come to Belize on bicycling trips, and travel around the country. Caution is advised, as roads are not wide, and traffic is often not used to taking care with bicyclists on the road.

Camping

Camping is allowed in the national parks in Belize, as well as in other protected areas. An exception to this is Mountain Pine Ridge National Park and the areas around protected archeological sites. Many places have rudimentary facilities to assist campers, and have designated camping sites. Some have simple thatched or wood bandas for shelter.

Birdwatching

Birding is very popular with many tourists visiting Belize, who are eager to explore Belize's rich avifauna. The spotting and identification of different birds is a skill that takes time, patience, and practice to develop, as the differences between species are often subtle and hard to detect to the untrained eye. A good bird guide book, an excellent pair of binoculars, and a spirit of discovery are essential for a guide when going out birdwatching. River environments provide excellent habitat for birdwatching, and many tourists will do birdwatching in the course of river trips. Walking and hiking into forests is another way to bird watch. There are approximately 540 species of birds in Belize, with 20 percent of the total avifauna being migrant species.

The Jabiru Stork, the largest flying bird in Central America, is a bird that many tourists wish to see. The Keel Billed Toucan, the national bird of Belize is another popular bird that tourists enjoy seeing.

There are good birding locations throughout Belize. Particular areas that are visited for birding include Crooked Tree Wildlife Sanctuary, Rio Bravo Conservation Area, Cockscomb Basin Wildlife Sanctuary, New River Lagoon and Shipstern Lagoon. The cayes offer excellent opportunities for seeing ocean and water birds.

Caving

Due to Belize's geography, and its main foundation of limestone rock, the country has a great variety of complex cave systems, some still being discovered. Caving is becoming an increasingly popular tourist experience, and the need for good training in cave guiding is increasing. Caves present challenges in guiding the surfaces inside caves are fragile, and footing can be treacherous. Thus, the risks of damage to the cave, and of injury to the visitor, are both high. Because many caves are located along river systems, with underground water flowing through them, there is also the risk of changes in water level within the cave system. Main attractions in caves are crystal formations, formed over millions of years. Stalactites are large crystal columns that grow down from the sides or ceiling of a cave, while stalagmites are large crystal columns that grow upwards from the floor of a cave. Most of the caves in Belize were also used by the ancient Maya, and Maya artifacts have been found in the caves discovered so far.

Table 4: Popular Caving Sites in Belize

Site	Description	Location
Caves Branch River	Cave tubing is available along this river, a tributary of the Sibun River, where you can float down river on a tube through a series of caves, led by a guide	Central Belize
St. Herman's Cave	Located in Blue Hole National Park this large cave is easily accessible from the Western Highway. It is entered through a series of steps originally cut by the Maya and the path inside meanders beside an underground river To go further than the initial chambers, you must be in the company of a guide, and the route inside is slippery and requires care, but is worth the effort The Blue Hole, a nearby cenote, and part of the same cave system, offers the possibility of a refreshing swim	Central Belize
Rio Frio Cave	Located in the Mountain Pine Ridge, this cave features an enormous arched entrance way (65 feet) leading into a ½ mile long cave	Western Belize
Chechem Ha Cave	Located in the Vaca Plateau south of San Ignacio, this large cave is known for the Maya artifacts found inside, some of them up to 2,000 years old. Guided trips into the cave are available.	Western Belize
Chiquibul Cave System	Located in western Belize, west of Caracol, and continuing on into Guatemala, this cave system is the longest cave system in Central America, and features the largest cave yet discovered in Belize, the Cebada, and a vast system of caves, many as yet still unexplored	Western Belize
Gumercindo Cave	Believed to be the third largest cave in the world this cave is named after its first visitor. Gumercindo Panti, from Succotz: The caves located south. Of Caracol, and continues into Guatemala.	Western Belize
Little Quartz Ridge, Blue Creek Cave. Hokeb Ha Cave	These cave systems are known in the Toledo District, but visitation remain minimal.	Southern Belize

Horseback riding

Horseback riding is available in many parts of the country, particularly in western Belize around San Ignacio. Many upscale hotels and resorts offer horseback riding as an optional activity. Riding is also available in Orange Walk District, in the Rio Bravo area.

Archeological touring

As a part of the Mundo Maya, Belize offers a variety of ancient Mayan archeological attractions for visitors to explore, and more are being discovered and excavated all the time, contributing to an increasing understanding of the ancient Mayan world. While Belize was once thought to be on the fringe of Mayan civilization, recent discoveries lead to the conclusion that Belize was, in fact, at the center of Mayan civilization for much of Mayan history, and its city states played an important role in Mayan history.

These sites and their significance will be explored in greater depth in Chapter 5: The World of the Maya.

Table 5: Archaeological Sites of Belize

Northern Belize	Western Belize	Southern Belize
Major Sites	Major Sites	Major Sites
Lamanai	Caracol	Lubaantun
Altun Ha		Nim Li Punit
Minor Sites	Minor Sites	Minor Sites
Santa Rita	Cahal Pech	Mayflower Archaeological Reserve
Cerros	Xunantunich	Uxbenka
Nohmul		Pusilha
Cuello		
Chan Chich		
La Milpa		

SKILL CHECK

EXERCISE 1:

On the blank map provided, locate five sites where tourism activity takes place. Indicate what tourism activities take place at that site. Make sure to indicate a range of activities, including marine, terrestrial and archeological activities.



EXERCISE 2:

Write a paragraph describing the role of the tour guide within the tourism network. (Discuss why tourism is important to Belize, and how the tour guide interacts within the tourism network to help sustain Belize's tourism development.)

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CHAPTER 3: NATURAL HISTORY OF BELIZE

INTRODUCTION:

Belize is small in area, yet home to a rich variety of biodiversity. Today, over 70% of Belize's total area is still dominated by natural vegetation; and about 41% is under some form of protected status (including forest and marine reserves). As a tour guide, your knowledge of Belize's natural history is crucial to the delivery of both terrestrial and marine-based tours. This knowledge, shared through the skilled interpretation you provide in your tours, will enrich the learning experience of the tourists.

This chapter will provide a comprehensive overview of the dynamics of terrestrial and marine ecosystems; and, it will present important information to assist you to play an active role in the continued protection of Belize's natural heritage.

OBJECTIVES:

At the end of this chapter, you will be able to:

1. Define what an ecosystem is, and identify the various ecosystems found in Belize.
2. Define the key aspects of Belize's geography that influence the ecosystems found in the country
3. Outline the importance of each ecosystem found in Belize
4. Identify common flora and fauna and examples of each ecosystem found in Belize

ASSESSMENT:

A written test consisting of multiple choice and open-ended questions will be administered at the completion of Units 1 and 2 and again after completion of Units 3 and 4. Questions will be based on the key concepts discussed in each unit of this chapter.

AT A GLANCE:

- Unit 1: Introduction to Ecosystems
- Unit 2: Terrestrial Ecosystems of Belize
- Unit 3: Marine Ecosystems of Belize
- Unit 4: Protected Areas of Belize

UNIT 1: INTRODUCTION TO ECOSYSTEMS

This unit will provide an overview of what ecosystems are and how they function. We will discuss how the geography of Belize plays a critical role in defining the wide diversity of flora and fauna found throughout the country.

OBJECTIVES:

At the end of this unit, you will be able to:

1. Define an ecosystem and explain how it functions
2. Define key ecological concepts
3. Define the key aspects of Belize's geography and explain how Belize's geography is directly linked to the rich biodiversity found in the country.
4. Learn some essential goods and services produced by ecosystems

AT A GLANCE:

1. Ecosystems: Design and Function – An Overview
2. Key Ecological Concepts
3. Ecosystems of Belize



ECOSYSTEMS: DESIGN AND FUNCTION: AN OVERVIEW

WHAT IS NATURAL HISTORY?

Natural History is the study of the natural world, its development and how organisms change and evolve over time. Organisms relate to each other in a variety of ways, and these relationships change over time. One way of looking at natural history is through ecology, or the study of ecosystems.

Understanding the design and function of ecosystems as well as the geographic factors that determine the types of ecosystems found in Belize are fundamental concepts underlying the discussion of Belize's natural history.

WHAT IS AN ECOSYSTEM?

An **ecosystem** may be defined as a self-sustaining and self-regulating natural community of organisms (i.e. living things) interacting with one another and their environment (Miller, 1985). A **community** consists of populations of plants and animals living in a given area at a given time (Miller, 1985). The 'given area' is the habitat of the plants and animals. **Habitat** is a place where a plant or animal gets the food, water, shelter and space it needs to live. An organism's environment consists of *biotic* (living things) and *abiotic* (nonliving) factors.

From its environment, a living thing -plant, animal, fungus or microbe- derives the conditions that enable it to survive, including food (energy) water, living space, sunlight and a multitude of other essentials. There are even in-built biological controls, such as grazers and browsers for plants, and predators for animals, that prohibit overpopulation. The in-built biological controls also include parasites, diseases and others. A healthy ecosystem is one in which all the organisms are in balance with one another.

Table 3.1:

Examples of biotic and abiotic factors that organisms must deal with in order to survive in an ecosystem

Biotic	<ul style="list-style-type: none"> • prey - plants and animals used for food • grazing and browsing animals • competing plants and animals • predators - animals that feed on other animals • internal and external parasites • disease causing bacteria, viruses and fungi
Abiotic	<ul style="list-style-type: none"> • weather and climate including: sunlight, wind, rainfall, humidity • soil characteristics including: composition, nutrients, slope, erosion, water retention/drainage • disturbance factors including: naturally caused fires, floods, hurricanes
Human-induced	<ul style="list-style-type: none"> • destruction - clear-cutting of forests for permanent development, filling of wetlands • arson and carelessly caused fires • pollution - chemical, sediment, solid waste • damming & diversion of water way • inundation • hunting/selective removal of animals & plants • poorly controlled tourism visitation causing trampling, noise & litter leading to frightening of wildlife, disturbance to reproduction, soil compaction, trashing

Disturbance is a major factor in ecosystem alteration. It may be natural (caused by abiotic factors such as extreme weather) or human-generated. Even though human beings are living organisms, our ability to change natural ecosystems - literally dismantling all or part of them for conversion to our own ends - puts human-induced disturbance in a category distinct from that brought about by natural means. Human-induced disturbances often result in long term, even permanent, disruption. As we shall see later, this has profound implications for continuation of the smooth function of ecosystems.

Species within an ecosystem have evolved not only to maximize their own abilities to collect energy, but to fit in with other ecosystem components and maximize the energy taken in and processed by the whole. This is how ecosystems sustain themselves over time. If conditions change, then the ecosystem will also change over time to fit the new conditions. Neighboring ecosystems and the organisms that live in them also make their mark causing the ecosystems to change slightly, rapidly or slowly.

For example, changes in soil factors are of particular importance in determining boundaries between ecosystems. If a broadleaf forest growing on shallow soil is cleared for milpa, and very heavy rains fall soon after, the meager top soil may be washed away. This may result in failure of the forest to regenerate after the milpa is abandoned, savanna may replace the broadleaf forest.

BIODIVERSITY

Our planet's *biodiversity* is the sum total of all the different kinds of living things on the earth. An ecosystem's biodiversity consist of all the different kinds of living things within that ecosystem. Ecosystems need all the different species of organisms that make them up to work together to collect energy. Each organism not only contributes to itself but also to others in the system, similar to a team. A reduction of biodiversity in an ecosystem may result in a reduced ability to collect energy, which may ultimately result in the ecosystem being unable to perform effectively. Thus, maximum biodiversity is essential to healthy ecosystems.

The two ecosystems on earth with the highest biodiversity are tropical broadleaf forests and coral reefs. Those having among the lowest biodiversity include deserts and permafrost; they have extreme abiotic conditions that permit relatively few species to survive.

HOW ECOSYSTEMS WORK

Ecosystems may be as small as one organism - with cells well grouped into organs that each perform a function in co-operation with the other - or as large as a planet, with component ecosystems connected by water or air flow, working together as a complete system. Our planet may be viewed as a spaceship, carrying all the necessary structures, components and mechanisms to support and sustain life.

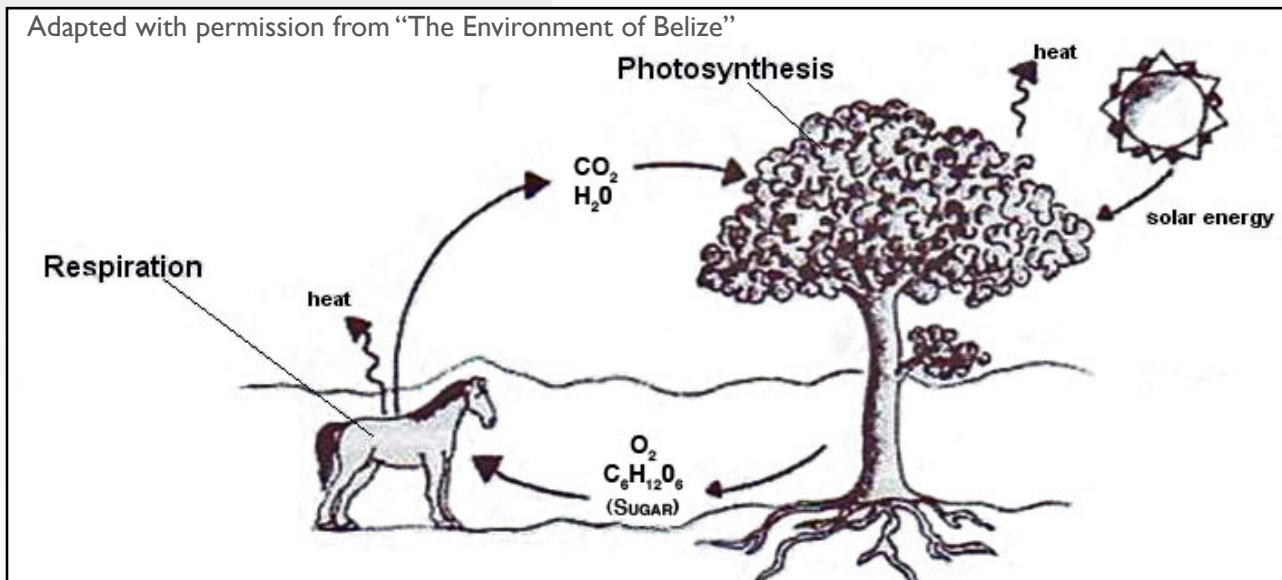
One way to study ecosystems, and the approach we will use in this chapter, is to look at like habitats as one ecosystem. However, it is essential to remember that all earth's ecosystems are interconnected, what happens in one ecosystem is usually felt in others, and often has far-reaching effects.

LIFE SUPPORT - ENERGY

Almost all energy on Earth comes from the star we know as the Sun. For example, solar energy powers the **water cycle**, which is the process of evaporation of water into the atmosphere where it condenses forming clouds, then precipitates and falls back to earth's surfaces and is again available for evaporation. Solar energy also powers **atmospheric movement** - what we know as wind - from high to low pressure areas.

Solar energy is used by plants to produce their own food by **photosynthesis** - a process that renders carbohydrates (sugars) and oxygen (O_2) from carbon dioxide (CO_2) and water. One important way that plants and animals work together in an ecosystem is by gas cycling. Plants take in carbon dioxide (CO_2), and release oxygen (O_2) during photosynthesis. Animals (and plants) take in oxygen (O_2) and release carbon dioxide (CO_2), during respiration. Thus, plants and animals function together to keep the supply of these important life-sustaining gases available in the ecosystem.

Figure 3.1. The Gas Cycling in Photosynthesis and Respiration



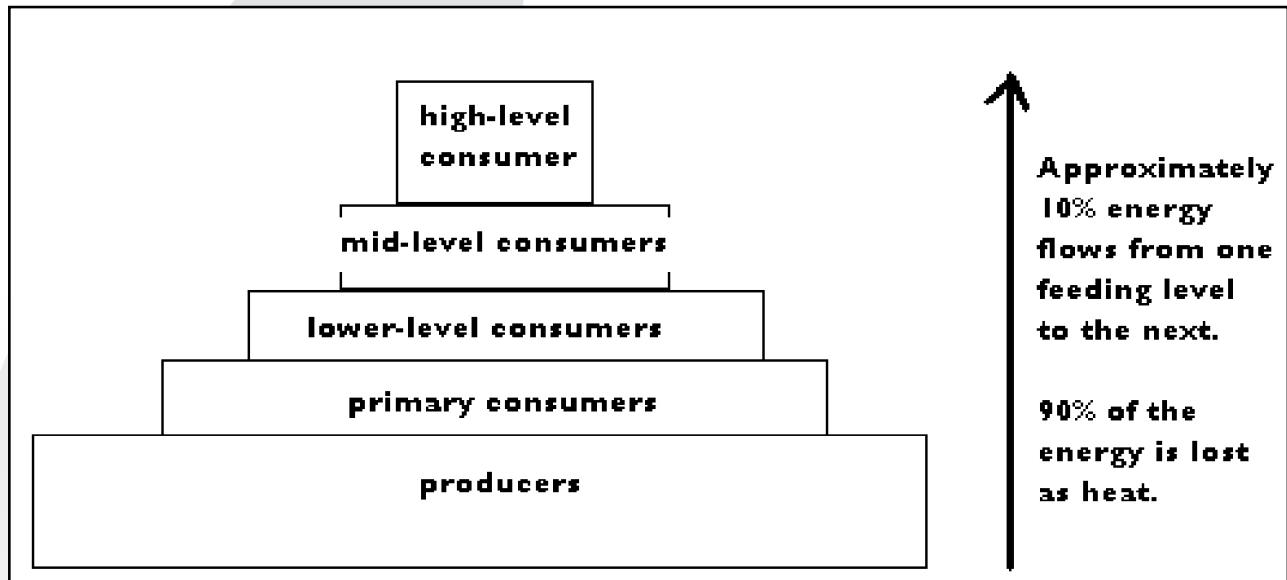
ENERGY FLOW

The process of photosynthesis makes available virtually all the energy passing through an ecosystem. The group of organisms that capture solar energy - plants - is, not surprisingly, called **producers**.

From the smallest to the largest, animals as a group derive their energy from either consuming plants, or from consuming other animals that consume plants. Animals are called **consumers**. Consumers that always or usually eat plants are termed **primary consumers**, while those that eat other animals are called **lower, mid-level or high-level consumers**. The lower the level, the closer the animal is to plants - the source of useful energy. This classification helps scientists to understand how energy moves through an ecosystem.

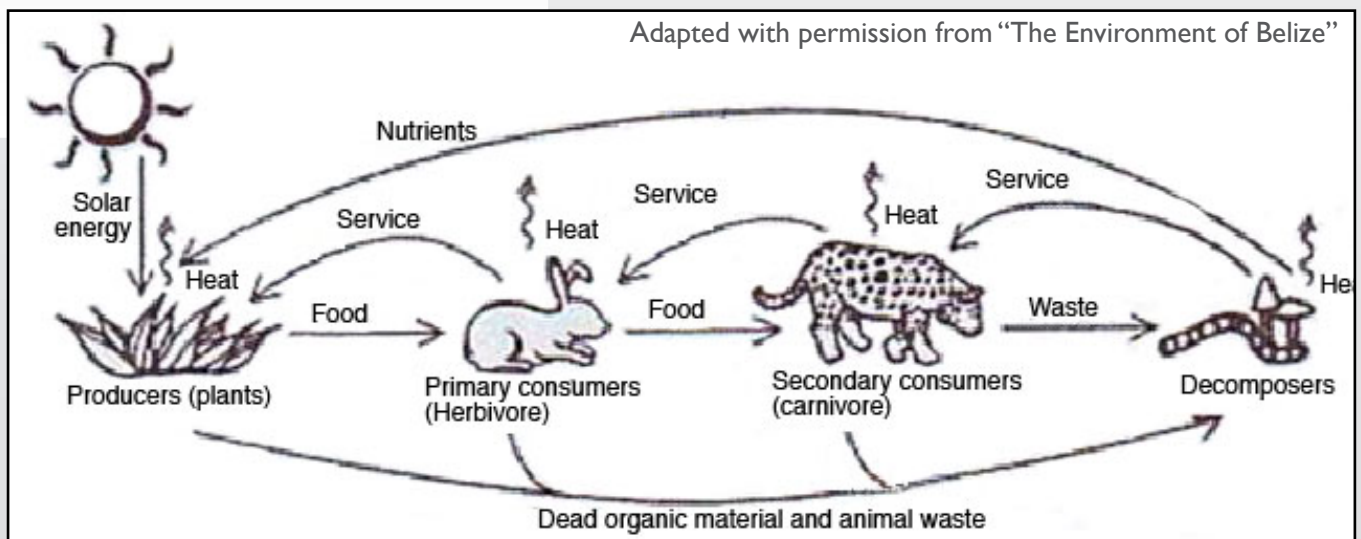
Each time an energy exchange occurs (e.g., a deer grazing, a hawk consuming a mouse; a barracuda consuming a wrasse), about 90% of the energy is lost as heat. Only about 10% of the energy is actually transferred to the consumer. This is why a high-level predator such as a jaguar requires such a large territory - it takes a lot of plants to feed the small animals that feed the larger animals that feed the jaguars.

Figure 3.2. Biomass and energy flow pyramid



Another type of ecosystem “duty” is nutrient recycling. When organisms secrete, die, or shed skin, leaves or other materials, their nutrients must be released into the ecosystem (recycled) by a group of organisms called **decomposers**. It is the job of these organisms to break up non-living organic material into its component parts so that other living organisms - plants and animals - can use them. While many people revile decomposers such as fungi and bacteria, or scavengers such as vultures (“John Crow”) and others, the world would be an unwholesome and cluttered place without them. It would also become starved for nutrients, as they would remain locked up in the first organism that picked them up. Without nutrient recycling, it would take a continuous input of outside energy to sustain life.

Figure 3.3. Diagram of a simplified Ecosystem

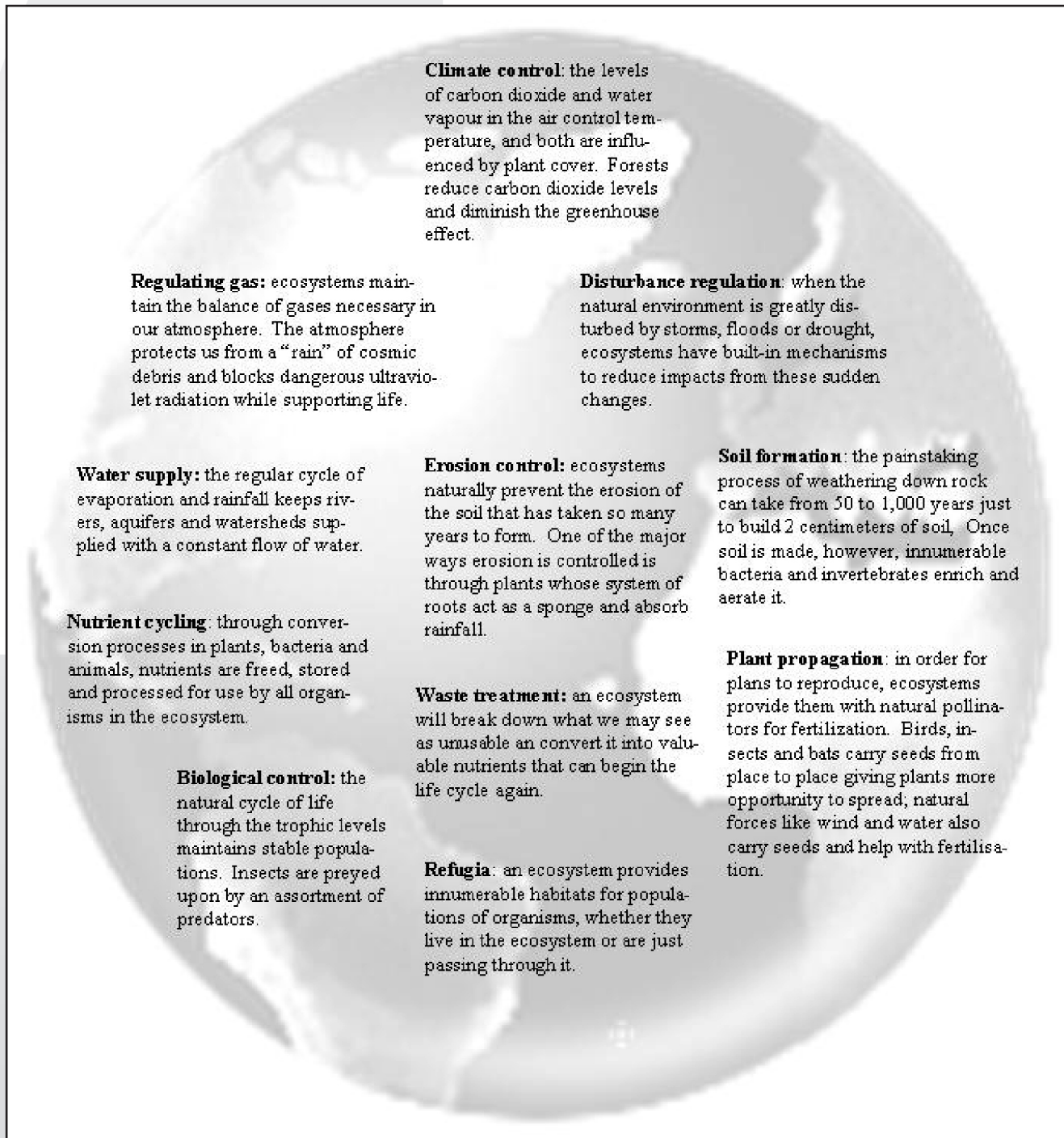


THE IMPORTANCE OF HEALTHY LIVING ECOSYSTEMS ON EARTH

Ecosystems provide goods and services that are routinely used by humans without thought to their origin. Without these goods and services, we cannot survive. At this point in time, human technology cannot replace the goods and services provided by the natural ecosystems. Thus, conservation of living ecosystems is not only good for the plants and animals living in them; it is essential for our own survival. Earth's living ecosystems are truly our life support system.

The diagram below shows some of the services natural ecosystems provide and which we often take for granted, without understanding where they originate.

Figure 7. Diagram of services provided by the natural Ecosystem



KEY ECOLOGICAL CONCEPTS

For your interpretation work as a tour guide, you will find it necessary to further your understanding of natural history and to use appropriate terms. To help you to do this, here are some terms frequently used when discussing ecosystems:

Habitat -The type of ecosystem where an animal lives - in other words, its home.

Carrying Capacity -The amount of organisms that can be supported by an ecosystem under a single set of environmental conditions. This may be changed drastically by such factors as weather or disturbance. While a year of plentiful rainfall may result in lush production, supporting high populations of grazers as well as predators, the next year may be very dry, with low plant production. In this latter case, the ecosystem's carrying capacity has been reduced. Sadly, this is often reflected in die-off by starvation of all levels of consumers.

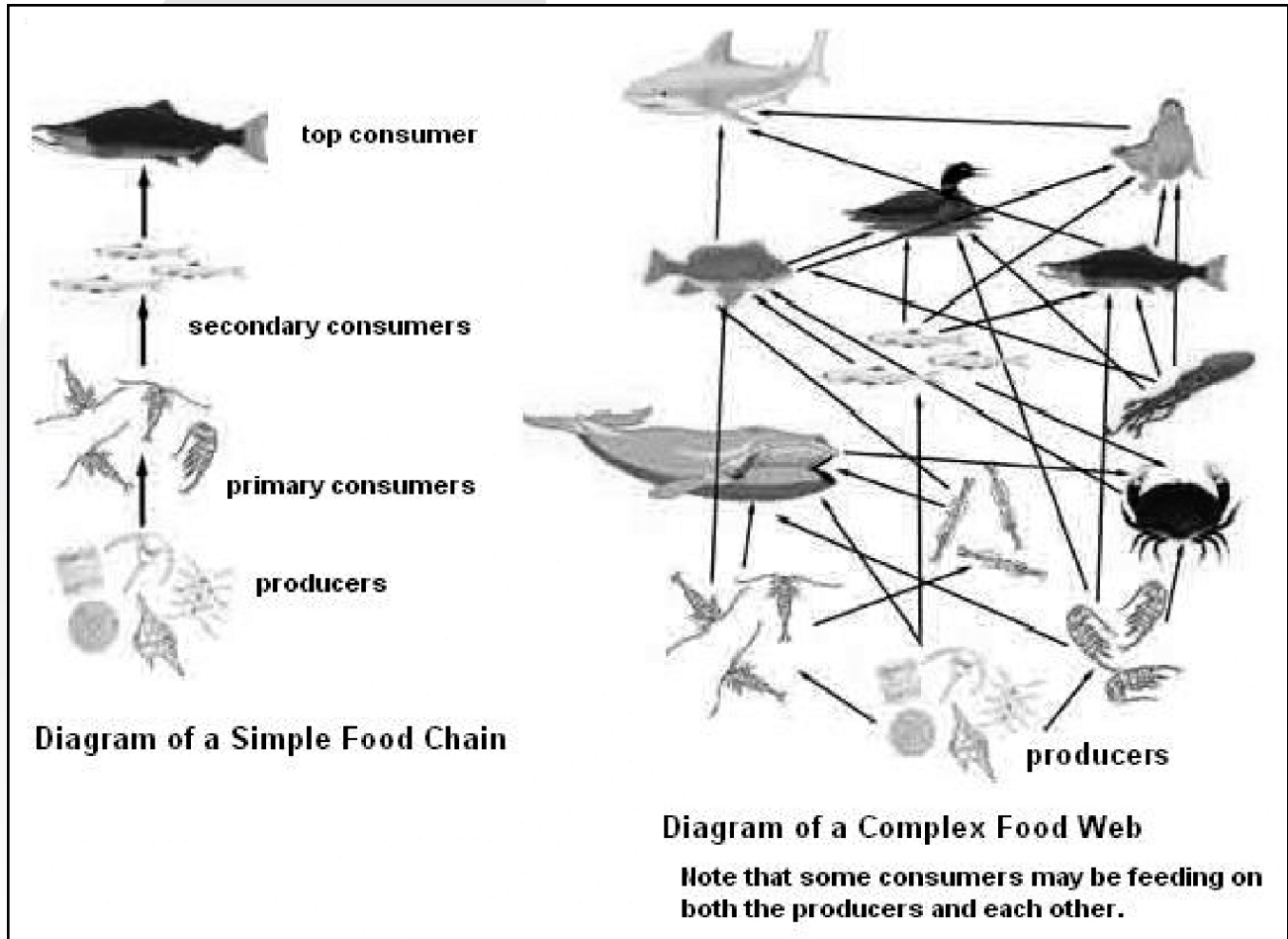
Extinction -The final end of a species, usually brought about by rapid and drastic change that impacts the species itself, or the ecosystem in which the species lives. Some species have actually been hunted to extinction by humans. For example, the Stellar's Sea-cow, a large Arctic relative of the manatee, was hunted to extinction less than 30 years following its discovery. Some species are so central to the web of life that their extinction may result in the loss of others who depend on them; this may also be true of certain habitats. These are known as keystone species and habitats. Example: a rare rainforest bee species pollinates six tree species throughout the year. One tree species is completely removed by logging. The bee colony is left without one of its food sources. Unless it can adapt to use a different tree, extinction will occur. Without pollination, the remaining trees serviced by the now-extinct bee have no pollinator. If no other species arises to perform the job, the other trees will also decline over time because there will be no young ones to replace the older generation. Thus, other organisms that depend on the tree species will also ultimately be faced with the challenge to adapt to new conditions or follow the others into extinction. This is termed a *cascade event*.

Symbiosis - Partnerships between organisms. Partnerships that enhance survival by providing teamwork between organisms are termed *mutualistic symbioses*. These are particularly important in promoting survival in a tough environment where organisms are competing for living space and food, while evading predators. Those that function to the benefit of one organism but do not hinder the other are called *commensal relationships*. An organism that benefits from a host that suffers harm by the relationship is termed a *parasite*; such a relationship is called *parasitism*.

Antibiosis - Many organisms that cannot move have developed chemical defenses - chemical compounds produced by their bodies that act on their environment to hinder competitors or those organisms that would consume them. Some of these chemical defense compounds have been found to be useful in fighting disease in humans; have you ever taken antibiotics to fight an illness?

Food Web -This is simply the feeding relationships between organisms; a complex of interrelated food chains in an ecological community. The basis of this is always solar energy, which supports plant life.

Figure 3.5. Diagrams of Marine based Food Chain and a Food Web

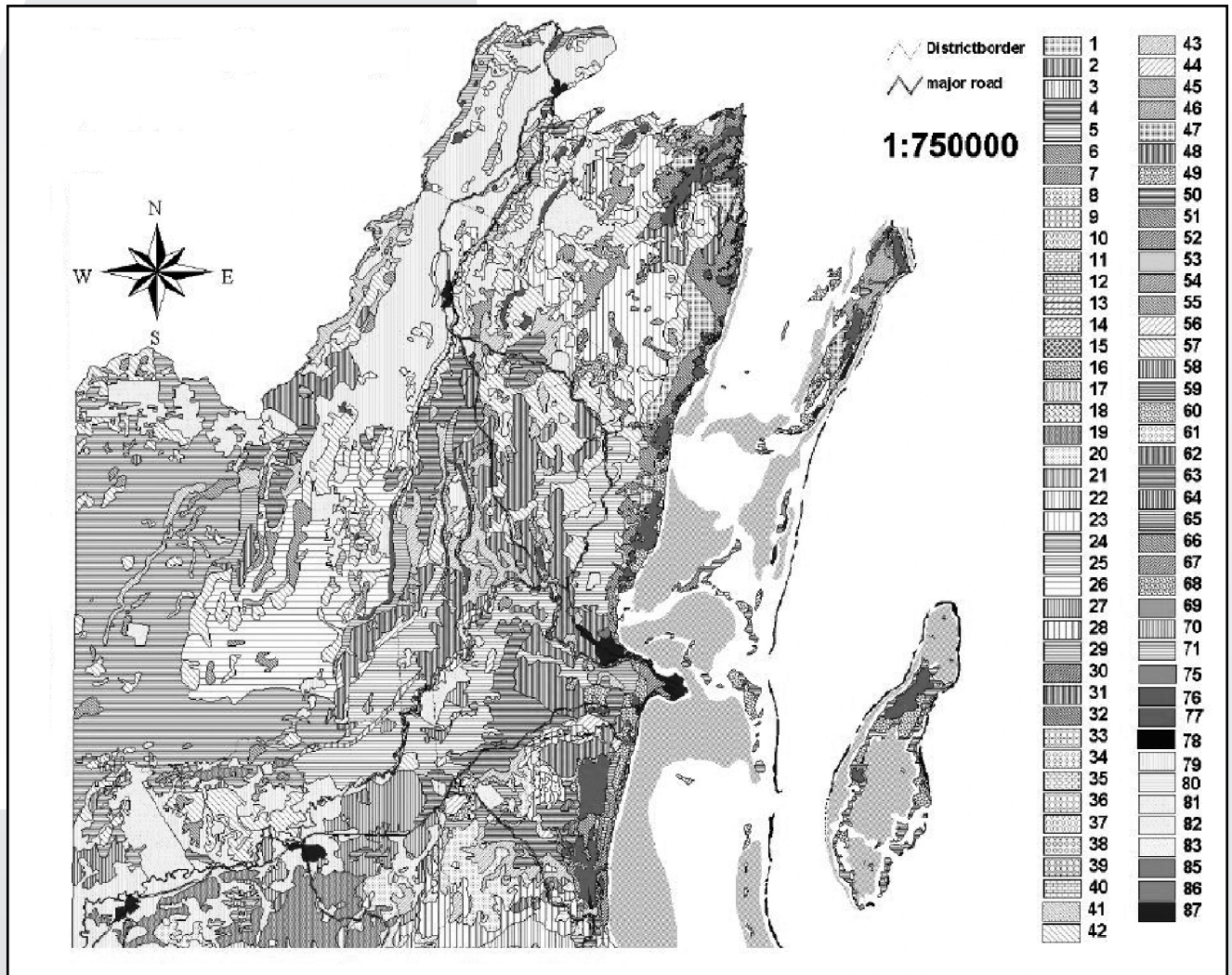


THE ECOSYSTEMS OF BELIZE

In Chapter 2, we learned that Belize has a total land area of 22,923 square kilometers (8,867 square miles) and lies south of Mexico and east of Guatemala. Offshore, lies the magnificent barrier reef extending the length of our coastline. Associated with it are over 200 cays situated within the Barrier Reef Lagoon and three offshore atolls (see Unit 3 of this chapter).

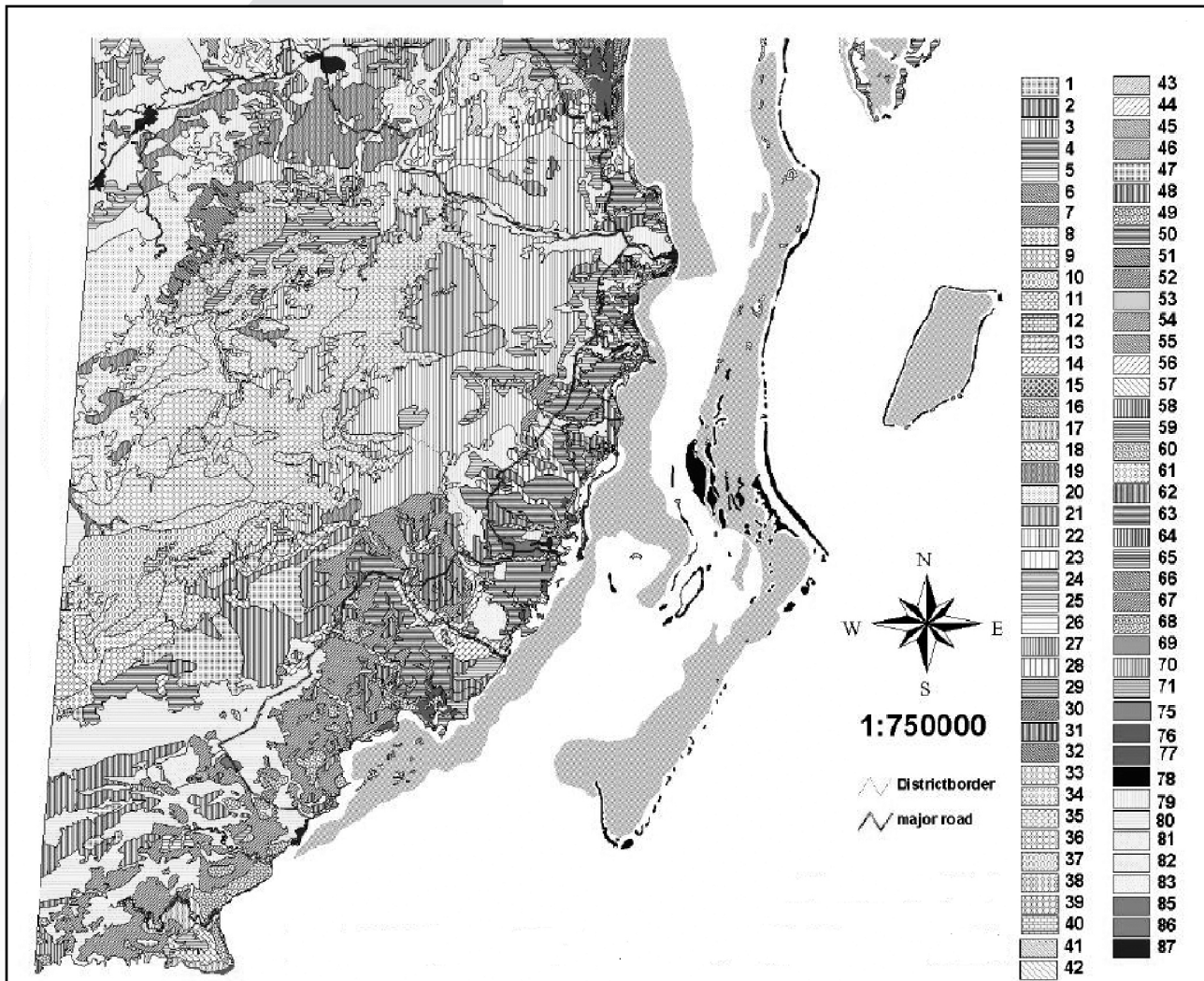
The maps below show the various ecosystems found in northern and southern Belize.

Map 3.1. Ecosystems of Northern Belize



Source: Meerman & Sabido Central American Ecosystems Map - 2001

Map 3.2. Ecosystems of Southern Belize



Source: Meerman & Sabido Central American Ecosystems Map - 2001

Three main geographic factors determine the type of ecosystems that thrive in a specific location. These factors are: latitude, soils and landforms, and rainfall. Altitude also plays a part in ecosystem determination but is not as significant in Belize as it is in other countries. To understand how these factors influence ecosystems, let's take a closer look at each factor.

LATITUDE

Latitude is the angular distance north or south of the earth's equator (measured in degrees along a meridian, as on a map or globe). In general, the closer one is to the Equator, the warmer the weather. As we learned in Chapter 1, Belize lies just south of the Tropic of Cancer, occupying the area from approximately Latitude 15 degrees N. to 18 degrees N., and Longitude 88 degrees W. to 91 degrees W. This location is a transition zone from subtropical to tropical climatic conditions, and temperature is a significant determinant of possible ecosystem types in the area. Thus Belize's location in a transition zone is one of the principal reasons that Belize has a variety of habitats.

SOILS AND LANDFORMS

Of all determinants of vegetation in Belize, soil is the most important. Its composition (including nutrient and salt content) and depth above bedrock generally defines basic vegetation type. Another important attribute of soil is drainage. Well-drained soil may support a wide variety of vegetation, while poorly drained soil results in varying degrees of standing water and more limited vegetation. Finally, soil erodability (readiness to erode from water and wind), along with slope and rainfall, will determine how long soil will remain in a location.

Through the passage of time, stone is converted into soil by expansion and contraction from temperature changes, wind and water erosion, and the roots of plants. It can take as long as 500 years to create just 1 centimeter (0.4 inch) of soil; yet erosion from deforestation, especially on riversides and along the sea, may lead to the loss of many centimeters during the course of a single flood event.

Belize was under the sea for at least three times in its history. As a result, much of our country's soils are made principally of limestone. Limestone is produced from the skeletal remains of sea creatures from millions of years ago. Over time, pressure and chemical processes turned these remains into limestone. Limestone soils have calcium carbonate (CaCO_3) as their principal component. Less common soils in Belize are derived from granite, which comes from igneous magma intrusion, and are mainly composed of quartz (Silica Dioxide, SiO_2) (Campbell et al, 1996).

Limestone rock is relatively soft and is riddled with cracks and fissures. When it is pounded by rain and more rain, over millennia, water dribbles down through the crevices, eroding as it goes. In this fashion caves are formed. The reason why Belize has so many caves is because we have so much limestone rock.

Another important feature of Belize is the Maya Mountains. These mountains cover one-third of our entire country and are the oldest mountains in all of Central America; the oldest rocks in Belize occur here. Remnants from the first time above water, these Paleozoic rocks are remnants of Belize's volcanic beginnings. They have been dry land for the past 65 million years and occupy the western central portion of the country.

During the formation of the Maya Mountains, the limestone that once covered the area was broken into large pieces containing many holes and fissures forming what is called *karst* landscape. Large areas of Belize, especially in the north, where a large shallow sea persisted after the mountains had been formed are karst. Karst also comprises most of the central and southern foothills, which mainly have granitic cores overlain by limestone. The central foothills are principally old eroded limestone hills, called *tower karst*.

Erosion has moved some of the limestone soils along waterways in the mountains and hills, resulting in a web-work of gallery forests threaded through vast areas of shallow sandy soils of granitic origin which support only savanna. This is the area known as Mountain Pine Ridge.

Along coastal areas, the land is principally low-lying, as in much of the northern portion of the country. Much of this is karst, while the remainder is covered by varying depths of water-deposited quartz and limestone sand. A further diversity of ecosystems is observed in the coastal zone, where salt content of the soil begins to limit vegetation.

A small minority of Belize's soils are deep, well-drained and fertile and therefore well-suited for farming (Class I soils). It is estimated that only 16% of Belize's total area is suitable for agriculture. The remainder of Belize's area is not suitable for farming. Reasons for this range from topography (i.e. slopes that are too high) to soil characteristics (for example, soils that are waterlogged all or part of the year, soils containing salt or some other mineral, and soils that are nutrient poor and/or highly erodable). (Country-wide Government-sponsored study from the UK, 1993; King et al, 1992, 1993).

RAINFALL

As noted previously, Belize occupies a position along the Caribbean coast of the Yucatan Peninsula, a transition zone from subtropical to tropical climatic conditions. Rainfall in Punta Gorda is about four times greater than that in Corozal; the amount of rain in the mountains is higher still. The amount of rainfall has profound effects on some of the tree species' growth, including height, flowering time, fruiting time and other processes that are determined by presence or absence of rainfall.

Differences in amount of rainfall lead to considerable variation within the habitat type from north to south. For example, broadleaf forests, the habitat still covering the largest area in Belize, differ considerably from north to south, largely due to duration and intensity of the dry season as well as total rainfall. Thus, while soil determines general ecosystem type, rainfall will create ecosystem sub-types.

ALTITUDE

Although Belize is not a country of extreme heights, higher elevations do affect the type of plants that can live in those habitats. Some effects on plant survival are due to soil and landform factors, such as slope and soil depth. Slope, for example, determines such factors as forest height and canopy structure. Other factors include reduced temperature and the highest rainfall in the country. This mixture results in distinct plant communities at higher elevations, some of which are not found in lower parts of the country.

These geographic factors - latitude, soil, rainfall and altitude - have influenced the formation of a wide range of ecosystems spanning the length and breadth of our country. The main ecosystems found in Belize are:

1. Broadleaf Forests
2. Savannas
3. Wetlands (freshwater)
4. Coastal Lagoons and Estuaries
5. Mangroves
6. Littoral Forests
7. Sea grasses
8. Coral Reefs

Units 2 and 3 will discuss each of these ecosystems in depth.

SKILL CHECK

Divide into groups of two or three and use the Manual and your notes to search out the answers: *(Note: Brief answers only)*

1. What is an ecosystem? Habitat? Carrying Capacity? Extinction? Symbiosis? Antibiosis?

2. What is the principal source of energy for life on Earth?

3. Why are plants essential for life on Earth?

4. What is a producer? A consumer? A decomposer?

5. Name 3 services our planet's ecosystems provide for us.

6. Why does Belize have so many ecosystems?

7. Name and briefly describe the principal factors that determine ecosystem type and subtype.

8. What are the most common soils in Belize? How are they formed? Where are they found?

9. How are caves formed?

10. How were the Maya Mountains formed?

11. Where are the oldest rocks in Belize located? How old are they?

12. List the various ecosystems found in Belize.

UNIT 2: TERRESTRIAL ECOSYSTEMS OF BELIZE

Terrestrial ecosystems are those that are land-based and marine ecosystems are those that are salt water based. According to the Central American Ecosystems Mapping Project, a total of eighty-five terrestrial ecosystems have been identified in Belize. In this unit, we will look at the four primary terrestrial ecosystems that cover Belize. To deliver a successful terrestrial-based tour, tour guides need to possess general knowledge of Belize's natural history in order to interpret its flora and fauna in an educational and interesting manner.

This unit is directly linked with the interpretation of natural history section covered in Chapter 1 and will provide you with an overview of each of the primary terrestrial ecosystems. The overview will define each ecosystem, discuss its importance and benefits, provide examples of each and highlight key flora and fauna found in each.

OBJECTIVES:

At the end of this unit, you will be able to:

1. Name and describe each of four terrestrial ecosystems
2. Name areas in Belize where each ecosystem is located
3. Describe the importance of each ecosystem
4. Identify common flora and fauna of each ecosystem
5. Identify and discuss threats to terrestrial ecosystems resulting from human impacts and conservation efforts
6. Interpret this information to class members as if on a tour

AT A GLANCE:

1. Broadleaf Forests
2. Savanna Ecosystems
3. Wetland Ecosystems – Freshwater
4. Cave Systems
5. Threats to Terrestrial Ecosystems and Conservation Efforts



BROADLEAF FORESTS

INTRODUCTION

Approximately sixty five percent of the mainland surface of Belize is covered by Tropical and Subtropical Broadleaf Forest (BLF), making it the dominant terrestrial ecosystem. Maps 3.1(a) and 3.1(b), Ecosystems of Belize, on pages 87 - 88 show the distribution of Lowland BLF, Submontane BLF and Montane BLF.

Broadleaf forest may be defined as being a forest dominated by broad-leaved tree species; typified by warm temperatures (average 21 - 32°C; 70 - 90°F); heavy rainfall; generally growing in stratified form (layers); and, exhibiting canopy structure. These forests are also typified by immense biodiversity and complex inter-species relationships, including a high degree of interdependence.

General characteristics of broadleaf forests are:

1. Tropical - subtropical broadleaf forests occur as a broad green belt around the equator to about 20 degrees north and south latitude, wherever topographic conditions permit.
2. Originally such forests covered an estimated 12% of the earth's surface. Accelerating deforestation associated with explosive human population growth has reduced the forest cover, such that less than 7% of the earth's surface now remains covered with these forests.
3. True Tropical Rainforest requires more than 380 cm.(150 inches) of rain each year! In Belize, only the Toledo District has true tropical rainforest. In these forests, a dry season is practically nonexistent.
4. Other BLF types in Belize have rainfall of 150 cm.(60 inches) and higher.

Broadleaf forests in Belize may grow on a wide variety of soils differentiated by whether they are basically composed of calcium carbonate (CaCO_3) or silica dioxide (SiO_2), well or poorly drained, deep or shallow, and rather poor in nutrients. In these soils, over 90% of the nutrients are either picked up by plants or leached out within the top 5 cm (2 inches) of soils. This means that plants must be fast at nutrient collection, or they loose out.

Fortunately, help for the plants is at hand in the form of partnerships (mutualistic symbioses) with special fungi that harbor in the roots of the great trees. These fungi, called *mycorrhizal associates*, help plants by speeding up the breakdown of leaves, twigs and other non-living organic material, called *forest litter*, found on the forest floor. Thus, the bulk of energy in the ecosystem is bound up within the living things, rather than existing as a rich pool of nutrients in soil.

Shallow soils with quickly disappearing nutrients also have their effect on the form taken by the roots of the great trees. Roots spread over the surface of the soil for considerable distances from the tree. This growth form aids in covering ground to increase nutrient uptake, as well as providing support to the tree in the absence of deep taproots. This type of root formation is one reason for the difficulty in walking while looking up at forest life - you are likely to stumble over these shallow roots!

In some areas, especially where water runs near trees, plank buttresses grow in response to undermining or sinking on one side of the tree. They take the form of narrow flanges or wedges of wood projecting from one side of the tree, stretching from the ground to a few meters from the base of the tree. These buttresses prolong the life of the tree by compensating for changing ground levels.

It is important to note that each tree that grows on a patch of soil changes that soil slightly to suit itself. These trends are relatively short-lived and will change when a different species of tree occupies the territory. Usually this works to assure that no species becomes dominant over the other. However, Cohune Palms (*Orbygina cohune*) and some other palm species are an important exception. Cohune ridges form where Cohune trees have conditioned the soil so that it favors survival for this species.

FOREST SUCCESSION

Succession is the orderly appearance of one life form after another as conditions in an area change. Succession in a forest begins when a gap opens by natural tree fall or a larger area is cleared by fire, flood, hurricane, or temporary agriculture.

The natural seed bank that was lying dormant among the forest floor litter springs to life. Certain species of plants suited for open space germinate and begin to compete furiously to fill the open space. This continues over time as each group of plants out competes the previous one.

Forest that has been untouched and has never been cut is called **primary forest**. Forest that has regenerated after clear-cutting is called **secondary forest**. Early regenerating forest (\approx 2-5 years) is called guamil (wamil). Belize has very little primary forest remaining due to its long history of logging. Additionally, the human population was far higher during the time of the Classic Maya than now, resulting in a higher percentage of cleared forest. Belize's forests have since regenerated but most are classified as secondary forest.

IMPORTANCE OF BROADLEAF FORESTS

Broadleaf forests are very important to the general health of our environment. They play several critical roles:

1. **Climate control**

The dense layers of vegetation characterizing BLFs have an important function in climate control. Some aspects of global climate change, including a trend towards local drying and warming, have resulted from their destruction.

2. **Maintenance of relatively constant temperature, light and humidity**

The constant environment under the canopy allows living things to flourish and form countless adaptations over time. This function is important globally as well as for the ecosystem's own life. (See 'The Greenhouse Effect' below)

3. **Filtration of pounding rainwater through canopy layers**

Thick vegetation of the canopy layers softens the effect of heavy rains, preventing erosion and soil loss. The dense canopy also reduces the loss of moisture from evaporation.

4. **Absorption of carbon dioxide (CO²) and other industrial gases**

Because plants use the most common exhaust gas of human industry for fuel to make their own food by photosynthesis, forests are massive storehouses of carbon and help to lessen the impact of the Greenhouse effect.

5. Home to an estimated ½ of all species of living things on the planet

The forests continuity and adaptability to life in a low-nutrient environment has provided the opportunity over time for tremendous bio-diversity to evolve. Flora and fauna function together as a team to catch the maximum energy from the sun - a very successful ecosystem!

The Greenhouse Effect

Worldwide, forests essentially pick up CO₂ and store it in their bulk. They hold and prevent loss of water and soil, thereby having a disproportionate impact on weather conditions in the tropics.

Many countries are sufficiently industrialized that they release a lot of CO₂ and other gases that trap heat within our atmosphere that would otherwise escape. This is called the “Greenhouse Effect” because the gases in the atmosphere act like a greenhouse (a building that traps heat for growing warm-weather plants in cold countries). Healthy forests help to remove these gases from the atmosphere and maintain global temperature patterns. The more forests are removed (the burning of stumps, underbrush and other debris also adds to the CO₂ load in the atmosphere), the less opportunity for gas removal.

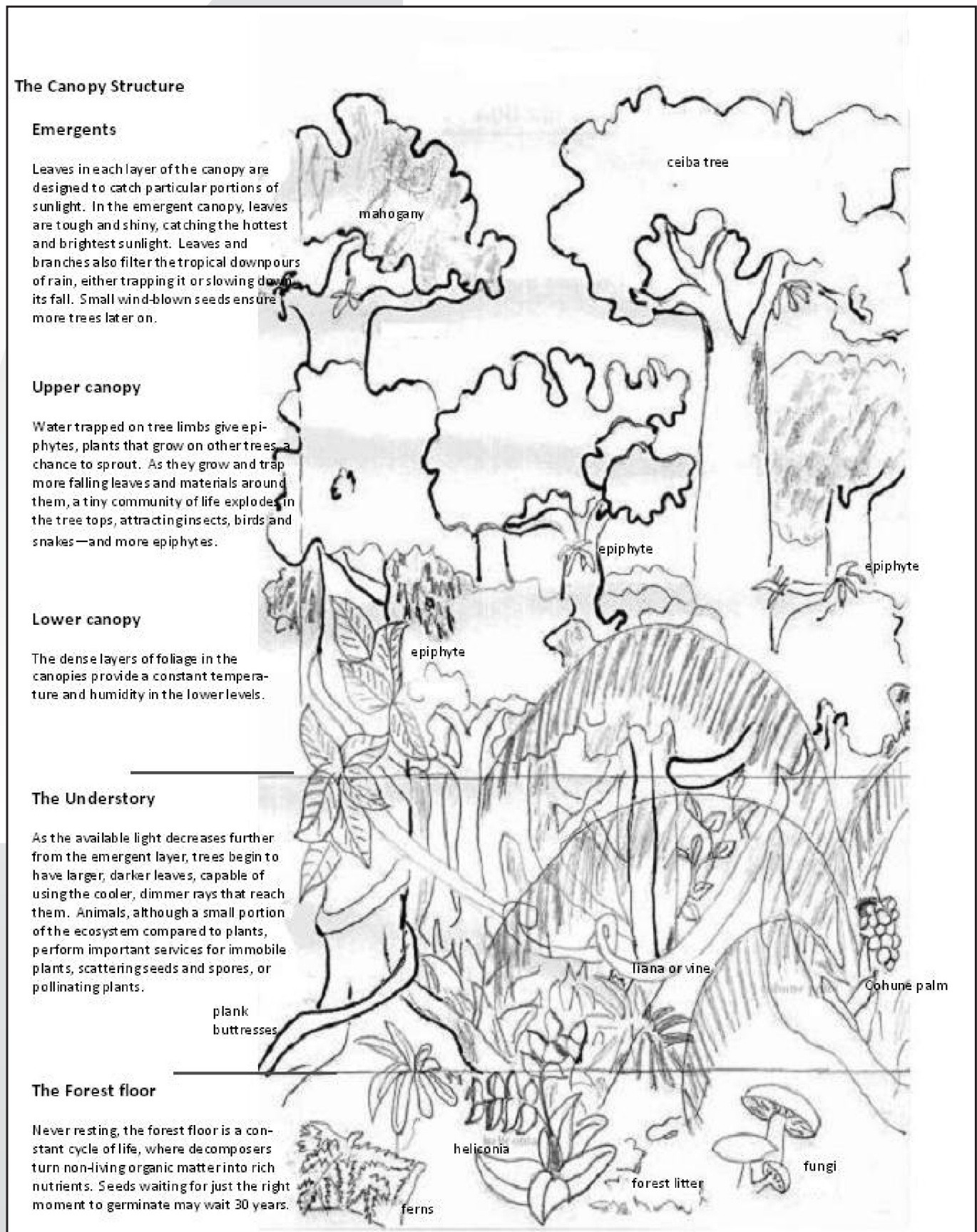
Ultimately, the mean temperature of our planet is increased, warming our planet and disrupting normal weather patterns around the globe. Temperature changes that have already occurred are blamed for the increase in frequency and severity of the El Niño phenomenon, which is now every 3-5 years instead of the previous cycle of every 5-7 years. El Niño events have enormous impact on many areas around the globe, causing thousands of human casualties and destruction with the poor in developing countries suffering the greatest losses. Scientists report that eight of the ten warmest years since 1860 have occurred in the last decade!

BROADLEAF FOREST: FORM AND FUNCTION

Broadleaf forests are organized into three stratified layers of plants:

1. Canopy - Emergents, Upper canopy and Lower canopy
2. Understory
3. Forest floor

A typical forest may be structured as shown in Figure 3.6 on the next page.

Figure 3.6. Structure of Broadleaf Forests

FLORA OF THE CANOPY STRUCTURE

The canopy structure of a broadleaf forest (BLF) is organized into one to three canopy layers - **Emergents, Upper canopy and Lower canopy**. A *canopy* is essentially an interconnected layer of trees growing at similar height, often connected by vines and lianas. Height and number of canopies vary according to landforms such as slope; soil type and depth; and time since the last hurricane, flood, fire or other localized catastrophic event. Let's take a look at the flora of each layer of the canopy.

EMERGENT

Emergent trees are generally taller than surrounding species growing to heights of over 60 meters (200 feet) so that their top branches project well above the upper canopy. Pollination and seed dispersal in these giants is often by wind.

There is a general trend toward small leaf size in emergent tree species; they often have small leaves or leaflets. Leaves are tough and shiny probably due to higher light levels - remember, photosynthesis occurs in leaves! Some have leaves which are symmetrical (having the midrib extend down the center of the leaf, dividing it in two), while others are asymmetrical (with the midrib off-center). A leaf's midrib is the major vein that passes nutrients and water back and forth to the leaf; most species have one midrib from which project smaller veins over the leaf's surface. A few groups have multiple midribs, making their leaves easier to identify, for example, the Melastome family. The leaves and branches of emergent trees filter the tropical downpours of rain, trapping some of it and slowing down its fall. Leaf tips are often shaped to permit water to drain off rather than remain and become fouled with algae, fungi and other growth.

Typical examples of emergent trees with widespread distribution in Belizean forests include the Mahogany, Guanacaste, Ceiba, Sapodilla and Spanish Cedar. Some characteristics of these trees are given in Table 3.2 below.

Species	Bark	Leaves	Interpretive Notes
Mahogany	Dark; rough; grooved	asymmetrical; 6-10 clumped opposite leaflets; $\approx 4-5 \times 2''$	Used for veneer & furniture. Traditionally harvested for more than 200 years by Baymen who used to stand on hills and search for red leaves during the dry season to locate trees for cutting
Spanish Cedar	Pale; vertical grooves	Asymmetrical; 18 - 24 opposite leaflets; $\approx 3-5''$	
Sapodilla (Chicle tree)	Dark; rough; often scarred with X-shaped cuts from bleeding chicle	Symmetrical; several spindle shaped leaves in clusters at branch tips	Used for chicle (chewing gum base)

Species	Bark	Leaves	Interpretive Notes
Ceiba (Silk Cotton tree)	Pale; smooth trunk often straight	Clusters of 5-8; lancet-shaped leaflets	Silky fibers used for stuffing; seed oil used for soap; trunks used for making boats. Held scared by Maya who believe that the soul of a person rises up the ceiba whose branches are in heaven.
Guanacaste (Tubroos)	Reddish to pale; smooth with many small lumps of knobs	40+ tiny rectangular leaflets arranged opposite on branch	

FLORA OF THE UPPER AND LOWER CANOPIES

BLF canopies are composed of a wide variety of tree species. A tree may begin life in the Understory, reach sufficient height to become part of the Lower canopy for a portion of its lifetime, then grow yet taller to join the Upper canopy. Average range in height of trees is 23 - 68 meters (75 - 223 feet).

Canopy trees are often festooned with epiphytes, *vines and lianas*. Vines and lianas are woody plants that utilize trees as support to assist in reaching a place in the sun while being rooted in the ground. Epiphytes grow on the moist surfaces of trunks and branches. They will be discussed later.

Large trees often found in the upper canopy layer or as emergents include Mame (or Mamee - sometimes bled for chide); Breadnut (Ramon-seeds, once used by the ancient Maya to supplement maize when the population was at its peak); Nargusta, Ironwood, Milady, Fiddlewood and Santamaria (prime timber species); and others such as Hogplum and Mapola.

Flora of the Lower Canopy includes trees, shrubs and palms. Lower canopy trees include the Gumbo limbo (Xaca) - noted for the medicinal qualities of its smooth trunk and thin red, peeling bark. A preparation made from the gumbo limbo bark is the antidote to the Black Poisonwood (Chechem). These two species are often found in close proximity to one another. Another low canopy tree is Allspice, or Spice-seed tree, whose white smooth bark and relatively large aromatic leaves make it easy and pleasant to identify. Its seeds are widely used as spice.

Over twenty useful tree species have been found in greater density near to ancient Maya sites than in the natural forest, possibly due to remnants of the cultivation of these species during Maya times. Examples include Allspice, Ramon, and Sapodilla.

Other lower canopy species include Prickly Yellow (named for its large trunk armament), White Maya, an unusually large member of the Melastome family (a group of smaller trees and shrubs having multiple midribs) and large individuals of some palm species such as Cohune.

Table 3.3 Canopy trees of Belizean Broadleaf Forests

Type	Species	Description	Interpretive Notes
Flowering plant trees			
Small to medium	Cojoton (Stemmademia)	Leaves opposite; Exudes milky white latex; large fruits occur in pairs	Common name: “Cojones de Caballo” because of paired fruits
	Allspice	Large leaves (4 - 6” in length), dark green upper surface, paler below; Bark smooth, whitish; Seeds small, rounded	Leaves very aromatic when crushed; Seeds used as spice. Used by Maya to embalm person held in high esteem

Table 3.3 Canopy trees of Belizean Broadleaf Forests

Medium	Santamaria	Beautiful deep green leaves with opposite arrangement	Important for lumber, strips used for lobster trap construction
Medium to large	Ramon (breadnut)	Branches very leafy, with clusters of: leaves 3-7” long. Small rounded fruits	When mature, hard nut fills up most of fruit
Palms			
Medium to large	Botan Palm	Palmate leaves without spines	Leaves used for thatch; trunk used for posts and bulkhead construction in coastal areas

EPIPHYTES

An *epiphyte*, also called “air plant”, is literally a plant living on another plant. BLF ecosystems are three-dimensional systems featuring plenty of area located high above the nourishing soil available for plant settlement. Epiphytes grow on the trunks and branches of the trees of the upper and lower canopies. Plants living in this fashion have many adaptations to ensure survival in such a habitat.

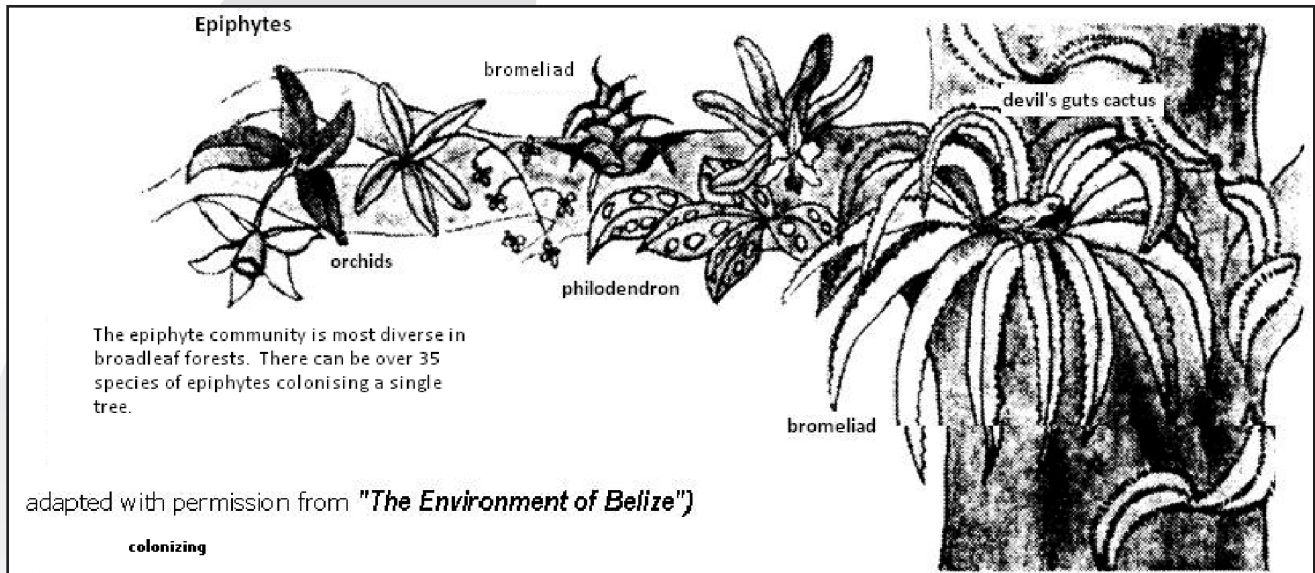
It is important to remember that most epiphytic plants are not parasites, but *commensals* that live and reproduce without harming their host tree. The few that are parasitic normally are able to grow faster than the host and overshadow its leaves, preventing or drastically reducing photosynthesis, thus ultimately killing the host. A notable BLF tree with this lifestyle is the Strangling Fig or Matapalo, which begins life as an ordinary epiphyte after a bird drops a seed high in a tree. As the young Matapalo grows, it sends down feeder roots toward the soil. Once these roots tap into the soil, explosive growth results, over shadowing the foliage of the host tree which eventually dies.

At the other end of the spectrum are certain massive bromeliads relatives of the pineapple. Their spiky leaves grow in a rosette form that traps water and detritus from higher levels.

This forms a “living compost” that may actually support feeder roots from the host tree! Thus, epiphytes run the full range of symbiosis - from parasite to mutualist, with most falling somewhere in between.

The diagram below depicts a BLF tree branch hosting a typical epiphyte community.

Figure 3.7. Epiphyte Community



Other important plant groups found with epiphytic species include:

1. **Mosses and liverworts** - Tiny plants that form a fuzzy or flattened layer along trunks and branches.
2. **Philodendrons** - Large-leafed epiphytic shrubs whose long root tendrils may be used to lash poles together during house construction.
3. **Ferns** - A variety of small to medium plants that reproduce by means of tiny spores instead of seed - these and the mosses and liverworts are not flowering plants.
4. **Ivy and other epiphytic vine** - like flowering plants.

Important characteristics of epiphytic species include:

1. **Roots that:**
 - a.) are specialized to anchor the plant in place, so that it is less likely to be knocked from its spot during windy periods;
 - b.) spread along the surface of the trunk or branch, seeking food and water particles from rain, fog, dust, and decaying detritus caught in the higher branches.
2. **Leaves and stems that are**
 - a.) specialized to hold and conserve water, which may be seasonally unavailable, especially in the north
 - b.) often stiff, covered with a thick or waxy cuticle to prevent water loss by transpiration (i.e., through the pores in leaves)
3. Other water conservation structures, such as waxy bulbs at the base of the leaves in some orchid species, store water until needed. Late in the dry season, it is common to observe these structures dried and shriveled, awaiting the onset of the rains. The thick stems of “Devil’s-guts” and other cactus species are also adapted for conserving water.
4. Tiny seeds or spores that spread like dust in whatever air currents may be found-not much wind is needed to move them!

Table 3.4 Important Epiphyte groups in Belizean Broadleaf Forests

Type	Species	Description	Interpretive Notes
Flower bearing			
Small	Orchids	Thick waxy leaves; ornate showy flowers; tiny seeds in small pods	Thick waxy leaves have water storage bulbs at base to conserve water
Small to large	Bromeliads	Thick waxy leaves may be spiked or lance-like	Plants flower once-a long spike, often with red flowers, then new plants grow near original
Large	Philodendrons	Large deep green ivy-like leaves, sometimes having holes; woody stems; often send long white roots down toward forest floor	Roots are sometimes used by people for tying poles, etc.

Table 3.4 Important Epiphyte groups in Belizean Broadleaf Forests

Type	Species	Description	Interpretive Notes
Flower bearing			
Climbers	Devil's Guts, Cereus and other Cactus	Have specially adapted leaves such as spines, and waxy, bulbous stems; flattened, jointed stems on trees	Devil's Guts resemble green sausage links; Cacti noted by green stems; Devil's Guts clings tight to trunk of host tree; Cereus and others produce showy flowers
Pteridophytes	Ferns, mosses, liverworts	Plants with lacy delicate leaves or leaflets, having spores instead of seeds. Spores for propagation are borne on undersides of leaflets	Most ferns have long spike like leaves with high numbers of small ovate leaves

FLORA OF THE UNDERSTORY

Understory plant species include young specimens of potentially large palm species (Cohune, Botan, and others) and smaller species, including Suppa, Pacaya, Palma de Lluvia, and Pokonoboy. The Understory also includes shrubs such as smaller Melastome species; the unique "Hot-lips" -a member of the coffee family, which appears as a shrub with two bright red bracts extending under tiny pale flowers or blue berries (these are also noted in savannas); and types of False Bird-of-Paradise (*Heliconia* sp.), a diverse group of shrubs featuring banana-like leaves and ornate and colorful flowers that are frequently visited by hummingbirds.

FLORA OF THE FOREST FLOOR

Plant life on the forest floor is not abundant although multitudes of seeds drop from trees, shrubs, palms and other plants and lie on the forest floor awaiting the proper time for germination. Many seeds sprout but most are quickly killed by plant feeders (herbivores) or are crowded out by competition with other young plants. Others fall victim to seed predators before ever growing, while still others remain dormant for many years until conditions are correct for their species. This is especially true for fast growing species that spring to life when a gap opens in the forest.

Bacteria and fungi, along with other decomposers, are hard at work breaking down the organic materials in the forest litter to release the nutrients stored. Dead wood is broken down by bracket fungi and orange cup fungi. The forest floor is usually covered by a thin layer of detritus - non-living organic material such as twigs, flowers, leaves, fruit, and fallen trees undergoing decomposition.

HIGHER ELEVATION BLF PLANTS

Higher elevations (>400 meters, 1312.32 feet) bring us into contact with forests that appear somewhat different than the dominant lowland Broadleaf Forest groups more commonly observed. The cooler climate and steeper slopes support a generally shorter forest, with such distinctive species as tree ferns, cypress and a variety of palms not seen elsewhere. The very highest reaches (>900 m, 2952.72 feet) are distinguished by magnolias, liquid amber and Colpothrinax palms. At the highest point in Belize - “Doyle’s Delight” - there is a species of Bamboo growing which was collected for identification in 1993; it turned out to be a new species of Bamboo for scientific records! There is also a palm tree found here which is one of the rarest palms in Central America. This tree has only a scientific name: *Colpothrinax cookii*.

FAUNA OF THE BROADLEAF FOREST

FAUNA OF THE FOREST CANOPY AND UNDERSTORY

Multitudes of insects, many transporting pollen as they flit among the high reaches of the tall trees, live in the canopy of broadleaf Forests. Canopy tree-frog species live their entire lives high above the forest floor, depositing their eggs in water trapped by rosette bromeliads where they live a brief time as tadpoles, and emerge to consume insects in the canopy.

There is a vertical stratification of birds in the highest forests, where some species occupy the highest reaches, others reside in the various mid-levels, and yet others keep to the lower levels of the forest. A multitude of tiny jewel-like bird species, feeding on nectar, fruit and small insects, spend most of their lives in the canopy. Parrots often sit in treetops, blending with the foliage as they munch on fruit, until they burst from the canopy in a raucous flurry of screeches. Toucans, Oropendolas, large birds of prey and others may be spotted in silhouette in the top dead branches of high trees. Myriad birds seek insects, fruit and other food - their calls and those of cicadas (cigarras) haunt the forest and make it familiar.

Also high in the treetops are found a variety of mammals, from tiny Mouse Opossums and small delicate Cacomistles in the mountains, to lowland species such as large and lively vociferous monkeys and the “Nightstalker” (Kinkajou). The slender, great-eyed Margay chases prey ranging from large insects to a multitude of squirrels and small tree rats. Carnivorous bats may locate a calling frog by sound and pick it off a tree branch. Tiny nectar-feeding bats also spend time high aloft.

FAUNA OF THE FOREST FLOOR

Life in the forest floor is very small. Along with countless bacteria and fungi, termites and woodlice, which contain symbiotic microorganisms that permit cellulose (the toughest part of wood) to be broken down, live out their lives by breaking down the detritus that falls from above and lies on the forest floor. These industrious colonial insects should be viewed as essential members of the recycling team -it's not their fault that your house is made of dead wood! Termites build their colonies in healthy trees and must construct covered trails in order to descend to the forest floor and perform their duty. A multitude of insects and millipedes - many not described by scientists - make their homes in the forest floor and live by consuming converted detrital material or the fungi and bacteria that break it down. And living on those organisms, is a host of tiny predators-- wolf spiders, predatory beetles, scorpions, centipedes and many others.

Rainforest Toads, from miniatures that are newly transformed from tadpoles, to adults, hop amongst the litter, perfectly disguised by protective coloration to match the background.

Snakes slide along in search of toads or unwary rodents, while larger predators such as Grey Fox and Coati mundi cruise along the ground, hoping to find other small unwary animals. Still larger predators walk in search of prey such as Gibnut, Brocket deer, Peccary and even young Tapir.

Table 3.5 Fauna of Belizean Broadleaf Forest

Type	Species or Group	Description	Interpretive Notes
Invertebrates			
Colonial Insect	Wee-Wee Ants (Leafcutter) (group)	Ants living in massive burrows, feeding on fungus grown in underground chambers on pieces of leaves and flowers collected by workers. Activities of individuals determined by treatment as larvae; Queen-lays eggs; very long-lived; Workers (all females) dig, collect food, etc. are soldiers (defend colony) tend Queen Drones (Males, winged-individuals) fertilize Queen; Primary consumers	
	Army Ants (group)	Ants living nomadic existence alternating with short stays in one area; Low-level predators; Soldiers and workers have strong formic acid. Attack small organisms as they move; drive such animals ahead of them	
Arachnid	Wolf Spiders (group)	Nocturnal, solitary hunters; low-level predators	Females carry juveniles on back before they disperse
	Whip Scorpion	Solitary predators of caves and forest litter; Low-to-moderate level predators	Large, having pincers. Do not sting on tail as true scorpion

Type	Species or Group	Description	Interpretive Notes
Vertebrates			
Amphibian Tree frog	Red-eyed Tree frog	Slender; has sucker toe pads; green body with yellow side markings and bright red eyes. Low-level predator	Congregate at water to breed; lives in upper and lower canopy
Amphibian Toad	Rainforest Toad	Small active toad; dark X-shaped or similar pattern on back; low level predator	Approach water only to breed; preys on forest litter community
Reptile: Snakes	Kingsnakes (group)	Brightly colored group of snakes. color pattern: black bands between red and yellow bands. Middle level predator	Protectively colored to resemble Coral snakes which are venomous

Table 3.5 Fauna of Belizean Broadleaf Forest

Type	Species or Group	Description	Interpretive Notes
Reptile: Snakes	Coral Snakes (group)	Group of slender small-headed venomous, rear-fanged snakes colored in alternating black, red and yellow bands. Low to middle level predator	3 species in Belize
	Vine snakes (group)	Group of very slender elongated tree snakes having mild venom. Low to mid-level predator	Grey and Green Vine Snakes in Belize – have elongated snout
	Fer-de-lance (Tommy Goff)	Variable coloration, from gray to olive, brown, or reddish, with dark triangles edged with light scales; triangles narrow at the top and wide at the bottom	Not to be confused with Cohune ridge Tommy Goff, a smaller snake with similar appearance, but having different markings

Type	Species or Group	Description	Interpretive Notes
Birds	BFL Parrots	A group of social fruit-eating birds having large curved bills and harsh calls. Primary Consumers. Belize has 10 species of parrots	
	Scarlet Macaw	Largest in the family- is also the rarest and most showy. Less than 250 of these birds are believed to remain in Belize	Migrate annually; nest in the Raspaculo, then migrating for January-March to southern Stann Creek District
	Mealy Parrot	large Amazon with green overall color; blue crown and a pale eye-ring	
	Red-lored Parrot	Green body; red and yellow face	
	Brown-hooded Parrot	Smaller; green body with a brown head and pale eye-ring	

Table 3.5 Fauna of Belizean Broadleaf Forest

Type	Species or Group	Description	Interpretive Notes
Birds	BLF Trogons	Brilliant-colored fruit and insect-eating birds. 4 species in Belize. Two smaller yellow-bellied trogons; Two larger species listed below.	
	Slaty-tailed Trogon	Its green head with bright yellow belly is distinctive	Lives in deep forest, calls from high perches
	Collared Trogon	Smaller, with red belly; white band between the head and belly	
	Woodcreepers (group)	Group of birds distinguished by their brown bodies marked with pale streaks and barred. These birds have a habit of climbing directly up tree trunks in search of insect food. Some follow Army ant swarms to pick up insects that are disturbed by the ants; Look carefully to distinguish among 8 species. Low-level predators.	

Type	Species or Group	Description	Interpretive Notes
	Toucans (group)	Large-billed, colorful birds. There are 3 species in Belize. They are omnivorous, meaning they take a wide variety of foods – insects, fruits, plants, etc. Primary to mid-level consumers.	
	Keel-billed Toucan	Largest of the species, colorful bill is the same length as the body. Prefer ripest fruit	Our national bird. To eat, the toucan flips the fruit in the air, tosses its head back and catches the fruit. It never misses!
	Collared Aracari	Mostly black, red and yellow; medium-sized	
	Emerald Toucanet	Mostly green. Smallest of the group	
	Ant birds (group)	This is a group of small deep-forest species. Generally shy and retiring Principally follow Army Ant swarms in search of food. The most common are the Zebra-striped Barred Antshrike, whose distinctive voice is often heard without ever being seen.	

Table 3.5 Fauna of Belizean Broadleaf Forest

Type	Species or Group	Description	Interpretive Notes
Mammals	Ungulate: Baird's Tapir	distinctive cream-colored marking on its face and throat and a dark spot on each cheek, behind and below the eye; rest of hair is dark brown or grayish-brown; grow to 2 m in length (6.5 ft) and 1.2 m (4 ft) in height, and adults weigh 240 - 400 kg (525 - 880 lbs); have small stubby tails and long, flexible proboscises; 4 toes on each front foot and 3 toes on each back foot.	National animal; Local name: Mountain cow These large primary consumers spend much of their time near mud and water. Though their thick skin is somewhat resistant to biting insects, a good coating of mud still helps! Their distinctive tracks may often be seen in forested areas and adjacent wetlands largest land mammal found in the wild from Mexico to South America
	Raccoon Family: Kinkajou	Red-brown to gray; nocturnal; lives in trees. Eats fruit and insects. Primary to low-level consumer. Noisy	Only member of family without ringed tail (Cacomistle, Coatimundi and Raccoon all have ringed tails)
	Rodent:: Paca (Gibnut)	Larger, nocturnal; red-brown with white spots on sides. Primary consumers; help distribute seeds by picking up fallen fruit	Known as the "Royal Rat" because it was served to Queen Elizabeth when she visited Belize. Severely over hunted in many areas.
	Agouti	Smaller, entirely brown, often out during afternoon. Primary consumers; help distribute seeds by picking up fallen fruit	Known locally as "bush rabbit"

Table 3.5 Fauna of Belizean Broadleaf Forest

Type	Species or Group	Description	Interpretive Notes
Mammals	Monkeys: Central American Spider Monkey	Back dark; face unpigmented, front side pale; feed primarily on fruit	Rarer of the two listed species. Very active and agile; prehensile tail helps them move rapidly through trees; often noisy in passage through forest. Scream to communicate, but bark when alarmed. Live in family troops. Endangered species, protected in Belize
	Mexican Black Howler (Baboon)	Entirely Black; generally move more slowly and deliberately than Spider; Primary consumers - eat fruit and leaves	Loud howls produced by elaborate set of special throat structures that magnify sounds, can be heard over large distances (one mile) in forest.
	Spotted Cats: Margay	The smallest of the spotted cats; tail longer than hind leg. Carnivore - mid to high-level consumers	Lives principally in trees, only cat able to climb head-down a vertical tree
	Ocelot	Generally larger, tail shorter than hind leg. Carnivore - mid to high-level consumers	Usually found on the ground
	Jaguar	Largest cats in neotropics. Tawny yellow with distinct black spots, underside white with black spots. Hunt day and night. Carnivore - mid to high-level consumers	Within its environment, extremely well-camouflaged. Local folklore has it that on full moon nights, they get frustrated by not being able to stalk their prey under the cover of darkness, and roar with frustration!

SERVICES PROVIDED BY ANIMALS TO PLANTS OF THE BROADLEAF FOREST

The sheer volume and scope of life in our tropical Broadleaf Forests is staggering to comprehend. Of over 750 tree species countrywide, 700 live in broadleaf forests. Some 99.9 % of all *biomass* (weight of living things) in BLF ecosystems are plants (Tropical Nature). That leaves a mere one-tenth of one percent (0.1%) of all biomass for animals. However, because most are capable of motion, animals are disproportionately important in these ecosystems.

Because plants are rooted to the ground, animals are induced to provide services for them that they cannot do for themselves. These are essential ecosystem services that are routinely performed by animals, which usually derive food, shelter or some other benefit in return - there is no “free lunch” in a tropical Broadleaf Forest, or in any other ecosystem! Here are the major services provided by animals in BLFs:

1. Pollination

Wind can move *pollen* (male plant reproductive material) in some cases; however most canopy trees and Understory plants do not have reliable access to wind. Mechanisms to ensure pollination by animals that are employed by plants include:

- (a) **Reward:** A form of bribery (usually nectar) - This is the most common method plants have evolved to induce pollination. Plants provide an enticement or form of advertisement that the food is there - e.g., a strong-smelling or showy flower that brings the animal in. In some cases, a rank smell like that of dung or carrion is produced to attract the appropriate insect! The flower is designed so that an animal brushes pollen while trying to feed, thus, the animal provides a service in exchange for food. Common examples include most bees, butterflies, hummingbirds, honeycreepers and other nectar-feeding birds. Night- blooming flowers are frequently pollinated by nectar-feeding bats and moths.
- (b) **Deceit:** Some plants produce flowers that are not what they seem! One example is a flower that has parts that mimic reproductive partners of certain species of bee. Again, this structure is located near to pollen so that the romantic bee must brush this in order to reach his heartthrob. Sadly for the bee, his lady-love is nothing but a fake, so he flies off -loaded with pollen - to try again. Fertilization takes place when the bee, apparently lacking long-term memory, visits other flowers with the same result, thereby carrying pollen from plant to plant.

2. Seed Distribution

It is not desirable for most tree or shrub species to sprout too close to the parent plant. Again, plants cannot, by themselves, stop this; therefore, animals are employed to disperse seeds far from the parent plant.

- (a) **Reward:** One common method for seeds to be dispersed is by the plant offering a movable reward along with the seed. Fruit-eating birds, including parrots, toucans, tanagers, and others, either move the seed along with the fruit or ingest it and excrete it unharmed in the feces. Also in the trees are found iguanas and monkeys that eat all or part of a fruit. When fruits are dropped, many ground animals - mammals in particular - consume them; either way, the seed is removed from the area of the tree that produced it.

- (b) **Passive Methods:** Sharp projections from seed coats may stick in the fur of mammals and be later removed during grooming. This is seen in many grass species and other plants, including a variety of stickers and burr-burrs.

3. Defense

Some animals defend plants, either against competition for space and nutrients from other plants, or against grazing or other interference by animals. These actions have also induced plants to evolve physical defenses of their own over time, such as sharp projections on seeds, or spines on leaves or trunks.

4. Fair Exchange

Several species of ants live in partnership with trees. Food and shelter are provided in exchange for defense against encroachment or grazing. Sharp ant jaws snip off small plants growing within the root area of their host. They also bite deep into the flesh of animals that dare to make a meal of leaves or other parts of the plant; in response to this (as well as pesky biting flies!), some animals have developed very thick skins.

In return, ants derive a safe place to raise their young, such as the hollow centers of the trunks of Trumpet (*Cecropia*) trees, or the thorns of Bullhorn Acacia (*Cockspur*). A ready source of food is also provided, either in the form of competing plants or specially produced carbohydrates, called Beltian bodies, placed for easy access to the hungry ants, as is the case with *Cockspur*.

UNIT 2 SKILL CHECK

EXERCISE 1: ANSWER THE FOLLOWING QUESTIONS

1. Describe two benefits of canopy structure of broadleaf forests.

2. What is the Greenhouse Effect? How is it affected by forests?

3. How do forest trees adapt to: (a) thin poor soils? (b) to undermining by water? (Name two ways for each)

a).

b).

4. What is an epiphyte? How do they survive off the ground?

5. How do animals benefit plants (name at least 2 ways). Why is this possible?

EXERCISE 2: INTERPRETATION

1. Name and interpret one plant from each of the following: emergent; canopy; understory.

a). _____

b). _____

c). _____

2. Interpret an epiphyte to the group. Talk about the plant's appearance and how it lives.

3. Choose two species or group from the following types and interpret: Invertebrate, Amphibian, and Reptile.

4. Choose one species or group from Birds and one species or group from mammals and interpret to the group.

EXERCISE 3: IDENTIFICATION

1. Identify from descriptions (Instructor will select random species or groups of flora and fauna from tables for group to identify orally.)

2. Identify from slides verbally. (You will be shown 5 slides and asked to identify images verbally and discuss as a group).

SAVANNA ECOSYSTEMS

INTRODUCTION

Savannas are described as grasslands with open stands, scattered clumps or individual trees growing on acidic (pH 4-5), sandy soils of poor fertility. There is usually a layer of varying thickness of sand overlying an impermeable clay layer. Consequently, soil drainage is often poor, resulting in standing water in wet season and cracked, dried hardpan in the dry season. Although some savannas form part of the seasonal wetlands of Belize; only drier savannas will be discussed in this section.

Savannas have no forest canopies as such and vegetation is usually open, leaving soils and organisms subject to the elements. Temperature and humidity match those of the surrounding air resulting in conditions that are relatively harsh with food not being abundant. Biodiversity, beginning with that of plants, is somewhat low in these areas. Most plants cannot tolerate the soil's high acid content, periodic standing water, or lack of nutrients. The ecosystem as a whole is simpler, lacking much in the way of complex relationships. Life is tough in a savanna ecosystem!

Savannas as a whole are tolerant of a wide range of temperature and rainfall. As a result, most savanna vegetation is tough and not very tall. The exceptions are the pine trees, which may reach heights in excess of 25 meters (82 feet), but which, just as often, may be stunted due to the harsh local conditions in which they live.

TYPES OF SAVANNAS

There are two major savanna types in Belize, separated by elevation. These are the Mountain Pine Ridge (an upland savanna) and Coastal Savannas (a group of lowland savannas).

Upland Savanna

The Mountain Pine Ridge system occurs on an elevated plateau between 600-915 meters (2000-3000 feet) in elevation, with very shallow silica dioxide (SiO_2) soils derived from granite which is close to the surface. During prehistoric submersion, a layer of limestone was deposited over the granite rocks. After the plateau was uplifted by geologic processes, much of the limestone was eroded off, leaving bare granite in places. In the poorer soils, pine has replaced broadleaf forest as the dominant vegetation. Some pockets of BLF may still be viewed when visiting the Mountain Pine Ridge, especially along waterways. A frequently-visited BLF surrounds the Rio Frio Cave system.

Mean rainfall in the Mountain Pine Ridge is about 188 cm (74 inches), while average temperature is about 22°C (72°F). The area contains many headwaters of rivers and streams that feed the central portion of the country.

Lowland Savanna

Lowland savannas may be divided into two major categories based on their construction. In the north, savannas are largely based on karstic topography - old eroded limestone on flat land featuring poor drainage. Soils are variable; sandy topsoils of varying depth overlie very compact clay or limestone subsoil. Lowland savannas are found from Gales Point northward. In the south, part of the coastal lowlands in Toledo and Stann Creek

Districts occur on soils of the old Coastal Plains. This lowland soil is composed of nutrient-poor, acidic quartz sand deposited by rivers from the mountains. Rainfall and temperature in these widely distributed savannas vary with latitude.

IMPORTANCE OF SAVANNA ECOSYSTEMS

The principal importance of savannas is in green house gas absorption. Additionally, species living close to the ground are capable of survival under vast seasonal sheets of rainwater – an adaptation that makes this ecosystem an important part of a larger natural system that is capable of handling large amounts of rainwater. (See the section about wetlands for more information about this important property of savannas and the part they play in the system.)

The Pine trees in savanna ecosystems serve as an important windbreak, and their roots help prevent erosion. While biodiversity is lower, the savanna is still home to a wide variety of flora and fauna, and also serves as a passageway for other species enroute between areas of broadleaf forest.

LIFE IN SAVANNA ECOSYSTEMS

Savanna ecosystems are dependent on fire for renewal. Pine trees, the dominant feature of many savannas, are rich in highly-flammable pitch or resins. They attract lightning, which starts equally-flammable grass burning. Fires may spread considerable distances consuming significant amounts of wildlife, brush and young trees. However, fire stimulates pine cones to open, releasing seeds of a new generation of trees. It also serves to clear underbrush for the next generation of shrubs and trees.

The tough bark of larger pine trees often enables them to survive fires. Look closely at the trunks of large pine trees in a savanna; many will have fire scars - blackened areas on tree trunks. The peak season for fires on Belize's savannas is during the dry season from March to May. On the other hand, during the rainy season, the land is often waterlogged, and both flora and fauna must adapt to these wet conditions. Temperature, humidity, and prevailing weather all directly affect savanna ecosystems, making for wider variations in conditions that both plants and animals must endure.

THE FLORA OF THE SAVANNA ECOSYSTEMS

Savannas are distinguished by the amount and type of vegetation that is found growing amongst the grass. Some savannas support tall stands of pine of varying density, while others feature a more open pattern of mixed pine and other vegetation. Still others may appear as a featureless plain of grass with only a few low clumps of palmetto and other shrubs to vary the scene.

The most obvious living things in many savannas are pine trees. As noted before, they function as windbreaks in their ecosystem, while their roots reduce erosion. Lacking root hairs, pine trees also form a partnership with mycorrhizal associates to take advantage of any litter that may fall. Pine seeds are winged, indicating wind distribution; however, feeding birds may also assist to disperse seeds. As stated before, pines are fire-tolerant to a degree, and their reproduction depends upon cyclical grass and brushfires.

Two species of pines dominate the savannas of Belize. The most common is *Pinus caribea*, which shows needles in groups of three. This tree is seen both in upland and lowland savanna (Horwich & Lyons, 1990). The other pine, *Pinus oocarpa*, is restricted to upland savanna in Belize. It has its needles in groups of five.

Information on various plant species also found along with pine trees in savanna ecosystems.

Table 3.6 Non-pine Flora of the Pine Savanna

Type	Species or Group	Description	Interpretive Notes
Trees			
Small tree	Palmetto	A palm with short, spiny trunk and leaves	Often seen in clumps in the most open savannas
	Oak	Low trees with large rounded leaves and gnarled, corrugated bark; seeds are acorns	Acorns distributed by Acorn Woodpeckers, which often forget where they put the acorns!
	Craboo	Leaves dark green, in clusters at the end of branches; fruit is yellow berry approximately 1 cm in diameter	Yellow berry fruit is edible
Shrubs to small trees	Melastomes (group)	Leaves with multiple (3-5) midribs; many species have whitish leaf undersurface	Some members of this group have fuzzy leaves; small flowers, rounded blue berries
Shrubs and Herbs			
Flowering Shrubs	St. John's Wort	Height to 1-2m, featuring yellow flowers and slender pointed leaves	
Shrub	Yaha	2-3m in height, leaves about 3-4 X 5cm. at the widest point	Known as "bush sandpaper" due to very rough-surfaced leaf
Tall herb	Mountain Orchid (Grass)	Grows from ground (not epiphytic) in the form of a 2-3m bamboo-like single stalk	Large showy purple flower at top
Small herb	Sundew	Small, low plant, featuring small sticky blossoms	Carnivorous plant; sticky blossoms attract, trap and digest insects
Fern	"Tiger-bush" Fern (Double-head)	Small low fern, forming clumps; compound leaves formed in two points	May cover extensive areas

THE FAUNA OF SAVANNA ECOSYSTEMS

Fauna occurring in savannas is often difficult to see without careful attention. The insect life will, however, find you without difficulty; mosquitoes, botlas (small biting gnats), doctor flies, horseflies are all there! Many of these insects emerge from temporary ponds deposited during the rainy season.

Since savanna is mainly a dry habitat, conditions are hostile to amphibian life; however, the Gulf Coast Toad may be sighted. Conversely, savanna is quite satisfactory for dry-loving reptiles. Several snakes may be spotted here, including the Cascabel (Central American Rattlesnake), the Green-head Snake, the Tropical Rat Snake and many others.

Birds are either small and difficult to observe, or large and conspicuous. Several Hawk species are found here all or part of the year. Many North American migrant bird species occupy savanna areas between September and April each year. These are principally insect-eating warblers. Some birds tend to be found here most frequently. The Acorn Woodpecker, Yellow-head Parrot, Black-headed Siskin, Vermillion Flycatcher and some others are almost always observed in savannas.

Few mammals are found in the savanna; they tend to be passing through rather than being residents.

Table 3.7 Fauna of Savanna Ecosystems

Type	Species or Group	Description	Interpretive Notes
Reptiles	Lizard: Spiny Lizards (Sceloporus group)	Small, active insectivorous lizards; Low-level predator	
	Snake: Cascabel (Central American Rattlesnake)	Active pit-viper with hemctoxin, venom injected into prey from two hollow long fangs at the front of the mouth. Low to mid-level predator	Series of dry segments at the end of the tail make a warning ‘rattle’ sound. Distinct markings are two parallel dark brown stripes from head along neck on gray background
	Tropical Whip Snake	Uniform light brown, long, slender snake, Low to mid-level predators	Fast-moving snake, feeding on lizards and small mammals
Birds	Parrot: Yellow-headed Parrot	Relatively large, 37 cm (14_ in); yellow face and crown; pale bill; distinctive rolling, rapid-fire gurgling notes	They especially favor the fruits of the Craboo tree. This is one of the 9 species of parrots found in Belize; nest in pine trees; they eat seeds and fruits

Table 3.7 Fauna of Savanna Ecosystems

Type	Species or Group	Description	Interpretive Notes
Birds	Woodpecker: Acorn Woodpecker	Black and white with red crown; white face becoming pale yellow on lower throat and upper breast; black forehead and chin; black breast streaked white; oddly patterned face with white eyes; 22 cm (8_ in)	After collecting acorns and stashing them in the holes of trees, the bird returns to eat, not the acorns, but the insects that eat the acorns. Easy to find in the savannah
	Passerine: Hepatic Tanager	Head and upper parts dull red, with dark patch behind eye. Stout dark bill. 7-1/2-8 inches. Primary low-level Consumer	Feeds on fruits, seeds and insects
Mammals	Xenarthrid (primitive):Nine-banded Armadillo	9 bands of gray to yellowish armor plates, separated by soft skin. simple peg-like teeth; females give birth to four identical young, from a single egg; Nocturnal; Low level consumer	Ancient animals; curl up into a ball if alarmed and protect themselves with their plated armor; eat ants, termites, other insects and fruits; have poor vision and live in deep burrows; are hunted for their meat; only live for four years;
	Canine: Grey Fox	gray back, light brown to brownish orange on the sides, neck and legs; black stripe along its back and tail; white belly. eats meat, plants, fruits, nuts, and insects; weigh between 3.6 to 6.8 kg (7.9 to 14.9 lbs);	Related to the dog; can easily climb up and down trees with their powerful, hooked claws; sleep in treetops during the day; call to each other with high-pitched barks; lives 6 to 10 years in the wild.
	Deer: White-tail Deer	Grey-brown to light brown-reddish colour; eat grasses, leaves and twigs; Only males grow antlers; female gives birth to 1-2 young	Largest deer in Belize; much smaller than those found in both North and South America; raise tail to show white underside as a warning when in danger; can run very fast- up to 30 miles per hour!

As with Broadleaf Forest, many plant and animal species found in savannas are seen in all savanna types while others appear only in upland or lowland systems. Still other species are not restricted to savanna ecosystems at all and can be found in other ecosystems. Following is a table denoting some of these plants and animals.

Table 3.8. Plant and Animal Species Observed in Savannah as well as other Ecosystems

Attribute	Examples
Restricted to Upland Savanna: Mountain Pine Ridge	Pinus oocarpa; Sundew; Mountain Orchid; “Tigerbush” (Doublehead) Fern; Greater Peewee; Rufous-capped Warbler; Black-headed Siskin
Restricted to Lowland Savanna	Craboo; Calabash; Cashew; Yellow-headed Parrot; Rufous-browed Peppershrike
Restricted to, or mostly occurring in Savanna ecosystems	Pinus Caribea; Oak; Yaha; St. John’s Wort; Hepatic Tanager; Grace’s Warbler; Acorn Woodpecker; Orange-breasted Falcon; Fork-tailed Flycatcher; White-tailed Deer; Porcupine
Use Savanna ecosystems but prefer other habitats	Red-lored Parrot; Violaceous Trogon; Yellow –throated Euphonia; White-collared Seedeater; Baird’s Tapir; Collared Peccary; Jaguar; Puma; various Rodents

SKILL CHECK

EXERCISE 1:

1. What is the principal feature of a savanna?

2. Do savanna systems have more or less diverse flora than broadleaf forests? Why?

3. Differentiate between *Pinus caribea* and *Pinus oocarpa* in terms of appearance and where they are found.

EXERCISE 2: INTERPRETATION

1. Interpret one of the following to the class group as if it was a tour:

- a). The connection between savanna soils and flora
- b). Differences between upland and lowland savanna
- c). The importance of fire in savanna ecosystems

EXERCISE 3: IDENTIFICATION

1. Identify by description (Instructor will select random species or groups of flora and fauna from tables for group to identify orally).

2. Identify flora and fauna from slides verbally. (You will be shown slides and asked to identify orally and discuss as a group.)

WETLAND ECOSYSTEMS - FRESHWATER

INTRODUCTION

Terrestrial freshwater ecosystems include all water-based ecosystems that do not contain salt. Most terrestrial wetlands consist of low, poorly drained areas under seasonal standing water and are characterized by BLF or savanna vegetation. Included in this category of ecosystem are swamp forests (bajos) and savanna wetlands. Other wetland habitats are permanent in nature due to extremely poor drainage and topography; these include herbaceous swamps, freshwater lagoons and waterways such as creeks, streams and rivers.

About 20 percent of Belize's land area is covered with wetlands ecosystems. Wide area wetlands such as lagoons are more common in the northern parts of Belize than in the south; however, the south has a far greater number of waterways.

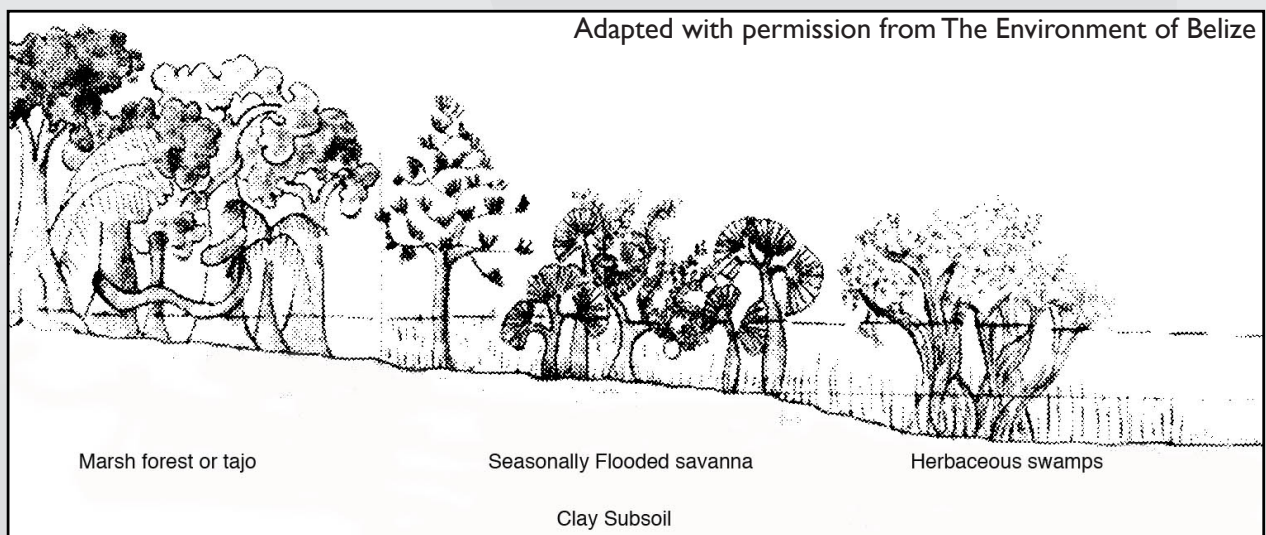
IMPORTANCE OF WETLAND ECOSYSTEMS

Freshwater wetland ecosystems act as Mother Nature's flood control. They function as spillways (i.e. rivers) to reach saline wetland (marine) ecosystems, as well as temporary (i.e. bajos) or permanent (i.e. herbaceous swamps) storage areas that absorb and hold tremendous amounts of water. This is an essential service, which helps to reduce the damage caused by extreme rainfall events.

Wetland ecosystems are also important because water-tolerant wetland vegetation filters both pollutants and sediment from moving rainwater. They help to clean the environment and, in the process, accumulate high amounts of nutrients. As a result, wetlands are very productive ecosystems; plants growing here utilize the nutrients they grab by filtration to grow bigger and stronger, and produce more reproductive materials (flowers, fruit and seeds).

This high level of productivity supports high biodiversity. With the rich food chains created, these systems support many permanent and part-year resident animals. The variation in types of wetlands - ranging from the demanding regimen of permanent ponds and lagoons to the more relaxed requirements of wet tropical broadleaf forest - results in a corresponding variety of living things in residence.

Figure 3.8. The Three Types of Wetland



HABITATS OF THE WETLAND ECOSYSTEMS

SEASONAL FRESHWATER WETLANDS

Some seasonal wetlands are found as pockets of low-lying land within higher forest or savanna environments. Underlying soils, such as fine-grained clay, or bedrock are permanently waterlogged or impervious to water, causing water to stand for considerable periods without passing underground. The following habitats are seasonal, or part-year wetlands.

SEASONALLY-FLOODED SAVANNA WETLAND

This habitat type is transitional between dry savannas and permanently flooded herbaceous swamps. The area appears as a typical open savanna with abundant grass, few pines, isolated clumps of palmetto and occasional Calabash and Melastomes, with all vegetation low in stature, average height less than 9 meters (30 feet).

Flat land such as that in northern Belize results in long-term standing water, usually very shallow (a few inches in depth) and vast in extent. Sometimes the water may be completely flat, like the land, and of uniform depth. Other savannas are riddled with shallow (30-60 cm; 1-2 ft.) in depth, very narrow (15-45 cm; 6-18 inches) channels, which may continue to hold water long after the surrounding surface dries out. These channels may present considerable hazard to a bird guide who is concentrating on his/her quarry in the trees and shrubs -some attention must always be paid to where feet are placed! The northern savannas are riddled with these channels; some may also be found in the south, such as Mafredi Marsh.

BAJO SYSTEMS

Another seasonal wetland vegetation type is *marsh forest*, or *bajo* (named for its low-lying aspect). This is an area of broadleaf forest occurring over poorly-drained soils on low land. The broadleaf forest found in the bajo system is shorter than dry forest (averaging 12-15 meters; 50-60 feet), often having a single canopy with few emergents. Many of the trees are similar to those in drier broadleaf forests. However, some species are specialized for life in wet areas. These tree species tend to have stilt roots, plank buttress and other adaptations.

Bajos may occur in large patches between (and sometimes quite near) coastal vegetation such as littoral forest or mangroves, and lowland savanna in such southern Belize areas as Blue Creek, Monkey River and the South Stann Creek area. Other examples may occur in drier BLF habitat located in especially low, poorly-drained areas. Some of the latter forest patches may be found in the Belize River area, Rio Bravo Conservation and Management area, and Freshwater Creek Forest Reserve, among others.

SEASONAL CREEKS AND STREAMS

Seasonal creeks and streams are small waterways that generally run dry at some point after the rains stop. They are carved by water flowing downhill through the lowest parts of a forest or savanna, and are common in many areas of the country. They usually lead to a larger waterway or lagoon.

PERMANENT FRESHWATER WETLAND SYSTEMS

Permanent freshwater wetland systems are never completely dry (except in extreme drought conditions), although they may reduce in depth during the dry season. Permanent ponds and lagoons are located in low-lying areas, generally with permanently waterlogged soils and impermeable sub-soils underlying them. Rivers and streams essentially follow the line of least resistance from their sources in the highlands, through the lowlands, to the sea.

HERBACEOUS SWAMPS AND FRESHWATER LAGOONS

Herbaceous swamps are permanently waterlogged and frequently feature ponds or lagoons. A limited diversity of reedy plants, sometimes occurring in floating mats, characterize these vast shallow water bodies. During extreme dry seasons, such as that of 1995, permanent lagoons such as Crooked Tree may recede far from their normal locations. Conversely, after extremely wet or flood events, such as Hurricanes Mitch (Oct 1998) and Keith (Sep-Oct 2000), the same lagoon may rise so high that normal land transportation is cut off for considerable periods.

RIVERS

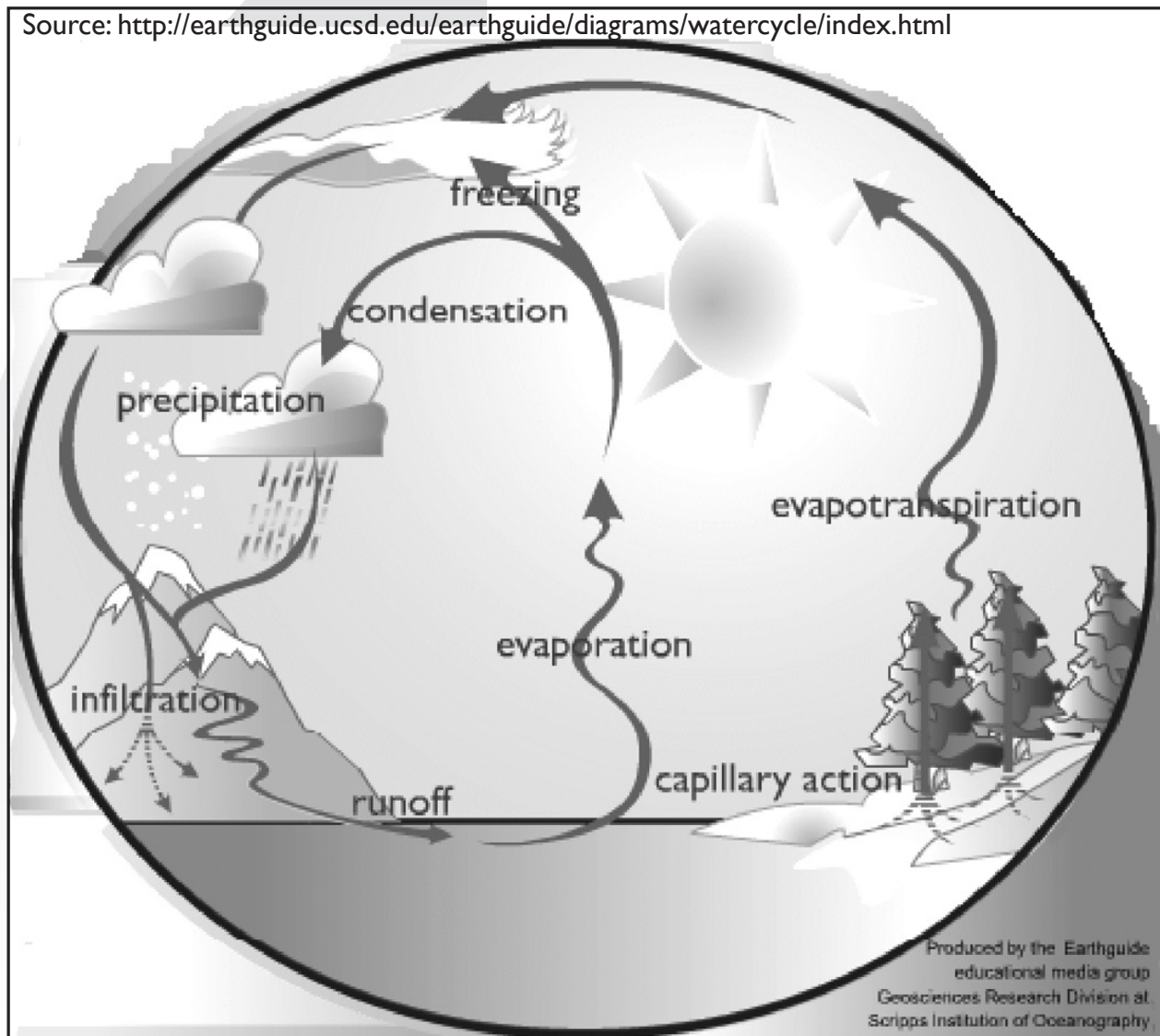
Rivers are divided into three major sections, depending mainly on how fast the land loses altitude, or, the slope of the land:

1. The *upper reaches or source* - the land is steep and prone to flash-floods. Vegetation is limited to that which is capable of survival on bare steep banks, and able to endure powerful floodwaters.
2. In the *middle sections* of a river, conditions ease somewhat as slope becomes less extreme and the river widens. Added nutrients from upstream make conditions lush and ripe for tall and dense vegetation that is designed to reduce riverbank erosion and keep the soil intact.
3. In the *lower reaches*, the river slows yet further as it meanders downstream. Land is undulating or fairly flat, and flood conditions are moderate rather than the extremes faced by the vegetation at the river's source. Dominant vegetation usually reflects the easier conditions; yet many rivers show early-successional vegetation explained below - an example is South Stann Creek River, whose lowest reaches are lined with dumb cane and other tall grasses.

Rivers as waterways are the major terrestrial method of moving water that has fallen inland as rain out to the sea. This movement of water is a part of the water cycle, an ecosystem service that is powered by the sun. Figure 3.9 below is a diagrammatic representation of the water cycle.

Figure 3.9 Diagram of the Water Cycle

Source: <http://earthguide.ucsd.edu/earthguide/diagrams/watercycle/index.html>



Rivers cut their way into the soil or rock along their course, moving soil, small rocks and even larger rocks during floods. The Grand Canyon of Arizona, U.S.A, is an extreme example of the work of a large river over millions of years - it is about two miles deep! In Belize, there are several examples of rivers that have cut through some steep cliffs. One of these is the Macal River. We also have examples of underground rivers that have carved out magnificent structures in their underground course. We can see their work at places where their “roofs” have collapsed exposing them to daylight. Blue Hole National Park, on the Hummingbird Highway, and the Rio Frio Cave in Mountain Pine Ridge are excellent examples of the work of rivers cutting their way through soil and rock.

Another important service of rivers, actually of their bank vegetation, is collecting nutrients swept along with the current. This is why rivers usually have fertile soil and luxurious vegetation alongside their banks. Rivers also carry the fruit and seeds of plants downstream to where birds, fish and river turtles may consume the seeds or they may drift ashore and sprout. Animals which use the river may also disperse the seeds. *Herbivores* (animals that eat only plants) find plentiful food along the banks of rivers.

Because rivers frequently over-wash their banks, the plants that manage to grow there are more “temporary” than the plants found growing further back; we call this *secondary vegetation*. This vegetation tends to grow very fast because it will likely be “washed away” by the next flood, so it must take care of its flowering and reproduction quickly. Secondary vegetation often contain toxins as defense. Toxins are substances which may be irritating or even poisonous if eaten.

River vegetation as a whole tends to be taller and more lush than that in drier forest areas, reflecting the continuous influx of nutrients and year-round water that is available to riverside trees. It is often termed *gallery forest*. Some pine savanna areas with rivers passing through will feature a startling change to broadleaf forest along the banks. This change in vegetation occurs in the Red Bank area (Southern Stann Creek District).

FLORA OF THE WETLAND ECOSYSTEMS

Some important characteristics of the vegetation in wetland ecosystems are that they:

1. Tolerate at least periodic inundation (flooding) by water;
2. Endure considerable force of flood, either by flexibility or by sheer strength;
3. Collect nutrients, sediment and other materials, including pollutants, from the water as it passes through them, thereby filtering and cleaning the water somewhat as it flows downstream;
4. Distribute seeds by means of water and water-borne animals (e.g., turtles, fish) or air and air-borne animals, such as insects and birds.

Table 3.9 Typical Plants of Different Types of Freshwater Wetlands

Wetland Type	Typical Vegetation
Savanna Wetlands	Palmetto; Calabash; Melastomes; Caribbean Pine;
Bajo	Swamp Kaway; Comfrey Palm and Waiks Chewstick (South); Copna (North)
Herbaceous Swamp/Lagoon	Logwood; Reeds; Bulrushes; Water Lily; Snowflake Lily;
Rivers and Streams - Upper Reaches	Amate, Quamwood; Guanacaste (Tubroos); Cecropia; Salmwood; Yemeri; shrubs vines
Rivers and Streams Middle Sections	Willow; Spiny Bamboo; Guanacaste, Amate; Bullet Tree; Bribri;
Rivers and Streams Lower Reaches	White Tamarind
	Bribri; Provision Dogwood; Logwood; Rosewood; Royal Palm; Copria (North only)

Characteristics of some wetland ecosystem plants are given in Table 3.10 below

Table 3.10 Flora of Wetland Ecosystems

Type	Species or Group	Description	Interpretive Notes
Trees:Tall tree	Swamp Kaway	Compound leaves with 5 - 7"; frequently grows plank buttress to compensate for erosion; trunk lacks spines	Often found near running water in the south. Sap is blood-red
	Quamwood	Fast growing, early-successional species found in bajos as well as dry BLF Bark rough, reddish; Leaves pinnate, very large, fernlike	Deciduous (loses leaves) in dry season; blooms bright yellow, appear March - April
Medium tree	Yemeri	Smooth grey bark: Leaves in groups of three arranged around branches, anchored opposite	Bright yellow flowers, appear May - June
	Bribri	Bark lacks spines, smooth compound leaves with 6-12 leaflets, leaf-like extensions from stem between leaflets	Spreading crown, often overhangs rivers; flowers white, with long filaments
	Dogwood	Trunk lacks spines: smooth; compound leaves with 5 leaflets oblong with tapered tips	Pink to purple flowers, appear in April - May
Medium low trees	Copna	Trunk with many large cone shaped spines; branches with three leaflets; found in very wet forest areas	Large orange flowers bloom in March - April. Flowers are eaten by howlers, coatis, and others

Type	Species or Group	Description	Interpretive Notes
Low tree	Logwood	Grows in lagoons; may be only tree type present; short twisted trunk; leaves compound: leaflets opposite, small, heart-shaped with point toward twig	Strong dye properties led to major extraction and export to England from 1500's to 1770's to support the people of Belize. At first, pirates burned Spanish ships with logwood,. Did not realize value of logwood for dye. One captured ship was taken to London with the wood load intact, and the value of the wood was "discovered" by the plunderers, who thereafter began to exploit the resource in Belize's forests
Medium-low palm	Cabbage Palm	Has green sheath on upper part of trunk; pinnate leafy fronds	May be an emergent above bajo forests
Shrubs and herbs	Shrubby grass: Spiny Bamboo	Jointed stalks: leaves with parallel veins; grows from base up	Hardens and grows spines as ages, becoming impervious to floods: essential to hold riverbank from erosion
	Floating Herbs: Water Lilies	Broad, rounded, floating leaves; widespread	Water lily has white flowers with yellow centres
	Snowflake Lily	much smaller than Water Lily; fringed white flowers	Especially noted in Crooked Tree Lagoon

THE FAUNA OF THE WETLAND ECOSYSTEMS

The tremendous productivity of wetlands supports a wealth of animal life. Many species are year-round residents, while others appear temporarily or seasonally.

Not surprisingly, some animals are better-suited for certain wetland areas. For example, swift-moving rivers and streams cannot support the same fauna as slow-moving waterways or standing water. Many species populations spread and retreat with the changing seasonal dimensions, reaching very high concentrations at peak dry season. It should be noted that many species appear in more than one wetland scenario.

AMPHIBIANS AND FISH

Amphibians

Within wetlands environments, we find several groups of animals in particular that are more profuse due to the presence of water - amphibians and fish. There are 33 species of amphibians in Belize. Amphibians need both a land and a water environment for their survival. The most common species of amphibians can be divided into three groups: toads, frogs, and tree frogs. They require at least seasonal ponds in which to lay their eggs. Tadpoles need sufficient time in total immersion to change from gilled fishlike larvae to air-breathing juveniles, capable of hopping about on land to hunt tiny insects. All frogs and toads are *carnivores* (meat-eaters), and most eat mainly insects. Don't kill toads in your garden-they consume almost their weight in insects every night!

An amphibian is usually a *toad* (scientific family name Bufonidae) if its skin is dry and rough, dotted with raised poison sacs on the back, has two enlarged glands behind the eyes, and is generally of stocky build. Toads use urine as a defence; urine and the glands on the toad's skin, which produce a very toxic substance, are the only defences this animal has against toothy and faster-moving predators. If eaten by a predator, the predator is very likely to die. Although toads do not cause warts (a common myth about them), their urine and toxic glands are causes for avoiding contact with them.

Frogs (Ranidae) are usually slender, with smooth wet skin (one notable exception is the Tungara Frog, a small species with the stocky build and rough skin of a toad). Frogs need to be near water for their entire lives, while toads may venture considerable distances into dry land, only returning to water to spawn (mate and lay eggs). Most frogs are capable of surprisingly long leaps that can propel them to safety from a predator. Small streams in deep forest areas serve as breeding grounds for tree frogs.

Tree Frogs (Hylidae) are usually small and more similar to frogs than toads. Sticky toe-pads enable them to climb plants, walls, even glass, which is not possible for a Ranidae frog. Tree frogs are capable of truly spectacular leaps. For individuals on the ground, look closely at the toes to distinguish between the Ranidae and Hylidae.

What do we think about when we think about frogs and toads in the Belizean environment? The sounds they make! The croaks of frogs are sounds coming mostly from the males. During the rainy season, from June-November, they croak to establish their "breeding zones" and to attract females. Scientists who study tree frogs believe that during the dry season they climb high into tree canopies, or they burrow under the ground. Exactly where frogs go when the rains stop, however, remains a mystery.

Fish

Fish are another important group that is restricted to wetland areas in terrestrial ecosystems. Belize has few fish species that are completely restricted to freshwater due to its geologic history. Until only about 2 million years ago, Central America was separated by sea from Mexico and South America; thus most fish found here have considerable salt-tolerance (Greenfield and Thomerson, 1997).

There are three groups of fish found in the wetland terrestrial ecosystem:

1. Primary freshwater fish

Only a few completely freshwater species have had the opportunity to move in from the north or south to populate Central American rivers, streams and permanent lagoons. Only three primary freshwater fish families (families whose species have always been linked with fresh water) have had the opportunity to colonize Belizean fresh waters; two of these are catfish families and one is the Characidae, with 3 difficult-to-distinguish species. Representatives of two primary fresh water fish families may be found in temporary ponds in savannas. These are the Billums (Mexican tetra and the deeper-bodied silver tetra) and the Pimelodid Catfish *Rhamdia* sp (Greenfield & Thomerson, 1997). These catfish may be recognized by the very long adipose fin which appears on the back behind the dorsal fin and lacks the spines or rays that most typify fish fins.

2. Secondary freshwater fish

Secondary fresh water fish are those which have family members that originated in seawater but have returned to fresh water; many may also be seen in brackish (partly saline) conditions. Four fish families are represented here, some of them among the most important in Belizean freshwater ecosystems: Poeciliidae (livebearers including mosquitofish or “popsie”, swordtails and mollies-12 Belizean species); Cichlidae (Cichlids - pair-forming fish that guard their eggs and young in defended territories on slow moving creek beds, lagoons or ponds-15 species in Belize); Cyprinodontidae (killifishes), with 4 species; and Synbranchidae-a family of mud-eels with only two Belizean species (Greenfield & Thomerson, 1997).

3. Peripheral freshwater fish

The third group of freshwater fish in Belize, tertiary or peripheral freshwater species, is the largest and is principally composed of those species which are essentially seawater species that are also able to tolerate fresh water. This group will be discussed in detail later in this chapter.

Freshwater lagoons and slow moving rivers and streams (usually the lower reaches) are generally populated by a large diversity of fish species that are primary and lower secondary consumers. Some larger species, higher level predators, such as the Snook and the predatory Cichlid Bay Snook, as well as others, may also be found. An unusual yellow-orange color morph of the Bay Snook is found in the White Water Lagoon in northwestern Belize near St. Paul's Bank Village. Tarpon and the Ictalurid Blue Catfish with its small adipose fin and eight head barbels (“whiskers”) are also found in this area. Another large predatory species of note occurring in an increasing number of Belize's watersheds and waterways is the Tilapia, a group of Asian fish species commonly farmed in commercial aquaculture ventures.

Many smaller fish species populate seasonal wetland savannas, and are able to travel far over flooded savannas; these remain stranded in deeper holes as time passes. Most of these small species either graze algae and other plant material or prey upon small invertebrates. Many of the small ponds will ultimately dry out before wet season returns, and only good fortune and the rains may save these individuals as the dry season grinds on. Meanwhile, the fish become compressed into an ever-shrinking habitat, resulting in dominance by the most aggressive species, for example, Jack Dempsey Cichlids – who take over from the normal species distribution.

BIRDS AND MAMMALS

Birds

There are more bird species in Belize than any other *vertebrate* (animal with a backbone) group. The overall number of species is estimated at 560. However, that is always changing because sightings of new species for the country are always being made. Many bird species - literally hundreds - spend all or part of their time in and near freshwater lagoons and/or rivers and streams. Many extend their ranges into marine wetland areas as well. It is essential for the aspiring bird guide to spend time in the field with books and binoculars if s/he is at all serious about this diverse group! Excellent wetlands with thriving bird populations are located countrywide. They include Shipstern Nature Reserve; near the Rio Bravo Conservation and Management Area; freshwater Creek Forest Reserve; Whitewater Lagoon; Lamanai; Crooked Tree Wildlife Sanctuary; the Belize River system; the Sibun River system; Gra Gra Swamp; Aguacaliente; and Ycacos Lagoon.

Bird life in seasonally flooded savanna wetlands is a combination of traditional wetland and savanna species. Abundant vegetation will continue to support Grace's Warblers, Vermilion, Fork-tailed and other Flycatchers, Rufous-browed Peppershrikes, Olive Sparrows, and other bird life. The seasonal ponds and sheets of water may harbor Green Herons and other waders, Spotted Sandpipers and similar shorebirds along with other types characteristic of waterways.

Mammals

Although several species spend most of their lives in an aquatic environment, the population of wetland and riverine mammal species are a matter of degree, as all mammals ultimately require water and will at times be observed in or near a wetland. Mammals are often difficult to observe in wetland ecosystems as foliage may be dense and they tend to be shy as a result of having been harassed or hunted in the past.

Not surprisingly, terrestrial mammals treat seasonal savanna wetland similarly to drier savanna types-as a place to cross on the way to another forest patch. An important exception is when they may leave the shelter of adjacent broadleaf forests to drink at remnant water holes located far (distances over a mile) from the forest. This is the case during very dry times, when this habitat type may help maintain high populations of animal life in an area. For example, during the spring of 2000, many small rainforest creeks went dry in the Sibun and Belize River watersheds along the Western Highway around Mile 31. Clear footprints of Tapir, large rodents such as Agouti, and other mammal and bird footprints were observed imprinted in mud and dust near a remnant water hole. Apparently the savanna water hole was the nearest source of water for this population.

REPTILES

Wetland savannas may harbor several snake and lizard species typical of savanna habitats. Most snakes are relatively neckless and possess smooth scales. Venomous snakes may be distinguished from most non-venomous varieties by keeled scales over the body, a vertical pupil in the eye (like a cat) and a relatively broad, spade-shaped head supported by a slender neck. The most likely venomous snake species to be found in savanna is the Tropical Rattlesnake, along with the Cantil (Mexican Moccasin), which haunts wetlands and other habitat in search of frogs and lizards (Gavel & Matola, 1995). Belize has many species of mildly-venomous snakes. Two species, the “Cohune Ridge Tommigoff” and Cat-eyed Snake, are mildly-venomous rear-fanged species which probably receive some degree of protection by mimicry of a dangerous venomous snake. The mild venom is not dangerous to humans, but is sufficient to paralyze prey.

Several non-venomous snakes may also be noted in savanna and other wetlands, including the day-active Checkered Garter Snake, an attractive tan snake speckled with dark brown that prefers frogs, lizards and freshwater fish as food (Gavel & Matola, 1995). This species has only been found in the swampy palm and savanna lands of the Belize District. Another common snake that inhabits a wide range of open habitats is the Boa Constrictor (Wowla), a large, showy and harmless species, performing an ecosystem service by eating rats and other small mammals, principally rodents. (Wowla is one of the few snake species that survive at the cayes.)

Some turtle species inhabit the seasonal wetland savanna and are capable of short migrations from one drying water hole to another that is still viable. Box turtles (Swanka) have been sighted crossing savanna roads in the vicinity of Burrell Boom.

Lizards are the reptiles most commonly associated with rivers. The Green and Spiny-tailed Iguanas and the Basilisk, or “Jesus Christ Lizard”, are found along riverbanks. The Spiny-tailed Iguana occupies a wider diversity of habitats; it is not limited to riverbanks.

Morelet’s crocodiles are the only crocodylian species in freshwater wetland areas. Large Morelet’s crocodiles are frequently found in sluggish waterways and lagoons. They like to haul out of the water onto sunny banks and bask in the sun.

Table 3.11 Fauna of Wetland Ecosystems

Type	Species or Group	Description	Interpretive Notes
Invertebrates			
Gastropod: Mollusk	Apple Snails	Large rounded snails common in lagoons and slow waterways. Primary consumers	Lay hardened pink egg-mass on vegetation when water is high; young hatch when water level drops, Hatched egg case appears whitish
Arthropod: Insect	Odonata (Dragonflies and Damselflies)	Medium to large; colorful; predatory; ; large compound eyes; double set of long narrow wings at right angles to a long, needle-like abdomen	Young entirely aquatic; metamorphose into winged adults that often hunt mosquitoes
Vertebrates			
Fish	Catfish (3 families)	Distinguished by having 4-6 “whiskers” (actually sensory organs) around mouth	Diverse group of fish mostly living in fresh water
	Cichlids (family)	Large family of fresh to brackish-water fishes; adults 3-6 inches long; Primary to low-level consumers	Most defend a territory as pairs, and care jointly for their young, which stay with parents. Many are sought as aquarium species outside Belize. 16 species found in different parts of Belize
	Mulletts (family)	Detritus-feeding fish family; commonly found in turbid muddy rivers having much detrital material	Several species are consumed by people living in nearby communities
Amphibians	Toad: Marine Toad	very large size – up to 20cm 0.66ft) in length, 1kg (2.2 lbs) weight; very large parotid glands behind eyes; Low to mid-level predator	Consume large amounts of insects; very large individuals may consume other creatures as well

Type	Species or Group	Description	Interpretive Notes
	Gulf Coast Toad	small, well-defined warts on body; distinctive light stripe along the spine; parotid glands & body size smaller than the previous species	Fairly common; found wherever humid & has water
	Tree Frog: Red-eyed Tree Frog	large, very slender green treefrog with yellow ladder-form markings on the sides and large prominent red eyes ; voracious insectivores - they consume large quantities of insects.	Difficult to find: two known sites are the La Milpa area on the Rio Bravo Conservation and Management Area and Cockscomb Basin Wildlife Sanctuary. Can be located by their call – short infrequent staccato notes - on rainy evenings

Table 3.11 Fauna of Wetland Ecosystems

Type	Species or Group	Description	Interpretive Notes
Reptiles	Lizard: Green Iguan	Males (garobo): have 2 skin flaps under the chin (dewlap); orangy-brown in color, with darker banding on the tail; up to 1.8 m (6 ft.) long from nose to tail tip Female: tan with dark brownish-black markings; up to 1.2 m (4 ft.) from nose to tail tip. Only young are green! Primary consumer.	They may be found basking in treetops near rivers by day and feeding in morning and evening. Coloration darkens or lightens depending on temperature and activity. They are known as “bamboo chicken” and hunted for meat and eggs
	Spiny-tailed Iguana	Normally pale gray to black in color, with dark tail bands; 0.9 – 1.2 m (3-4 ft.) long; and may be found in diverse habitats- they are not limited to riverbanks; omnivorous	Will eat anything, plant or animal, that they can swallow. Robbing nest cavities is a specialty they also may take over the nest cavity once they consume the young birds
	Basilisk	Light brownish colour; adult males have a crest on their head; about 0.6 m (2 ft.) long and about 113 gms(_ lb.) in weight; Fast-moving insectivores.	Basilisks are mythical creatures believed to have the head of a cock and the body of a serpent. Known as the “Jesus Christ Lizard” because frightened individuals rise up on their hind feet and run so fast they can stay afloat running for short distances
	Snake: Black Water snake	Sluggish, slow- moving snakes; dark in color. Low to mid- level predators	Spend much time on the bottom of small, slow creeks. Consumes fish, tadpoles and frogs

Type	Species or Group	Description	Interpretive Notes
	Turtle: Hickatee (Central American River Turtle)	large turtles up to 22 kg (49 lb); low, dark, carapace smooth and leathery in adults; posterior margin of shell is smooth; yellow or cream-colored plastron; snout is pointed; toes are strongly webbed; top of the head in adult males is yellowish and in adult females and juveniles is gray; females larger than males	The largest freshwater turtle in Belize, and the last of a family of ancient turtles once common throughout the world. They have a very narrow range- southern Mexico, Guatemala and Belize. Old accounts report greater size, but have been severely hunted. Used as food; shells strung together as percussion instruments. Recently under serious decline- laws have been enacted to restrict taking of these turtles during the breeding season, which is thought to be in May. Illegal to export parts of this animal. Unlike other turtles, does not rise to the surface to bask, but rests on the bottom of the creek of lagoon.
	Crocodile: Morelet's Crocodile	relatively small - usually about 3m (13 ft) in length; broad snout; grayish brown with darker bands and spots on the body and tail; juvenile colouration is a brighter yellow with black banding; diet mainly consists of fish, turtles, birds and small mammals	Morelet's crocodiles usually inhabit freshwater lakes, rivers and ponds. Only crocodylian species in freshwater wetland areas. Large Morelet's Crocodiles are frequently found in sluggish waterways and lagoons

Table 3.11 Fauna of Wetland Ecosystems

Type	Species or Group	Description	Interpretive Notes
Birds	Hérons and Egrets (group)	Their overall color is white or gray. Several species of these long-legged wading birds spend considerable time in standing and slow-current wetlands. Examples include Great Blue Herons, Great Egrets, Little Blue Herons, Snowy Egrets, Green Herons, as well as relatives such as White Ibis. These birds search patiently for fish, worms and invertebrates in shallow waters or in the mud of lagoons or riversides.	
	Grey-necked Woodrail	chunky, chicken sized rail; short upturned black tail; overall rusty-coloured body; gray neck; bright red legs	These shy birds venture onto river or lagoon banks in search of insects and other invertebrate as food
	Northern Jacana ("Georgy Bull")	Midsized; russet-colored birds with yellow wing linings; mid to low level predators; long, green toes	Their long, green toes spread wide enough to stop them from sinking into the soft mud of the wetland edge, where they forage for small invertebrates
	Bitterns and Tiger-Hérons	Large birds with streaked bodies; mid to high level predators	They freeze motionless, blending in with tall reeds and grasses in herbaceous swamps while hunting for food
	Snail Kite	Striking black raptor with a stark white rump patch; long, slender, deeply hooked black bill; Low level predator	Maybe observed circling low over-seasonal savanna or permanent lagoons in search of one prey item only the Apple Snail. When the Snail Kite collects an Apple Snail, it retreats to a branch and pulls the snail out of its shell without breaking the shell.

Type	Species or Group	Description	Interpretive Notes
	Common Black Hawk	mainly black, heavy body; 43-53cm (1.4 – 1.7 ft) long; 930g (32.5 lbs) weight; heavy hooked black bill; very broad wings; legs and cere are yellow; short black tail with a single broad white band and a white tip. High level predator	The Common Black Hawk (actually not that common!) flies high in search of its prey. Preferred foods are birds to eat or Great-tailed Grackle nests to rob
	Jabiru	large tropical American stork; stands some 1.5 m (5 ft) tall and has a wingspan of almost 2 m (6 ft); immense bill 36 -38 cm (12 – 13 inches); white plumage with a pink band at the neck and a naked head; eats frogs, small birds, and mammals, and reptiles; high –level predator	Largest flying bird in the Americas. Sometimes they are attracted to shrimp farms when harvest is on They build a stick platform nest on top of a tall snag-often a pine tree – and lay from 2 - 4 eggs. Individuals may be sighted in savanna wetlands or shallow lagoons,
	Hummingbirds	Small to very small birds, 5–22 cm(2–8.7 in); 1.9–21 g (0.07–0.7 oz); extensive metallic plumage; bill thin, extremely different in shape; feet tiny	Hummingbirds mainly drink nectar, but also eat insects They are attracted to flowers many of which are red. When a hummingbird hovers. it actually reverses its wings. This allows the bird to fly backwards There are 23 species of hummingbirds in Belize. A number of different species are found in the riverine ecosystems.

Table 3.11 Fauna of Wetland Ecosystems

Type	Species or Group	Description	Interpretive Notes
Mammals	Tamandua (anteater or antsbear)	thick, bristly, cream, tan or black fur with a brown to black collar; toothless; has long tongue covered with a sticky saliva; prehensile tail; strong, four-clawed forelimbs; 0.5 -0.6 m(20 - 24 in) tall; nocturnal; low level predator	They are frequently found in mangrove forest. Uses fore claws to rip open termite nests to feed. Lives in trees during the day.
	Southern River Otter	Body 0.57 – 0.69 m (22.5-27.5 in)long; tail 0.34 – 0.46 m (13.5 – 18 in) long; very dark brown fur with lighter cinnamon underbody; notably soft, lies sleekly back along the body; good swimmer – can spend two minutes underwater; heavily webbed feet with strong claws; body shaped like a cylinder, with a sleek head for slipping through the water; muzzle is broad and whiskered; ears are small, rounded, and set back on the head Mid to high level predators.	Adapted to living much of its life in water. Found in clear, fast-moving streams and rivers. Are active in both the day and night. Otters eat fish and shellfish, and often lay on their backs in the water, rest their food on their stomachs, and eat.

SKILL CHECK

EXERCISE 1: ANSWER THE FOLLOWING QUESTIONS

1. Why does water stay in lagoons?

2. Describe how water “selects” a course to become a waterway.

3. Name and describe three types of wetland ecosystems.

4. Describe the changes a river goes through as it moves from highlands to the sea.

5. What is a gallery forest and how does it arise?

6. Describe the importance of wetlands.

EXERCISE 2: INTERPRETATION

1. Choose two plants from each type of wetlands. Interpret these to your class group as if on a tour.

2. Choose one reptile, one bird, and one mammal from wetlands ecosystems and interpret to your class.

EXERCISE 3: IDENTIFICATION

1. Identify by description (Instructor will select random species or groups of flora and fauna from tables for groups to identify orally)

2. Identify from slides verbally. (You will be shown slides and asked to identify orally and discuss as a group)

CAVE SYSTEMS

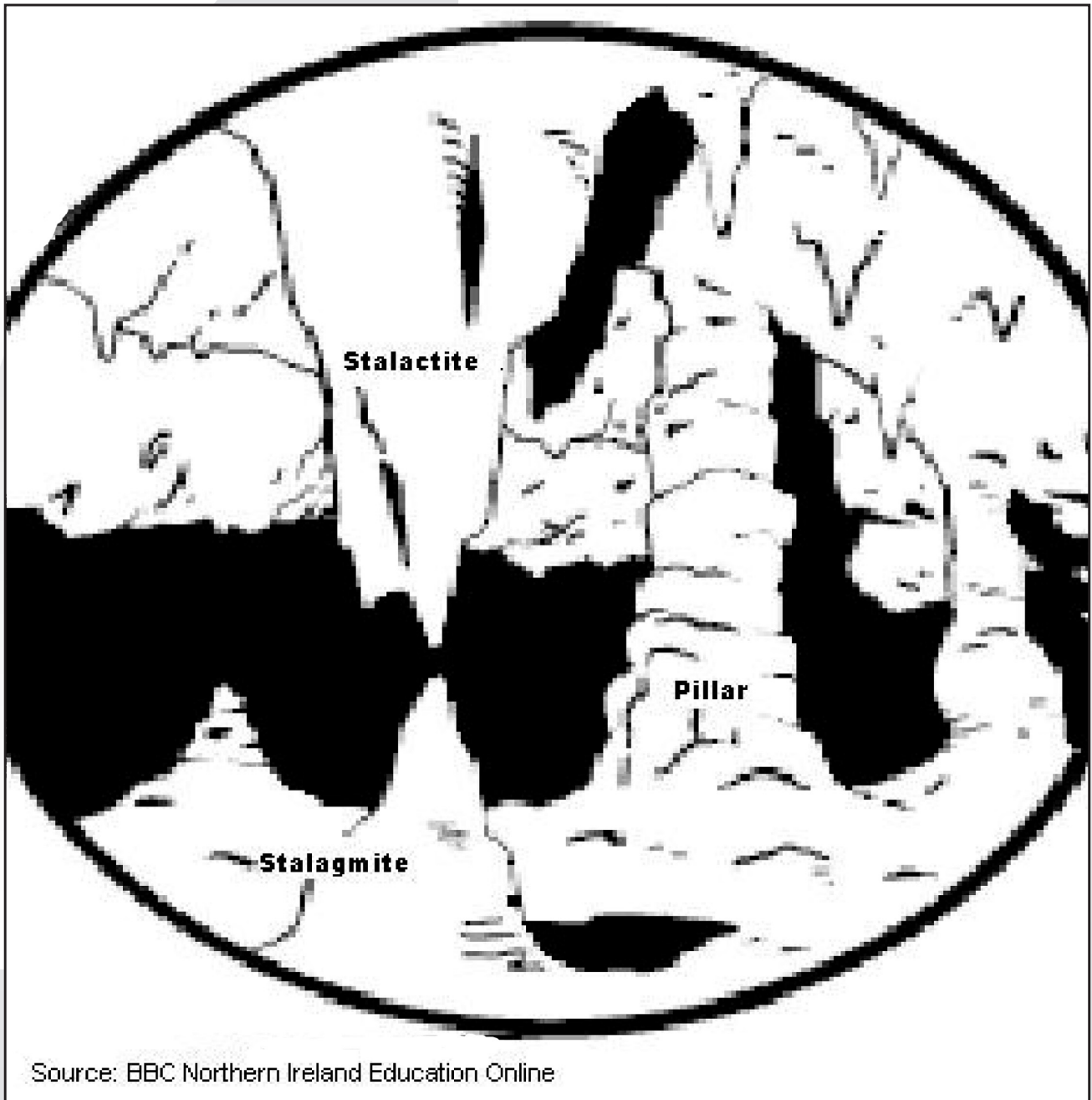
As we learned in Unit 1 of this chapter, there are many caves in Belize. We are going to look at some of the characteristic formations found in limestone cave systems as well as a few examples of the flora and fauna of the caves.

Belize has many caves because there is so much limestone which is easily dissolved by rainwater that has combined with carbon dioxide to form a weak acid called carbonic acid. Rain water picks up carbon dioxide as it falls through the sky and as it passes through air pockets in soil. The more carbon dioxide present in the air water passes through, the greater the amount of carbonic acid formed. Limestone is filled with cracks and fissures through which water can trickle and seep down until non-porous soil, such as clay, or hard impervious bedrock, such as granite, is encountered. **Solution caves** are formed over thousands of years as the continuous downward flow of this weak acid solution through the cracks, crevices and splits in the limestone rock dissolves the calcium carbonate so that the rock substrate is weakened and eroded. Caverns or underground chambers eventually form at different levels along the path of the downward flowing acid water solution. If the water table has risen and fallen over the years, additional erosion of the rock substrate has also occurred from the bottom up.

Underground rivers form caves by abrasive erosion and create *winding tunnels*. Evidence of erosion, including sand and small rounded stones, will be found in such caves even if the river has disappeared. In Belize, we have at least two existing underground river cave systems. The Rio Frio Cave marks the remnants of an underground river vastly larger than the stream that flows through it now. It is open at both ends, an indication that the rest of the tunnel has collapsed. The Blue Hole National Park on the Hummingbird Highway is a *cenote* - a limestone *sinkhole* formed by the action of carbonic acid. Sinkholes provide evidence of underground cave systems. The easily accessible cenote at the Blue Hole National Park marks the presence of an underground river cave system with a small portion of its roof collapsed and only a small portion of the river visible from the surface. The most famous cenote is the one in the Yucatan Maya ruin of Chichen Itza.

Caves often have striking formations formed due to precipitation of dissolved carbonate into the open air of a chamber. Downward projecting icicle-like formations -called *stalactites* - have formed from centuries' worth of drips. If the drips of carbonate-laden water hit a dry floor, a buildup of carbonate may be precipitated out into a column projecting upward from the floor, called a *stalagmite*. Where a stalactite and a stalagmite meet, a pillar is formed. See diagram on the following page.

Figure 3.10 Diagram of Stalactites, Stalagmites and Pillars



Source: BBC Northern Ireland Education Online

Other striking formations such as *sheet flowstone* - where the water spread out in a flat sheet and deposited its load of carbonate, or the water dribbled in through a small hole in the wall, to create formations that resemble folds of cloth or other exotic shapes are found in some Belizean caves. Examples of sheet flowstone formations can be found in the Rio Frio and Barton Creek Caves.

Caves and sinkholes are even found under the sea. The most famous in Belize is the (other) Blue Hole located at roughly the midpoint of Lighthouse Atoll; it drops to a depth of over 120 meters (400 feet). Dripstone formations are observed at 40 meters (132 feet) and are a popular dive attraction. These dripstone formations are not quite vertical, due to continued earth movement since the cave's formation. Given that limestone cave formations could not possibly have formed underwater, the off-vertical position of the formations provides evidence of dissolution action occurring when the caves were above sea level, such as during the Ice Ages, which ended about 5,000-8,000 years ago.

Other cave systems through which you can canoe to view formations are Blue Creek and Little Quartz Ridge in the Toledo District; Petroglyph and Caves Branch; and Barton Creek Cave. Chechem-Ha cave, used by generations of Maya for ceremonial and burial purposes, is a winding cave with a dirt bottom and lacks noticeable dripstone formations. The largest cave system in Belize is the Chiquibul, located near Guatemala, west of the Maya Mountains. It has many miles of tunnels, including the spectacular Cebada.

Another massive cave system lies under Caye Caulker. From a small entrance on the leeward side of the island, a large shaft opens up, and then shrinks down to where it can barely accommodate one person! The narrow shaft opens up into a massive, completely-submerged cavern some 460 meters (1500 feet) in length. Off to the sides of the cavern are several passages that have not as yet been explored. Inside are massive stalactites that are also off-vertical.

LIFE IN CAVE SYSTEMS

Two types of cave life exist. One type consists of organisms adapted completely to cave systems for all aspects of their life history, including food getting and reproduction. The second type of cave life is that adapted to shelter in caves but obtaining food outside.

The only plants capable of life in a lightless environment are the *fungi*. These plants lack the green pigment chlorophyll needed for photosynthesis and like animals—they must obtain their nutrients otherwise. Bat guano and other animal detritus is a common source of nutrients for cave dwellers; other nutrients may be deposited by underground rivers.

Animals such as blind cave fish are adapted to life without light; for them, other senses take over the importance normally held by sight. For example, smell can lead an animal to food or a mate. Under the sea eyeless shrimp species have been noted, and in anchialine caves, an entire new group of small, multi-legged arthropods called Remipedes have recently been discovered. *Anchialine habitats* are flooded coastal caves and groundwater habitats that lack any direct surface connection with the open sea.

Bats fall into the second category of cave dwellers. Bat guano supports not only fungi, but species of insects and other simpler life forms. Some birds, mostly swallows, nest in cave entrances. Similarly, some mammals, reptiles and others shelter in caves; however, larger animals usually prefer small cavities that they can easily defend.

Humans have also sheltered in or otherwise used caves throughout their history. Most terrestrial caves in Belize show some evidence of use by the ancient Maya. In Maya mythology, caves were a gateway to the underworld -Xibalba. Therefore, the principal use to which they were put was ceremonial, including burials. A total of over 200 burials have been found in over 20 caves. Since many caves contain water - which was in short supply for northern Belize and the Yucatan Peninsula - the Maya used caves as water reservoirs and needed to descend into these frightening places to obtain it. There are places in Belize named for such sunken wells - for example, Sarteneja (the last syllable-ha-means water in Maya). Some Maya also believe that mythical creatures like the “Duende” and “Sisimite” live in caves in remote “back a bush” parts of Belize.

There are several visitable cave systems in Belize; however, it is essential that care be taken when inside, as it is possible to become lost in the confusion of their winding passages. Cave guiding requires some very specialized guiding skills.

SKILL CHECK

Answer the following questions

1. What are the two types of caves systems? How are they formed?

2. Give examples of each type of the two types of cave systems found in Belize.

3. What are the two types of life forms that may be found in caves?

4. Give two examples of organisms for each type of life form found in caves.

THREATS & CONSERVATION OF TERRESTRIAL HABITATS

THREATS

When discussing threats to an ecosystem, it is important to remember that all ecosystems are connected by air and water processes. Threats to terrestrial ecosystems arise from natural occurring and human initiated activities. While natural impacts may be far-reaching, they are usually short-term. Human impacts, on the other hand, often result in long-term habitat degradation or outright destruction. For this reason, this section will concentrate on impacts resulting from human activities.

Major threats to dry terrestrial ecosystems arise from removal of vegetation for temporary or long-term development. Inappropriate or poorly-managed development activities in dry areas may soon result in effects to rivers and other wetlands as rainwater picks up soil particles and moves them to lower wet areas.

Deforestation results from removal of existing vegetation from an area. It may be temporary as in milpas, or so long-term, as to be virtually permanent (for example, for growing of large-scale export crops, including sugar, citrus and bananas; shrimp-farming (most located in savannas at or near Coastal Zone savanna habitat); clear-cut logging; or removal for large-scale housing development (also largely in pine savanna).

Other activities resulting in habitat degradation or impacting on flora and fauna include selection logging; road construction; hunting; insensitive tourism visitation (including the effects of noise from loud talking and radios); off-trail straying; trashing, including garbage from visitation and from poorly-managed landfills for villages.

Major threats to wetland ecosystems are from damming or filling and pollution.

Damming to produce a permanent water source for some individual or, on a larger scale, to produce electric power, has far-reaching effects both on upstream flora and fauna (inundated by water) and downstream (complete drying or reduced water volume). Considerable dry habitat, in addition to wetland, is affected in these situations. Most dams have a limited life-span as river sediments ultimately are deposited behind the dam and gradually fill in the reservoir. Materials in the construct of the dam may be affected by upstream pressures during flood events further limiting its life span. Affected habitats, meanwhile, are impacted over the long-term.

Filling/conversion frequently occurs in wetland areas desired for development. Problems here include loss of territory for natural flood control, possibly resulting in increased flooding problems in nearby areas during heavy rain events.

Organic pollution from agriculture, industry and domestic sources. Examples of organic sources include livestock excrement, human sewerage, cane slurry or fruit peels from processing. This type of pollution results in: excess algae which translates into cloudy water; choking growths of water hyacinth and other fleshy plants in standing water or sluggish streams; bacterial growth in water that may cause skin or gastric disease in humans; lack of oxygen in the water due to large amounts of detritus in the water all decaying at the same time results in fish kills. (The decomposing bacteria use all the oxygen in the water leaving none for fish and other animals.)

Chemical pollution from sources such as pesticides; industrial chemicals, heavy metals and other toxic waste; leachate (seepage through soil) into streams and rivers from household waste from human communities living near waterways and lagoons; and oil, gas and chemical spills. Chemical pollution results in: kills of aquatic life from chemical and metal poisoning; human and wildlife health problems relating from drinking water with small amounts of chemicals and metals; immunosuppression (reduced ability of a person or animal's immune system to fight off disease); and other effects.

Sediment pollution from riverbanks that have been cleared. Displaced sediment may reach far downstream, although some filtration by wetland plants occurs, reducing the amount of sediment from upstream as the water moves down the river.

CONSERVATION

Most conservation arises from protected areas and environmental laws which will be discussed in Unit 4 of this chapter. The National Biological Corridors Initiative (NBCI) is a relatively new way of linking protected areas with one another, by encouraging local communities to protect, rather than destroy, those areas still forested but lacking protection status. The NBCI project hopes to work with villages near forested corridors to help them initiate development projects and income generation schemes that are complementary with forested areas, rather than those requiring deforestation, such as new farming within the corridors. This is a project in progress that will hopefully result in more environmentally sound development moving forward economically without moving backward environmental.

In thinking about sustainable development, it is important to remember that ecosystems provide services for us that we cannot provide for ourselves.

SKILL CHECK

EXERCISE 1: ANSWER THE FOLLOWING QUESTIONS

1. Name the major type of environmental threat to dry ecosystems.

2. Name the two major threats to wetland ecosystems.

3. What are three different types of pollution?

4. What are the major ways that conservation is accomplished for terrestrial and freshwater ecosystems?

EXERCISE 2: INTERPRETATION

Using interpretation techniques, discuss and describe a threat to a terrestrial or wetland ecosystem. Suggest ways a specific development project might be accomplished that would reduce or eliminate destructive impacts.

UNIT 3: MARINE ECOSYSTEMS OF BELIZE

Successful delivery of marine-based tours requires guides who possess general knowledge of Belize's marine ecosystems and are able to interpret its flora and fauna in an educational and interesting manner. This unit will provide you with an overview of marine ecosystems and will define each marine ecosystem, discuss its importance and benefits, provide examples of each ecosystem and highlight key flora and fauna of each. This unit is directly linked with the interpretation of natural history and generic tour sections in Chapter 2.

OBJECTIVES:

At the end of this unit, you will be able to:

1. Name and describe each of five marine ecosystems of Belize
2. Name areas in Belize where each ecosystem is found.
3. Describe the importance of each marine ecosystem
4. Identify common marine species of Belize
5. Interpret materials to class members as if on tour

AT A GLANCE:

1. Introduction to Marine Wetland Ecosystems
2. Coastal Lagoons and Estuaries
3. Mangroves
4. Littoral Forests
5. Seagrass Ecosystems
6. Coral Reefs
7. Threats and Conservation



INTRODUCTION TO MARINE WETLAND ECOSYSTEMS

As seen in the previous section, wetlands are areas characterized by poorly drained, supersaturated soils and immense productivity derived from nutrients collected by the vegetation. The boundary separating freshwater from marine wetlands is one of salinity in both soils and water, rather than of structure or form. The coastal zone is defined by the influx of saline water from the sea into freshwater lagoons, river mouths (estuaries), stream-fed bays or other water bodies located near the coast. Sixteen watersheds drain into a series of coastal lagoons ranging from Shipstern in the north to Port Honduras in the south.

Salinity - the measure of salt content in water-is measured in parts per thousand (ppt). Water with just a few ppt is termed brackish, while full-strength seawater, such as that found around the barrier reef, will normally carry 34-36 ppt. Heavy rains falling in a short time over lagoons, estuaries, or the open sea may cause considerable and rapid changes in salinity.

Like all other ecosystems on Earth, marine ecosystems are run by the conversion of solar energy by plants into biological energy, where it may be accessed by animals. Coastal areas are frequently rich in plants and animals, as living things may draw upon both terrestrial and marine environments for resources. However, only specially adapted organisms may tolerate such sudden, wide shifts in salinity.

Energy, converted by plants to a usable form, comes to the subtidal (always below water) world primarily from three vegetation sources: *phytoplankton* (single-celled, microscopic algae floating in surface waters); *benthic microflora* (microscopic algae living on the bottom and on other bottom-dwelling animals); and *macroflora* (large attached plants, such as seagrass, mangroves and macroalgae).

Belize has five major marine wetland ecosystems:

- i. Coastal lagoons and estuaries
- ii. Mangroves
- iii. Littoral forests
- iv. Seagrass beds
- v. Coral reefs

Let's look at each in turn.

COASTAL LAGOONS AND ESTUARIES

Introduction

The first level of marine habitat - coastal lagoons and estuaries - is also the most extreme for living things. Seasonally, variation in salinity for lagoons may range from near zero in times of heavy rain to full oceanic salinity. Even within a single day-the first day the rains return after the dry season, for example - salinity may drop drastically. Rain falling far upstream may pulse into a coastal lagoon or river mouth radically altering conditions in the lagoon and near-shore. Offshore, changes are far less extreme and rainwater will diffuse more quickly into the surrounding sea; even so, patches of water of lower salinity may be identified by a snorkeler as blurry areas.

Coastal lagoons, like their freshwater counterparts, are shallow bodies of water lying along or near the coast (Jolly & McRae, 1998). Shipstern Lagoon, in far northeastern Belize, tops a near continuous line of lagoons reaching south almost to the Belize River estuary.

Estuaries are found at the mouths of rivers, where the freshwater of the river meets the sea. They represent the end of the long journey of water from its source, gathering additional water as its flows through its *watershed* -the area drained by that particular river -traversing the landscape enroute to the sea.

Because of its low-lying, poorly drained topography, northern Belize is particularly rich in coastal lagoons. However, only three major watersheds, ranking first, second and third largest in area in the country, lie within the northern section. These are, respectively, the Belize River Oust (under 655,000 ha in area); the Rio Hondo (over 267,000 ha); and the New River (nearly 191,000 ha) watersheds (Lee et al, 1994). The low topography of northern Belize directs the latter two of these to be sluggish in flow, enroute to the largest semi-enclosed body of water, or bay, in the country - Bahia Chetumal (Chetumal-Corozal Bay). The lower reaches of the Belize River are also sluggish in flow.

Central Belize boasts four major lagoons (Jones, Northern, Southern and Quashie Trap Lagoons) associated with one major (Sibun) and one small (Manatee) river system, located between Belize City and Dangriga. The latter three lagoons are associated with *relict* (left from a previous geologic age) alluvial wash from the Maya Mountains deposited by the Sibun River, with a watershed located to the immediate south.

In contrast, southern Belize has many river watersheds and few lagoons. A few small lagoons are associated with small streams, including Salt Creek and Sapodilla Lagoons, while the Sennis River drains into Indian Hill Lagoon. Further south, Placencia Lagoon is contiguous with the sea and is more like a bay or inlet than a lagoon, while Ycacos Lagoon lies amidst a vast, richly productive delta within the recently-designated Port Honduras Marine Protected Area.

Rivers and streams in the south are numerous and usually small. The estuaries of the Mullins River, as well as those of the North and South Stann Creek Rivers are small. The Sittee River has a larger, somewhat better developed estuary. One exception is the Monkey River watershed, which is the fourth largest in the country, with an area of nearly 127,560 ha (Lee et al, 1994). From Monkey River southward, small but deep streams and rivers are found; they include Deep River and Golden Stream within Port Honduras, and the Rio Grande and Moho Rivers located between Port Honduras and Punta Gorda. At the southern end of the country, a second productive *delta* (the deposits of soil and nutrients found at the mouths of rivers) is shared by the Temash and Sarstoon Rivers (McField et al, 1996).

Importance of Coastal Lagoons and Estuaries

Coastal lagoons and estuaries are of great importance in the marine wetland ecosystem. They are at the lower end of the essential flood control system provided by freshwater wetlands and waterways. Their vegetation, like that of freshwater wetlands, collects nutrients from upriver. They also accumulate waste, filtering impurities from water passing through them.

Coastal lagoons and estuaries connected to the sea provide protected nursery grounds for many animal species, including some species of commercial importance. This makes them some of the most productive of all ecosystems.

Life in Coastal Lagoons and Estuaries

As fresh water meets the ebb and flow of the sea tides, conditions in coastal lagoons and estuaries are in a constant state of change. Colonies of nesting wading birds make their homes in the quiet shelter of coastal lagoons, while numerous insects hide amid the vegetation. Small marine animals begin their lives here, moving out into more dangerous waters as they mature. Here in the coastal lagoons, the two species of crocodiles found in Belize cross paths - the only environment in the country where they are both found.

Flora of Coastal Lagoons and Estuaries

The principal vegetation found in coastal lagoons and estuaries is mangrove, fully described in the next section. Other vegetation, tough and broadly salt-tolerant, are also found in coastal lagoon and estuarine areas. The orchid Dama de Noche may be observed, while ground herbs such as Morning Glory and the tall bromeliad, Jacob's Ladder, may be observed amidst a variety of grasses. On the water, water lilies and water hyacinth grow near to land in very calm areas, while microscopic algae add to the rich production of the area. Water hyacinth, in particular, is useful for filtering pollutants from the water.

Table 3.12 Non-mangrove Flora of Coastal Lagoons

Type	Species	Description	Interpretive Notes
Tree - Low palm	Palmetto - Saltwater Palmetto	Fuzzy Trunk	Often harvested to split for lobster trap construction
Shrub	Cocoplum	Rounded leaves arranged alternately along branches; fruit about 2.5 cm (1 inch) in diameter	The edible fruit found on the mainland is dark
Epiphyte	Orchids: (Cow horn; Dama de Noche)	Both species have very thick, stiff leaves; Cow horn has leaves about 2.5-4 cm (1-1.5 in.) diameter and about 18 cm long; Dama de Noche has long, pointed, very thick leaves	
Ground Bromeliad	Jacob's Ladder	Spiky gray-green pointed leaves growing in clumps on ground; flowers on tall 1.5-2.5 m (5-8 ft.) stalk	This plant flowers only once in its lifetime

Fauna of Coastal Lagoons and Estuaries

Primary consumers (animals that obtain their energy from plants) of coastal lagoons include a wide range of creatures, from tiny shrimp and other invertebrates through a variety of fish to the massive West-Indian Manatee; they may be found in either fresh or salt water. Many of the smaller species may contribute their energy to the next order by providing food for secondary consumers, or predators. Small fish, such as cichlids, and the young of species such as Tarpon, consume smaller fish and invertebrates suspended in the water column. Larger predatory fish such as snook also prey on small fish.

Many fish and invertebrates are also consumed by wetland birds such as anhingas, herons and egrets, ibis, wood storks and kingfishers, among others. Wading birds form semi-permanent nesting aggregations in several coastal lagoons, either along the shore or on small mangrove islets found within the lagoons. These groups of birds, called *rookeries*, are seasonally active and may consist of tens to hundreds of Wood storks or Great Egrets, along with smaller numbers of other species, such as Boat-billed Herons, Snowy Egrets, White Ibis and others.

The size of the rookeries is a good indication of the health of the ecosystem. The Northern Lagoon hosts Great and Snowy Egrets, White Ibis and Boat-billed Herons, while Shipstern Lagoon has a variety of heronries. Two other coastal lagoons host major Wood stork colonies. Secretive wetland birds such as rails and bitterns conceal themselves in salt marshes or in vegetation around lagoon borders.

The top predators in marine wetland ecosystems are Belize's two crocodiles, Morelet's and American (Saltwater); only here do they occur together. Young crocodiles hatch from nests above the water line and are cared for by their mothers for the first part of their lives. As juveniles, the crocodiles consume insects and other small invertebrates, while adults eat larger fish, birds, mammals, and other organisms.

Table 3.13 Fauna of Coastal Lagoons and Estuaries

Type	Species	Description	Interpretive Notes
Fish	Tarpon	Fusiform (bullet-shaped), fast swimming fish having small upturned mouth and very large silvery scales, Low-level predator, feeding on plankton and small fish	These fish may grow very large, and are known to fishermen as the 'silver bull',
	Snook	Elongated pale fish with conspicuous lateral line and flattened forehead midlevel predator, consuming fish and invertebrates	

Table 3.13 Fauna of Coastal Lagoons and Estuaries

Type	Species	Description	Interpretive Notes
Reptiles	Morelet's Crocodile	Prefers fresh water, but is also found in brackish water. Can grow to 4.5 meters (13 ft.) long or more	Named after discoverer, who found it in 1870. Mainly nocturnal, they are shy and avoid contact with humans. Endangered, found only in Belize, Mexico and Guatemala. Eye shine is red
	American Crocodile	Prefers salt and brackish water; slender snout; larger body than Morelet's	
Birds	Boat-billed Heron	Large, stocky heron; large eyes, back of head black, pale gray back; rusty colored belly; white forehead.	Easily identified by its massive distinctive bloated bill: completely nocturnal in feeding; roosts by day
	Wood stork	Large and heavy: all white except black wingtips and head, with slightly down turned bill. eats animals, particularly fishes. Mid to high-level predator	Rookeries found in 2-3 coastal lagoons and one inland lagoon
Mammal	Fishing Bat	Large-sized bat with red color; pointed wings up to 60 cm (24 in) long; feed on fish and crustaceans below surface of the water	Bat detects prey below surface of water with sonar. uses claws on feet to gaff, then places catch into pouch in mouth mid-flight to eat upon return to roosting. Locally known as bulldog bat
	West Indian Manatee	Large 2-3.5 meters (8-12 ft), heavy bodied gray mammal, largely hairless. Can reach up to 600 Kg (1300 pounds). Rounded face; no neck; muzzle falls in folds over its mouth; rounded paddle tail; may have algae patches or barnacles on skin. Grazes on Water Hyacinth, Seagrass and other submerged or floating plants. Range from fully fresh to fully salt water	Population in Belize estimated 200-700 animals. Does not mate until 7 - 8 years of age, breed infrequently (every three years), care for calf for 2 - 4 years. CITES I endangered due to hunting; fully protected in Belize.

SKILL CHECK

EXERCISE 1: ANSWER THE FOLLOWING QUESTIONS

1. How is the coastal zone different from other wetlands?

2. How many watersheds drain into coastal lagoons?

3. What is the reason for the harshness of coastal lagoon and estuarine habitats?

4. Name 2 of the principal primary production sources in subtidal waters.

5. Name three estuaries, and three coastal lagoons,

EXERCISE 2: INTERPRETATION

1. Choose one of the following to interpret to the class: Morelet's Crocodile, American Crocodile, West Indian Manatee, Tarpon, Fishing Bat.

EXERCISE 3: IDENTIFICATION

1. Identify from descriptions. (Instructor will select random species or groups of flora and fauna from tables for group to identify orally.)

2. identify from slides verbally. (You will be shown slides and asked to identify images verbally, and discuss as a group.)

MANGROVES

Introduction

Mangroves are a group of trees with special adaptations for survival in *hypersaline* (high concentration of salt) soil and water, conditions of low oxygen (O_2), and at least *phasic* (periodic) inundation or flooding. Worldwide, there are about 35 species of true mangroves and somewhat less than twice that of mangrove associates (Andrade, 1996). Belize is home to three true mangroves (the Red, Black and White Mangroves) and one associate, depending upon the literature one consults (Buttonwood, or Grey Mangrove).

Mangroves cover some 3.4% of Belize's land surface, and occur in a belt of varying width along the coastal zone. In some areas, they may occur considerable distances inland (e.g., Belize peninsula mangroves are seen as far as 12 miles from the coast along the Western Highway) or up river (e.g., the Temash River). In the latter case, the water where the mangroves are found may be completely fresh. Red Mangroves lining rivers may grow to over 13 meters (50 feet) in places.

Mangroves as a group may endure considerable variation in salinity. When heavy rains come, salinity may drop considerably in a very short time. Due to their adaptations for survival in low-oxygen, high-salinity conditions, mangroves and their associates may have few to no competitors in their stark, harsh habitat.

Mangroves are designed to use energy from non-living organic material (*detritus*) in the sea, mud flat or river in which they live. The detritus may be their own dead leaves - this may be nearly the only source available to dwarf mangroves living in barren mudflats. Along coasts and cayes, mangroves have considerable input from algae and seagrass detritus deposited amongst their roots by the tides. The dense prop roots of Red mangroves lining rivers trap nutrients coming from upstream.

Decomposers use up oxygen (O_2) while doing their job of breaking down detritus. Most plants cannot survive without oxygen (O_2) in the soil around their roots - this is another reason mangroves and their associates have so little competition. Mangroves are able to grow in soil that may contain no oxygen (anoxic conditions) because they have special adaptations for roots to take in oxygen directly from the air around the roots. Red Mangroves have special organs in their prop roots while Black and White Mangroves have root extensions called pneumatophores that grow up out of the soil and permit them to take in oxygen from the air around them. Only bacteria that do not require oxygen (O_2) may live anywhere other than the top few millimeters of soil. Bacteria requiring sulfur for their life process are so common in mangrove habitats that the "mangrove smell" normally associated with this habitat arises from hydrogen sulfide (H_2S) gas produced by the bacteria.

Importance of Mangroves

Mangrove ecosystems are the last terrestrial-based filtration system before water passes through submerged seagrass and ultimately reaches the very sensitive coral reefs. As the water passes through, the mangroves help to filter and clean the water and lessen the likelihood of harmful pollutants being deposited in waters near coral reefs.

Mangroves also form a protective buffer between the sea and inland areas in the event of severe marine weather, such as that caused by hurricanes. They are often known as "Mother Nature's Seawall." Mangroves systems not only defend land, they actually help to build land, collecting sediment among their tangled roots eventually forming small islets, and reinforcing coastlines. Mangroves are immensely productive ecosystems with accumulated sediments and

nutrients within their dense root systems. Their productivity is such that they export nutrients to other adjacent ecosystems resulting in a tremendous web of life revolving around the tightly clumped trees. In addition to providing important habitat for migrating birds, mangroves are also a nursery ground for millions of juvenile forms of marine life which shelter and take food amongst the roots.

Life in the Mangroves

As the tides flow in and out along the coast of Belize, mangroves continually adapt to changing conditions. The Red mangroves' tangled roots planted in water provide food and shelter to a myriad of small animals - from crabs to newly settled lobster to tiny fish - which dart in and out among them. Many of these tiny fish, for example, young barracuda (9 - 15 cm/4 - 6 inches), are easily recognised as miniatures of species observed at the coral reef; they prowl amongst the roots in search of even smaller fish to eat. Larger barracuda and other species such as the Grey snappers are frequent denizens of mangrove habitats; they lurk about the roots also finding food and shelter. Along the bottom of the mangrove channels, microorganisms work to convert dead mangrove leaves and other detritus (non-living organic material) to usable nutrients.

Up above, snails and crabs move along the exposed roots, while in the branches of the trees, insects galore go about their busy lives, or rest and wait; reptiles and lizards move silently in search of prey. Birds of many descriptions are found among the branches and atop the trees, enroute from other ecosystems, or migrants resting wearily after a long flight.

Mangrove habitats are extremely important for long-legged wading birds, which not only nest in their branches, but feed in the shallow protected waters near-shore. The same calm waters that give mangroves a chance to thrive also provide wading birds with the conditions necessary for their own survival.

Flora of Mangrove Ecosystems: The Trees Themselves

Red mangroves

Mangroves in Belize are often typified by the red mangrove, which forms the seaward margin of a large area of Belize's coasts and cayes. The red mangrove's arching red prop roots which help to anchor them in the mud are a familiar sight to anyone who spends time in the coastal zone. It is this root form that permits the red mangroves to occupy areas in water of some depth, as well as to survive in hypersaline muck containing almost no oxygen (anoxic conditions). None of the other mangroves have this type of root and are thus limited to a lifestyle in considerably shallower water than the red mangrove.

In season, their long, bottom-weighted propagules (seeds) are very conspicuous. These propagules may drift at sea for long periods of time; ultimately they may wash ashore, introducing new genetic material into a mangrove area. The clumped growth pattern of red mangrove trees is achieved by two means (i) dropping their propagules into the muck right next to the parent plant, or (ii) drifting propagules piling up on shore during storms.

Red mangroves have large waxy leaves which help to prevent water loss and exclude salt from the water at the root before the water is absorbed. Excess salt that makes its way past this barrier is shunted to dying (yellow) leaves, which are soon shed from the tree, becoming part of the detritus.

Black mangroves

Black mangroves grow immediately behind the red mangroves in the land zone subject to inundation. The black mangrove is the most salt-tolerant of all trees in Belize. The tree is designed to survive in water several inches deep - the length of its oxygen-collecting *pneumatophores* (narrow, pencil-shaped root extensions) clustered about the base of the tree. During dry times, the shallow water may evaporate, leaving soil and water with higher than oceanic salinity.

The trees are characterized by dark color trunks and a grayer overall appearance (especially the leaf underside) unlike the other mangrove species which have brighter green foliage (leaves). Leaves are considerably smaller than those of the red mangrove and lack the waxy covering. Salt is excreted across the leaf surfaces giving them a 'crusty' texture. This is the secret to the black mangrove's ability to tolerate extremely high salinity.

White mangroves

White mangrove is adapted for life in saturated soils that may be temporarily covered with sea or rainwater. They are found growing in the land zone furthest in from the water line. White mangroves may exhibit short, club-tipped pneumatophores that assure survival in anoxic soils. Their waxy leaves are more rounded than those of any other mangrove, and may often have a small notch in the tip. At the base of the *petiole* (short stem supporting the leaf) two small glands, believed to be *extrafloral nectaries* (nectar-producing glands located outside of flowers) can be found. Contrary to the tree's name, neither trunk nor leaves of the tree is white. They are the least salt-tolerant of the three mangrove species.

Mangrove associates

Buttonwood, called by some researchers Grey Mangrove, does not have any obvious adaptation to salinity. No obvious root extensions are known, while leaves are small and lack a waxy cuticle, making them somewhat easy to confuse with Black Mangroves. However, Buttonwood leaves are more pointed at the tip and are the same bright green color on both sides of the leaves. These trees grow in the highest and driest conditions of all the mangrove habitats, yet may survive for considerable time growing along shore lines.

Other plants that may be found sharing tough conditions with mangroves include the Mangrove Fern, a Morning-glory species, and a few epiphytic orchids and Tillandsia Bromeliads, the latter characterized by gray-green, strap-like curled leaves. Few plants can endure the conditions braved by mangroves.

Table 3.14 Flora of Mangrove Ecosystems

Species	Leaves & Flowers	Trunk & Roots	Interpretive Notes
Red Mangrove	Leaves: waxy, bright green, pointed, 10-15 cm (4in) long; Flowers: small, white and appear in pair clusters.	Low to medium tree; Reddish, smooth bark; High arching prop roots	Seeds are known as Sea Pencils. The bark is used for tanning. The wood is used for construction and as charcoal. Largest leaves of all the mangroves in Belize. Colonize permanently submerged areas. Has specialized adaptations for life in high salt, low oxygen environments. Fraying twigs at the end gives a natural toothbrush.
Black Mangrove	Leaves about 5 cm (2 in) in length, slender; dark green above, pale green below; salty to taste, Flowers: small, white and clustered on spikes	Low to medium tree; Bark dark, slightly corrugated; Slender root extensions (pneumatophores) projecting upward through mud at base of parent tree	Salt is excreted from leaves. Nectar from flowers makes very good honey, so tree is sometimes called 'honey mangrove'
White Mangrove	Leaves rounded, about 5cms. (2 ins.), long, often with slight notch in tip; waxy; two small swellings at leaf base	Trunk: pale colour; Roots: may extend short, club-tipped pneumatophores in anoxic conditions	Pale trunk often riddled with holes dripping clear sap (the result of boring beetles) Least salt tolerant of mangrove species in Belize
Buttonwood	Leaves narrow, pointed; same color green top and bottom; underside shows alternating rows of holes along midrib	Trunk mildly corrugated, No pneumatophores	Generally found on higher, drier ground, but often grows alongside White Mangrove
Mangrove Fern	long fronds with leaflets that may be several inches long	Shrubby fern	

Fauna of Mangrove Ecosystem

A mangrove ecosystem has a rich and varied collection of animal inhabitants. The richness and variety can easily be seen by exploring the three distinct zones of a red mangrove stand.

Figure 3.11 Diagram of Vertical Zonation of Red Mangrove Habitat

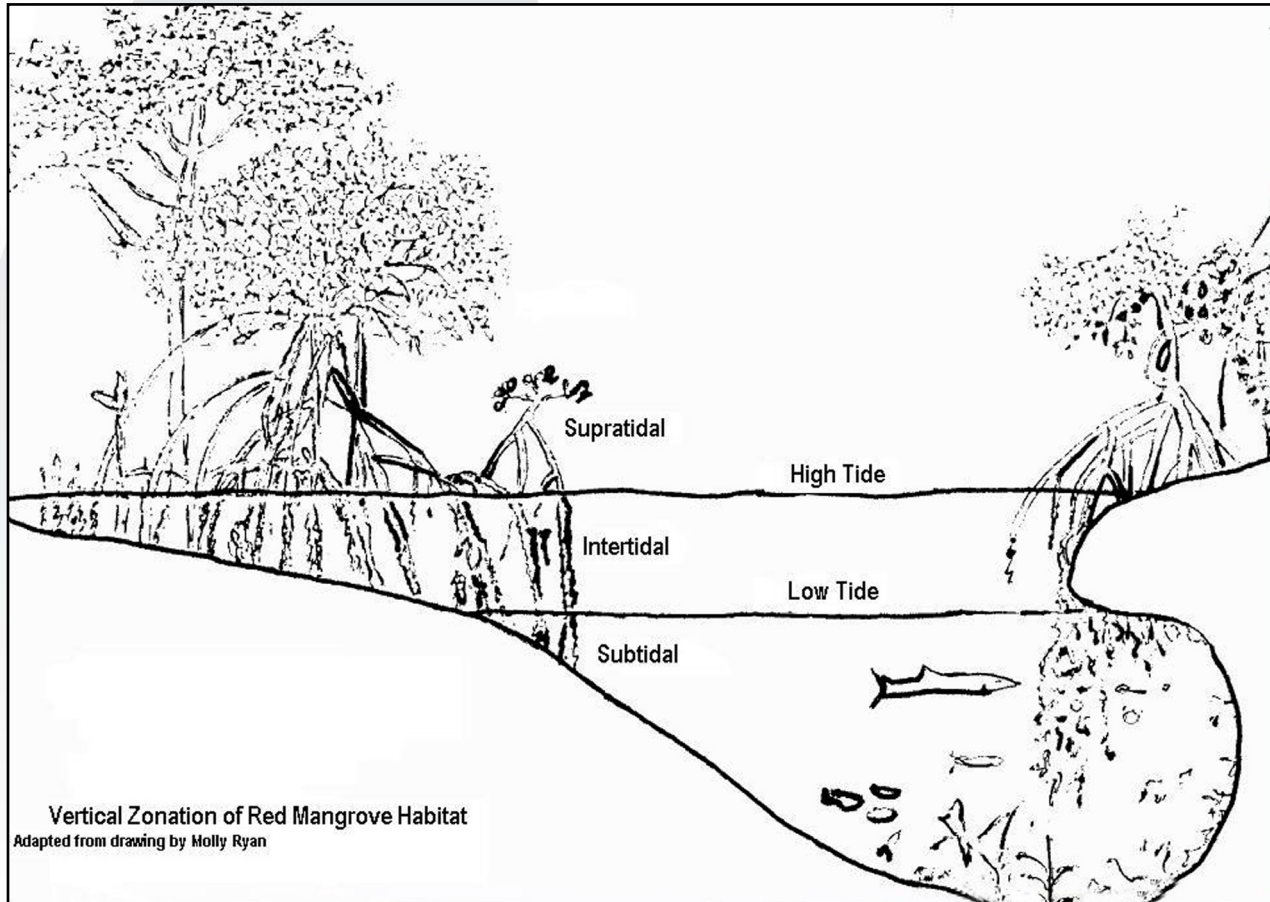


Figure 3.11 above depicts the vertical zonation of a red mangrove habitat. The three zones are determined by the rise and fall of the tide and the concurrent flooding of the 'land' on which the trees are growing. They are:

- i. subtidal zone - always below the water line
- ii. intertidal zone - below water at high tide and exposed at low tide, and
- iii. supratidal zone - always above the water line.

A multitude of organisms, both plants and animals, live in these three zones. Some are specialized to inhabit one zone exclusively while others move freely among them.

Subtidal Zone

The arching prop roots of the red mangrove form a tangled web work containing many tiny compartments designed to collect and hold soil. However, these roots not only hold sediment, creating “Mother Nature’s Seawall”, their submerged portions are home to vast numbers of sessile (immobile, attached to the roots) organisms including sponges, anemones, bryozoans, hydroids, corals (including stinging corals), barnacles and others.

Tubeworms, whose gills resemble flowers, attach to the roots between tunicate clumps. Long tentacled spaghetti worms, also seen on reefs, insert their mucous and sand-grain tubes in hidden crevices. Mangrove oysters attached to mangrove roots filter water over their gills in order to obtain food and oxygen. Newly settled spiny lobsters, less than an inch long, hide by day amongst the roots and venture out at night to hunt for even smaller organisms. Many fish lurk about the roots finding food and shelter while *decorator crabs* (small members of the spider crab family) conceal themselves by attaching sponges and algae to their backs for protection since their tiny claws, designed for picking up food particles and algae, leave them quite defenseless.

Large organisms are also found in the mangrove channels. American (Saltwater) crocodiles inhabit mangrove channels, coasts along the mainland and cayes alike. The West-Indian Manatee finds refuge amongst the quiet, protected mangrove channels in which they rest and graze on sea grass while in marine waters. Some species of shark, for example, Nurse sharks and Lemon sharks, are frequently seen in the deeper channels.

Intertidal Zone

Among and on top of the prop roots, scamper a multitude of small walking or crawling invertebrates. Many types of snails glide along the mangrove roots grazing on algae or consuming small invertebrates. A particularly large and showy example is the Atlantic Deer Cowry, commonly called “Mangrove Snail”. Hermit crabs, which occupy the shells of deceased snails and must find new shells to accommodate their larger bodies as they grow, may be plentiful in this zone. Life in the intertidal zone is facilitated by a combination of red algae which covers the mangrove roots in this zone. These red algae are especially adapted to retain water when the tide withdraws and the water level falls. Barnacles and oysters are also inhabitants of the intertidal zone.

Supratidal Zone

Above the water line, *Littorina* snails (periwinkles) creep over the mangrove roots, while, especially in White Mangroves, Boring Beetles tunnel through the wood, leaving hardened globules of sap along the trunk. Wharf Crabs and Sally Lightfoot Crabs-speedy movers with square flattened carapaces- zip across the root surface in search of food. Amongst the branches move Spiny-tailed Iguanas and smaller, agile Anolis lizards, in search of insects. Multi-paned orb webs are evidence of brightly-colored Mangrove Spiders, who may build colonies of 40-50 individuals, usually a large female and a small male to each web.

Along the mainland coast, bird species usually associated with broadleaf forests extend their ranges to the mangroves along the seaside. Woodcreepers, Manakins and many species of Flycatchers have been observed in the coastal zone. Additionally, small songbirds that travel far distances each year will be found seasonally in the mangroves. Some of these are familiar from forest or savanna habitat, while others may not be observed elsewhere in the country.

Offshore, some of the smallest islets of mangrove are sought by sea and wading birds as safe strongholds for nesting purposes. The smaller the island, the less likelihood that predators will make their way there to interfere with the nests which are made of sticks. Nests will be used

year after year. At some islands, species of birds nest sequentially, that is, one or two species nest. Then, as their young ones are maturing, another group of bird species will begin nesting after repairing or constructing new nests. Often, one of the pair will remain in the nest while the other partner searches for food.

Small mangrove cayes close to shore between Ambergris Caye and the mainland host nesting groups of wading birds including Roseate Spoonbill, Tricolor and Boatbill Herons, Reddish Egrets and White Ibis during winter and spring. A few cayes off the southern coast are nesting grounds for Terns, Magnificent Frigate birds and Anhingas. Little Monkey Caye hosts nesting for Great Egrets; additionally Short-billed Pigeons - normally deep forest birds - fly out to this near-shore island for night roosting. The shy Rufous-necked Woodrail may be observed in the correct tide at Caye Caulker, while rails such as the Yucatan subspecies of the Clapper Rail and the migrant Sora may be observed more widely. Smaller birds such as the White-crowned Pigeon also nest in mangroves while searching out fruit in adjacent littoral forest.

Far offshore, islands such as Halfmoon, Man o' War and Southwest Cayes host nesting groups of flying fish hunters such as the Red-footed and Brown Boobies, Magnificent Frigatebirds and Brown Noddies.

Near wading bird rookeries, the repeated use of the small islets by the birds for colonial nesting adds nitrates (NO_3) in the form of guano - the perfect fertilizer for increasing mangrove growth and enhancing the energy supply of the detritus based habitat. The enhanced energy supply in turn helps sustain large shoals of small fishes that associate with the mangrove roots. In mangrove lagoons or along shorelines, wading bird species such as Great Egrets, Wood Storks, Tricolor Heron, Reddish Egret and Roseate Spoonbill search for fish and invertebrates such as marine worms and small crabs that are their main food supply. Ibis bore deep into the mud with their curved red bills hunting for boring organisms. Pelicans often fish for Redear Herring and other bait fishes; their fishing activities often point the way to human fishermen searching for bait themselves. The Magnificent Frigatebirds are known for pirating food and nesting materials from a 'designated victim' species of bird.

The major raptors occurring in mangroves are the Osprey (fish hawk) and the Snail Kite, which may be observed at work seeking Pomacea snails a mere two miles from Belize City.

Along the coast, many mammals reach as far as coastal swamp-forests in the south or mangroves in the north. Jaguars and White tail deer were historically present in Northern Ambergris Caye while raccoons persist today. Along the mainland, one may encounter Tamandua and other small mammals as well.

Table 3.15 Fauna of Mangrove Ecosystems

Type	Species	Description	Interpretive Notes
Invertebrates			
Gastropod: Mollusc	Atlantic Deer Cowry	Shell; smooth, brown with small white spots	Shell most often covered by the snail's prickly gray mantle
Arthropod: Crustacean	Spider crab: Decorator crab	Small, slow-moving; Primary consumer	Called Decorator crabs because they attach sponges and algae to the carapace as camouflage.

Type	Species	Description	Interpretive Notes
Arthropod: Crustacean	Giant land crab	Oval body; 2 pincers; 4 pairs of walking legs; larval stage is planktonic	Males have 1 pincer much larger than the other. Walk on land at night, hide in burrows by day. Vast numbers migrate to the sea to release eggs.
Protochordate	Tunicates (group) Sea squirts / Sea grapes	Sessile organisms; have two holes at top of body – one takes in water, the other expels water; feeds on plankton caught on 'tunic' structure inside body	Brightly coloured, colonial animals living on mangrove roots or other surfaces.
Vertebrates			
Birds	Roseate Spoonbill	Tall, long-legged; rounded bill used to strain small crustaceans out of water	Wading bird whose striking pink colour arises from the food consumed. Nests on near shore mangrove island in northern Barrier Reef lagoon
	Clapper Rail	Pale reddish overall; back brown; chest & forehead paler; belly white; flanks striped dark brown and white	
	Tricolor Heron	Wings, back of neck and head dark gray; white belly, with white stripe up neck and throat; bill yellow. Back gray, with rusty plumes in breeding season	Back acquires rusty colored plumes during breeding season
	Magnificent Frigatebird	Males are black with an obvious red Gular; juveniles and female have a white head and neck; Long (up to 7ft) narrow bent wings; eats fish	Local name: 'Man-o-War' bird. Steals food from other birds, whom it accosts at sea until they drop their fish. Favourite victims include Cormorants, Boobies, Anhingas, terns, etc.

Table 3.15 Fauna of Mangrove Ecosystems

Type	Species	Description	Interpretive Notes
Mammals	Raccoon	Stocky, medium sized carnivore, having gray fur overall with black mask over a short muzzle. Primary to midlevel consumer	Eat crustaceans, fruit and other animals
	West Indian Manatee	Large 3.5 m (8-12 ft.), heavy-bodied gray mammal, largely hairless. Can reach up to 600 Kg (1300 lbs). Rounded face, no neck, muzzle in folds over its mouth; rounded paddle tail; may have algae patches or barnacles on skin. Grazes on Water hyacinth, Seagrass and other submerged or floating plants. Range from fully fresh to fully salt water	Population in Belize estimated at 200-700 animals. Does not mate until 7-8 years of age, breed infrequently (every three years), care for calf for 24 years. CITES I endangered due to Hunting; fully protected in Belize

SKILL CHECK

EXERCISE 1: ANSWER THE FOLLOWING QUESTIONS

1. What are the major adaptations of mangroves?

2. What percent of Belize's land are is covered by mangroves?

3. Aside from sunlight, what is the principal source of energy for mangrove ecosystems?

4. Why are only a few plants able to survive in mangrove ecosystems?

5. What are the major reasons that mangrove ecosystems are important to the overall environment?

6. What are the major differences between mangrove species in Belize?

EXERCISE 2: INTERPRETATION

1. Interpret one of the following to your class as if you were their guide.
 - a. “mangrove smell”
 - b. Difficulty of living conditions
 - c. mangroves’ root adaptations to conditions
 - d. mangrove salt balance regulation

2. Choose two bird species that nest in mangroves and give an interpretative description of them.

3. Name two fish species that inhabit mangroves for at least part of their lives and give an interpretative description of them.

EXERCISE 3: IDENTIFICATION

1. Identify from descriptions. (Instructor will select random species or groups of flora and fauna from tables for group to identify orally.)
2. Identify slides verbally. (You will be shown slides and asked to identify images verbally and discuss as a group.)

LITTORAL FORESTS

Introduction

Littoral forests are dense forests composed of tough woody, salt-tolerant vegetation. Littoral forests occur in patches and narrow strips along the mainland coast and some cayes. They represent one of the smallest area habitats in the country covering merely 0.114% of Belize's land surface. Caye littoral forests specifically covered less than 2000 hectares as of 1995. The current extent of littoral forests in Belize, as of the year 2000, is not entirely known as not all coastal areas and cayes have been recently surveyed. There has been a continuous loss of habitat over time due to the recent surge in coastal and caye development.

Littoral forest plants do not have the height or diversity found in inland forests. They are dependent on soil type and the elevation of the land above the sea. A reduction of as little as a foot or two in elevation may result in a total shift from littoral forest to mangrove habitat. Often, cayes and coasts having sufficient elevation to feature these forests will be crossed by dips or low spots occupied by mangroves. Not all cayes have littoral forest because many are drowned mangrove island or are too small to support a forest.

Coastal littoral forest is similar to a blend between transitional broadleaf forests and caye littoral forests. Coastal littoral forests are found on high ground along the coast of Belize. Small pockets are found between Shipstern Lagoon and the Pott's Creek area; the Placencia peninsula; areas near Monkey River; some patches near Port Honduras; south of the Moho River; and, south of Barranco. Areas with related vegetation include some areas along the north coast, the beach barriers at Northern and Southern Lagoons and south of Barranco.

Caye littoral forests have more distinctive vegetation types than coastal littoral forests. The largest areas of caye littoral forests are, not surprisingly, found on the higher elevations of the developed islands of Caye Caulker and Ambergris Caye. It is also not surprising that these are the areas where they are disappearing fastest. Most small cayes may be rapidly cleared of littoral forest vegetation in a short time once development commences because they have only a small area of high land. One example is Mosquito Caye in the Southern shelf atoll. Other cayes known to have some area of littoral forest include Calabash and Blackbird Cayes at Turneffe Atoll; Northern Two Cayes and Halfmoon Caye at Lighthouse Atoll; some small northern cayes to the lee side of Ambergris Caye including Cayo Rosario, Cayo Guano, Little Guano Caye and others, and several small southern cayes including West Snake, Scipio, Gladden, and Quamina Cayes. Other, less well-known cayes, doubtlessly also have small patches of littoral forest.

Littoral thickets are usually early successional forest (a very young forest characterized by a dense growth of shrubs and saplings). In some areas, soil conditions permit only low herbaceous or shrubby vegetation to grow; plants are less than two meters (6 feet) in height and densely packed.

Along recently cleared beaches, the first vegetation to appear is termed *strand vegetation*. It consists of plants that grow above the high tide mark from seeds that wash up on the beach or as extensions of roots and stems of vines growing very low to the ground. Other, normally taller littoral thicket and forest plants whose growth has been stunted by strong wind can be found on some windward beaches exposed to strong winds many days of the year.

Importance of Littoral Forests

The major importance of littoral forests is protection of soil during over wash events, such as hurricane surges. Because of the forest's dense carpet of vegetation abutting fringing mangroves on the windward side of cayes, water is slowed in its progress across islands during weather events, reducing soil loss. Additionally, wind erosion effects are also stifled by the dense carpet of plants in littoral forests, thickets and strand vegetation. Strand vegetation is also essential in protecting coastlines from sheet and gully erosion from rain, as well as mild shoreline chop.

Another very important service littoral forest performs is habitat for resident and migrant birds, some of which are not seen anywhere else in the country.

Life in Littoral Forests

While plant diversity is greater in littoral forests than in mangrove ecosystems, it does not approach the diversity in other forest ecosystems. Plants in coastal littoral forests are mainly tall shrubs and small trees which tend to be taller than those found in caye littoral forests. Littoral forests are home to a variety of insects, lizards and birds.

Flora of Littoral Forests

Littoral forest and thicket species bear fruit in a seasonal succession with a peak in summer, thereby assuring very little time will pass without food for birds. In exchange, the fruit eating birds do their part by dispersing seeds and providing opportunities for plants to grow in areas they would not otherwise occupy.

Plants of the littoral forests are categorized into three groups – trees, thicket shrubs and strand vegetation.

Littoral forests contain tree species such as: Seagrape, Mul-che, Gumbolimbo (Xaca), Black Poisonwood (Chechem); Cocoplum (Hicaco); Saltwater Palm (Chit); Island Ziricote; Thespesia; Xocoi, interspersed with the introduced Coconut Palm and at times Buttonwood.

Littoral thicket may contain young individuals of the trees and shrubs above, in addition to Cimarron; Ernodia (Beach Creeper); Seaside Lavender; Seaside Daisy and others.

Strand vegetation may include a variety of grasses, Beach Morning Glory, Seaside Bean, a few Passion flower species, Wedelia (Seaside Oxeye), Euphorbia species, Ageratum, seaside purslane, and others.

Table 3.16 Flora of Littoral Forests

Type	Species	Description	Interpretive notes
Flowering Plant: Strand vegetation	Beach Morning Glory	Vine; Leaves folded like butterfly wings over midrib; Indentation at leaf tip	Helps to prevent beach erosion by holding down sand, especially when hard breeze is blowing.
Thicket Shrub	Xocoi (Pithecellobium)	Single branching petiole (leaf stem) contains two sets of leaflets, one pair to each side	Pods are spiral with black seeds and bright red fruit

Type	Species	Description	Interpretive notes
Tree	Black Poisonwood	Leaves with wavy margins- trunk of large trees with cracks and ridges, punctures leaking black sap. Berries are an important food for birds	All parts of tree contain TOXIC ALKALOID that causes serious rash
	Chit (Thrinax)	Small palm with fanlike leaves; lacking spines. White berries eaten by birds	Incorrectly called beach palmetto
	Seagrape	Tree having smooth bark, large round tough leaves and producing grape-like clusters of purplish fruits during summer	Fruits eaten by birds and humans.

Fauna of Littoral Forests

Animals found in the littoral forests include a number of insects, spiders, toads, frogs, snakes and a variety of lizards ranging from small Anolis and a few gecko species, to larger Spiny-tailed Iguanas and the brilliantly coloured Rainbow Racer of Monkey River in the south. Toads and frogs are found only in the littoral forests on the mainland while the Basilisk is found in the littoral forests on the mainland and Ambergris Caye.

Reptiles

American crocodiles like the high ground of littoral forests for their nests as they can place their eggs above the water line where they will not drown. Some marine turtles also lay their eggs on the edges of caye littoral forests.

Birds

While birds are well represented in littoral forests, it is difficult to entirely distinguish between birds dependent on littoral forests and/or mangrove habitats. On the mainland, many littoral forest species are observed in both littoral forests and mangroves. Coastal littoral forests and that on Ambergris Caye, once connected to the Yucatan Peninsula, have resident bird and wildlife species more typical of other forested areas.

Included among the variety of birds seen in littoral forests are species such as the White-crowned Pigeon, to whom both littoral forests and mangroves are critical habitats, with nesting carried out in mangroves and feeding entirely upon the seasonal succession of fruits and berries in the littoral forest. Some small migrant species, such as the Prairie, Black-throated Blue, Cape May and other warblers, are almost exclusively seen in the coastal zone especially in littoral forest areas. Native fruit-eating bird species principally limited to littoral forests include the Yucatan vireo, Black Catbird and Caribbean Elaenia. The only raptor observed commonly in littoral forests on cayes is the Common Black Hawk. Ospreys prefer mangrove vegetation while others only pass through during migrations.

Mammals

No native mammals exist on true cayes but some have been introduced as a result of human habitation of cayes. On Half Moon Caye, for example, the very large population of rats has been a threat to the survival of lizards and small birds. Peccaries, racoons and white-tailed deer are found on San Pedro; sightings of jaguars have also been reported by locals. Bats are also found on some cayes with littoral forests.

Table 3.17 Fauna of Littoral Forests

Type	Species	Description	Interpretive notes
Reptiles	Lizard Brown	Male: dark pigment with	Slim, agile lizards
	Anole	pale flecks; Female: brown body with a pale stripe down mid-body. Eat insects	
Snake	Boa Constrictor	Harmless snake having long snout and attractive oval markings,	Kills prey by constriction The only snake common on cayes
Birds	Black Catbird	Small, shy, glossy black mockingbird, having a reddish brown eye. Eat mostly fruit	Endemic to the Yucatan, with most distribution in coastal Littoral Forests
	Yucatan Vireo	Tan bird with heavy bill and strong eyebrow stripes, with bluish legs. Eats fruit	Endemic to the Yucatan, mostly Caribbean coastal zone Littoral Forests
	Warblers	A diverse group of small, mostly migratory birds, which are seasonal residents or transient migrants. Eat insects	

SKILL CHECK

EXERCISE 1: ANSWER THE FOLLOWING QUESTIONS

1. What is littoral forest? What does “littoral” mean?

2. Name at least three places in Belize where littoral forests are found?

3. What is littoral thicket? How does it relate to littoral forest?

4. What is strand vegetation? Describe it.

5. What is the major importance of littoral forest, strand and thicket?

EXERCISE 2: IDENTIFICATION

1. Identify by description. (Instructor will select random species or groups of flora and fauna from tables for group to identify orally.)

2. Identify slides orally, (You will be shown slides and asked to identify images verbally and discuss as group.)

SEAGRASS ECOSYSTEM

Introduction

The Belize Barrier Reef divides the Barrier Reef Lagoon from the Caribbean Sea thereby roughly doubling Belize's total area. Topography of the lagoon bottom essentially mirrors that of the adjacent mainland. The flat limestone of Northern Belize is similar to the shallow (average 2-4 m; 7-13 ft) flats of the lagoon. Off Southern Belize, the deeper, craggy bottom (up to 60 m; 200 ft) is a reflection of the Maya Mountains on shore.

Sea grasses grow in vast meadows carpeting the bottom of quiet protected shallow waters, or appearing in patches separated by bare sand. Sea grasses grow on bottom soils derived from either the mainland (principal element - silica dioxide (SiO_2) -brought by river flow) or the coral reef (principal element -calcium carbonate (CaCO_3)). Calcareous soils come from broken bits of coral, shells and algae, while siliceous soils arise from erosion of quartz hills far inland.

Sea grasses need plenty of sunlight to make their food by photosynthesis; therefore, they grow on the calcareous soils in the shallow waters of the Northern Shelf Lagoon, the southern Barrier platform, stretching between the Barrier Reef and the line of cayes located 1-5 miles west, and near the southern shores, where they grow on siliceous bottom sediments.

Importance of Seagrass Ecosystem

The lagoon bottom is soft and easily moved where seagrass grows; however, the seagrass root-mat holds and collects sediment, providing stability. In addition to bottom stabilization, sea grasses, like mangroves, filter and collect sediment providing the final opportunity for water purification before waters reach coral reefs.

The seagrass mat also creates a rough surface on the bottom, which tends to slow current flow, thus reducing the amount of sediment in suspension.

Sea grasses are immensely productive. Directly and indirectly, they provide food for countless organisms living all or part of their lives in the seagrass meadows. Often, blades are clipped near the base by parrotfish, causing them to detach and float considerable distances. While they float, bacteria are working to decompose them, releasing their nutrients for use by other organisms; these nutrients may drift over reefs. Many blades also wash ashore amongst mangrove roots, where they decompose and contribute to that ecosystem. Additionally they wash up on sandy beaches, forming a line, termed *wrack line*, that is consumed by bacteria and their tiny springy amphipod predators. In turn, shorebirds and migrants use these organisms as food. Thus seagrass beds export considerable energy to other systems.

Another very important aspect of seagrass ecosystem function is that of nursery ground. Like in mangrove ecosystems, juveniles of many species that will later grow up and move to the reef, spend time in seagrass beds and take shelter amongst the blades. During the night, reef-based predators disperse and enter seagrass beds in search of food-often the young stages of fish and invertebrates in temporary residence. Thus, energy from seagrass beds has another pathway to the reef.

Life in Seagrass Ecosystem

As in mangrove ecosystems, there are a limited number of plants capable of survival in the somewhat harsh environment of seagrass ecosystems. Of primary importance are the sea grasses themselves. But tiny algae species also grow on the blades of sea grasses, where they are available to fish, crustaceans and myriad other organisms for grazing. An exception to this is filamentous red algae which has as a chemical defense, a disagreeable flavor, to reduce grazing showing that chemical defense is observed in the sea as well as on land.

Flora of Seagrass Ecosystem

The principal plant observed in Seagrass Ecosystems is *Turtle grass*, a broad-bladed species observed all over most seagrass beds. Turtle grass has flattened strap like leaves that are about 1.8 cm (0.75 in) wide and about 30 cm (1 ft) tall often with a crusty, whitish appearance due large numbers of epiphytic organisms colonizing the blades. In some areas a second species, *Manatee grass*, grows amongst the Turtle grass, or covers some patches on its own. It is narrow and round in cross-section. A third species, *Shoal grass*, has very narrow, also strap-like, flat leaf blades 2 - 3 mm (0.08 – 0.12 in) wide and 4-10 cm (1.57 – 3.9 in) tall. limited in distribution to very shallow water (less than 3 meters (10 feet) in small areas and usually less than 1 meter (3 feet) in areas near shore.)

Sea grasses are true flowering plants, whose flowers are pollinated by the currents of the sea. However, most new area coverage in seagrass beds occurs by extension of rhizomes from the root mat. Once cleared or removed from an area, Turtle grass takes a long time to regenerate; Shoal grass recovers faster, especially along the shoreline.

In a bare-sand area, the first plants to make an appearance are usually algae. Several species may occur on bare sand; several more are found amongst sea grasses. A very commonly observed alga looks like tiny hard green chips; this is green algae with embedded calcium carbonate (CaCO_3) called Halimeda. Another type of green algae grows alone and looks like a small brush – hence the name “Merman’s Shaving brush”..

Table 3.18 Flora of Seagrass Ecosystems

Type	Species	Description	Interpretive notes
Flowering Plants	Turtle grass	Broad-bladed; 1.8 cm (0.75 in) wide and about 30 cm (1 ft) tall; usually encrusted with epiphytes	Most common grass found in seagrass ecosystem
	Manatee grass	Slender Species 1-2mm (0.04-0.08 in) round in cross section	May mix with Turtle grass
	Shoal grass	Slender, flat-bladed species; blades 2 - 3 mm (0.08 – 0.12 in) wide and 4-10 cm (1.57 - 3.9 in) tall	normally grows in shallowest areas
Green Algae	Halimeda	Green algae; has CaCO_3 deposits in short, dense, jointed branches	Called oatmeal algae
	Penicillus	Short green stalks with fuzzy brush-like head having siliceous inclusions to make it tough	Known as “Merman’s shaving brush”

FAUNA OF SEAGRASS ECOSYSTEMS

A large number of species are found in the seagrass beds buried in or attached to the bare sand, or growing on the surface of the sea grass blades. Countless others spend part of their lives hiding and feeding among the lush grass and algae growth before migrating to the reef, others pass through on their route from one marine ecosystem to another, while still others move back and forth from the reef or mangroves to the grass beds on a daily basis to hide and feed respectively.

Invertebrates

Sessile invertebrates such as anemones, sponges, encrusting bryozoans and hydroids are found attached to the sea bottom or to the seagrass blades themselves. Stinging hydroids may be attached to blade surfaces, causing swimmers discomfort when they brush against the encrusted blades while passing through shallows. Other invertebrates are free-living and creep, crawl, walk or swim amongst the blades. A multitude of these tiny creatures never grow large enough to leave the shelter of the protecting blades.

Minute snails, tiny crustaceans such as shrimps and crabs, hide amongst the blades and provide food for other larger organisms. Several reef-based grazers or predators import energy from seagrass beds and carry it to the reef. Large numbers of juvenile stages of reef-based animals take up temporary residence during the early part of their lives in the seagrass beds before they migrate to the reef once they mature. The most important of these is the Spiny Lobster, one of the most important of Belize's commercial species.

For over forty five years, spiny lobsters have been sought in Belize for sale abroad as a delicacy. The largest fishermen's cooperatives have been formed on the basis of lobster export and in response to exploitative pricing on the part of foreign buyers. Spiny lobster eggs are carried for about a month before hatching. The female keeps them clean and aerated. When it is time for hatching, the female walks into fore-reef areas, where currents will pick up the tiny larvae for their long and perilous journey toward adulthood. Between hatching and transformation into tiny lobsters, a lobster travels many hundreds of miles as a member of the plankton. During this time, a larval lobster is transparent and it *molts* (changes shells) ten times in order to grow.

A larval lobster will ride the currents for 6-12 months, attacking and consuming organisms even tinier than itself. When it is time to settle out, a Stage XI larva begins to move inshore. The only stages of lobster larvae that are observed by researchers at distances less than 80.4 Km (50 miles) offshore are Stages I and XI. However, most individuals are devoured by fish or other creatures before this occurs.

The late-stage larva transforms to a tiny (less than 1/2 cm ;0.2 in.) transparent juvenile lobster and swims inshore to settle in shallow seagrass or mangrove roots. For the first few months of its life as a juvenile, it hides by day and feeds on tiny invertebrates by night. It is solitary at this time. Molts permit growth about every 30 days; thus, a lobster about 4 cm (1.5 in) from between the eyes to tail tip is anywhere from 10 to 16 months of age.

Once lobsters reach a larger size, they move into seagrass to feed by night, while they shelter by day under ledges, in coral reefs and mangroves. They begin to secrete a chemical that attracts other lobsters. The lobster will spend 2 to 4 years of its life feeding in seagrass beds. As the lobster grows (and avoids being eaten by fish, octopus and the like), it molts less frequently. By the time it reaches maturity, it will be 4 to 5 years of age. When a mature female encounters a male, he deposits a black tar-like sperm packet on the bottom side of

their body, near the tail. When her eggs are ready for laying, she scratches the tar spot with the spurs on her specially-adapted hind legs to release the sperm inside, thereby fertilizing them. Then she attaches the bright-orange spawn to the appendages on the underside of her tail to keep them alive, and the cycle repeats.

In addition to the variety of sessile organisms and small creatures that live in, around and on the sea grasses, some seagrass-based denizens grow larger--but have the means to protect themselves. Heavy-shelled conch graze algae among seagrass in relative safety, while other mollusks, such as predatory Helmets and Tritons, seek their own invertebrate prey. Large-clawed Stonecrabs make burrows in the sediment and attack prey. Even hard-shelled animals cannot stand up to the pressure of their crusher and ripper claws.

Other creatures particularly observed in seagrass beds include the Green Sea Turtle, as it grazes heavily upon the grasses, and various species of Starfish (Sea stars).

Vertebrates

Fish that spend the early part of their lives among the seagrass include Queen and Grey Angelfish, Four-eyed Butterflyfish, Doctorfish, Squirrelfishes and others. As these mature, many will move to the reef and return to the grass beds to forage for food.

During the day, Redtail and Yellowtail (Redfin) Parrotfish graze on seagrass and associated algae, returning to sleep upon the reef at night. The night shift includes the algae-grazing Long-seined Black Urchin, which leaves its sheltering holes and crevices in the coral to feed on reefs and seagrass beds, keeping them clean in the process. Grunts, which hang in groups over the reef by day, and Squirrelfish, which also spend daylight hours in crevices, disperse by night over seagrass beds to feed on invertebrates. Snappers, sometimes joining grunts in their daytime resting places or forming their own groups, also spread out and separate over seagrass to graze.

Near to mangroves, herons, egrets and other wading birds search amongst seagrass for small fish and other prey. Further offshore, cormorants and pelicans dive and search the blades for fish, while caye-based ospreys fly over in search of fish which they carry to their young in the nests in mangroves. The West Indian Manatee, who also feed heavily upon seagrass during their stays in seawater, are sometimes seen in the sea grass beds.

Table 3.19 Fauna of Seagrass Ecosystems

Type	Species	Description	Interpretive notes
Arthropods: Crustacean	Spiny Lobster	many stout spines arise from the hard shell that covers their body; two largest spines or “horns” project forward over their eyes; five pairs of walking legs; segmented body usually orange-brown on back fading to tan on the sides; tail fan has distinct dark bands; lacks claws	Two long, spiny antennae projecting out from under a ledge or coral may be the first sight you have of this species. Preys on snails, crabs and other small invertebrates by night usually in seagrass
Echinoderm: Asteroid	Cushion Sea-star	Large sea star with five broad spiny arms. Orange to dull red in color	Prey on clams, etc

Table 3.19 Fauna of Seagrass Ecosystems

Type	Species	Description	Interpretive notes
Bony Fish	Yellowfin Mojarra	Small, gray-barred fish with slender, deeply forked tail and yellow ventral fins; large eyes High level Predator - feeds on fish	Large-eyed, alert fish seen from shoreline to rubble zone
	Queen Angelfish	Small angelfish (body narrow from side to side); deep-bodied, brilliant electric blue circle on forehead, other blue markings on intense yellow. Low level predator	Feeds on sponges
	Mutton Snapper	Large, heavy-bodied snapper, Gray, with reddish belly, having lower tail fin reddish and upper, yellow	Especially valued as a food fish
Bird	Double-breasted Cormorant	long bodies; long necks; long beaks with a hooked upper mandible; completely webbed feet; short legs and wedge-shaped tails; feathers predominantly black with a greenish or bronze sheen in both sexes	Large black diving bird that searches for fish on lagoon bottoms, searching amongst seagrass blades for fish
Mammal	Bottlenosed Dolphin	Large beaked dolphin; beak is about 8 cm (3.15 in) long; 20 to 28 sharp conical teeth on each side of each jaw; head and body length is 175-400 cm (5.7 – 13.1 ft), with males being much larger than females; grey colour	Usually these hunt fish. Locate their food by echolocation - the emission of fine-pitched sound waves produced by nasal sacs in their round forehead called their 'melon'. At times you may find a group turning over lobster traps, perhaps in search of trapped lobsters

SKILL CHECK

EXERCISE 1: ANSWER THE FOLLOWING QUESTIONS

1. What is the area of the Belize Barrier Reef Lagoon?

2. Where do seagrasses grow? What type of soils?

3. Name three (3) ways seagrass helps reef and cayes/coasts.

4. Differentiate between the three (3) major species of seagrass. How do they reproduce?

EXERCISE 2: IDENTIFICATION

1. Identify algae and fauna that live in seagrass beds by description. The instructor will select random species from the tables found in this section to be orally identified and discussed by the group.

2. Identify slides orally. (You will be shown slides and asked to identify images verbally and discuss as a group.)

CORAL REEFS

Introduction

Coral reefs flourish in the tropical and low subtropical regions of the world's oceans. Their productivity and tremendous beauty support fisheries and tourism worldwide, and are home to hundreds of thousands of species of plants, animals, and microorganisms. They are the marine counterparts to tropical broadleaf forests, and share considerable similarities: energy is principally bound up within the living things rather than the surrounding matrix; there are associated organisms (symbionts) to assist in energy uptake; and all life centers around a principal type of life (forest trees and reef corals). Coral reefs, along with human settlements, are the only live features visible from space.

Coral reefs are built of individual colonies of living polyps—tiny anemone-like entities joined by a connecting tissue that protects the colony from disease or colonization by other creatures. This tissue layer is non-retractable and may be easily damaged by handling, trampling or boat groundings. Only the outside layer of a coral colony is living; the interior is a calcium carbonate (CaCO_3) matrix bearing the patterns of the colony's growth—the skeletons of previous polyp generations. Reef-building (hermatypic) coral growth rates average (1–28 mm; 0.04–1.1 in) of calcium carbonate (CaCO_3) extension per year.

Coral polyps are nourished in several ways. Principal methods include:

1. tentacular feeding -- polyp tentacles contain rows of specialized cells that inject venom into tiny planktonic organisms which are then 'eaten' by the polyps; and
2. through a symbiotic relationship with zooxanthellae -- single-celled plant partners living within each polyp's tissues, that use the polyp's waste products to fuel production of their own food which they share with the host polyp.

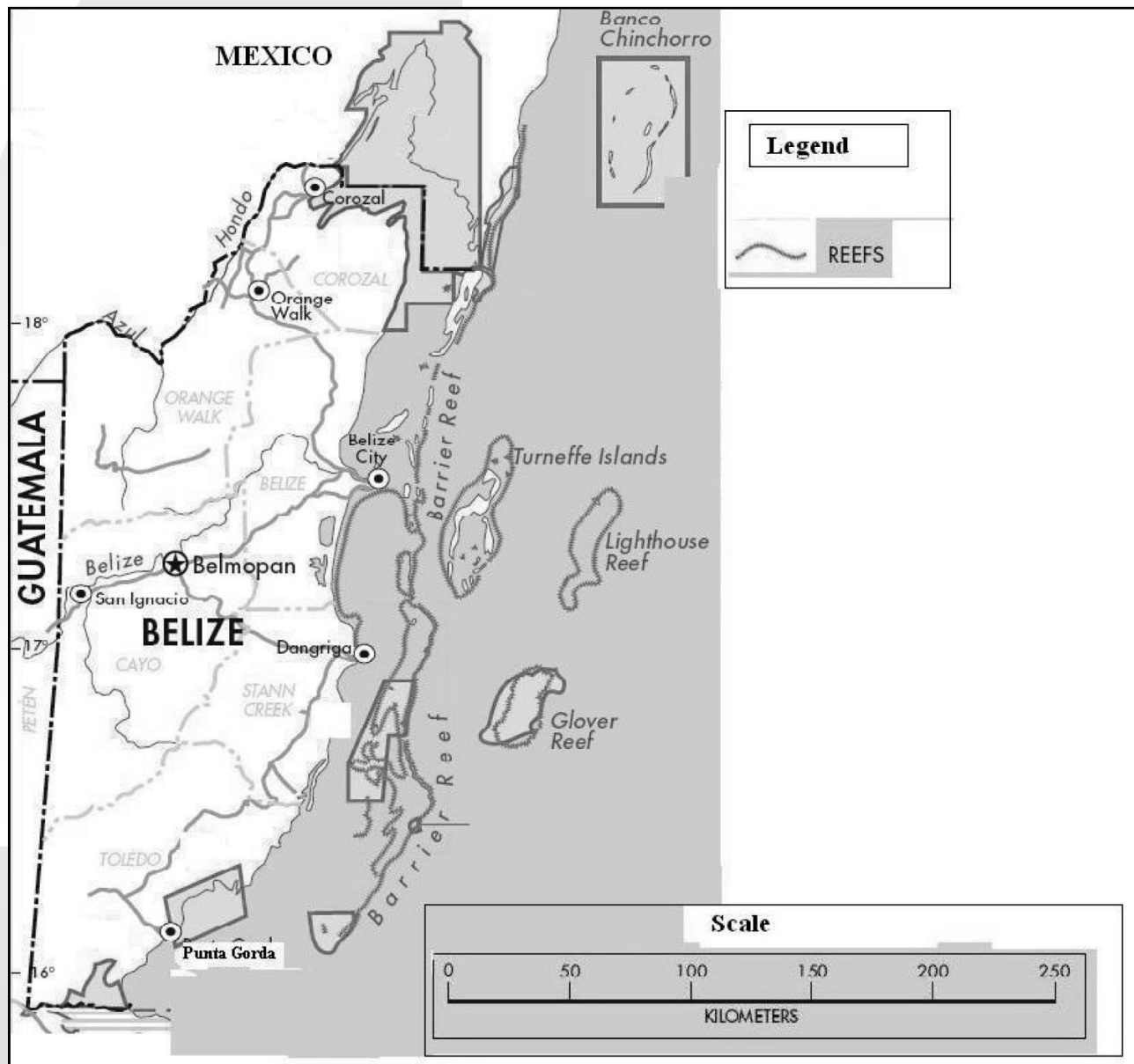
Subsequently up to 50% of the food produced by the zooxanthellae may go to nourish the polyp. This is a true mutualistic symbiosis, on the order of the mycorrhizal associates living in the roots of the great forest trees - the whole is greater than the sum of the parts.

Although corals appear to be tough, they have a very narrow range of growth requirements that include (i) clear, clean water; (ii) oceanic salinity (32 - 42 psu); and (iii) a very narrow temperature range (best is 25 - 29°C; 77 - 84°F). The clearer the water, the more sunlight can reach the coral's plant partners and the more food they can make. Coral colonies must have a hard bottom on which to attach. Young coral larvae settling on mud bottom will not survive. Dirty or cloudy water reduces the ability of the zooxanthellae to produce food for the coral polyp. Therefore, a reef is only as good as the water that surrounds it.

The geologic structure that supports the Belize Barrier Reef is believed to have arisen some 6567 million years ago, at about the same time as the Chicxulub meteor event that impacted the north point of the Yucatan Peninsula. These geological structures are fault blocks, tilted like books on end, which form a series of submerged fracture ridges roughly 1-5 km (0.6 -3 miles) across and which run roughly parallel to the Belize coast. The ridges have deep channels between them (Jolly & McRae, 1998). Extensive growth of coral over time has connected the bases of three ridges which support the Belize Barrier Reef and atoll system. High spots on two of the ridges have given rise to Belize's three atolls (Turneffe, Lighthouse and Glover's) and Banco Chinchorro in Mexico, a fourth atoll, aligned north-northeast of Turneffe Atoll.

Reef growth has not been continuous; the Ice Ages resulted in a global reduction in sea level of approximately 61 -121.9 meter (200-400 ft), which killed coral in shallow locations and dried the Barrier Reef Lagoon, creating the basement structure for many present-day cayes. Recent reef growth commenced 5-8000 years ago, coinciding with the end of the last Ice Age (Perkins, 1983). The map below shows the distribution of coral reefs in Belize.

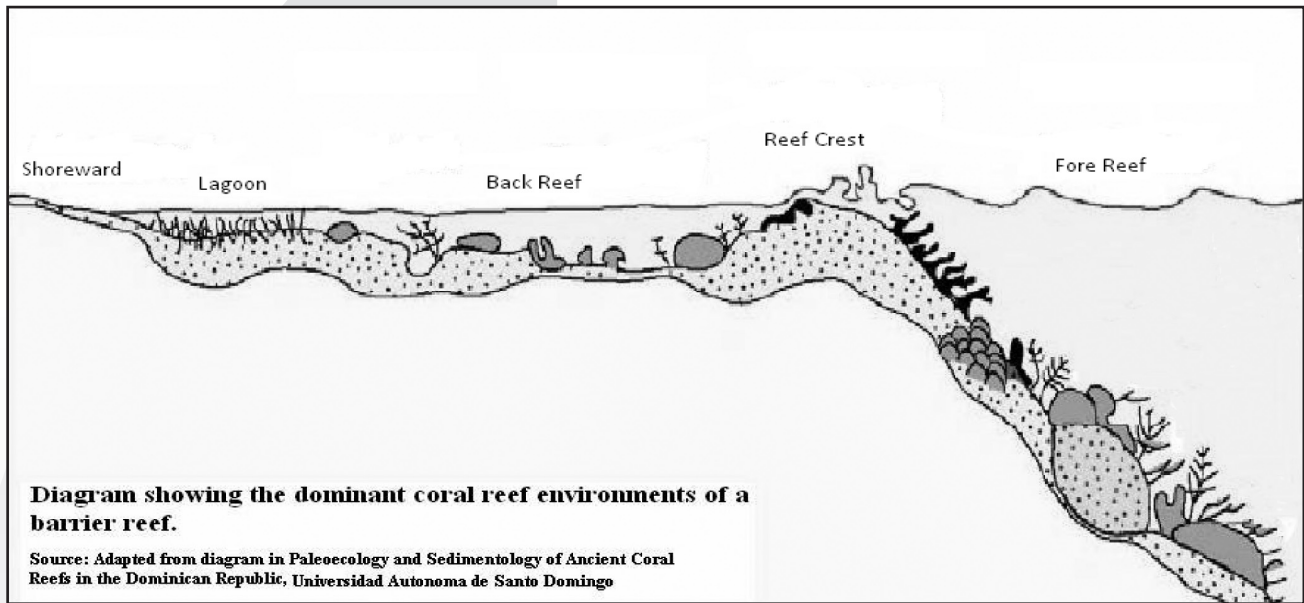
Map 3.3 Distribution of Coral Reefs of Belize



Types and major locations of five reef types found in Belize are as follows:

Barrier reef - A barrier reef is essentially a self-repairing breakwater that creates the calm conditions behind it that permit its own support habitats - seagrass, mangroves and the cayes and coasts themselves to thrive. It is a coral wall based upon a linear geologic structure, having a large, deep lagoon between the reef and land. Belize's Barrier Reef is an example of this type of reef. Barrier reef structure seaward of the highest portion is termed the fore reef. The highest portion, the crest, may be exposed at low tide while the calm waters behind it are referred to as the back reef. Most reefs, except patch reefs, perform a similar function over a smaller area.

Figure 3.12 Diagram showing horizontal zonation of Barrier Reef



Atoll - an encircling reef around a lagoon, usually built around a peak, ridge or other submerged geologic structure. Belize has three examples of atolls: Turneffe, Lighthouse, and Glover's Reef. They are built of some 65 million years of coral growth around the perimeter of submarine ridges --the same structure that support the Barrier Reef. The atolls range in length from 24-48 km (14.9-29.8 miles) and 7.2-16 km (4.47-9.94 miles) in width.

Fringing reef - Coral strip growing very close to land, or having only a very shallow (less than 1 m; 3 ft) lagoon. In Belize, fringing reefs are seen only in the coastal area between Placencia and Punta Ycacos. As they are located near-shore, these contain limited numbers of coral species that are tolerant of wide ranges of salinity.

Patch reef - Isolated clumps of coral growing separate from other distinct reef structures. Patch reefs are widespread among the faros (see below), in atoll lagoons and on the floor of the Barrier Reef Lagoon. There are some very extensive patch reefs in the Northern Shelf Lagoon off Ambergris Caye (Mexico Rocks); between Ambergris and Caye Caulker (Mitchell Rocks or one of a number of "Coral Gardens"); and off Caye Caulker and Caye Chapel Channels.

Faro (Shelf Atoll) - a rare reef type that occurs in southern Belize-- these are small atolls growing on tower karst or other narrow geologic features within a barrier reef lagoon. There is a group in the Southern Shelf Lagoon; Laughing Bird Caye is a good example.

Importance of Coral Reefs

The Belize Barrier Reef portion of the Mesoamerican Reef System extends some 220-250 kilometers (180 miles) in front of Belize. It is broken by various cuts and channels into ribbons of reef. The most important of reef benefit is its breakwater function. Lacking that, no mangroves, seagrass or permanent cayes could form in a low-lying marine environment like Belize. It is this function that saves communities like San Pedro and Caye Caulker from catastrophic damage or outright eradication during storm events. It is essential to note that only living coral reefs can keep performing this function; a reef where almost all coral is dead and only algae remains will erode down over time, permitting ever larger waves to reach the land behind it. Multitudes of marine organisms also depend on the quiet waters of the back reef for survival.

Coral reefs, like the great tropical broadleaf forests of the mainland, support a number of sessile and slow-moving organisms that produce chemical defenses to help them in their competition for survival. And also like those of forest plants, many of these chemical compounds are proving to be active against diseases in humans. Coral reefs, again like broadleaf forests, are also massive carbon sinks, collecting and packing carbon into their massive structures.

Another attribute of great importance is the reefs immense productivity. The great reef corals form a structure that encourages occupation by a tremendous variety of organisms, from tiny bacteria to the great reef sharks. Included are the fish and shellfish that support the fisheries industry. The great beauty of the reef and its occupants attract divers, fishing enthusiasts and snorkelers thereby supporting the tourism industry. Thus, the combined marine habitats of reef, seagrass, mangroves and cays support two of the major industries in the country, while achieving protection from storm surge. This is a service beyond valuation.

LIFE IN THE CORAL REEF ECOSYSTEM

Flora of Coral Reefs

Plant species found in the coral reef ecosystem consists of algae - simple plants lacking true roots, stems or leaves but having parts that resemble these structures. The algae obtain nutrients directly from the sea water and by making their own food through photosynthesis. All algae found in reef ecosystems have the green pigment, chlorophyll, necessary for photosynthesis; other pigments may mask the green colour making them look brown or red.

Smaller algae species may grow in a turf over corals usually where the coral has suffered some damage. This can be a considerable problem in areas where too much nutrient material is reaching reef waters enabling abundant alga growth. Larger algae, like the common brown algae seen on the reef, have air-filled bladders to keep them afloat. Turbinaria has pyramid-shaped bladders, while those on Sargassum are smaller and round. These algae may float up onto beaches and amongst mangrove roots in considerable amounts. Some species of red and green algae deposit calcium carbonate (CaCO_3) in their cell walls and contribute to the building of the coral reefs.

Table 3.20 Flora of Coral Reefs

Type	Species	Description	Interpretative Notes
Brown algae	Sargassum	Small, leaf-like blades grow interspersed with small round air bladders	Grows attached to dead coral. Often seen floating over reef
	Turbinaria	Grows as single stalk of thick pyramid-shaped air bladders	

FAUNA OF CORAL REEFS

Invertebrates

Hard corals provide the major structure found in reefs. By 1995, sixty five species, fifty three of which are *hermatypic* (corals having a symbiotic combination of a coral animal and a zooxanthellae), had been identified in Belizean waters. Eight coral genera, one of which is closely allied to the stinging hydroids often found on seagrass blades, form the bulk of the Barrier Reef.

Probably the most important coral species is Elkhorn Coral, the massive branching species that forms 95 - 99% of the reef crest, or highest point of the Barrier Reef. This species is not only able to live in the heavy surf it stops from entering quiet lagoon waters, it is also among the fastest growing of all corals. Both traits are necessary adaptations to life in the roughest part of the reef. Its more delicate relative, Staghorn Coral, known by some fishermen as Pipesnake, is only found in deep fore reef or protected back reef waters. They may grow over 28 mm (1.1 in) per year.

At the other end of the growth spectrum is a group of Brain Corals, which grow as slow as 1-5 mm per year. The grooves and ridges in these corals look very much like their namesake, the brain, setting them apart from most other coral species; however, they can grow much larger. One of the most common groups on the reef is the Boulder, or Boulder-Star, Coral complex (*Montastrea*). These corals range from smooth to knobby, and cover large areas of reef. Among the most common corals seen in the back reef, their surfaces range from greenish to tan in colour and are covered with small pores about 1-2 mm (0.04 – 0.08 in) across. A lesser species with smaller pores is called Mustard Hill Coral; it is green to yellowish in color. An early successional species, small Mustard Hill colonies are among the first to reappear following hurricanes. Many small colonies were visible soon after the six-day pummeling delivered by Hurricane Mitch.

Due to their delicate nature, reef corals should never be touched. Breaks in the delicate connective tissue covering colonies may let in bacteria, algae propagules, boring sponges and other organisms that may weaken coral. One type of coral punishes those who touch it. Though all corals have stinging cells, Fire or Stinging Coral has venom with particular power. A person stung will have a fiery burn on the affected surface for about 45 minutes; welts may form that last a day or two. Fire Coral is mustardy-yellow in color and has a very smooth appearance. The pattern on its surface has one larger pore surrounded by several tiny ones; however, no pores are as large as even the small pores of Mustard Hill Coral. When its polyps are extended, Fire Coral has a fuzzy appearance.

Soft corals are also found in the reefs of Belize. One very common example is the sea fan. Other soft corals appear as long, narrow, whip-like projections; examples are Sea Fingers and Sea Rods. Soft corals also have calcium carbonate (CaCO_3) skeletons, occurring in small bits that permit flexibility. The flexibility of the calcareous branching skeleton of soft corals allows them to sway and bend with the motion of the sea mimicking the swaying of plants in the wind. Sea fans appear brownish when polyps are extended and purple when they are retracted.

Other invertebrates

Many other species of invertebrates found in the reefs look like plants and live attached to the bottom sediments. These include colorful sponges, anemones and tubeworms. Other invertebrates burrow into the bottom and consume detritus mixed in with sediments. Some snails and biscuit urchins have this lifestyle. Clams burrow into bottom sediments but send a siphon, which brings in water laden with food and oxygen, to the surface. An exhaust, or excurrent siphon, feeds water back into the sea after it has passed through the strainer-like gills.

One animal that appears beautiful, yet packs a ferocious sting, is the Portuguese Man O' War. It looks like an attractive small oblong purple-and-pink balloon floating on the water's surface. The sad fact is that it has very long (greater than 4 meters/5 feet) tentacles attached to its underside, streaming out with the current. It is very important to watch out for these and warn tourists, who may not realize that these animals occur in Belizean waters.

The most active benthic (bottom) dwellers are the crustaceans. Large crabs wander about the reef, searching for prey. One bright red predatory and scavenging species is the Coral Crab; another large reef crab is the Spiny Spider Crab, which just takes algae in with its spoon-tipped chelae (pincers). Many smaller species hide in cracks and crevices or seek the protection of sea anemones between meals of detritus, in a one-sided form of symbiosis (commensalism).

Squids and octopuses are another group of active invertebrates. Shy nocturnal octopuses creep on the sea bottom with their similar-colored body, in search of crabs, lobsters and other small animals; when they encounter danger, they flush red and jet away by squirting water out their siphon. Squids are also observed on the reef.

Shrimp also live near the protection of reef crevices, or may share the company of an anemone. One well-known anemone-shrimp partnership is that between the Ringed Sea Anemone and the Red Pistol (Snapping) Shrimp. This is a mutualistic symbiosis, with both partners deriving benefit. The anemone provides protection from hungry fish, while the shrimp (usually a pair settles with an anemone) keep the burrow clean and drive off Fireworm predators trying to make a meal of the anemone. An anemone with a shrimp partner may be noted by the red-and-white banded shrimp antennae amongst the anemone's tentacles. And that's not all, some of these anemones host a tiny clear shrimp with brilliant purple markings which can be seen waving its white antennae from a perch above the anemone. This little shrimp is soliciting fish, which it will clean by removing parasites and diseased areas from the fish's body.

Another symbiosis featuring anemones and crabs is the Star-eyed Hermit Crab and Tricolor Anemone. The crabs wear anemones on their backs to protect against predation by sensitive-skinned predators such as octopus. Crabs transfer anemones to a new shell when they move, and fight with other crabs for anemones. Giant Decorator Crabs are typical spider crabs except for one thing; they place Tricolor Anemones on their backs in place of the algae and sponges preferred by smaller Decorator Crabs. These crabs also keep their anemones from molt to molt.

Vertebrates

Fish

The most obvious life-forms found on reefs, aside from corals, are fish. They are immensely diverse, with hundreds of species occupying reefs in Belize. Of particular importance are the important food fish groups, grunts and snappers. Many species of each are commonly observed as they hang by day over reefs in wait for their nocturnal feeding shift. Most frequently observed in back-reef and shallow fore-reef is the Schoolmaster (“Dogteeth” snapper), having a gray body with yellow fins. By choice of the fish, vertical white bars may be seen across the fish’s back. Also common are the gray Mahogany Snappers, with a dark spot high on the flank and a reddish tail edge. More active Yellowtail Snappers have a bluish-gray body with a yellow midline stripe joining a yellow tail. Over rubble zones lining back-reefs and adjacent seagrass beds, heavy-bodied Mutton Snappers (called Red Snappers by some) can be seen lurking singly or in pairs in search of fish. This species is especially sought for its fine tasty flesh.

Several species of grunts also hang about reefs by day. Most commonly observed are French Grunts, bearing broad yellow diagonal stripes across their sides; and Blue-striped Grunts, whose narrow alternating blue and pale yellow lines, with black tail, separate them from similar species. One species almost always noted in reef waters is the Barracuda, whose long narrow form, long undershot jaw and staring eye is unmistakable. This is a diurnal hunter whose speed during attack is almost too fast for the eye to follow.

Wrasses feed on invertebrates and are one of two fish families for which some, but not all, individuals transform into a brilliantly-colored male as a final stage. The Hogfish is the largest and least colorful of these and the terminal male is not brilliant; however, it does become larger than other individuals and its snout becomes proportionally larger. Hogfish are named for their feeding method of rooting in sediment for buried invertebrate prey. The fish is flat from side to side (compressed), and has three elongated dorsal fin spines projecting from its back.

Other common Wrasse species average 10-20 cm (4-8 inches) in length, with terminal males always brilliantly colored. The Bluehead Wrasse is small in its initial phase, usually colored yellow, black and white in long broad stripes down the body. Juveniles establish cleaning stations, where fish report one or more times per day to have parasites and diseases dealt with by the small fish. This is another mutualistic symbiosis, with small fish gaining an easy food source and immunity from predation, while the larger fish are having health problems removed. This is, like the coral-zooxanthellae partnership, one of the most important symbioses in the sea.

Terminal male Bluehead Wrasse have (not surprisingly) a brilliant blue head, with a broad vertical black bar bordering it, a blue-gray central section with a second black bar, and a bright green tail. Research shows that if a terminal male dies, the largest female in the group will become a terminal male.

Parrotfish are the second group to feature this type of social organization. Reef parrotfish tend to be also brilliantly colored (at least the terminal males); however, species spending much of their daylight hours in seagrass beds are more dull in hue. The three most commonly seen species of parrotfish on Belize’s Reef are the Striped, Stoplight and Queen Parrotfish.

Table 3.20 lists the appearance during initial and terminal phase of these three species of parrot fish. Terminal males (TPM) will spawn one-to-one with a female, while Initial phase males (IPM) spawn as a group.

Table 3.21 Appearance at Different Stages of Belize's Most Common Species of Reef Parrotfishes

Species	Initial Phase	Terminal Phase
Striped Parrotfish	White stripe above upper dark stripe ending at gill opening; upper and lower caudal margins pale	blue-green and orange, chest and head pink below a green band at lower edge of eye; median fins with blue borders, broad central parts orange with linear blue markings
Stoplight Parrotfish	brown head; scales of upper two-thirds of the body with pale centers and dark brown edges; lower third of body and fins bright red	green with yellow spot on gill cover; three diagonal orange bands on upper half of head and orange crescent in tail
Queen Parrotfish	dark gray overall, with broad white stripe slightly below mid-side	Green to blue-green with pink at corner of the mouth and on tail; light stripe on dorsal fin

Parrotfish are very important in recycling calcium carbonate (CaCO_3) on the reef. When you spot a large parrotfish at work on the reef, you may note their action of scraping algae off dead coral or taking bites from it. Its four large teeth may be heard crunching at (mostly) dead coral, while its throat mill (not visible!) grinds up the bites of coral, extracts algae for nutrition, and passes sand onto the reef. The importance of this action is twofold: (1) removing algae from reefs; and (2) crushing calcium carbonate (CaCO_3) locked up in dead coral into small bits which may be more easily dissolved in seawater. This is essential, as living corals, snails, fishes and other organisms extract dissolved calcium carbonate (CaCO_3) from seawater.

Also essential in grazing algae off the reef are the large cruising groups of Blue Tangs - which may range in color from lavender to indigo - and other, more drably-colored Surgeonfishes. In an attempt to avoid being chased away from algae territorial patches established by combative Damselfishes, these compressed, deep-bodied fishes collect in large schools and descend in large numbers to feed. Following these groups can be very rewarding, as you will note (if you do not approach too closely) the frantic attacks of the Damselfish dashing from one intruder to another. Fortunately for the Damselfishes, they defend a larger territory of algae than they really need and do not suffer unduly from the feeding forays of the Blue Tang.

Other extraordinary colored fish species include the sponge-feeding Angelfish and the small invertebrate predators Butterflyfish and Squirrelfish. Seahorses are not as brightly coloured but, their colours are so well matched to the seagrasses and soft corals they cling to, that they are virtually invisible.

Among larger species, the cartilaginous fishes (sharks and rays) are of some interest to the tourist. In nature, large gray Southern Stingrays feed on buried shellfish by stopping over a sandy spot on the reef and flapping their wings to uncover their prey. The sediment they raise can help you find them at work. Similar behavior is noted in the graceful, beautifully-patterned Spotted Eagle Ray.

Several species of sharks are frequently observed on the reef. The easygoing Nurse Shark - so named for the sucking action of its mouth - may be found in nature stashed under ledges or cruising leisurely about the reef. They can be recognized by their brown color and the two barbels visible on the underside of their nose. Most sharks turn away during an encounter with a snorkeler or diver; however, there are exceptions. Spear fishing is one activity that tends to attract shark interest - they can detect vibrations of a dying fish in the water, and smell blood in

as low a concentration as 1 part per million. Late afternoon snorkeling in reef channels may also result in a shark encounter. It is not easy to identify sharks that are not Nurse sharks; identifying characteristics to look for are the size of the two dorsal fins, head shape and body shape. It is the job of top predators such as sharks, barracudas or other large scalefish to control numbers of smaller, lower-level species.

Reptiles

Sea turtles are among the few reptiles noted around Belize's reefs. All are classified as endangered or threatened worldwide, due to their rapid decline in response to direct fishing, incidental catch in trawls, egg poaching and destruction or disturbance of nesting beaches.

Three species of sea turtles nest on Belizean beaches, and are occasionally seen in reef waters. The most endangered is the Hawksbill, whose shell was used for jewelry and other objects before prohibition of hunting in 1993. Its carapace (shell) is notched on the edge, and the shell is mottled brown in color. Nesting is generally in the shelter of beach forest at Manatee Bar, the Sapodilla Cayes, and a few beaches throughout the Southern Cayes (McField et al, 1996). Nesting is usually May-October. The Hawksbill is the turtle most dependent upon reef ecosystems. The Loggerhead Turtle has a very large head and a yellowish cast to the skin and carapace. It nests primarily at northern Ambergris Caye, Lighthouse and Glover's Atolls, and other offshore cayes, normally between May and August. It consumes jellyfish and other small plankton.

The Green Sea Turtle is most frequently observed in seagrass beds. Its carapace is smooth on the edges and tends to have its plates bordered with white, hence the common local name "White Turtle".

Outside the Barrier Reef, a massive Leatherback Turtle may be seen during its migration. Its size and the long ridges on its back identify it easily.

Birds

Several bird species may be noted while at the barrier reef. The most common are Royal Terns, which may beg for baitfish from tour boats. These white birds have a pale grey back, black feet, a bushy black crest and a sharp bright orange bill. Smaller species of pale terns occasionally noted include the Sandwich Tern-black-billed with a yellow tip--and the tiny threatened Least Tern, distinctive in size and in its yellow leg colour. The Brown Noddy-dark-bodied with a bright white forehead-may be found perched on reef cayes, mooring buoys, or "dry reef" (dead coral projecting from the sea). Terns hover while sighting their fish prey, then plummet to the sea surface for the catch.

The Osprey --"Billy Hawk" or Sea Hawk-is another bird of prey featuring hover- and- dive behaviour. It is a brown-backed raptor with white head and underside which reach with their sharp talons into the sea to grasp their prey. Red-footed Boobies-large, web-footed heavy-bodied birds adapted for long-distance flight-range far in search of fish, while piratical Magnificent Frigatebirds lurk near their shared nesting islands awaiting a chance to rob the weary travelers of their nestlings' supper. This unsavoury-appearing habit, termed *kleptoparasitism*, along with extreme flying ability, is an adaptation for the birds to safely obtain food and nesting materials while lacking waterproof feathers.

Occasionally herons, pelicans and other mangrove birds may be noted flying along the reef, while even in open sea migrating land birds may drop on a boat deck in exhaustion.

Mammals

Marine mammals observed on the reef are nomads, not usually remaining for great lengths of time in one place. The West-Indian Manatee is occasionally observed around reefs; it, along with the tarpon, is one of perhaps the only two organisms that may span all the way from freshwater habitats, through coastal lagoons, to the reef and beyond. Belize has no seal or sea-lion species.

However, several species of dolphins occur in wholly marine waters, extending from mangroves through seagrass to coral reef. Chief among lagoon species is the familiar Bottlenose Dolphin, a large, powerful grey-coloured species, whose toothy beak captures even speedy, streamlined prey such as jacks. Migrating Sperm Whales are reported occasionally by divemasters en route to or from the atolls, while a true giant –the second largest creature on Earth–the Fin Whale–spent the last several months of its life in the southern shelf lagoon in the vicinity of Buttonwood Caye. Ultimately starvation claimed this gentle behemoth, as the clear waters of Belize do not contain sufficient plankton to sustain this filter-feeder. Fibrous bristles, arranged along their jaws in brush-like structures called *baleen*, strain the water, collecting tiny animals that swarm in cooler seas.

Table 3.22 Fauna of the Coral Reef

Type	Species	Description	Interpretative Notes
Invertebrates			
Cnidarians	Elkhorn Coral “Pantails”	Massive, rough-textured branching coral species.	Forms the highest portion of a barrier reef (crest), in the heavy wave action zone. Along with Staghorn, protected under the US Endangered Species Act due to decline.
	Staghorn Coral “Pipeshenk”	Slim cylindrical finely branching coral species.	Forms dense thickets in protected back-reef or deep fore-reef areas.
	Boulder or Boulder-Star Coral Complex	Colonies of massive stone-like clumps covered by small pits, each containing a polyp. Range from smooth to knobby surface.	One of the most common of corals.
	Brain Corals	Several species, which form massive boulder-like colonies, textured in multitudes of grooves like its namesake.	One of the most common of corals. The slowest-growing of massive coral species.
	Fire or Stinging Coral	Very smooth surface marked with tiny pores in a circle around single larger pores. Mustardy to pale yellow,; occasionally fuzzy with tentacles. One type is massive, located just outside the Elkhorn zone; one species encrusts, growing into finely branched projections above area overgrown.	STINGS, leaving welts. Always show groups. Avoid for safety.

Table 3.22 Fauna of the Coral Reef

Type	Species	Description	Interpretative Notes
Invertebrates			
Siphonophore	Portuguese Man o' War	Purple-and-pink air bladders that float on the sea surface, trailing very long stream of tentacles	STINGS; Always show groups. Avoid for safety
Annelida (Polychaete)	Featherduster Worms	Family of worms 2.5 – 13.5 cm; 1 – 5 in. long; Live in parchment-like tubes they secrete; tubes embedded in sand or coral; crown of colorful, feathery tentacles extend from mouth of tube; filter water for food	Extremely shy ; Quickly retract tentacles when approached
Mollusc (Gastropod)	Queen Conch	Large snails having a pink smooth interior and a large flange projecting from the side of the aperture. Young do not have flange: may bury in sand	Important commercial species. Often observed on bottom with algae growth on shell, at the end of a trail like a furrow in the sand
	Reef squids	Small: approximately 30 cm (12 ins.) in length with short tentacles at one end topped by a wary green eye to either side; stabilizer fins along both sides keep the animal flat in the water, and color changes are frequently seen when one swims near to them; Mid-level predators - consume small fish	Hang together in groups of 2-9; however, may occasionally be observed in squadrons of 40 or more
Echinoderm	Caribbean Long-spined Urchin	appears as a large black pin-cushion, with spines several inches in length, protruding from a small central body	During daylight hours these hide under rocks, emerging at night to feed on algae, Very important in keeping the reef free of algae overgrowth.

Table 3.22 Fauna of the Coral Reef

Type	Species	Description	Interpretative Notes
Vertebrates			
Fish	Cartilaginous Fish Nurse Shark	Large (1-3.5 m; 3 - 12 ft) brown bottom dwelling shark. Two barbells project from the underside of the face, under its small yellow eyes	Usually peaceable by nature
	Cartilaginous Fish Southern Stingray	Gray, flattened body, with mouth on bottom. Serrated barb at base of body	Feeds by raising sand to uncover buried shellfish. Barb used principally for defense
	Bony Fish Snappers	Fusiform, bodies with slightly notched tail; mouth powerful, with two distinctive large canine teeth	At least seven species common in Belize-commercially important
	Parrotfish	Bodies similar in shape to above; however, mouth adapted for scraping algae or biting coral. Tails usually crescent-shaped	Brilliant colors on terminal phase, individuals
	Angelfishes	Bodies flattened side-to-side, deep from top to bottom. Small mouth nibbles sponges. May be brightly colored	4 large, 2 small Belizean species
Reptile	Turtle: Hawksbill Turtle	small to medium-sized, up to 1 m (3 ft) in length; relatively small head with a distinctive hawk-like beak; flippers with two claws; elongated oval shell brown with numerous splashes of yellow, orange, or reddish-brown on carapace; plastron is yellowish with black spots; adults commonly average about 0.76 m (2_ ft) in length and weigh between 43 – 75 Kg (95 – 165 lbs); feeds primarily on sponges	Breeds Central Belize mainland shores Most endangered of Belize's sea turtles

Table 3.22 Fauna of the Coral Reef

Type	Species	Description	Interpretative Notes
Vertebrates			
Reptile	Loggerhead Turtle	large head and strong jaws; rusty coloured carapace often with many encrusting barnacles; 92 cm (3.01 ft) long; adults weigh about 115kg (253 lbs)	Breeds Northern Ambergris Loggerheads are highly migratory, making some of the longest journeys known of all marine turtle species. Local name: Cawama
	Green Turtle	carapace oval when viewed from above; dark black-brown or greenish yellow colour; head is relatively small and blunt; range from 80 - 150 cm (2.6 – 4.9 ft) in length; can reach 132 kg (290 lbs) in size;	Breeds Northern Ambergris Called White Turtle because of its white plastron and Green turtle because of the greenish body fat of the adults
Bird	Terns	Sharp-billed; hover-and-dive predators of small fish	Nest on sand spits in shallow unprotected scrapes; at risk from sand mining on cayes.
	Osprey	Large fish-eating hawk; white head and underside; brown back	The only white-headed hawk noted at sea.
Mammal	Bottlenose Dolphin	Large beaked dolphin; beak is about 8 cm (3.15 in) long; 20 to 28 sharp conical teeth on each side of each jaw; head and body length is 175-400 cm (5.7 – 13.1 ft), with males being much larger than females; grey colour	Usually these hunt fish. Locate their food by echolocation - the emission of fine-pitched sound waves produced by nasal sacs in their round forehead called their 'melon'. At times you may find a group turning over lobster traps, perhaps in search of trapped lobsters The best-known of all dolphins; common inside Belize Barrier Reef Lagoon.

SKILL CHECK

EXERCISE 1: ANSWER THE FOLLOWING QUESTIONS

1. What is a barrier reef?

2. Name at least one way that coral reefs are similar to Broadleaf forests.

3. Name 2 ways corals feed.

4. What conditions do coral reefs need to thrive?

5. How does cloudy or dirty water affect reef corals?

6. What structure supports the Belize Barrier Reef?

7. How long has reef growth been going on? Recent reef growth? What happened in between?

8. Name at least 3 types of coral reef. Where are they found in Belize?

9. Name at least 3 important functions of coral reefs.

10. How many species of reef-building corals live in Belizean waters?

EXERCISE 2: INTERPRETATION

1. Interpret 3 important reef coral species.

2. Using interpretative techniques, differentiate between the three most important sea turtle species of Belize.

3. Interpret a reef-based symbiosis to the group.

EXERCISE 3: IDENTIFICATION

1. Identify from description three species of parrotfish,

2. Identify reef inhabitants from slides.

THREATS AND CONSERVATION

Coastal Lagoons and Estuaries

Lagoons and estuaries not only receive nutrients from upstream; they also receive whatever else happens to be thrown, blown or carried by rain into the waterways. These may include a wide variety of items that people would not ordinarily think would be a problem. The shallow waters of coastal lagoons and estuaries act as a sink for chemicals, which may cause fish kills directly or cause mortality indirectly, by killing food animals. Great benefit can be derived for fishermen and other users of coastal lagoons and estuaries by keeping at least a 20 meter (66 foot) strip of vegetation along rivers and streams. Not only is it important for fish and other life; it is the law. Introduction of toxic, industrial or high-nutrient waste effluent into waterways or lagoons is also prohibited by law. It is necessary to find a place to dump waste, sewerage, oil and other materials far from waterways.

The following table indicates pollution input to not only coastal lagoons and estuaries, but other wetland areas as well, both marine and freshwater. These inputs may often be combined and in high concentrations in lagoons and estuaries.

Table 27. Materials found in Lagoons and Estuaries, and their Cause or Origin

Material	Cause/Origin
Silt and Sediment	Deforestation along rivers or streams
Fertilizers	Carried from crops into rivers without vegetation buffer by rainfall
Pesticides	Blown during aerial application, or attached to soil particles and be carried by runoff water
Industrial Effluent	Piped into river; carried by runoff water during heavy rainfall or overflow of settlement
Oil	Spillage, overflow during storms
Trash, Waste	Throwing garbage into river or lagoon; washing clothes or objects in river or lagoon; also leachate from waste water through soil
Heavy metals	Sewerage, industrial effluent, domestic waste (e.g., batteries, paint tins, leaded fuel, etc. ; lead shots fired into wetland may be eaten by birds as gravel and cause lead poisoning
Sewerage	Development too close to riverbanks; improper sewage disposal

Mangrove

The principal threat to mangrove habitats is outright removal and destruction especially in areas near Belize City, Ambergris Caye, Placencia, Caye Caulker and other coastal and island locations undergoing rapid development. Despite efforts to stop degradation of the mangrove habitats, mangroves are being removed for development purposes, principally residential subdivisions, resort building and aquaculture. Mangrove removal represents not only a total loss for the organisms dependent on the habitat, but also a loss to:

- the fisheries industry which depends upon mangroves for production of young lobsters and scale fish;
- the tourism industry which depends upon mangrove for production of decorative organisms that grow up and populate coral reefs with beautiful life, and also in themselves provide tourists with an interesting and rich experience; and

- local people themselves who, when faced with beach loss following mangrove deforestation, must resort to destructive dredge and fill to expensively and temporarily restore their beaches. Beach losses from Hurricane Mitch at South Water Caye were very substantial, showing that a seawall and sand fill are not equal to the original mangrove-protected shoreline.

Losses resulting from removal of mangrove can be forestalled by trimming mangroves, that is, leaving roots and canopy while removing some of the dense foliage in the middle to allow the breeze to penetrate. The law allows 25% of foliage to be trimmed away in this fashion.

Although mangroves are detritus based ecosystems, nature is limited in the amount of excessive nutrients, toxic materials and other pollutants that they can process in a given amount of time. Overloading mangrove systems by dumping large amounts of waste, spills and other such materials is another way to degrade or destroy a mangrove system. To forestall this, appropriate waste management and proper handling of fuel and other toxic material in the cayes and coastal zone is essential.

Littoral Forest

The principal threat to littoral forest habitats is complete and permanent eradication due to coastal development. Along the mainland, high-density housing subdivisions are replacing coastal littoral forest and other wetland habitats. Examples include False Sittee Point and South Stann Creek, where littoral forest habitats have been permanently and completely removed.

A similar fate is befalling caye littoral forests, perhaps the most endangered habitats in the country. In particular, Ambergris Caye and Caye Caulker, where the largest littoral forest areas once flourished, have been recently decimated by housing developments. Some smaller islands, such as South Water Caye, Mosquito Caye and Caye Chapel, have removed virtually all native vegetation for personal housing, resorts and terrestrial recreation purposes. All of this means permanent and total loss of an already-threatened habitat.

Littoral forests currently under conservation include small patches in the Caye Caulker Forest Reserve, Bacalar Chico Marine Reserve, tiny Bird Sanctuary Island of Little Guana Caye, Half Moon Caye of Lighthouse Atoll, and West Snake Caye at Port Honduras. Virtually the only protected areas of littoral forest are those found on cayes or coastal zones that are in a protected area. Combined area is unknown, as littoral forest has never been comprehensively surveyed. A proposed Wildlife Sanctuary including a strip across the wetlands to the leeward of Ambergris Caye stretching to Bulkhead Lagoon on the coast will encompass 16 cayes used by birds as nesting habitat. Several of these cayes support areas of littoral forest. No legislation comparable to the Mangrove Protection Act is in place for littoral forest.

Seagrass and Reef Systems

As reef corals are fragile systems that may be easily damaged, it is not surprising that there are a large number of human activities that result in reef degradation or damage. Coral damage may be either direct-caused by immediate impact and activities on the reef, or indirect - resulting from unrelated activities far up-current that have secondary effects on the reef.

One of the major dangers to seagrass and reefs arises from dredge and fill operations. As seagrass rhizomes only penetrate about 10 inches into the substrate, one does not have to dig deep before the benefits of seagrass are lost. Offshore oil blasting that occurred during the 1970's in the Central Barrier Platform area left round blowouts that remained up until at least 1995. Meanwhile, shrimp trawling operations often scour the seabed destroying seagrass communities.

Sediment contamination from dredging and coastal runoff from deforestation leaves fine grains suspended in the water. Sediment may be carried by currents far from dredge sites. The fine grains cloud the water and reduce influx of solar energy -the power source fueling the entire system. In sufficient amounts, these clouds reduce productivity at the least, and may suffocate seagrass or coral reefs.

Chemical runoff from agriculture; resort, garden and turf maintenance; domestic waste leachate; and industrial effluent may introduce chemicals into seagrass systems that can enter food webs or, in the case of herbicides, damage or kill seagrass outright.

Oil pollution from spills has been known to kill very shallow seagrass and damage submerged seagrass. Nutrient enrichment in poorly drained areas may result in seagrass blades being overgrown by epiphytic algae. Ultimately, the seagrass may die off. Hypersaline brine from reverse osmosis plants may locally affect seagrass communities.

Most Marine Protected Areas (MPAs) contain at least some seagrass habitat. Laws generally prohibit sand extraction, but they do not specifically proscribe industrial or agricultural activity and subsequent runoff nearby or up-current of the MPA.

Marine threats may be summarized in table form:

Table 3.24 Threats to Coral Reefs and Adjacent Marine Systems

Impact	Effects	Prevention
Direct Damage		
Hurricanes	Coral breakage; smothering by sand and/or sediment; Mangrove & littoral forest defoliation; uprooting or breakage	None; however, intact shoreline vegetation retards erosion and building damage caused by surge
Boat groundings	Coral breakage	<ol style="list-style-type: none"> 1. Ensure guides are knowledgeable of the area 2. Do NOT rent boats to visitors 3. Take extra care on cloudy days when it is difficult to see coral below you 4. Do NOT use alcohol or other drugs while operating a boat
Anchors thrown onto coral	Coral breakage; Seagrass bed damage	<ol style="list-style-type: none"> 1. use reef mooring systems whenever possible 2. Anchor only in sand if no mooring available 3. Use an anchor large enough for your boat. DO NOT wedge a small anchor into coral
Uncontrolled visitor damage	rampling; Breakage of coral; Raising sand/sediment from bottom onto coral. Collection of souvenirs; Spearfishing;	<ol style="list-style-type: none"> 1. Tour guide must present a briefing that includes information on visitor conduct, as well as the importance that they behave safely and appropriately 2. Once people are properly briefed about proper conduct, the tour guide must closely monitor behaviour and warn or, ultimately, threaten citation by warden for conduct that may damage reefs.

Table 3.24 Threats to Coral Reefs and Adjacent Marine Systems

Impact	Effects	Prevention
Indirect Damage		
Excess nutrient input	Cloudy water (stress);Algae turf overgrowth of coral and seagrass(if enough death results)	<ol style="list-style-type: none"> 1. Use of composting toilets; routing of hotel and household sewerage and 'gray water' (laundry, dishwashing, etc ') into constructed wetlands attached to drains and septic 2. Strip nutrients from sewerage and other nutrient-rich effluent, such as shrimp ponds, industrial (tertiary treatment) 3. Restrict development styles in areas near coral reefs; if our reefs are to remain alive to attract visitors, support fisheries and protect from storm surge, nutrient load, as well as sediment (see below), must be kept away from reef corals 4. Infractions should be not merely fined, but input removed
Inadequate dredge/ fill; Riverside or island deforestation; Poorly designed roads	Cloudy water: introduction of disease; suffocation of coral	<ol style="list-style-type: none"> 1. Dredging within 2 miles of reef corals should be prohibited 2. Fill should be bound by botan or other low seawall with 45 degree angle stone fill in front 3. Removal of riverside or caye fringing mangroves should be strictly regulated; infractions should not be merely fined, but vegetation replaced
Introduction of chemicals, including oil and fuel, into marine environment	Suppression of natural immunity to disease; hormonal interference; death	<ol style="list-style-type: none"> 1. Fuel stations should be placed on leeward faces of islands to reduce likelihood of fuel spills into the sea 2. Pesticides should not be used near to the seaside on cayes Or coastal zone 3. Entry of fuels or industrial effluent into waterways should be restricted: fines and removal of effluent stream need to be effected

Impact	Effects	Prevention
Solid waste, including leachate (seepage of waste materials into ground or seawater)	Entry of toxic chemicals into sea or groundwater (see above); drifting trash in sea, including entanglement with reef corals; ingestion of waste by marine life including turtles, often resulting in death	<ol style="list-style-type: none"> 1. Tour guides need to point out bag or other place to place waste; NEVER throw trash into the sea! 2. Place waste in proper dump facility. Waste from coastal zone needs to be ultimately dumped in a properly located, securely lined facility on land that threatens neither groundwater or waterways
Excessive/ Inappropriate Coastal and Caye development with destruction of habitat	Loss of water-retarding ability of mangroves & littoral forest; reduced ability to hold against storm surge or wind erosion	Control development amount and type in coastal zone

SKILL CHECK

1. Name at least two sources of damage or degradation for each marine ecosystem.

a. Coastal Lagoons and Estuaries:

b. Mangrove:

c. Littoral Forests:

d. Seagrass and Reef Systems:

2. Select a marine ecosystem; interpret a threat to the select marine ecosystem to the group. Be sure to outline ways to prevent or reduce the threat in your presentation.

3. Develop a short presentation in which you role play the part of tour guide explaining the following issues to a group of tourists:

- a.) Why we don't stand on coral
- b.) Why we do not kick or raise sand near coral
- c.) Why we do not throw anchors in coral.

a).

b).

c).

UNIT 4: PROTECTED AREAS OF BELIZE

INTRODUCTION

Tour guides are key players in the protection and conservation of protected areas. In 2006, approximately 234,625 tourists visited Belize. The majority visited at least one protected area.

This unit will discuss the importance of protected areas to tourism, outline the functions and categories of protected areas and provide usage guidelines for the various categories. Knowledge of protected areas forms a critical part of your role as a tour guide in being a steward of the environment and an ambassador of conservation. The information learned in this unit can be incorporated into your interpretive presentations.

OBJECTIVE:

At the end of this unit, you will be able to define the various categories of protected areas, give examples of each category and highlight acceptable activities for each category. You will also be able to incorporate interpretive comments about protected areas into your tour guiding presentations.

AT A GLANCE:

1. Guiding for the Protection of Belize's Natural Resources
2. History of Protected Areas in Belize
3. Functions of Protected Areas
4. International Protected Areas Overview
5. Protected Areas in Belize
6. Co-management of Belize's Protected Areas
7. Guidelines for the Use of Protected Areas



GUIDING FOR THE PROTECTION OF BELIZE'S NATURAL RESOURCES

As you learned in Chapter 1, you have several important roles as a tour guide in relation to Belize's environment. As a steward of the environment and our culture and as an ambassador of conservation, it is important that you know and understand the rules and regulations that apply to Belize's protected areas. Much of the guiding that you will do will take you into some of these protected areas, because it is here that both terrestrial and marine flora and fauna thrive. Keeping your guests informed about the rules and regulations that govern the various types of protected areas, why they are put in place, and reminding them of good, environmentally conscious behavior will help to ensure that these areas continue to thrive into the future.

Review the Tour Guiding Techniques for Ecotourism that you learned in Chapter 1. These techniques are particularly important when guiding in protected areas. In addition, it is important to include information about the reasons for protected area rules and regulations in your interpretation, so that your guests can learn and understand more about these precious natural resources, and be inspired and motivated to act accordingly to help in their protection.

We want to act responsibly in protected areas because:

1. The presence of visitors may disrupt feeding and predator-prey relationships.
2. The presence of visitors may disrupt breeding patterns.
3. Wildlife may be accidentally injured or killed (i.e. manatees and boat propellers)
4. The presence of too many visitors may cause out-migration to alternative areas less able to support wildlife needs.
5. Litter can change habitats and encourage scavengers,
6. Inappropriate use of birdcalls may exhaust and disorient birds.
7. All wildlife can be unpredictable and dangerous if provoked, especially those with young.
8. Many plants in the tropics can be toxic, thus it is better to look only.
9. Many natural resources are extremely sensitive to human interference i.e. touching stalactites or stalagmites in caves causes them to stop growing', touching, standing on or kicking coral can open the way for disease and destruction.

Let us now look at how Belize has established its own protected areas, and the rules that govern them.

HISTORY OF PROTECTED AREAS IN BELIZE

Protected Areas in Belize have been recognized since the 1920's, with the establishment of Forest Reserves under the Forest Act. However, the areas established at that time were to serve as extractive reserves, for their rich timber resources. In the colonial days, protected areas were declared under the Crown Lands Ordinance. Silk Grass was the first to be established as a Forest Reserve in 1922 (Zisman, 1996), and can thus be considered the oldest protected area in Belize. This site was declared for the protection and development of mahogany silviculture. This was followed by a number of other reserves, all declared by 1930. These included Freshwater Creek, Sibun, Silk Grass, Vaca and Columbia River (Manzanero & Castillo 1996). Other areas declared under the Crown Lands Ordinance were Rio Grande (1972). Guanacaste (1973) and the Bird Sanctuaries (1977) located west of Ambergris Caye, seven small cayes where nesting colonies of birds are found.

It was not until after independence in 1981 that we developed a more defined approach towards Protected Areas Management in Belize with the passing of two major laws namely, the Wildlife Protection Act (WPA) and the National Parks System Act (NPSA). These allowed for the strengthening of protected areas in Belize and facilitated the protection and conservation of ecologically important species such as Jabiru Storks and the Jaguar, and established several different categories and levels of protection for the various habitats. However, forest reserves form the backbone of the protected areas system in our country (NARMAP 1995).

Belize Audubon Society (BAS), the first Belizean non-governmental conservation organization, was instrumental in the preparation of the NPSA (1981) and WPA (1981). In 1984, BAS was given the responsibility for six protected areas under the NPSA (Manzanero & Castillo 1996) and the official management contract between the Government of Belize and BAS was signed in November 1995. Presently, BAS manages eleven protected areas.

Since 1997, the Forest Department has depended on communities to manage protected areas in their immediate surroundings. This is essential, since the department does not have the financial or human resources to manage these parks as they should be managed. The first of these "co-management" agreements was signed with the Association of Friends of Five Blues Lake on 11th February 1997 for the co-management of Five Blues Lake National Park, which is located in St. Margaret's Village, Cayo District. Co-management agreements between the Government of Belize and various agencies, organisations and communities are continuously in the pipeline. We will learn more about co-management later in this unit.

The National Protected Areas Systems Plan (Draft) 2005 reports that at January 1st, 2005, there were 16 National Parks, 7 Wildlife Sanctuaries, 3 Nature Reserves, 6 Natural Monuments, 12 Archaeological Reserves, 20 Marine Reserves, 17 Forest Reserves, 7 Bird Sanctuaries and 8 Private Reserves representing some 18.53% of Belize's land and sea resources under some form of protected status. It is important for tour guides to note that the management status of protected areas changes periodically due to several factors. Tour guides need to continuously inform themselves of the status of the areas they visit and work in to ensure that the proper usage regulations are always observed.

FUNCTIONS OF PROTECTED AREAS

As we learned in Unit 1 of this chapter, the different ecosystems within protected areas perform numerous functions that are beneficial for the survival of humans. We depend to a large extent on the products and services provided to us by natural resources for survival, whether it is oxygen for us to breathe or food for us to consume. Some of the major functions are as follows:

Biodiversity:	Conserve genetic resources and biological diversity more generally, enabling evolution to continue and providing raw materials for biotechnology.
Watershed Protection:	Protect watersheds for downstream hydroelectric, irrigation and water supply installations.
Storm Protection:	Protect coastlines against damages from storms (especially coral reefs and mangroves) and absorb heavy rainfall (especially wetlands and forest).
Tourism:	Provide destinations for nature based tourism and recreation
Provision of Local Services:	Provide benefits and values like shade and education services for both locals and visitors.
Supply of Forest Products:	Provide a wide range of non-timber forest products, and limited amounts of timber.
Nutrient Recycling:	Forest leaf litter, along with microorganisms, build soils and recycles nutrients.
Sequestering of Carbon:	Forests sequester carbon, contributing to global efforts to address climate change.
Research Sites:	Protected areas serve as sites for scientific research on a wide range of ecological, social and economic topics.
Cultural Values:	Conserve culturally important sites and resources, and demonstrate the nation's interest in its natural heritage.

INTERNATIONAL PROTECTED AREAS OVERVIEW

The organization that is internationally recognized as the authority for global protected areas is the International Union for the Conservation of Nature (IUCN). This organization created the first globally recognized definition for a protected area, which reads:

A protected area is “an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means” (WCMC 2000).

This definition is the official explanation for what most countries, including Belize, call a protected area today, and although the management objectives can differ greatly, this definition is generally applicable to all protected areas.

The IUCN has created seven different protected areas categories, which provide for different levels of protection and use. These categories and their definitions have been used internationally as a guide to protected areas in many countries. The table which follows shows the IUCN categories, compared with the categories established by Belize for protected areas.

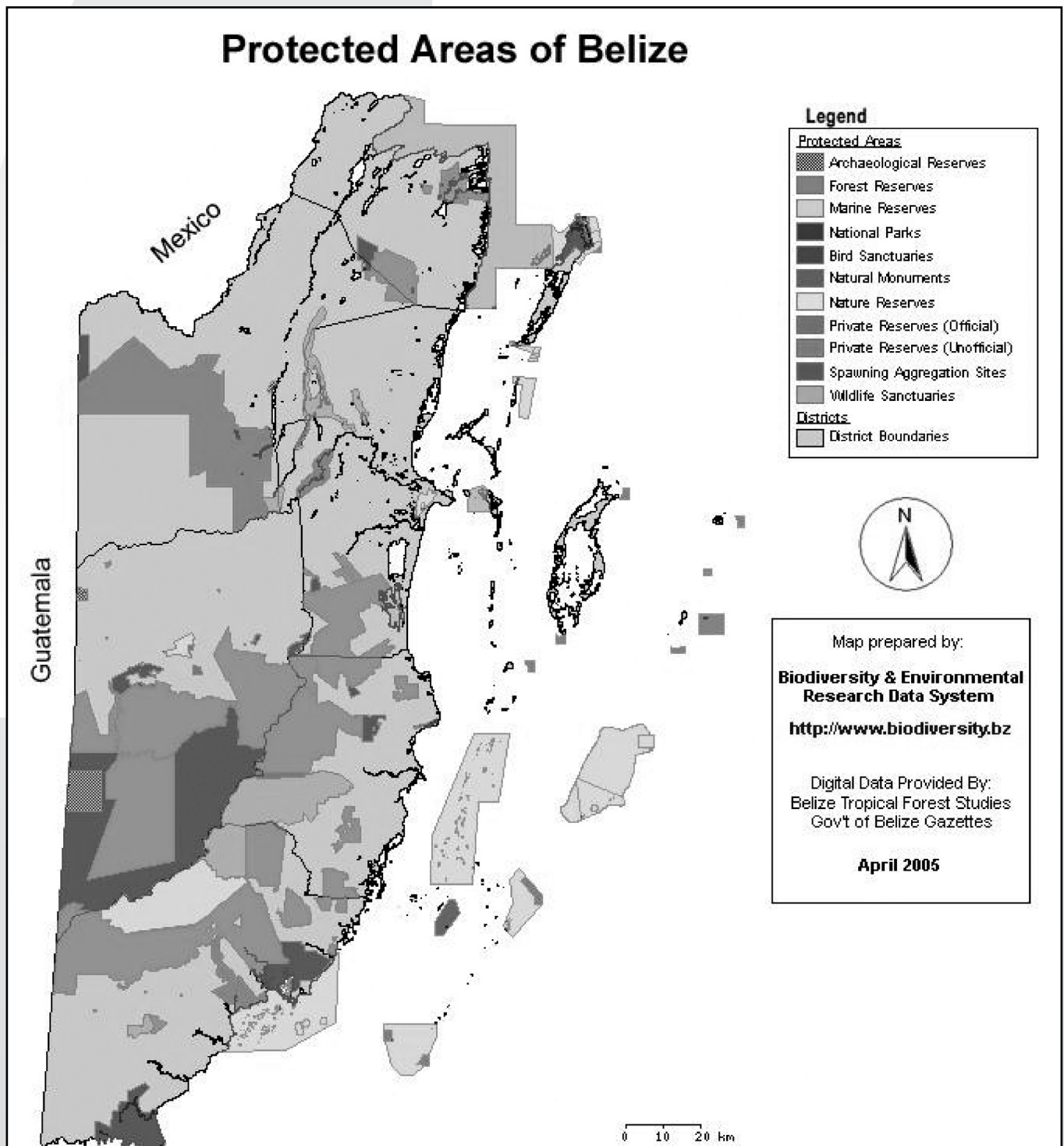
Table 3.25 IUCN Categories and Belizean Categories of Protected Areas

IUCN Categories	Belizean Categories
Category Ia - Strict Nature Reserve, managed mainly for science	Nature Reserve - Managed strictly for research and education (e.g.: Bladen Nature Reserve)
Category Ib - Wilderness Area, managed mainly for wilderness protection	Closest Belizean designation is Nature Reserve
Category II - National Park, managed mainly for ecosystem protection and recreation	National Park Managed for protection of scenic values and recreation (e.g.: Blue Hole National Park)
Category III - Natural Monument, managed mainly for conservation of specific natural features	Natural Monument Managed for protection and preservation of significant natural feature, (e.g., Victoria Peak Natural Monument)
Category IV - Habitat/Species Management Area managed mainly for conservation through management intervention	Wildlife Sanctuary - Managed for protection of nationally significant species, habitat or physical feature (e.g., Cockscomb, Basin Wildlife Sanctuary)
Category V - Protected Landscape/Seascape, managed mainly for conservation and recreation	Marine Reserve Managed for protection, research, recreation, education and controlled extraction of marine and freshwater species. (e.g., Bacalar Chico)
Category VI - Managed Resource Protected Area managed mainly for sustainable use of natural ecosystems	Forest Reserve - The closest Belizean designation, which allows for sustainable extraction and uses of natural ecosystems

PROTECTED AREAS IN BELIZE

There are presently seven different categories of protected areas in Belize. The management of these areas is the responsibility of three different government agencies the Forest Department, the Archaeology Department and the Fisheries Department. However, the Forest Department allows other reputable organizations to co-manage some of the protected areas, as can be seen in the tables that follow.

Map 3.4 Protected Areas of Belize



The Biodiversity and Environment Resource Data System of Belize, 2004 (BERDS) reports the number of protected areas of Belize as one hundred and fifteen encompassing a 18.53% (approx. 2.61 million acres; 1.05 million hectares) of the country's land and sea resources. Below is a list of these protected areas, their designation, where they are located, the area in acres and the agency that is responsible for their management.

Table 3.26 Nature Reserve

“an area reserved for research, education and wilderness protection”

Protected Area	Location (Dist.)	Area (acres)	Management
Bladen	Toledo	97,000	Forest Department/BMC
Burdon Canal	Belize	5,970	Forest Department
Tapir Mountain	Cayo	6,741	Forest Department/BAS

Source: National Protected Areas Systems Plan (Draft) 2005

Table 3.27 National Park.

“an area reserved for the protection and preservation of natural and scenic values of national significance for the benefit and enjoyment of the general public.”

Protected Area	Location (Dist.)	Area (acres)	Management
Aguas Turbias	Orange Walk	8,754.40	Forest Department
Bacalar Chico	Corozal	11,145.20	Forest Department
Billy Barquedier	Stann Creek	1,639.10	Forest Department/FV
Chiquibul	Cayo	264,003.30	Forest Department
Five Blues Lake	Cayo	4,061.20	BAS
Gra Gra Lagoon	Stann Creek	1,319.70	Forest Department/FGG
Guanacaste	Cayo	57.60	Forest Department/BAS
Honey Camp	Orange Walk	7,772.00	Forest Department
Laughing Bird Caye	Toledo	10,119.60	Forest Department/FN
Mayflower Bocawina	Stann Creek	7,854.00	Forest Department/FMB
Monkey Bay	Belize	2122.00	Forest Department/MBWS
Nojkaaxmeen Eligio Panti	Cayo	12,657.30	Forest Department/Itzama Society
Paynes Creek	Toledo	36,420.50	Forest Department/TIDE
Rio Blanco	Toledo	94.30	Forest Department/FRB
Sarstoon/ Temash	Toledo	41,854.70	Forest Department/SATIM
St. Herman's Blue Hole	Cayo	664.50	Forest Department/BAS

Source: National Protected Areas Systems Plan (Draft) 2005

Table 3.28 Natural Monument

“an area reserved for the protection and preservation of nationally significant natural features and unique characteristics for education, research and public appreciation.”

Protected Area	Location (Dist.)	Area (acres)	Management
Actun Tunichil Muknal	Cayo	457.30	Forest Department/BAS
Blue Hole	Belize	946.50	Forest Department/BAS
Blue Hole	Cayo	76.60	Forest Department/BAS
Half Moon Caye	Belize	9,770.90	Forest Department/BAS
Thousand Foot Falls	Cayo	1,290.50	Forest Department
Victoria Peak	Stann Creek	4,840.60	Forest Department

Source: National Protected Areas Systems Plan (Draft) 2005

Table 3.29 Wildlife Sanctuary

“an area reserved as a nature conservation reserve for the protection of nationally significant species, wildlife habitats and physical features.”

Protected Area	Location (Dist.)	Area (acres)	Management
Aguacaliente	Toledo	5,467.90	Forest Department/AMT
Cockscomb Basin	Stann Creek	122,260.10	Forest Department/BAS
Crooked Tree	Belize	36,479.30	Forest Department/BAS
Gales Point	Belize	9,096.80	Forest Department
Corozal Bay	Corozal	180,508.30	Forest Department
Spanish Creek	Belize	6,001.30	Forest Department/RDDG
Swallow Caye	Belize	8,972.10	Forest Department/FSC

Source: National Protected Areas Systems Plan (Draft) 2005

Table 3.30 Forest Reserve

“an area reserved for the protection of forests for management of timber extraction and/or the conservation of soils, watershed, and wildlife resources”

Protected Area	Location (Dist.)	Area (acres)	Management
Caye Caulker	Belize	93.70	Forest Department/FAMRACC
Chiquilbul	Cayo	147,823.10	Forest Department
Columbia River	Toledo	148,303.00	Forest Department
Deep River	Toledo	67,304.80	Forest Department
Freshwater Creek	Orange Walk	33,392.90	Forest Department/FFWC
Grants Work	Stann Creek	7,906.10	Forest Department
Machaca	Toledo	3,096.10	Forest Department
Manatee	Stann Creek/Belize	103,908.00	Forest Department
Mango Creek (1)	Stann Creek	10,803.20	Forest Department
Mango Creek (4)	Stann Creek	19,071.80	Forest Department
Maya Mountain	Toledo	41,729.90	Forest Department
Monkey Caye	Toledo	1,654.40	Forest Department
Mountain Pine Ridge	Cayo	106,352.70	Forest Department
Sibun	Cayo	106,303.00	Forest Department
Sittee River	Stann Creek	92,316.60	Forest Department
Swasey Bladen	Toledo	14,778.60	Forest Department
VACA	Cayo	34,886.80	Forest Department

Source: National Protected Areas Systems Plan (Draft) 2005

Table 3.31 Marine Reserve

“an area reserved as a nature conservation reserve for the protection, research, recreation, education and controlled extraction in relation to marine and freshwater species and their habitats.”

Protected Area	Location (Dist.)	Area (acres)	Management
Bacalar Chico (1)	Corozal	11,597.00	Fisheries Department
Bacalar Chico (2)	Corozal	4,196.80	Fisheries Department
Caye Caulker	Belize	9,670.20	Fisheries Department/FAMRACC
Dog Flea	Belize	1,424.30	Fisheries Department
Emily or Caye Glory	Belize	1,350.90	Fisheries Department
Gladden Spit	Stann Creek	3,996.90	Fisheries Department
Gladden Spit/Silk Cayes	Stann Creek	25,978.30	Fisheries Department/FN
Glovers Reef (1)	Belize	3,831.50	Fisheries Department
Glovers Reef (2)	Belize	17,470.90	Fisheries Department
Glovers Reef (3)	Belize	667.40	Fisheries Department

Protected Area	Location (Dist.)	Area (acres)	Management
Glovers Reef (4)	Belize	64,683.30	Fisheries Department
Hol Chan (1)	Belize	624.20	Fisheries Department
Hol Chan (2)	Belize	1,458.60	Fisheries Department
Hol Chan (3)	Belize	285.90	Fisheries Department
Hol Chan (4)	Belize	454.70	Fisheries Department
Hol Chan (5)	Belize	989.80	Fisheries Department
Nicholas Caye	Toledo	1,663.30	Fisheries Department
Northern Glovers Reef	Belize	1,536.10	Fisheries Department
Port Honduras (1)	Toledo	96,731.10	Fisheries Department/TIDE
Port Honduras (2)	Toledo	3,270.00	Fisheries Department/TIDE
Rise and Fall Bank	Belize	4,252.20	Fisheries Department
Rocky Point	Belize	1,408.80	Fisheries Department
Sandbore	Belize	1,288.30	Fisheries Department
Sapodilla Cayes	Toledo	38,594.00	Fisheries Department/TASTE
Seal Caye	Toledo	1,600.80	Fisheries Department
South Point Lighthouse	Belize	1,316.50	Fisheries Department
South Point Turneffe	Belize	1,378.70	Fisheries Department
South Water Caye	Stann Creek	117,874.90	Fisheries Department

Source: National Protected Areas Systems Plan (Draft) 2005

N.B. Most of the marine reserves are zoned for specific uses or activities.

Table 3.32 Archaeological Reserve

“an area reserved for the protection of cultural and historic resource and management of visitors.”

Protected Area	Location (Dist.)	Area (acres)	Management
Altun Ha	Belize	38.4	NICH
Barton Creek	Cayo	0.50	NICH
Cahal Pech	Cayo	22.4	NICH
Caracol	Cayo	25,549.50	NICH
Caves Branch	Cayo	15.3	NICH
Cerros Maya	Corozal	24.3	NICH
El Pilar	Cayo	1,906.80	NICH
Lamanai	Orange Walk	979.70	NICH
Lubaantum	Toledo	33.4	NICH
Nimli Punit	Toledo	41.7	NICH
Santa Rita	Corozal	0.10	NICH
Xunantunich	Cayo	7.7	NICH

Source: National Protected Areas Systems Plan (Draft) 2005

Table 3.33 Bird Sanctuaries

There are seven bird sanctuaries and they are not under the legal jurisdiction of the Forest Department.

Protected Area	Location (Dist.)	Area (acres)	Management
Bird Caye	Belize	1.30	Green Reef
Doubloon Bank	Orange Walk	3.70	
Little Guana Caye	Belize	2.60	
Los Salones	Belize	2.90	
Man of War Caye	Stann Creek	1.90	Belize Audubon Society
Monkey Caye	Toledo	1.30	
Un-named Caye	Belize	1.10	

Source: National Protected Areas Systems Plan (Draft) 2005

CO-MANAGEMENT OF BELIZE'S PROTECTED AREAS

The quantity and health of protected areas in Belize is affected mainly by human impacts. The Government's protection strategy has traditionally been to designate certain areas without consulting the communities near to those areas. Additionally, the overall management and decision-making has taken place in Belmopan at the headquarters of the managing agencies, and this approach has had a heavy emphasis on regulation and enforcement.

Valuable as the protected areas are, the cost of putting enough enforcement officers and equipment in place to make a real difference is very high. The entire management process lacks adequate funding and resources, thereby facilitating forests becoming deforested, squatters occupying protected lands, areas being de-reserved, land distributed and the environment rapidly degraded.

Seeing that this approach does not appear to have had adequate positive impacts, the Forest Department has embarked on involving communities in the management of protected areas. This process of including the communities is referred to as co-management. Community participation has started to gain wide acceptance; it is important when communities are involved in decision-making, implementation and enforcement of regulations concerning protected areas. In addition, management decisions are more complete when communities participate in drafting their own management plans and ensure that pressure is applied at the community level for the implementation of these plans. In other words, the chances of success are greater with co-management than with any other approach. The cost of enforcement for the government is also reduced, since the communities are responsible for the day-to-day activities within the protected areas.

Co-management of protected areas is, therefore, an approach where representatives of communities, including government and non-government organizations, participate in the planning, execution and enforcement of the strategies and regulations for the proper management of the protected areas. It is important that:

1. No community group is excluded from the co-management process.
2. Members must be genuine delegates selected by the communities and government.
3. The delegates must report back to their communities and must bring the views of the communities to the discussion table.
4. All decisions must be democratically taken.
5. All aspects of management (planning, execution and enforcement) must be included.

Over the past years, the Forest Department and the Government of Belize have signed Co-management agreements with several organizations. You will have noted some of them in the tables on pages 233 – 237.

Organizations that have co-management status and the protected areas they co-manage are as follows:

Belize Audubon Society (BAS):

Guanacaste National Park	Tapir Mountain Nature Reserve
St. Herman's Blue Hole National Park	Blue Hole Natural Monument
Victoria Peak Natural Monument	Cockscomb Basin Wildlife Sanctuary
Crooked Tree Wildlife Sanctuary	Half Moon Caye Natural Monument
Man of War Caye Bird Sanctuary	Five Blues Lake National Park
Actun Tunichil Muknal Natural Monument	

Forest and Marine Reserves Association of Caye Caulker (FAMRACC):

Caye Caulker Forest Reserve	Caye Caulker Marine Reserve
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Association of Friends of Freshwater Creek (AFFC):

Freshwater Creek Forest Reserve

Friends of Nature (FN):

Gladden Spit Marine Reserve	Silk Cayes Marine Reserve
Laughing Bird Caye National Park	

Toledo Institute for Development and Environment (TIDE):

Port Honduras Marine Reserve	Payne's Creek National Park
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TASTE:

Sapodilla Cayes Marine Reserve

Friends of the Valley (FV):

Billy Barquedeer National Park

Friends of Mayflower/Boca (FMB):

Mayflower Bocawina National Park

Itzama Society (IS):

Nojkaaxmeen Eligio Panti National Park

Friends of Rio Blanco (FRB):

Rio Blanco National Park

Aguacaliente Management Team (AMT):

Aguas Caliente Wildlife Sanctuary

Rancho Dolores Development Group (RDDG):

Spanish Creek Wildlife Sanctuary

Friends of Swallow Caye (FSC):

Swallow Caye Wildlife Sanctuary

Sarstoon 'Temash Institute of Indigenous Management (SATIM):

Sarstoon 'Temash National Park

Bladen Management Committee (BMC):

Bladen Nature Reserve

Table 3.34 Private Reserves:

There are eight protected areas which are private reserves managed by reputable private organisations.

Protected Area	Location (Dist.)	Area (acres)	Management
Aguacate Lagoon	Cayo	283.9	Private
Block 127	Toledo	9,231.80	TIDE
Community Baboon Sanctuary	Belize	12,980.10	Community Baboon Sanctuary
Golden Stream	Toledo	15,038.10	Yaaxché Conservation Trust / Fauna and Flora International
Monkey Bay	Belize	1,150.00	Monkey Bay Wildlife Sanctuary
Rio Bravo C&MA	Orange Walk	259,205.70	Programme for Belize
Runaway Creek	Belize		Birds Without Borders / Zoological Society of Milwaukee
Shipstern Nature Reserve	Corozal	20,332.80	ITCF

Source: National Protected Areas Systems Plan (Draft) 2005

GUIDELINES FOR THE USE OF PROTECTED AREAS

All protected areas have restrictions on use of the sites and the resources within the sites. While some of the protected areas allow extraction of materials, but in a controlled manner, others do not allow any kind of activity other than for scientific research and educational purposes. As we have noted above, it is important that visitors to these sites

know what is allowed and what is not allowed within the different protected areas, so as to have the least negative impact on the resources that we are trying to protect. The list below explains the different activities that are allowed and those that are prohibited in the different categories of protected areas.

Table 3.35 Usage Guidelines of Different Categories of Protected Areas

Designation	Tourism	Research Activities	Educational	Subsistence Farming	Collection	Squatting	Logging
Nature Reserve	No	With permit	with permit		No	No	No
National Park	Yes	With permit	Yes	No	No	No	No
Natural Monument	Yes	With permit	Yes	No	No	No	No
Wildlife Sanctuaries	Yes	With permit	Yes	No	No	No	No
Forest Reserves	Yes	With permit	Yes	With permit	No	No	With permit
Marine Reserves	Yes	With permit	Yes	With permit	No	--	No
Archaeological Reserves	Yes	With permit	Yes	No	No	No	No

When guiding in protected areas, you will need to monitor your guests' and remind them of proper behavior. Remember, your goal is to "take only photographs. leave only footprints." Use your guiding techniques to inform, educate, and inspire.

SKILL CHECK

EXERCISE 1: ANSWER THE FOLLOWING QUESTIONS

1. List three ways in which the natural environment can be changed by visitation to protected areas.

2. What are the two most important laws that today help to protect Belize's environment?

3. Name Belize's seven categories of protected areas.

- a) _____
- b) _____
- c) _____
- d) _____
- e) _____
- f) _____
- g) _____

4. Name two areas for each of Belize's seven protected area categories.

- a) _____
- b) _____
- c) _____
- d) _____
- e) _____
- f) _____
- g) _____

5. What percentage of Belize's total area is under some form of protection? _____

6. How many protected areas are there in Belize today? _____

7. What is co-management, and why is it important to Belize's protected areas?

8. Name two co managed protected areas.

9. Name two types of protected areas where extraction is permitted.

EXERCISE 2: INTERPRETATION

Role-play the following two scenarios:

1. You will be taking a group of visitors through St. Herman's Cave. You will first walk along a trail to the cave, pointing out birds and other flora and fauna. At the end of your cave tour, you will have a picnic lunch near the Blue Hole. Role-play your briefing to the group before departing on the walk, remembering to explain the rules and regulations for behavior during the tour.

2. You are taking a group snorkeling at Hol Chan Marine Reserve. You notice that one pair of snorkelers keeps getting too close to the coral and to a moray eel that you know resides in one of the nearby rock crevices. What do you do and say to these two snorkelers?

EXERCISE 3: COMPLETE THE FOLLOWING CHART

Name the 7 categories of protected areas in Belize, and list activities permitted in each category of protected area.

Designation	Tourism	Research Activities	Educational	Subsistence Farming	Collection	Squatting	Logging
Nature Reserve							
National Park							
Natural Monument							
Wildlife Sanctuaries							
Forest Reserves							
Marine Reserves							
Archaeological Reserves							

RECOMMENDED READINGS

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CHAPTER 4: HISTORY & CULTURE OF BELIZE

INTRODUCTION

Belize, “this beautiful jewel of ours,” is a country of diverse ethnic/culture groups, none of which is ethnically “pure.” Belize is a multi-cultural, multi-ethnic, and multi-lingual country. It is a country of diverse cultures, belief systems, foods, customs, traditions and languages. Maya, Mestizo, Creole, Garifuna, Mennonite, Taiwanese, and East Indian comprise the major ethnic groups. Each group has its own culture – although they sometimes overlap. Languages range from English, Creole, and Spanish to various native tongues.

ASSESSMENT

Oral presentation and a written test will be administered. Questions will be based on the key concepts discussed in this unit.

AT A GLANCE

- Unit 1: Historical Background
- Unit 2: The Creole
- Unit 3: The Mestizo
- Unit 4: The Garifuna
- Unit 5: The Maya

UNIT 1: HISTORICAL BACKGROUND

This unit will provide an overview of the different cultural groups that are present in Belize and how each contributed to the forming of a new Belize

OBJECTIVES:

At the end of this unit, you will be able to:

1. Develop short presentations outlining how key topics such as slavery or the Battle of St. George's Caye have contributed to making Belize what it is today.
2. Using a chronological table with dates only, you will be able to develop a narrative of events that took place within a specific timeline.
3. With the aid of a political map of Belize, you will be able to fill in the different locations where different ethnic/culture groups reside

AT A GLANCE:

1. Historical background
2. The early Maya
3. The meaning of the name of Belize
4. The colonization of the Bay of Honduras
5. Immigration
6. The twentieth century
7. Conclusion



INTRODUCTION

WHAT IS HISTORY?

History is the story of human beings, of what they have done and suffered or enjoyed. If history is about how human beings have made conscious choices and built upon experience to change their environment and culture, then all achievements should be seen as part of the whole human experience.

While history may be the story of humans, how it is remembered, whether written or by oral tradition will be different depending on who is recalling it. History is not timeless and unchanging. Our knowledge and understanding about any people or culture will always be based on what we read and learn. Formal education is often taken more seriously than informal education so that information in a book tends to be seen as the only truth. However, we rarely question the background of authors and experts and how their views influence not only what they write but how they write about their topic.

Belizean history did not begin with the arrival of the Europeans. Every year, thousands of visitors, Belizeans and non-Belizeans visit the remains of ancient cities that were flourishing while most of Europe was still in the Dark Ages. They are evidence of a complex civilization in Belize. While most of us acknowledge the achievement of the ancient Maya, we are not so comfortable acknowledging the Maya people of Belize as our descendants and even less of other non-Maya Belizeans.

MULTICULTURAL BELIZE

Another break in this chapter from standard Belizean history is the emphasis on multiculturalism. Up to the 1930s, it might make sense to talk about ethnic groups. Yet ethnic groups do not fully explain the cultural mixing that has occurred predominantly in the urban areas. Indeed, many of the younger generation no longer speak the language of their grandparents and speak Creole instead. As you read about each group bear in mind the following: a majority of Belizeans claim biological descent from Africa, Maya, Europe and India (Asia). If you just arrived in Belize and don't have any of the above mentioned ancestors, you claim cultural heritage through food, music, dance, language, religion, arts and crafts. Nearly everyone claims Western heritage (biological or cultural). After all Belize was a British colony and inherited the legal system, education, language, and values of its colonizers. However, few Belizeans are willing to acknowledge the other aspects of their heritage which have managed to survive despite suppression and negative portrayals. The more we intermarry and exchange ideas, the more we realise how similar we are as a people. We appreciate and encourage the good work ethics, of sharing, taking care of our elders, of family and community support, of creativity and ingenuity and of leadership skills. These attitudes more than skin colour or phenotype are what counts in our society. When reading the units on the cultural groups we can see where they overlap. There are many similarities between the African and Maya culture probably because they both came from similar environments.

For all the mixing that has been going on, there are groups of people who fall outside the multicultural model. They have retained their unique way of seeing the world through their language, cultural rituals, dance, music and religion. Yet, despite these factors, they also participate in the larger Belizean society through the education, political and religious systems and through food and music. They advocate intercultural education so that others can understand and appreciate their cultures. After all, there is more than one way of seeing the world. Their values can balance our very Western outlook in Belize such as respect for the environment and appreciation of strong family and community networks.

HISTORICAL BACKGROUND

THE COLONIAL MAYA

Much of what we know about the early history of the Maya is from European records. Just because we do not know of an event does not mean that it did not happen. It seems that the Post Classic Maya populations remaining in Belize lived in three provinces, running from north to south. These were known as Chetumal, Dzuluinicob, and Manche Chol provinces (maps of these areas Shoman pg 13). The Spanish Conquest led to the death by diseases, the desolation and the displacement of many of these people to lesser controlled areas. Some of the gaps in early Belizean history were filled by Franciscan priests who wrote about the Maya in the hope of easier conversion. The Spanish missionary Father Diego Delgado in 1677 came across many Maya communities in southern Belize as he travelled to entradas such as Tipu near Negroman Eddy, in the Cayo District. Most likely the Maya inhabitants would have been taken to entradas in Guatemala for easier monitoring and conversion to Christianity (and pacification) and as sources of labour. In the Peten they intermarried with the local Maya population. It was not just Maya who were intermixing; so too were the Spanish and the Maya producing a new culture and people.

After repeated failures at Lamanai, culminating with the rebellion of Tipu in 1638, the missionaries left Belize at the end of the seventeenth century. The people most likely to encounter the Maya, the logwood cutters, were not literate. Moreover, most of the land initially being exploited was swampland and other inhospitable places for farming and living. Moreover most of the logwood and mahogany extraction was in northern Belize not in the south so reports of the Maya are even more sparse.

The earliest record of the Maya, by the British, was in 1779 and they were seen as non-threatening. However, as the logwood cutters moved further inland in Northern Belize, there was increased contact between themselves and the Maya and there were reports of 'wild indians'. In 1802 there was a request for troops to be sent up to punish 'Indians' attacking the mahogany camps.

MEXICO

In order to understand the context of the Caste War of the 1840s which had such an enormous impact on Belize, a brief background is given. It took the Spanish seventeen years to conquer the Maya in Yucatan. There were a series of Maya resistance, which were quickly and brutally suppressed, starvation caused by war and plague hastened by weak immune systems. Catholic priests looked for any sign of indigenous religion and swiftly dealt with any transgression. After a while, a tired land and people were ruled by foreign invaders replacing the local elite and priests. The remaining Maya were centralized and forced to pay tribute in kind of services. The Maya were enslaved with some being sent to work in gold and silver mines in other parts of the Americas as far away as Peru.

In Mexico a new cultural blend of Spanish/Maya cultural blend was achieved and remained until the nineteenth century. In the meantime, the Maya population rebuilt itself and needed more resources such as land and water. Higher taxation, increasing labour demands and stricter control over religious activity led to growing Maya dissatisfaction. Mexico was also moving towards Independence from Spain and publishing revolutionary ideas about liberty and equality, no forced labour, no tribute to the Crown and no Church tax (obviously for themselves and not the Maya) and growing land hungry crops such as henequen and sugar. Competing needs and interests eventually led to the Caste War. The Maya would no longer be submissive to the wants of the state. Freshly armed and experienced from a conflict between Yucatan and Mexico, they declared war. Many of their leaders were Mestizoes who were from their communities. The majority of the resistance came from southern Yucatan rather than the northeast.

HOW BELIZE GOT ITS NAME

Historians do not know what the Maya called the territory now known as Belize. However, Europeans referred to this area by different names at different times. It was first referred to as the Bay of Honduras (from the Spanish Hondo meaning deep) in 1502 and British Honduras to differentiate it from Spanish Honduras (now Honduras) from 1862 to June 1 1973, when it was renamed Belize.

Various theories have been put forward to explain how Belize got its name. It is said to be derived from Peter Wallace or Wallis, a Scottish buccaneer who settled in what became Belize. The Spaniards called it Wallis, and the corrupting influence of time has softened it to Belize. Others have attributed the name Belize to the Maya words belakin (land towards the sea), baltiz (land of the Itza), and beliz (muddy waters). In recent times, an African explanation has been added to the puzzle: David Hernandez has traced the name Belize to a tiny village and river of the same spelling and pronunciation in the Cabinda Province of Angola (in Africa).

THE COLONIZATION OF THE BAY OF HONDURAS

Just like much of early Maya history is unknown so too is the beginning of the British settlement in the Bay of Honduras. Available records indicate 1638 as the date for the establishment of the settlement. Many historians agree that before 1670, there were already British settlements in Central America using African slave labor (obtained through Dutch merchants). This was also the time of piracy which was costly to Spain but a bounty for other countries. In 1670 the Godolphin Treaty was signed between England and Spain. Under the terms of the Treaty, piracy was suppressed and Spain recognized the legitimacy of British settlements in the New World.

Many former pirates turned to logwood extraction in the mainland settlements. Despite the Godolphin Treaty, many of the settlement remained questionable as far as the Spaniards were concerned. Despite the dispute over the territory occupied by the British settlers in the Yucatan Peninsula, the Bay settlers continued to cut logwood for sale in Europe, where, until the mid 1850's, dyes from the wood were very important for European manufactures.

For a time, the Spaniards left the British logwood cutters alone. However, in 1680, the Spaniards attacked and sacked the British settlement of Trist in the Bay of Campeche. Even though evidence on this aspect of history is not conclusive, many historians believe that the British logwood cutters shifted their activities to the area around present Belize in the early 1700s.

The change from logwood to mahogany export was the result of demand in Europe, and it changed the population picture of the area now known as Belize. The reason for this change was the nature and character of the labor requirement for mahogany exploitation. As more and more labor was required for mahogany exploitation, and as the Maya population continued to decline due to European-borne diseases, the importation of African slaves increased until their population actually exceeded European and Maya populations put together.

It is difficult to recapture the life led by the woodcutters during the eighteenth century. It is also very difficult to estimate their exact numbers. Available evidence on the slaves indicates that many of them were African born and, until the mid-nineteenth century, their ethnic origins and cultural practices could still be identified. Nevertheless, the process of Creolization, the blending of the different cultures, was going on at the same time.

TREATIES AND BORDERS

The first attempt by the Spanish to remove the British settlers from the Belize area is believed to have come by a land journey from Peten in 1718. This expedition led to the establishment of Spanish Lookout. It is still not clear who first established Spanish Lookout. One version claims that the Spaniards established it as an outpost to “look out” for the British. Another version claims that it was the British that established the outpost to “look out” for the Spanish. However, what remains clear is the series of wars fought between the British settlers and the Spaniards, and the resultant treaties that governed their conduct and behavior.

The Treaty of Paris, 1763, led to Spain’s recognition of the economic activities of the British settlers while maintaining its sovereignty. Whenever they felt that the British were getting too settled they attacked but these series of attacks did not prevent the settlers from expanding their timber exploitation as far north as the Rio Hondo. The Spanish complaints against further violation of their territory grew louder and were followed by a series of raids from their headquarters in Bacalar.

It was at this time that Admiral Burnaby, Commander-in-Chief at Jamaica, visited the settlement. He met with the Governor of Yucatan and was reported to have said that he was “perfectly satisfied” with the new relations between the two warring parties. He also established Burnaby’s Code, an early form of self-government for the settlers. Burnaby ordered periodic visits by a British warship to the Bay area, which had the intended effect of reducing Spanish attacks for a while. Nevertheless, the internal situation in the settlement was far from peaceful. In 1768, Admiral Burnaby advised the Admiralty that a warship be kept permanently in the Bay of Honduras “to prevent as much as possible murders, frauds, and confusion which are [disgracefully] practiced among the Baymen.” At the same time, the warship was to help contain escapes and rebellions by the African slaves. In fact, in the slave rebellion of 1773, two white men were killed up the Belize River.

Even with the security arrangements, the Spaniards attacked and destroyed the settlement in 1779. It was not until the Treaty of Versailles in 1783 that the settlers returned from the Mosquito Coast, where they had taken refuge. The British settlers were not happy with the treaty because it restricted their activities to the area between the Belize and Hondo Rivers. After continued pressure by the British, the Spaniards signed the London Convention in 1786. By the terms of the London Convention, Britain agreed to give up claims to the Mosquito Shore in return for an extension of the boundaries of the British territory in the Bay area as far south as the Sibun River. The Baymen, as they were now called were only allowed to cut mahogany and all other timber, fish, and inhabit St. George’s Caye. They were, however, not allowed to build forts, establish any form of government, or develop agriculture. Spain in fact, retained sovereignty over the area and asserted the right to inspect the settlement twice a year to insure strict compliance to the terms of the treaty. The evacuation of the Mosquito Shore of just over 2000 people caused a dramatic increase in the population of the Bay settlement.

Apparently, the Spaniards were not happy with the terms of the London Convention – in 1798 they attacked the British settlement of St. George’s Caye in a number of brief encounters. They were turned back by the British with the support of their African slave population, in what is now celebrated as the Battle of St. George’s Caye. This battle has acquired an unjustified predominance in the history of Belize and created controversy over the type of relations that existed between the slaves and their masters. It is true that the defense of the settlement against such a strong force was a notable achievement. However, no one at that time imagined that this was the defining battle between the two rivals. In 1799 a statement was issued, “Since the establishment of a Garrison at Honduras the Tenure and possession of the Country altered. His

Majesty holds it by force and it may in some degree be considered as a “Conquered Country”. However, in the Treaty of Amiens 1802, the British surrendered all rights to the territories they occupied during the war which started in 1796, except Trinidad, to Spain. This included Belize, extinguishing whatever the ‘Right of conquest’ the Battle of St George’s Caye might have gained.

Nevertheless, after the Battle of St. George’s Caye, the settlement experienced a period of peace, except for the few times when rumors of Spanish attacks caused panic among the population. The settlement was governed through the Superintendents, who were representatives of the British Crown. Apart from the office of the Superintendent, there were Magistrates, who made up the Public Meeting. Only white men, known as the “Principal Inhabitants”, were allowed to participate in the Public Meeting which was the system of government. The Magistrates played a dual role, acting as the Executive (a position that caused a lot of friction between the “Principal Inhabitants” and the Superintendents) and the Judiciary.

The Public Meeting excluded women and non-whites until 1831. After emancipation in 1833, the settlement remained rigidly divided according to race, and the small population of Whites, still call “The Principal Inhabitants”, continued to dominate every aspect of life. The majority of the population remained landless and poor even after emancipation. As a matter of fact, laws were passed making it difficult for newly freed slaves and other small farmers to acquire land. Nevertheless, subsistence farming developed from these groups. The irony is that many of the large landowners got their land free, first under location laws, and then in 1817 by Crown grant. So instead of allocating land and creating a more vibrant peasant agricultural system, the Apprenticeship system was introduced in 1838 by the British to teach ex-slaves how to work (in jobs they had been doing for years) meant that the ex-slaves returned to a life that was not different from slavery except in name.

The Belize River Valley has much evidence of peasant farming challenging the myth that Creole did not work the land. They learnt how to feed themselves over the centuries as the provision they got from the Europeans was never enough. Also many of the camps had ‘provision’ grounds of vegetables and ground food to complement camp food. In addition some slaves were allowed to have ‘plantations’ to grow provision food for themselves and for sale or barter in the local markets for additional food, clothing, personal possession etc.

CASTE WAR

The Caste War which simmered for fifty years affected Belize through a constitutional change to the status of the colony, the arrival of pioneer agriculturalists and the creation of the reservation and alcalde systems in Belize.

MAYA RESISTANCE

The Maya were not outside colonial politics. When the Maya in particular were forced to move south because of the Caste War, many Maya joined other Maya living in the area between Mexico, Belize and Guatemala. Guatemala and Great Britain had just signed on to the 1859 delineating their borders. The Icaiche Maya, under Luciano Tzuc felt that their rights to the land were recognised when the rent they were asking was being paid from the 1850s. When the rent was not forthcoming, kidnapping and ransoms were the response. The land demands did not culminate until the death of Marcus Canul at Orange Walk town in 1772. The demand for land would re-surface during the sugar cane boom in the 1900s.

In the meantime, the threat to national security posed by Canul and the Icaiche, and the Legislative Assembly's inability to raise the tax to pay for defense, led to the settlers asking Great Britain to pick up the defense bill. In so doing, the Legislative Assembly committed political suicide in surrendering its autonomy and Belize became a crown colony.

In 1893 the Mexican and British Governments signed the Mariscal-St John Treaty, which made Rio Hondo, the southern border of Mexican territory with British Honduras. In return for giving up its claim to Belize, Mexico expected the British to stop supplying arms to the Cruzob Maya who were the main rebel Mayas from the Caste War. The Belizean merchants had been participating in the lucrative smuggling trade of chicle from Mexico to Belize, arms and other imported goods from Belize to Mexico as they had been doing for some time.

FOREST EXTRACTION

Despite the entrepot trade which made many Belize merchants rich, the vast majority of the population remained poor. While the African population was engaged in the forest industry, the Maya/Mestizo sections were involved in the extraction of Chicle. What is striking about the forest extraction system was the similarity in labour control through a system called the truck and advance system.

Population of Belize 1790 - 1991

Date	Population
1790	2,656
1803	3,959
1806	3,526
1816	3,824
1823	4,107
1826	4,163
1829	3,883
1832	3,794
1835	2,543
1839	2,946
1841	8,235
1845	9,809
1861	25,635
1871	24,710
1881	27,452
1891	31,471
1901	37,479
1911	40,458
1921	45,317
1931	51,347
1946	59,220
1960	90,505
1970	119,645
1980	145,353
1991	189,392

TRUCK AND ADVANCE SYSTEM

The chicle industry meant that men and women (as the support unit) had to live for long months in the forest. The sapodilla trees (*Manilkara Zapota*), from which chicle sap was extracted were scattered throughout the forest. Control over the labour force was exercised through a system of 'indebtedness' familiar in many other parts of Latin America and in Belize. A contractor gave an advance to the chicle tapper (chiclero) to enable him to begin his work in the forest. The advance was not generally given in cash but through supplying the chiclero with the tools he needed to work, and the groceries he required to survive in the forest during the harvest season. At least in theory, then, the tapper would be obliged to work for the contractor until the value of extracted chicle covered the value of the credit initially given. Many times, the tapper was unable to pay off debts and so the cycle remained unbroken. Of course many also ran away from their contractual obligations for which there were severe repercussions such as death sentences. The heyday of the chicle trade ended in the 1920 during the economic depression.

Extract on Chicle Life

The chiclero, the man who worked in the forest for extended periods tended to be Maya or Mestizo. From the description below, his life was not an envious one.

Life in the camps was tightly structured. There was a hierarchy of authority: the Contractor was based in the village or town and was only an occasional visitor to the camp itself, but he was the Boss: he did the hiring, owned the mules, sold the chicle and provided the supplies for the chicleiros. The ordinary day to day boss in the camps was the Camp Master who was himself usually a chiclero. He was in charge of the supervision of all the affairs of the camp, the division of areas for work, the supervision of the cooking and molding of the chicle, the distribution of supplies, the keeping of records... The Camp Master... received a percentage of the production of all the men who worked from his camp.

The ordinary chiclero had a rough existence; the work was hard and tiring and the best chicle seasons (plenty of rain) were not the most comfortable times to be in the bush; usually there were two or three women in the camps who cooked meals and did chores about the camp.

CREATING A MULTICULTURAL BELIZE

The Garinagu

One of the first groups to arrive after Mayas, Europeans and the Africans were the Black Caribs now known as the Garinagu. After having been expelled from St Vincent for fighting on the wrong side, they arrived on the Caribbean coast of Honduras, Nicaragua, Guatemala and slowly made their way up the coast to the Belize. The first record of them was in 1802.

They first settled in the Stann Creek area, where they engaged in fishing and agriculture. By 1811, the Black Caribs were selling their produce to Belize Town, albeit under extremely difficult conditions, as they were only allowed into Belize Town after obtaining a permit that restricted their stay to forty-nine hours. Despite these restrictions, the Garinagu worked along with Africans in the mahogany camps. On November 19, 1832, a major wave of Garifuna immigrants entered the settlement with much fanfare, a fact that has been commemorated as a national holiday in Belize. In 1835, the Garifuna were "carrying on a constant traffic by sea with Belize Town, selling plantain, maize, poultry, etc."

By 1841, Stephens, an American traveler, described both Dangriga and Punta Gorda as large settlements. And by 1858, the population of the Garifuna is said to have exceeded 2,200. The Garifuna population was concentrated in Stann Creek and Toledo Districts. Urbanization has led to many changes in the lifestyle of the Garinagu today including the change in gender roles, language, food and ways of making a living. They have also contributed to the musical culture of Belize.

The Maya

The population was furthered bolstered by the migration forced or otherwise by other Maya groups from Mexico and Guatemala from the 1840s to today. The nineteenth century saw the arrival of refugees from Mexico and Guatemala. The Yucatec Maya fleeing the Caste War beginning in the 1840s settled in northern Belize while the Mopan and Q'eqchi resisting taxation and labour control in the Peten area in the 1880s settled in the Cayo and Toledo districts. Just a quick glance at the population table illustrates just how much Belize's population increased. The Mosquito Coast inhabitants in 1786 were the last group to have such an impact on the diversity of Belize's emerging culture. They contributed to the language, food and music of Belize.

THE CASTE WAR REFUGEES: THE MAYA AND THE MESTIZO

The people who arrived in Belize from Mexico were not united or had common backgrounds other than they were Mexicans running away from conflict.

A majority of the Maya who came south of the border established communities far from the Mestizoes or white Yucatecos and only had contact when in need of basic items or to market their produce of corn, beans and vegetables. This wariness is hardly surprising given the recent Caste War which had elements of racism and economical, political and social discrimination. The Maya also supplied the forest camps with food and labour, both of which were in short supply. They were allowed to cultivate on land as long as they did not cut down the logwood and mahogany, owned by the large landowners either based in Belize Town or overseas. A few of the Maya were even successful in becoming small sugar and banana producers but without access to capital and land, it was difficult for them to develop their industry as much as their white counterparts.

The white Yucatecos arrived with business networks, financial resources and lobbying skills into their new homes. For instance, James Hume Blake, a wealthy Belizean merchant was well known in Bacalar and when the Santa Cruz Maya attacked Bacalar in 1848, Blake encouraged the Yucatecos to settle on his Pembroke Hall and Goshen estates in Corozal and offered credit in some cases. Although many Yucatecos returned after Bacalar was regained from the rebel Maya, many stayed or moved on to Back Landing, Orange Walk town and San Estevan. Some of the Yucatecos were from sugar producing areas which had been the source of sugar and rum for Belize. By 1858, Belize was exporting sugar and rum. Not surprisingly, most of the sugar was coming from the Goshen and Pembroke Hall estates owned by James Hume Blake. When the large landowners saw that there money to be made, they too started sugar plantations especially as there had been prolonged mahogany depression with 1870 being the worst year on record.

(Sources: 1830-33, Quarterly return in CO 132/42-45; 1834-35, Robert Montgomery Martin, History of Colonies of the British Empire in the West Indies. London, 1843, 141; 1837, 1845-46, Archibald Robertson Gibbs, British Honduras..., London, 1883, 93, 102; 1857-67 Longden to Grant, 19 June 1868, AB. R. 98; 1868, Longden to Grant, 17 May 1869, AB, R. 98). *1870= 2.75million feet.

Exports of Mahogany from Belize, 1830-1846; 1857-1868

Date	Mahogany in 1,000 Superficial Feet	Date	Mahogany in 1,000 Superficial Feet
1830	4,557	1858	6,275
1831	3,866	1859	5,436
1832	5,015	1860	8,090
1833	4,565	1861	8,657
1834	6308	1862	8,885
1835	6,421	1863	6,196
1836	9,788	1864	7,135
1837	8,500	1865	5,240
1838-44	-	1866	5,167
1845	9,320	1867	4,156
1846	13,719	1868	3,007
1847-56	-	1870	2,750
1857	7,267		

(Sources: 1830-33, Quarterly return in CO 132/ 42-45; 1834-35, Robert Montgomery Martin, *History of Colonies of the British Empire in the West Indies*. London, 1843, 141; 1837, 1845-46, Archibald Robertson Gibbs, *British Honduras...*, London, 1883, 93, 102; 1857-67 Longden to Grant, 19 June 1868, AB. R. 98; 1868, Longden to Grant, 17 May 1869, AB, R. 98). *1870= 2.75million feet.

Many plantations were equipped with machinery and Indian Church, near the ancient city of Lamanai, still has remains of steam machinery used for sugar production. However, this first foray in the sugar industry did not last long and was, in fact, in decline by the mid 1880s due to labour shortage and competition from beet root. Belize and Yucatan were not alone in this. Sugar depression affected the whole Caribbean.

Lobbying skills were important for seeking tax relief. As early as 1856 twenty five planters in Corozal complained to the superintendent about the introduction of sugar tax and threatened to abandon not only sugar but coffee, castor oil, cotton and tobacco production.

Some of the Yucatecos were able to acquire land through their trading network although they were not allowed to hold land titles as they were aliens. With not all things being equal, however, the wealthier Yucatecos qualified for naturalization and, in time, became relatively large landowners. The Maya excluded from land ownership continued to work for wages on these plantation and either rented or squatted on land to grow their corn and other subsistence crops until the sugar production in the latter half of the 1990s. It was with the Cane Farmers Association under the leadership of Mateo Ayuso that small farmers, which included many Maya, would truly benefit from the sugar boom whose heyday was in the 70s.

MAYA MESTIZO

The Yucatec Maya are increasingly calling themselves Maya Mestizo. It is a reflection of the changes that they have been undergoing as a people. While many speak Spanish, their food, religion and many aspects of their culture is mixture of Maya and Spanish influences. Are they different from the Maya or the Mestizo? It depends how cultural groups are defined. Is it by blood or by socialization? There are many cases of Maya parents producing Mestizo children. In the 2000 census the Yucatec Maya numbered just 1.4 % (3,155) of the population down from 3.1% in the 1990 census. Where did the 2% go? Most likely they put classified themselves into another category.

Mopan and Q'eqchi Maya

Unlike the northern Maya who were Yucatec (Lowland Maya) and spoke one language and shared cultural characteristics; two groups migrated from Guatemala: the Mopan and the Q'eqchi. The Mopan are a branch of the Yucatec as evidenced by their language and cultural traits such as cross-stitched embroidery which has the same name: Xocbil Chuy. How the Mopan came to be in Peten, Guatemala is unclear but the most likely reason is that they were part of the Itza group that migrated from the Yucatan during the civil war between the Xiu and Cocom families during the Terminal Classic period (790 A.D to 1500 A.D.) which settled at Lake Tayasal. After the Itzaj capital on the island Noj Petén was subjugated by the Spanish in 1697, Mayas were forced to live in missionary towns also known as entradas. The Mopan, the Itza and San Jose are from the same branch of the Maya family.

The Q'eqchi, on the other hand, are highland Mayas who came from the Alta Verapaz region and migrated when coffee production took off in the 19th century. They belong to a different linguistic group. The two groups met in San Luis, Peten and intermarried. There are still some villages in Toledo, Santa Elena and Santa Cruz that have villagers of mixed ancestry (Mopan and Qeqchi). Some Q'eqchi arrived in Belize as part of a workforce for Cramer estates. Bernard Cramer, a German, bought land in northern Belize as well as land from the Young, Toledo and Company near the Sarstoon River in Toledo. After Cramer's agricultural (coffee and cacao farms) attempt failed in 1914, the Q'eqchi either settled and created villages such as Dolores, Otoxha and Crique Sarco or moved elsewhere.

While Mopan migration from Guatemala has more or less stopped, Guatemala's internal conflict, some say the genocide of the Maya, led to many Maya from the Guatemala highland settling in Belize in the 1980s. Many of them were Q'eqchi bringing new and old customs keeping the culture very vibrant.

The Qeqchi are the most populous Maya in Belize. Even in Guatemala, they number just over half a million. In Toledo District, they make up the majority of the population and make up just over 5 percent of Belize's population according to the 2000 census.

AMERICAN CONFEDERATES, EAST INDIANS AND CHINESE

As a result of the sugar industry taking off, labor was in short demand especially after the 1838 Emancipation of the Africans. A further and very important factor was the appointment of John Gardiner Austin as Lieutenant-Governor of British Honduras in 1864. He was a man with extensive experience in recruiting both Chinese and Indian laborers, especially for the government of British Guiana.

The Chinese

In 1865, the British Honduras Company convinced the British authority to allow the importation of 474 Chinese from Amoy to work on its estates on the New River. By the summer over 100 died from overwork, bad food and opium. 100 more fled to Mexico where they intermarried with the Santa Cruz Maya. Between 1868 and 1869, the Chinese population declined from 211 to 193 and by 1871, it fell further to 133 and continued to decline until the 1920s, when a new wave of Chinese emigrants began to arrive. Many of the remaining Chinese were transferred to other sugar estates in the Toledo area before the experiment in Chinese laborers was declared a failure and the colony turned to the importation of East Indian laborers in 1871.

Of the Chinese who chose to stay in Belize, many stayed in Orange Walk, Corozal or Toledo, but many others moved to Belize City where they established small shops, laundries, opium houses and brothels. The next large number of Chinese came in the 1920s and 1930s, mostly from Guatemala, where they had been indentured laborers, and also from Honduras. These included such names as Chi, Mak and Quan, many of whom started as farmers in Punta Gorda and later set up as merchants in Belize City. The local newspaper, the Clarion complained loudly in 1930 of a "Chinese invasion" and wondered about the morals and work ethic of these immigrants. These sentiments were once again heard in reference to the Taiwanese immigrants today who began arriving between 1990 and 2000. Today there is hardly a town in the country which does not have at least one Chinese business: dry goods or hardware stores, restaurants or hotels.

While some are using Belize as a stepping stone to the United States, many more have settled for good in Belize and sharing their culture such as the Dragon Dance which has been a part of the September celebrations for at least 25 years. Most Chinese continue to teach their language and traditions in food to their children.

American Confederates

They invited the Confederates to develop Belize's agriculture and a small number arrived in Belize in 1868 and established settlements and sugar plantations in Cattle Landing, Eldridgeville, Forest Home, etc. Governor Austin practically gave land away when he sold an acre of land for 20 cents when the market price was 2.50 an acre.

The settlement scheme was short-lived, as many of the Confederates died during the cholera epidemic of 1868, and others left for Guatemala and Honduras. Nevertheless, those who remained began importing East Indians from Calcutta and other areas in the West Indies in the early 1880s to work on their estates. Other East Indians drifted in small numbers from the West Indies to the Toledo agricultural settlements.

As the prices of sugar collapsed on the European market, many of them began to drift back to the United States. By 1910, the Toledo settlements virtually ceased to exist. Their lasting contribution to Belize was the migration of the East Indians to Belize.

East Indians

Those who arrived in Belize came mainly from Jamaica between 1870 and 1880. Several of them, especially those who settled in Belize City's Southside in Queen Charlotte Town, Yarborough and Faber's Road after serving their contract and established themselves as business people. The population was almost wiped out in the 1931 Hurricane which devastated Queen Charlotte's town. For the most part, others settled near the farms they worked at such as Cattle Landing, Forest Home, West Morland and Fairview in the Toledo District surviving as subsistence farmers. Other East Indians settled in San Andres, San Antonio, Ranchito and Calcutta in the Corozal District.

The East Indians are one of the people in Belize who seem to have lost all vestiges of their original culture apart from food. Yet we continue to identify them as an ethnic group. In fact, they might represent one of the first multicultural groups in this country.

THE TWENTIETH CENTURY MIGRATION

The Mennonites

In the 20th century, there have been other waves of migration into Belize. Perhaps the culture group that has made the greatest impact on the society (not in terms of numbers, but in terms of the economy) is the Mennonite community. Their immigration is unique in the history of Belize because, unlike the other groups before and after them, the Mennonites were able to obtain firm assurances from the British government of substantial autonomy on many national matters, including politics.

The Mennonites are a relatively small Protestant Christian group comprising many divisions. All subgroups recognize a European historical heritage as Anabaptists, a religious movement that dates to the Protestant Reformation. They took their name from a Dutch priest Menno Simons. Hostile reactions from the more established churches to such Anabaptist practices as adult baptism and to radical beliefs such as separation of church and state, particularly a refusal to bear arms or pay certain taxes led to persecution, martyrdom and, frequently, to Mennonite migration starting from the Netherlands in the 1600s to Mexico in the 1950s. Landing first in Canada and then the United States of America, they and subsequent immigrants became ancestors to the variety of Amish and Mennonite communities now found in the eastern United States and Canada. After the Mexican government wanted to include them in their social security program, the first of some 500 Mennonites made their way into what was then known as British Honduras in 1958 where the British authorities were more than happy to have them for their agricultural skills.

Although the Mennonites had largely been able to maintain their religion throughout their endless odyssey, there are many divisions within the ranks - particularly on the matters of language and the use of technology. The two different groups of "Mexican Mennonites"--the Old Colony and the Kleine Gemeinde- exist in Belize.

Like the Amish of Pennsylvania, The Old Colony or Altkolonier Mennonites seek to exist in isolated farming communities without modern technology (calling themselves, at times, die Stillen im Lande, the Unobtrusive Ones). They purchased 115,000 acres (46,000 hectares) of wilderness at Blue Creek between Mexico and Guatemala. These groups spoke German and used only those farming implements available in the early 1900s (when an edict had been passed against the engine and science). The Altkolonier group can still be seen on the highways driving their horse-drawn buggies, the men with close-cropped hair and flowing beards, the women modestly dressed in black.

The more progressive/modern Mennonites- Kleine Gemeinde, such as those in Spanish Lookout meanwhile had no problems using modern equipment and fertilizer. They have relaxed their traditional dress. Their villages hardly look different to those in Canada. They became successful farmers and entrepreneurs in Belize. They supply most of the country's produce milk, eggs, cheese, chicken rice, and vegetables. They mingle easily in the district town markets and can be seen on North Front Street in Belize City every Friday and Saturday morning selling furniture.

While many Mennonite are of German extraction, there are many Belizeans who are baptized Mennonites. We also find more Mennonites moving beyond farming and becoming involved in national politics and in other parts of Belizean culture.

Central American Refugees/Mestizo

Since 1979, about 30,000 (their exact numbers are unknown) migrants from the Central American countries of El Salvador, Guatemala, Honduras have settled in Belize. They were running away from civil wars and other conflicts in their country. While some 9000 were granted amnesty, many more remain undocumented. They were also given land around Belmopan. Their communities of Armenia, Valley of Peace, Las Flores and Bella Vista line the Hummingbird and Southern highways. There is also Salvapan on the outskirts of Belmopan. These 'aliens' has prompted both praise and criticism. Praise for their hard work and criticism for their numbers in low-level, semi-skilled jobs such as construction. As of 1991, Salvadoran and Guatemalan vendors lined the sidewalks of Belize City's main commercial street selling everything from fruits and fast food (tacos) to working in bars and restaurants. They are prominent in the marketplaces of Orange Walk, Dangriga, and especially Belmopan selling vegetables and snacks. Huge numbers of Central Americans also work in the banana and citrus industries of Stann Creek and Toledo. They have contributed to the development of Belize and their children are growing up as Belizeans.

Although they may come from different countries, there are many overlaps in their culture such as food (corn, rice, bean and tomatoes), religion (Roman Catholic and increasingly Evangelicals) and music.

The Middle East

One of the most prominent Belizeans is an Arab descendant. One of the lesser but politically and economically successful are immigrants from Lebanon, Palestine. Names such as Espat, Awe, Bedran have been equated with success. They made their wealth from chicle, lumber and agricultural production and are now in the retail industry.

CONCLUSION

To better understand the complexity of Belize's multi-cultural makeup, the rest of the chapter will provide detailed description of the major ethnic groups and a brief overview of the others. Belize's major ethnic groups include: the Creole, Mestizo, Garifuna and Maya. The minor groups are: East Indians, Central Americans, Mennonites, Chinese and people of the Middle East.

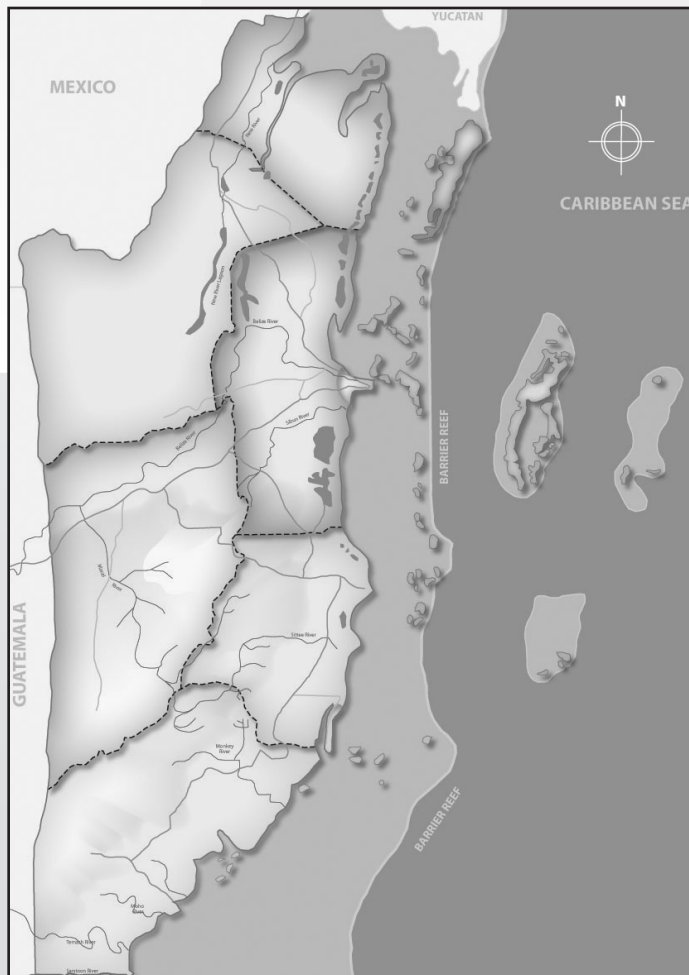
SKILL CHECK

EXERCISE 1

1. Describe how Belize got its name.

2. Develop a short presentation outlining how the Battle of St. George's Caye contributed to making Belize what it is today.

3. With the aid of the black map of Belize, fill in the different locations where different ethnic/culture groups reside.



UNIT 2: THE CREOLE

This unit focuses on the Creole as a distinctive ethnic group within Belizean multi-cultural society.

OBJECTIVES:

At the end of this unit, you will be able to:

1. Define and explain the origin of the term Creole
2. Describe the Creole Language and its origin
3. Discuss some of the different beliefs of the Creole
4. Describe the music, song and dance of the Creole
5. Describe Creole arts, crafts and household utensils
6. Describe some Creole dishes

AT A GLANCE:

1. What does Creole mean?
2. Creole language
3. Creole culture and belief system
4. Music, song and dance
5. Creole arts, crafts and household utensils
6. Creole dishes
7. Conclusion



WHAT DOES “CREOLE” MEAN?

In Belize, the term Creole has come to mean a person of mixed European and African ancestry. However, it referred to Europeans born in the New World. In New Orleans, Louisiana, it refers to French descendants. Over the centuries the meaning has changed and depends very much on the local context. Before Creoles, the term Coloured was used to refer to African descendants. Leo Bradley elaborated on the term, writing that, “Creole as used by us, and referring to one of our ethnic groups, means anyone who has any tinge of African blood, however small or however large. Therefore a Creole might be very fair or dark.” Thus, Belize Creoles refers to those of African descent, with or without European ancestry. This view was expressed in the 1888/89 Handbook of British Honduras as follows: “Colored population as it is of the various shades and admixtures of color between the European and African, including the pure blacks ... together with the whites, comprise the backbone of the colony.”

The difficulty in determining the racial composition of Creoles has led to many scholars to define in cultural and behavioral terms. According to this, anybody that is not Maya, Mestizo, Garifuna, etc., but practices a way of life and a set of values that are the result of the mixing between Africans and Europeans (Anglo-Saxons) would be considered Creole. This cultural mixing was the result of constant contact between the two during and immediately after slavery. Perhaps what is most remarkable about the Africans is that they and their culture survived the dehumanizing condition of being kidnapped and turned into chattels. Bringing nothing but memory, they recreated their culture in the Caribbean and the America. It required ingenuity and sheer tenacity not to give up. For that, we must appreciate our African ancestors’ contribution to our national culture.

The appearance of the term Creole in Belize can be explained as a response by the ex-slaves in Belize to the challenge of British racism after 1871. As many British administrators came to govern the new Crown Colony, there was a movement by the Creole elite to identify themselves with British heritage in to order gain acceptance into the increasingly racist society. In a way, it was a way of distinguishing themselves from the Garinagu, the Maya, the Mestizo and others that were not the product of slavery in Belize. Creolization was, however, played down during the struggle for independence. Those who tended to emphasize Creole heritage in this period were accused of being British colonial supporters and anti-Independence.

Today, the Creole largely live in and around Belize City, along the old Northern and Western highways, and along the Belize River. Some of the villages that are predominantly Creole include Mullins River, Gales Point Manatee, Crooked Tree, Burrell Boom, Rancho Dolores, Free Town Sibun, Grace Bank, Hattieville, Lucky Strike, Camalote, Democracia, Biscayne; Lemonal, Scotland Half-Moon, Isabella Bank, Rockstone Pond, Maskall, Black Man Eddy, Tea Kettle, Roaring Creek, More Tomorrow, Placencia, Monkey River and Lord’s Bank. Creoles are also found in Orange Walk, Corozal, Dangriga, and Punta Gorda town. There are Creole settlements that carry African names such as Quashie Banner Creek, Cudjoe Creek, Quamina Creek, Quaco Creek (all derived from the Akan of modern Ghana in West Africa) Nago Bank (Yoruba of modern Nigeria), Eboe Town (Igbo of modern Nigeria), Bomba Bank, and quite possibly Belize Town (Cabinda Province of Angola).

The Creole were the majority ethnic group in Belize until 1990, when the Mestizo replaced them in that position.

CREOLE LANGUAGE

The majority of the ancestors of the present Creoles came from different West African ethnic/culture groups such as Eboes, Nagos (all from Nigeria), Ashantees (from Ghana), Congoes (Democratic Republic of Congo), Mandingoes (SeneGambia), and Mongolas (Angola). Creole language evolved as the common language of communication when these groups of Africans came into contact with the British woodcutters (Irish, Scotts, etc.) who spoke English, in order for the different groups to understand each other. The slave masters tried desperately to keep slaves of the same language and culture apart for fear of revolts and forced them to communicate in the master's language. From these conditions came Belizean Creole, a language whose vocabulary differs significantly from Standard English. Creole language became the only means of expression through which African values, proverbs, and folktales were conveyed and a way through which the slaves could ridicule their masters. African values and wisdom were conveyed through proverbs, sayings, and folktales in which Anansi, the spider, featured, along with Bra Tiger and other animals.

Only recently have careful studies shown that syntax (grammar) and idiom (forms of speech) of many West Indian Creoles are based on elements found in the speech of the peoples of West Africa. In most cases, African words have been replaced by English, Spanish or French equivalents (lexical items). Nevertheless many African words were preserved. This explains why African word such as “nyam” (to eat), “gattu”, “cho” (exclamation), “unu” (you), “guzu” (magic spell), “bembe” (strong), “pikni” (child), “juk” (pierce), “kata” (head pad), “kunu” (female organ), “buru” (a form of Creole dance), “yampi” (yam), “konkante” (plantain porridge), “bukra” (white person) and dukunu are still in use today. Most of these words are used today not only by the Creole, but by all the other cultural groups in Belize. In African languages, double negative is grammatically correct and the same holds true for Creole. Repetitions are used in African (and Maya) languages for emphasis, and this is also found in Belizean Creole.

A Booklet of Belizean Proverbs compiled by the present Governor General of Belize, Sir Colville Young, has shown how African proverbs were Creolized. One of these proverbs reads as follows: “Wen fish come fram riba battam an tell you alligeta hab belly ache, believe am.” The same proverb in Ghana, West Africa translates to: “When the Apopoky comes out of the water and says, ‘The alligator is dead’, then there can be no doubt”. What this proverb is saying is that, when an inside source says that there is something wrong within a family or organization, then more than likely, the statement is true. Another proverb reads as follows: “Neba call alligator big mout’ till you don cross di riba” which, among the Twi of Ghana, reads as follows: “When you have not quite crossed the river, you should not say that the crocodile has a bump on its snout’ These proverbs, sayings and folktales convey African values and wisdom.

CREOLE CULTURE AND BELIEF SYSTEM

Creole culture is the result of the interracial and intercultural relationships between the white slave masters, their African slaves, and the other groups that interacted in the logwood, mahogany and chicle camps. It also evolved out of continued contacts among different groups who resided in the only urban settlement, Belize Town, during the period of slavery, and afterwards, in the era of British colonial administration. During this period, African culture was kept alive and passed on to successive generations through the women. The women in most culture were the ones who raised the children passing on values and culture. The fact that many of the slave women and their children worked in the houses of the slave masters also

meant that it was possible for them to pick up some of the mannerisms, food habits, customs and values of the slave masters. After slavery, the introduction of British colonial administration, the introduction of Christianity and education brought together the disparate groups in Belize to form what is today referred to as Belizean culture. The distinction between Creole culture and Belizean culture is yet to be determined by historians and ethnographers.

Today, it is still possible to identify the source of Creole burial practices such as wakes and nine nights (African origin), and their so-called superstitions (such as the belief that dogs barking the night indicates that somebody is going to die, etc.) as African in origin. It is therefore, not surprising that the Creole funeral today is still filled with customs handed down from their African ancestors setting the Creoles apart from other culture groups in Belize.

In the past, when a person died, the body was placed in a coffin on two chairs or stools. The men sang “sankys”, played cards, dice, and drank spirits at the wake. They also talked about the things that the person used to do while alive (African tradition). The women on the other hand made wreaths (European tradition). Thus Creole culture became in many ways a mixture of African and European customs. After the wake, the corpse was held aloft and carried to the houses of family, friends and acquaintance in search of peace and forgiveness from those he may have offended while alive. Then, the body was taken to the cemetery for burial.

Today in Belize, almost all the cultural groups carry out the tradition of a procession for the dead, although no stops are made along the route to the cemetery. The Belize Creole still carry the dead in a procession using vehicles. At some funerals, we still see some families passing a child over the dead body several times. In the past, this was accompanied by the pouring of alcoholic spirits over the grave of the deceased to prevent the spirit of the dead from coming back to haunt or harm the living.

FOLKLORE

Folklore is a way of transmitting values and information to the next generation. It forms a very important part of Belizean culture. It has become a challenge to separate folkloric stories according to cultural groups. In Belize, folklore is the unrecorded tradition of all those who worked in the mahogany camps. It has been passed on from generation to generation. Sharing the same beliefs was important for the African slaves because this made them united beyond their original languages and cultures. Over time, the different groups’ customs, traditions and beliefs belonged to the Creole.

By far, the most popular and enduring Creole folklore character is Bra Anansi, the spider, and his adversary, Bra Tiger. Currently, Anansi stories have become Belizeanized and are popular among all the cultural groups. Most of Anansi’s attributes are so exaggerated that they appear funny rather than disgusting. He is lazy, greedy, selfish, treacherous and a lying thief. Anansi’s intelligence more than compensates for his small size and he uses it effectively against enemies. Anansi folktales crossed over to Belize on the slave ships from Africa. They were used primarily to amuse, entertain, and teach moral lessons. Anansi also served as a means of explaining the order of things in society, and why certain animals, people and things are the way they are. In the “New World”, he represented the slaves and those he tricked were the Masters. The ending of most Anansi stories till carries the prophetic message: “If the pin neva ben, the story no mi wa en!”

Apart from Anansi, the “Ole Heg” and “Jack O’Lantern” are a mixture of African and European, while ‘Tata Duende’ and Negro de Agua are both African and Maya in origin. “Warri Massa” is both Miskito Indian (Waika) and African. All of the above have been Creolized and Belizeanized.

The Creole search for an understanding of mysterious powers, referred to as “obeah”, was shared, and is still shared, by all the cultural groups in Belize. The practice of “obeah” was banned in Belize in 1791, and the threat of capital punishment levied on whoever was found to be an ‘obeah” practitioner. Despite such efforts, the Belizean Creole held onto this aspect of his/her culture and practiced it secretly. It continues to be practiced in Belize today, although in a very discrete manner.

The Creole also use natural phenomena, such as the full moon, to guide them in determining when to plant their crops and when to go fishing. Creole farmers listen to the sounds of the toads and the abundance of insects and flies to foretell heavy rains, thunder and lightening. Creole fishermen use the height of the sea tides to determine whether or not their fishing trips will be fruitful. Thus, one often hears the Creole fisherman proclaim that, “Low tide means I’ll catch a lot of mullet this mawnin,” and “Rainbow in the morning, sailor’s delight; rainbow in the evening, sailor take warning.” Many Creole hunters use the appearance of the moon to determine if it is right to go hunting. They know that many animals, including deer and gibbon, are easily caught feeding under the light of the moon.

Another aspect of Creole culture that can be traced to the legacy of slavery is the practice of “bush medicine.” Both the European masters and their African slaves did not have doctors in the timber camps, so they depended on their African slaves’ knowledge of roots, barks, leaves, and vines such as *contribo*, *bukut*, and *serosie* to survive snake bites, fevers and other ailments.

MUSIC, SONG AND DANCE

Music and dance were an essential part of spiritual and everyday rituals among the slaves in Belize. Knowledge of how to make and play musical instruments survived among the Creoles, despite efforts by the masters to suppress them. Congregation of any kind was seen as cover for plotting revolts by the slave masters. They consequently banned the playing of gombay drums in 1791. Nevertheless, in 1830, it was reported that in Belize Town, “large parties met at night, at some appointed Negro yard, where they commenced dancing to the beat of the drums, and the music of their voices.” Thus, the slaves maintained much of their musical heritage by adapting to the new conditions. This was especially true of those slaves who escaped and established homes far away from their former masters.

Sambai (Samba) music and dance is still popular in Gales Point Manatee. According to informants in Gales Point, Sambai dance survived slavery due to the remoteness of the settlement from Belize Town. It is thought to be a fertility dance. Sambai is a traditional Creole dance performed to the rhythm of the gombay, which has survived as a key instrument in the “Boom-and-Chime” Band.

Among the Belizean Creole, Christmas time is a grand time. Even today, during this time people buy new furniture, curtains, and re-varnish wooden floor and re-paint the house. In the past, the Christmas celebration lasted for an entire week, with friends and neighbors visiting each other and moving from house to house with their gombays, shakka and grater, singing and dancing to the tune of “Good Maaning Miss Lady.” Hips and bellies gyrate, shoulders swung and arms flung about with abandon while the legs kept up a rhythmic beat dancing the Brukdawn. The music was a combination of two or three of the following: drum, accordion, banjo, guitar, mouth organ, jawbone and any other implement that could be used to make music. For example, forks for scraping against graters, combs covered with a soft cloth or brooms struck against the floor. As the liquor and wine (made from craboo, blackberries,

cashew and ginger) flowed, enthusiasm replaced harmony. The procession then moves on to the next house. Today a slight variation of this “Christmas bram” still occurs in the villages that are predominantly Creole. However the celebration begins early Christmas morning and usually only goes to the break of day on the morning of the 26th of December. Bramming is now mainly performed by young people, who rarely use drums/gombays as their African ancestors did.

Song and dance were important media through which African slaves expressed themselves. They were a key ingredient at rituals and gatherings, and signified strength. These were said to calm the spirit of the person doing the singing. Thus, it is not surprising that when the slaves sang and danced, the songs conveyed their feelings, conditions, and also commented about their physical state. The traditional performance of classics such as “Freetown Gial” and “Missa Maatin” symbolize the most creative aspects of Belize Creole culture. Many of the Creole songs were composed in the mahogany and chicle camps. In the John Canoe (Jankunu) dance, for example, the masks of the leaders resemble the headdresses worn by secret societies in Africa. The dance, however, assumed a new meaning in Belize, as well as the rest of the Caribbean, as it became a way of mocking the white slave master. John Canoe in the past was popular with both Garifuna and Creole, but is now only performed by the Garinagu. In the Caribbean, John Canoe is performed by African descendants.

Two structures can be identified in Creole songs: “the call and response” and “the solo note.” Many of the call and response songs have not survived because they were sung in African languages. However, some of the call and response chants of Africa are today present in the call and response folk songs of Gales Point Manatee. Although the words are different, the form is the same as can be heard in the song “Misa Martin Had A Leaky Ol Dorey”. Versions of call and response songs can also be heard in the Fire Sambai of Gales Point Manatee. Others have found expressions in “Boom and Chime”, “bruk-down”, and “bram.” The most prominent Creole artists include Lord Rhaburn, Bredda David, Mr. Peters and Lila Vernon. There has not been a Brukdwn competition since 2004 held in December and supported by the National Institute of Culture and History (NICH).

Another form of recreation for the Africans was that of water sports, in the form of dory and pit-pan races during the Christmas season. This was a special season for the Africans, as they came together and shared cultural exchanges. There were also carnivals and the discharging of gunpowder from shotguns during Christmas celebrations. Carnivals have recently been revived and form part of the September celebrations. Boat races and fireworks still form part of the Christmas celebrations in Belize City and Gales Point Manatee. In Belize today, our September celebrations also seem to bring us together as one, regardless of our ethnicity. This is something we have learned from our ancestors.

MUSICAL INSTRUMENT

During slavery, the musical instruments varied in shapes and sizes. The styles of the instruments were dependent on the materials available. Most of the musical instruments were used for rituals, festivities, and relaxation. Music was used to temporarily forget the sufferings of slavery. The African slaves were very creative in designing their musical instruments:

- a) Drums were mainly made from wood and animal skin. The drum was the main musical instrument used initially by the Africans in Belize. The drums in present day Belize are similar to those used during slavery. The best known of these drums are the base “Talking Drum” and the percussion constructed by the people of Gales Point Manatee.
- b) The Rattle is made from a calabash gourd and contains seeds or stones placed inside and sealed. When shaken, it gives a unique sound.

- c) Scrapers are made of metal, or scraping sticks. Scrapers were used in making a continuous background tempo. In Belize, the scraper is called a grater. It is used for folklore music and is a primary instrument of the famous “Boom and Chime” Band. However the primary use of the grater is for grating coconut to obtain milk used for cooking.
- d) The guitar and the accordion are of European origin and currently feature prominently in Creole folk music.
- e) The jawbone of an Ass or Cow is also used to provide a rich sound in the famous “Boom and Chime.”

CREOLE ARTS, CRAFTS AND HOUSEHOLD UTENSILS

The Creole inherited from their African ancestors a rich tradition of arts and crafts such as basket works, straw-platting (used in making bed-mats, wicker chairs, baskets), pottery (earthen pots and jars), and carving. Basketry is a skill evident among the Maya, Creole and Garinagu. In the rural areas, women make baskets, hats, and other items from palmetto leaves and other suitable materials. The weaving of straw and other materials into baskets, hats, bowls, that is carried out by both the Creoles and the Garinagu are distinctively West African in origin. The pataki, a watertight, rectangular travel and storage basket is an example of Creole craftsmanship that survived the slave experience.

Many of the kitchen utensils used in Africa are still present in Belize today, especially those used in the preparation of fu-fu from plantain and yam, such as the mortar (mata) and pestle. The mortar and pestle are used for crushing cohune nuts for making oil. They are also used for pounding plantain and for winnowing rice.

Another household utensil is the calabash bowl used for eating, dipping water, storing grains, keeping tortillas, crushing herbs to make traditional medicine, etc. It is also used for storing water to keep it cool. This gourd is used after it has been dried and the inside removed. The inside of the calabash is also used in making cough syrup.

African slaves brought their skills in sculpturing works of art from a variety of materials, especially wood. Today, many Creoles possess this skill and their wares are displayed in Belize City and other places for tourists to sample and buy. Mr. George Gabb, a famous Creole Belizean sculptor, made several carvings out of wood. Many other Creoles can also be seen with carvings of fish, birds, boats and other items carved from zericote wood and cow horns. Creole sculptures are at the forefront of the tourism industry and they are training other Belizeans in these skills.

The Dory (a corruption of the African word duri, which denotes the female part) a boat with a bow and stern, is basically of African origin. It differs from the traditional boat of the indigenous people which is basically a large hollowed out log without bow and stern. The Creole made dugout canoes for fishing and travel along the rivers, as there was no other means of transportation until the 20th century. The Creoles build their dories using trunks from such trees as the Mayflower and Red Cedar. These dories continue to be used in Belize today by all ethnic groups.

The taraya, or round fishing net, found in places like Gales Point Manatee, is also used by other groups in Belize, especially the Mestizos. Indeed, fishermen of all ethnic groups in Belize use it to catch small fish or bait. Virtually all the ethnic groups in Belize use traps made from strips of the fan palm or palmetto to catch shrimps and other fishes.

To handle firewood properly on the fire, the Creoles in the villages use kiss-kiss, made from the poke and-dough-boy stick. The kiss-kiss is used to move coal to and from the fire. It is used by every group, but mainly in villages and rural areas, where outdoor fire hearths are still prevalent. Since most people use kerosene stoves, butane gas stoves, and electric stoves, the kiss-kiss has now been adapted for catching crabs.

The fly brush, made from the stalks of cohune fronds, is used for swatting flies. After the nuts are removed, the stalk is shaped and one end is beaten. It is then left to dry for several days. It resembles the bushy tail of an animal. The fly brush was and is still used primarily for brushing away flies while relaxing.

The construction of the thatch houses by the Creoles is still popular in many rural areas. These houses are made from the Cabbage palm. The base is made of wild cane, or pimiento, and recently of lumber. The roof is made of cohune leaves, Moho bark, and tie-tie. Clay is used to plaster the house and make a solid raised floor. Most of the ethnic groups in Belize use these materials.

CREOLE DISHES

The different varieties of Creole food are derived from African and European cuisines. In fact many of the food consumed had their origins in Africa such as yam and okra. Banana and plantain are from Asia while tomato (for the boil up sauce), cassava, sweet potato and Irish potato are indigenous to the Americas. Carrots and cabbage are from Europe. Salted meat was result of camp food as salt is a preservative.

Most Creole dishes are chiefly made of ground food such as cassava, yampi, yam, sweet potato, Irish potatoes, carrots and coco, others include plantain and banana. There are either boiled or mashed, and contain ingredients such as pig tail, okra, fish, boiled cakes and ox tail. Hence, the term “boil- up”. Some foods that were once very popular among the Creoles include Fu-fu (mashed plantain or yam), konkante (dried grated plantain porridge), cerre (sere) and Matilda foot (dumplings made of grated green banana). Some of these are still popular in Gales Point and other Creole villages; not to mention as ‘Special of the day’ in numerous restaurants in Belize City.

Creole soups contain okra, amaranth (callaloo) salted fish or salted meat. Flour is still used for making dumplings, bread and buns, tortillas, pastries and porridge. The green plantain, once popular among the African slaves as a snack when fried has continued to serve not only the Creoles but other cultural groups in Belize as well. The ripe plantain, on the other hand, when fried, adds flavor to the Creole dish of rice and beans which is normally cooked in coconut milk or oil.

The Creoles also assimilated European culture and this can be seen in some of the incredibly delicious Johnny cakes and fried jacks.

African slaves also introduced the methods of processing cohune oil using mortar and pestle. This method involves cracking the hard shell of the cohune nuts, removing the kernels and pounding them in a mortar and pestle, after which they are boiled or fried over slow heat to extract the oil. In the past, the cohune oil was either used for cooking or oiling the hair and body. It was also used as a softener for braiding hair in various sizes and shapes.

Today many of the Creole dishes are prepared and enjoyed by Belizeans of all backgrounds.

CONCLUSION

Creole culture is part and parcel of Belizean society. It evolved out of the contacts between Europeans and Africans in the slave society that existed between 1720 and 1834. Creole culture has always been dynamic, incorporating, assimilating, acculturating and absorbing everything it comes into contact with. It is this ever dynamic nature of Creole ethnicity and Creole culture that has continued to attract others to it. As a result, it is becoming increasingly difficult to distinguish the different cultures in Belize as all have continued to merge together and are also incorporating western influences in their seemingly different cultures.

SKILL CHECK

EXERCISE 1

1. Define the term Creole as used in Belize.

2. How are Creoles distinct from the other ethnic groups in Belize?

3. Where have the Creoles settled most, and why have they settled there?

4. Why are proverbs and folktales important to the Creole?

5. In what ways are the Creole beliefs and cultural practices a reflection of their African and European heritage?

6. In what ways is the Creole language a reflection of their African and European heritage?

7. In what way is Creole music a reflection of African and European influences?

UNIT 3: THE MESTIZO

This unit will focus on the Mestizo as a distinctive ethnic group within Belize's multi-cultural society.

OBJECTIVES:

At the end of this unit, you will be able to:

1. Define and explain the origin of the term Mestizo
2. Describe the Mestizo language and its origin
3. Discuss some of the different beliefs of the Mestizo
4. Describe the music, song and dance of the Mestizo
5. Describe some Mestizo dishes

AT A GLANCE:

1. What does Mestizo mean?
2. Mestizo language
3. Mestizo culture and belief system
4. Music, song and dance
5. Mestizo dishes
6. Conclusion



WHO ARE THE “MESTIZO”?

Mestizo refers to a mixture. Labels are changing as we speak. Some Mestizo are beginning to refer to themselves as Latinos and Hispanics. Since we are living in a multicultural Belize, we just need to bear in mind that these labels are cultural rather than racial terms. For now, we use Mestizo to describe people who are either the cultural or biological descendants of European (mainly Spanish) or indigenous peoples.

The Maya influence is very strong on the Mestizo culture and it will become obvious that they share many of the same cultural practices. The Maya and Mestizo share the same food (corn, beans, annatto, and tomato), religion (Roman Catholic), folktales and beliefs and superstitions. It is not easy to say where one ends and the other begins.

The Mestizo people are today found all over Belize. Historically they lived in Corozal, Orange Walk and Cayo. They also inhabit the islands of Ambergris Caye and Caye Caulker. The Mestizo are predominantly Roman Catholic. As with all the other cultural groups in Belize, the language was spoken by all but there are many cases where the younger generation speak Creole as the main language of communication.

The Mestizo are involved in agriculture (especially large-scale sugar production), fishing, and commerce. They also work in the private and public sectors as doctors, architects, engineers, lawyers, writers, professors, artists, and musical composers, etc.

The Mestizo throughout the country are a homogeneous group, meaning that they are similar in their history and culture. The Mestizo from Northern Belize and Southern Mexico share much of Mexico's colonial history. Both groups speak Spanish or Yucatec Maya as the case in the north. Most are Roman Catholic, a religion that they adopted from the Spaniards which they synthesized with the rituals of the Maya. There are other cultural characteristics in which both groups are homogeneous. The Mestizo in the west and south tend to have stronger ties with Guatemala. Since Mexico and Guatemala and Central America were colonized by Spain, there are many overlaps in religion, language, food and music. That is why the Hispanic Central American can be classified as Mestizo.

HISTORY OF THE MESTIZO

From the arrival of the conquistadors in Mexico, there have been intermarriages. The more high profiles ones are Hernan Cortez and Malinche or Dona Marina, the Mexican woman who translated and accompanied Cortez in his conquest of Mexico. There is also Gonzalo Guerrero, a shipwrecked sailor who was given refuge by the Maya leader, Nachan Kan. Guerrero married Kan's daughter, Sasil Ha and later helped the Maya in their resistance against the Spanish. By the time Cortez set on his conquest of Mexico, Guerrero already had three children with his wife. These two may be considered the parents of the Mestizo people. Malinche and Cortez had a son.

Many of these refugees of the Caste War returned to Yucatan, but a large number remained and settled in Belize. While this migration was taking place, another one was occurring from the Peten area into the western part of British Honduras. Some of these refugees were fleeing from a dictatorial regime in newly independent Guatemala. With the inclusion of Central American refugees as Mestizo, they are majority cultural group in Belize constituting just under 50% of the population in 2000.

MESTIZO LANGUAGE

Spanish is spoken by the Mestizo. Depending on which part of Latin America they live, there are a lot of loan words from other languages. In northern and western Belize, the Mestizo use many Yucatec words such as chokosakan (atole), tuch (navel), pim pim wah (thick corn tortillas), pib (pibil) (oven), cuch (load), lek (gourd container for tortillas), chuj (gourd container), tup (pinkie), waya (kenep), mukul (coco), pok chuc, cochinito pibil, and chib (palm shoot), and xpasha (fermented atole). There are even some 'Manish' such as codzitos- rolled taco. Codz means to wrap fold in Yucatec and it is the Spanish diminutive. So we see how language continues to evolve in the context of Belize's multi-lingual and multi-cultural environment.

CULTURE AND BELIEF SYSTEM

Every society has the domain of magic and religion, and that of science. They are associated with beliefs in supernatural forces, especially those of magic, or with ideas about beings, spirits, ghosts, dead ancestors, or gods. The Mestizos, like the Maya, believe that there are spirits who own the forests, rivers, and haunted houses.

FOLKTALES

These beliefs are strongly exhibited in folktales. For example, El Duende (dwarf) and Alux is a spirit that guards the forests. He is obviously the same phenomena the Maya recognize as protector. He is a short man who plays tricks on people. It is believed that el duende was one of the bad angels that God threw from heaven. That is the reason some people will place a guitar, tobacco and rum in the house in order to drive him away. They believe that el duende cries at the sight of the guitar because he remembers when he was in heaven as a good angel. Of course, there are varied stories of el duende, but in all of them, the principal character is el duende, a spirit who is transformed into a short man.

La Llorona is another important character in the culture of the Mestizos. Again, there are varied stories of this character, but the spirit of a woman with long hair who weeps for the loss of her children is the central character of the legend. The versions are different. In one version, La Llorona is a woman who committed adultery and drowned her child. In some communities, the woman is known as the X-tabay, who lures men to her home under the Ceiba tree and kills them. It is believed that she is heard weeping by creeks and rivers.

SUPERSTITION AND INDIGENOUS RELIGION

Some Mestizos blame evil spirits for their misfortunes such as poverty, illness, failed romances, deaths, etc. They consult bush doctors, witch doctors or "obeah" men or women. When they become ill, some Mestizos prefer to consult a bush doctor perhaps in recognition that they suffer physically and emotionally. Maya medicine sees a sick person in term of a whole rather than just the physical manifestation. Plants such as ruda, Billy Webb, jackass bitters, lemon grass and skunk root are used to cure illnesses like rheumatism, indigestion, the common cold, diarrhea, etc. Garlic, oregano, ginger, thyme and parsley from Europe and Asia are also used in home remedies.

RELIGION

The majority of the Mestizo belong to the Roman Catholic religion which they inherited from the Spaniards. The rituals of baptism, marriage, and death take place in the church. Children are baptized within the first twelve months of their lives. In the past a person who can act as a positive role model is chosen to be the godparent of the child. The relationship between the child, godparent (s) and parents becomes an extension of the family. The ritual of baptism gives birth to the terms comadre (female) and compadre (male).

Marriage is very sacred to the Mestizo as with all cultures. Divorces are very rare most likely because the Roman Catholic religion prohibits it. After the ceremony, the newlyweds go to the residence of the groom where both mothers present water to them. They drink the water and the mothers bless them.

The Mestizo believe in an after life. Dreams are when the souls visit. Thus originated the belief in ghosts and the spirits of the dead. When a person dies, the bells of the church are rung. Prayers are recited during the wake and hymns of praise are sung. Food and beverages are served. The body is taken to the church for the rituals of the dead. Prayers, known as Novenas, are recited for nine days so that the deceased person may rest in peace. Once in a while, special masses will be held in honor of the deceased. On November 2, (All Souls' Day), Mestizos (and the Maya) prepare a special meal for the dead. The meal includes the traditional "bollos" (tamales) with "Xpelon" (black beans), and anise seed. "Xpa'sha", the traditional drink of corn, milk and spices, is also served for the dead.

CEREMONIES

Humans have always sought to control the course of nature usually through the intervention of the supernatural. Rites are performed and spell said to call upon the weather and animals in the primicia. Other ceremonies include the Cha chak ceremony to call on rain. To stop rain, a ramada or thatched house is built. A Novena (prayer of nine days) is offered to saints such as San Antonio, San Isidra, or San Miguel. This primicia ends with the pig-head dance. To maintain the safety of animals on the farm and to protect the milpa, the third primicia is held on the feast of San Joaquin and Mayan dishes are served.

MUSIC AND DANCE

Many of the dances show the influences of their ancestors. Fiestas are a huge part of both Maya and Mestizo life but among the Mestizo, the carnival is punctuated by dances such as Los Mascarados in which people in costumes and masks drag chains through the village. Usually done before Lent, Juan Carnival named after an effigy dressed in men's clothes with a calabash for a head would be burnt on the eve of Ash Wednesday. Some of the dances are the Mestizada, Hog-head dance, and the Toro dance. These dances are accompanied by the guitar and the marimba. The Mestizada includes the Zapateado and Jarana. Couples are required for both dances. The dances consist of the rapid movement of the feet.

Music from Mexico and other parts of Latin America such as boleros, rancheros, mariachis and zapateado along with contemporary music such as reggaeton and rock are a big part of the culture.

DANCES

Hogshead Dance

The Hogshead Dance is performed in San Jose, Succotz and Benque Viejo in the Western region of the country and in some northern village in Corozal and Orange Walk, especially during the patron saint days. The Hogshead and Toro Dance are products of colonialism. The pig and bull are from Europe but the concept is Maya.

The dance depicts an offering to the God of Sickness on behalf of an ill relative. To the tune of 'pax in pol' marimba music, a male dancer dressed in white wearing a red handkerchief around his neck carries a sling bag filled with corn and a chuj (gourd) for water for the pig. The other dancer carries a hogshead decorated with little flags and biscoches (sweet bread), candles and bottles. The rest of the pig is sold. This pig is sometimes cooked in an earthen fire- "pib", and shared during the festival.

Toro Dance

The Toro dance was most likely introduced after the Spanish conquest on the hacienda. Grant Jones writing about bullfighting in Xaibe in the 1860s describes two simultaneous events being practiced by the Maya and the 'Spanish'. A Kaxche (Yukatek Maya for enclosure) was built in the village centre. A Yaxche, the ceiba or cottonwood tree, would be erected in the middle of the Kaxche to which bulls would be teased and tortured until their death upon which their meat would be distributed among the villagers. The Yaxche, the bull and orientation of the kaxche were all integral parts of Maya cosmology. While the Maya were using the real animals in the Kaxche, another Toro dance was taking place with Ladino men representing bulls and with women representing bullfighters. Grant interpreted the dance as male domination over women and human over nature.

MESTIZO DISHES

The exchange of ideas and cultures between the Europe, Africa and Asia and the Americas meant that new domesticated animals and new crops were incorporated into different cultures. The dishes listed give an idea of how Mestizo cuisine has changed. Yucatecan cuisine which has had the most influence on Mestizo food is a combination of Maya and Spanish (Arabic) influence. From the Maya came corn, tomato, chocolate, turkey, deer, and achiote, squash, beans, chaya, honey, habanero and other chiles. The Spanish contributed beef, pork, chicken, capers, olives, rice, black pepper and vinegar. From these ingredients we get panuchos, salbutes, garnaches, tacos, enchiladas, empanadas, tamales, tamalitos, escabeche, cochinito pibil, queso relleno (stuffed cheese), mole, sopa de limon, brazo de reina (chaya tamales with boiled eggs), papadzules tortillas (with egg and pumpkin sauce) to name a few.

CONCLUSION

It is evident that the culture of the Mestizo in Belize reflects a combination of the culture of the Spanish and the Maya people.

SKILL CHECK

EXERCISE 1

1. How did the term Mestizo come about?

2. How did the Mestizo come to be in Belize?

3. Where are the major population centers for Mestizos?

4. Who is El Duende?

5. Describe one culture ritual of the Mestizo.

6. Describe one of the Mestizo traditional dances and its significance.

7. Name a Mestizo dish and describe how it is prepared.

UNIT 4: THE GARIFUNA

This unit focuses on the Garifuna as a distinctive ethnic group within Belize's multi-cultural society.

OBJECTIVES:

At the end of this unit, you will be able to:

1. Define and explain the origin of the Garifuna
2. Discuss some of the different beliefs of the Garifuna
3. Describe the music, song and dance of the Garifuna
4. Describe some Garifuna dishes

AT A GLANCE:

1. What does Garifuna mean
2. Garifuna belief system
3. Music, song and dance
4. Garifuna arts, crafts and household utensils
5. Garifuna dishes



WHAT DOES ‘GARIFUNA’ MEAN?

HISTORICAL BACKGROUND

In 1635, two ships carrying African slaves wrecked near Becquia, St. Vincent. The slaves escaped and took refuge among the local Caribs. The Africans inter-married with the island Carib women, giving birth to the Black Caribs now known as the Garinagu. In 1773, the English on the island restricted the Black and Island Caribs to a small area of St. Vincent. Over time many other runaway Africans joined this group adding to the cultural diversity. Over the years, the common language adopted was a combination of Arawak and Carib (female Arawak and male Carib) languages that remain distinct but understood by both sexes. French, English and, most recently, Spanish loan words have been adopted. The amount of African words that have made it into the language is unknown at this point.

In 1795, the French, hoping to reclaim St. Vincent, instigated a rebellion against the British by the Caribs and Black Caribs, under the leadership of Joseph Chatoyer. The rebellion was not successful and as punishment, the English exiled 5,080 Garifuna men, women and children to the island of Balliceaux for six months, and then to the island of Roatan, off the northern coast of Honduras.

By 1802, the Garinagu began to establish communities along the coast of Central America. For example, between August 9 and December 17, 1802, an estimated 150 Garinagu made a series of landings on the shores of Belize. They were not welcomed. After all they were free Blacks who posed a threat to the captive African population. The Garinagu, however, lingered on, and the need for cheap labor for timber and agriculture eventually led to their acceptance.

Garifuna communities established during this time continue to flourish into the present. In Nicaragua, there are two Garifuna settlements. In Honduras, there are approximately forty-two to forty-six Garifuna settlements, the largest being Trujillo, with a population of about 10,000. In Guatemala, there are three communities. In Belize, there are six communities: the major town of Dangriga, Hopkins, Seine Bight, Georgetown, Punta Gorda, and Barranco. In addition to these Central American settlements, the Garinagu began to migrate to the United States in the late 1960's, establishing communities in the state of California, particularly Los Angeles, and in the cities of Chicago and New York. There are currently approximately 30,000 Garinagu living in the United States. Despite having the smallest population, the Belizean Garinagu have made the most impact on the international stage in music with Andy Palacio being its most visible artist. 2007 was his year with the release of this Watina CD which made an impact on the world music chart.

In Belize the Garinagu number 14,061 and make up approximately 6% of the population of the country, according to 2000 census.

GARIFUNA BELIEF SYSTEM

As with all peoples, the Garinagu have a complex belief system that has evolved out of the mixture of its history, its location, and its interactions with other ethnic groups. It is believed that the Garinagu inherited these beliefs (of communicating with the dead) from both their African and Carib ancestors.

There are three main ancestral rites practiced by the Garinagu:

- a. The Amuñadahaní - Bathing of the Spirit of the Ancestors
- b. The Chugu - Feeding of the Ancestors
- c. The Dugu - Feasting of the Ancestors

Of these three rites, the one that is the most sacred, and demonstrates the climax of Garinagu respect, appreciation for, and feeling of communion with ancestors is the Dugu. The Dugu is performed following a request made by a deceased ancestor. These requests are made known to a Buyei, or Garifuna seer normally after a family has experienced a series of misfortunes, including sickness and death. In a ceremony called Arairaguni - “bringing down”, the Buyei calls upon his/her hiuraha (spirit helpers) to explain a particular problem. The Buyei acts as a medium between a representative of the ill-fated family and the Gubida, the deceased ancestors. During the ceremony, the ancestors make their desires known through oracles. For example, a great grandfather may have been slighted by his delinquent grandchildren or children, and has visited them with misfortune. His appeasement is a three-day Dugu.

Preparation for this rite involves three main activities:

- a. Invitation of relatives and friends from home and abroad - Belize, Guatemala, Honduras and U.S.A.
- b. The acquisition of food and drinks; with specific efforts made to obtain the particular food or drink which may be requested by the ancestor.
- c. A date is agreed upon with the Buyei who, in turn, informs other officiated participants. These include 3 segunda drummers, singers, Afunahountiuya who are painted in annatto and the Adugahatiun (appointed fishermen to catch sea foods).

The primary purpose of the Dugu is placating or appeasement of the Gubida ancestor on whose behalf it is being held. The Gubida is endowed with human qualities for the duration of the Dugu by all those participating. The ancestor may invite other ancestors to the feast. The ancestor spirit is asked to drink, eat and dance as he wishes. At tense moments during the ceremonies, one or more of the participants may lose consciousness, and, in a trance (owehani), assume the characteristics of the Gubida ancestor being honored. At the end of the ceremonies, the ancestor is asked whether he acknowledges receipt of the Dugu. Depending on the response of the Gubida, the ceremonies may have to be repeated.

The Dugu ceremony has four types of dances: The Abeimahani: a semi-sacred song of the women, the Ámalihaní, song and dance of supplication, the Awangulahani: a dance of rejoicing and the Hugulendu, a dance in circular formation.

For these dances, four components are constant:

1. The circular formation
2. The presentation of ritual foods are associated with the circle
3. Progress around the circle labored
4. The direction of the circle alternate
5. The Amalihani and Awangulahani are also circular in design, and contain direction reversals.

The Dugu ritual serves as a place for psychological release and provides for general improvement in the family's condition, including curing diseases. In the Dabuyaba a part of the ceremony, a consultation, Arairaguni, takes place and became way of reasserting the group's solidarity among friends, relatives and within the community at large.

MUSIC, SONGS AND DANCE

Songs, dances, mime, plays, processions, storytelling, and poetry make up Garifuna performing arts. Locally, expert drummers, singers, dancers, and composers are well-recognized and their fame spreads from village to village. Small children perform publicly with mastery rare in cultures where musical talent is considered the special gift of a privileged few. Men and women are active participants.

Dance has different functions ranging from sacred to entertainment. Dance beat vary widely and include some which are rapid and polyrhythmic (wanaragua, punta) and others with moderate tempos in both double meter (gunjai, chumba and paranda) and triple meter (hungu-hungu).

Songs can also be sung a capella (without instrument)-these melodies are semi sacred songs and sung by both men and women. New songs are constantly emerging, often coming to the composer in dreams or visions. The Garifuna repertoire includes work songs for men and women, lullabies, hymns, healing songs, ballads, and many types of dancing songs.

While there is no word for music, music dominates this culture and is used for both religion (as in the Dugu ceremony) and entertainment. In secular dance music, two drummers are the rule. One is called the primero and the other is designated as the segunda. Each drummer plays his own part, with the segunda acting mainly as a steady accompaniment to the more expansive and elaborate cross-rhythms of the primero player. In sacred music, three large drums are used.

The following some Garifuna dances:

Mali: a dance led by a buyei (priest/ess) which unites the living and ancestors. The dancers may enter trances symbolizing the ancestors are around.

Punta: the most popular dance performed at wakes, holidays, parties and social events. Dancing as couples, men and women try to out-do one another with sensual movements and styles. Everyone takes a turn and the competitive spirit is high. Punta lyrics are usually written by women. Due to the influence of Pen Cayetano, Andy Palacio, Mohobub Flores, and Chico Ramos and Supa G to name a few, this dance has become punta rock and is a national favourite.

Hunguhungu: a circle dance which appears to be secular version of the sacred dancing of the Dugu. Songs recall events from ancestor celebration to a hard days work.

Wanaragua: also known as John Canoe, this masked dance was once performed throughout the Caribbean at Christmas time, one of the few events during the year when slaves were free to dance and party for an extended period of time. Wearing head dresses with flowers, mirrors and feathers, knee rattles of cowrie shells and pink mesh masks, dancers visit the houses of their masters and receive food and drinks in return for riotous behaviour. Today, they visit houses and perform for a small fee usually around the Christmas holiday.

Charikanari (Two foot cow): a mimed dance, a hunter meets up with a cave man and a cow.

Pia Manadi: is masked dance that is no longer performed. It is based on the death and resurrection of one of the players. The main characters include the Devil, Doctor and a Patient

Gunjai: a graceful dance performed by several couples dancing together. Its songs include French words and its dance formation indicates that it most likely originated from the French quadrille in St Vincent.

Chumba: a highly accented poly-rhythmic song danced by soloists with great individualized style. This dance is probably related to the Chumba found in other parts of the Caribbean such as Grenada and Curacao where a people reportedly descended from a people of Eastern Nigeria. This performance includes a wide range of Garifuna music.

Paranda: a dance and song accompanied by guitar and drums. It is popular in the Spanish-speaking Central American countries.

GARIFUNA ARTS, CRAFTS AND HOUSEHOLD UTENSILS

The Garinagu as the cultural descendants of indigenous people and Africans have inherited many of the technologies in food processing and other ways of making life easier. Some of them are described below.

Baisawa (Brush)

The brush is used to even out the cassava flour on the griddle when baking cassava bread. It is about two and half feet long. It resembles the fly brush that is used in parts of rural Belize and other countries in the region.

The raw material is the leaf of the saltwater palmetto. To make one brush, one cuts five stalks of leaves and dries them for a few days. The only tool used is a long sack needle. It is also helpful to wear a thimble to protect's one index finger. The brush results from making straight strokes with the needle along the length of the leaves held firmly in the hand. When the strands are fine enough, the leaves are tied together using a string. When one part of the brush gets frayed from heavy use, more leaves can be added. The long reach of the brush is especially helpful in reaching across the wide and hot griddle when making cassava bread.

Nadu (reed mat)

The nadu mat is used for sleeping. The main materials are dried reed stems cut from swamplands. The stems are placed in alternating patterns and tied together against a rectangular wooden frame. Making the mat is very much a social activity. Up to eight persons at any time can be involved, each one holding to a string and tying the knots from top to bottom. Men, women, and children join in talking, singing, and sharing jokes and it becomes a medium of building solidarity.

Eigi (stone grater)

The grater varies in length depending on what is being grated. A commonly used grater measures about six by nine inches is used for grating coconut, a main ingredient in dishes. The main material is a slab of mahogany, granite pieces, a four inch nail and a hammer. The granite is broken into smaller pieces and inserted into holes in the slab. Chips are easily replaced.

GARIFUNA DISHES

Food is usually prepared and eaten three times a day. The morning meal, Bachati (something warm) or tea may consist of left-over fish, fried bread and coffee or, more simply, a porridge, bread and coffee. The evening meal is essentially the same, but usually includes meat or cheese. The largest meal is prepared at midday and consists of a starchy food and ui or udire (meat or fish), typically joined by gravy based on coconut milk.

Lasusu (gravy) is characteristic of Garifuna cooking, providing a tasty dip for ereba or hoodut (pounded plantains). Until a generation ago, women commonly prepared dumari from cassava juice, the equivalent of the Island Carib toumalin, to be used as a sauce and seasoning. Today, coconut milk is found in Garifuna cuisine. A similar emphasis on coconut milk is found in many Afro-Caribbean cultures, including the Creoles of Belize and the Miskito Indians of the Central American coast

There is a wide variety of Garifuna porridges, called Adulu. They include: Letu - ripe banana porridge; Gurentu - ripe plantain porridge; Gurentu Mabi - sweet potato porridge; Gungunde - green banana porridge; and Faluma - Sere Lasus.

There were two types of domesticated cassava or manioc in the Americas. The sweet one was domesticated in Mesoamerica while in South America, the bitter one had to have its cyanide juice squeezed out to make it edible. The Arawak and Carib created an ingenious implement called ruguma to strain this juice. The liquid is collected and the sediment is used for cooking or laundry use. The sibiba is left to dry overnight and sieved through round, flat baskets called “hibise” the following day. The coarse gratings are put aside to be baked later into a brown biscuit used to make hiu, or cassava wine.

As the cassava flour cooks, it forms one large pancake, which is flipped over with a wooden spatula in midair. The ereba is cut with a knife with a characteristic double cross, marking six equal triangular pieces. Sun-dried and stored in waterproof containers, ereba can be preserved for a year or more. The Spanish used it on their long journeys to conquer the Americas. There are many recipes for cassava and its byproducts, including porridge, jellies and sauce.

The processing of bitter cassava into bread or ereba and its by-products is continued today among many Garifuna women, especially elders. It is a time consuming, laborious process and women usually work in small groups, sharing equipment, the work load, and its products. Older women know dozens of special grating songs to relieve the monotony. These songs usually bemoan the sad conditions of poverty, loneliness and dependence. Despite the hard work and soulful lyrics, the task is approached with good humor and playfulness.

CONCLUSION

The Garinagu have made a huge impact on the cultural landscape of Belize despite being one of the smaller cultural groups. Yet they, like all people moving into urban areas, are experiencing a loss of their rich heritage among the younger generation. Time will tell if they and others can continue to transmit over time and space.

SKILL CHECK

EXERCISE 1

1. Explain how the Garifuna came to be in Belize

2. Describe the Dugu ceremony in your own words.

3. List the Garifuna dances and describe one in detail.

EXERCISE 2

Prepare a five-minute interpretative presentation on one aspect of Garifuna culture to present to the class. Choose from among Garifuna beliefs, ceremonies, music and dance or foods and their preparation.

UNIT 5: THE MAYA

This unit focuses on the Maya as a distinctive ethnic group within Belizean multi-cultural society.

OBJECTIVES:

At the end of this unit, you will be able to:

1. Define and explain the origin of the Maya
2. Describe the Maya language and its origins
3. Discuss the different belief systems of the Maya
4. Describe the music, song and dance of the Maya
5. Describe Maya arts, crafts and household utensils
6. Describe some Maya dishes

AT A GLANCE:

1. Who are the Maya?
2. Maya language
3. Maya culture and belief system
4. Music, song and dance
5. Maya arts, culture and household utensils
6. Maya dishes
7. Conclusion



WHO ARE THE MAYA?

As we have seen in the previous unit, the Maya did not disappear after the decline of their civilization. Rather, they continued their religion, farming and cultural practices well into the twenty first century. Although we will be discussing the Maya in Belize, they share the same world views and many of the agricultural practices of the Maya in Mexico, Guatemala and Honduras. In addition, there will be many overlaps with the Mestizo section in cultural rituals, folktales, music and religion.

LANGUAGE

The different groups of Maya speak different variants of ancient Mayan languages, interspersed, Spanish, English and Creole words. All the Maya languages today derive from the ProtoMaya which was spoken about two thousand years ago.

Maya Language Chart



RELIGION AND BELIEF SYSTEMS

Maya religious beliefs are a continuation of the worldview of the Ancient Maya. The Maya world as part of indigenous religion believed that everything has a life force. Called animism, this worldview is still dominant in many Maya cultures today and is evident in their rituals and other practices. Religion is a way of bringing the worldview into action. It defines the nature of the world, answers question of origin of humanity, purpose of life on earth, relationship between family, society and gods. Like all of the great religions today, Maya religion was seen as universal and practiced by all Mayas and that is why the modern Maya continued many religious practices.

Perhaps one of the clearest example of how this world view was illustrated was through the sacred book, the Popol Vuh, The book has been classified as the greatest work of literature on Maya mythology. It also records the genealogical history of the K'iché Maya and the Maya people. Archaeologists agree that the characters from the stories are depicted on stelae, ceramics and walls that date back to the Classic period. The Popol Vuh is the most striking example of Maya religious continuity from the Classic period to the sixteenth century. In addition, ethnographers are finding different versions of the stories being related among all the Maya today.

However, the Popul Vuh was lost and lay unknown in Guatemala until Fray Francisco Ximenez found, copied and translated the manuscript around 1701-1703. Eventually, the original manuscript was transferred to the Newberry Library in Chicago.

The Popol Vuh tells how four gods (mother/fathers) created the world so they would be venerated. The world was created and destroyed at least three times before the present one. The attempts to form such beings have found parallels in other cultures' cosmic creations and destructions. There is a flood and of burning resin that destroys the men of wood because they did not respect their creators. Floods are common themes in creation stories including the Bible. After the flood destroys the third creation, the Creators made humans out of yellow and white corn dough. They are conscious beings who venerate and feed the gods and are perfect in every way. In fact they were so perfect, that the gods, frightened by what they saw, partially blinded them.

In this current version, it is believed that the earth is a flat surface with four corners, each associated with a certain color: white for north, red for east, yellow for south, and black for west, with green at the center. The sky is supported by four trees, each a different color and species. At the center, the sky is supported by a Ceiba tree. Above the sky is a heaven of thirteen layers, each with its own god. The underworld, Xibalba, is passed through after death, on the way to the place of rest. The nine layers of hell are guarded by the "Lords of the Night" and deep caves are believed to connect with the underworld.

NUMBERS AND COSMOLOGY

An important aspect of Maya worldview is represented numbers which signified powerful and important ideas. For instance, the number three, four, five, nine and thirteen are particularly important.

The significance of number three is thought to come from the Classic Maya view of Creation. The three-stone fire hearth is where the First Fire of Creation was lit and is represented by the constellation we know as Orion. Its Maya sign is the turtle.

Number four refers to the four 'cardinal' points or directions; north, south, east and west. It refers to the four bacabs who support the world, the four creators (mothers and fathers) of this world.

From the Popul Vuh we have the following:

“The fourfold siding, fourfold cornering, measuring, fourfold staking, halving the cord, stretching the cord in the sky, on the earth, the four sides, the four corners as it is said by the Maker, Modeler, mother-father of humankind.”

Number five is important because in addition to the four corners and directions, the ancient and modern Maya also considered the centre to be important. It is considered to be the navel of the earth. Yukatek mythology has it that after a great flood, five trees grew to support the four corner and the centre of the sky. These world trees are associated with colours and directions as indicated in preceding paragraph.

The number nine refers to the lords and layers of the underworld, the Bolon ti ku. It is also the number of times that First Mother ground the yellow and white corn that would become human flesh. It might also be the source of the Nine nights of a death ritual to represent the nine layers of the underworld.

Thirteen refers to the layers of the universe the Oxlahun ti ku with earth as the bottommost layer. It also refers to the thirteen cycles of twenty days of the Tzolkin, one of the more important guides to Maya life. The Deer dance has thirteen sequences. Fasting normally takes thirteen days.

RITUALS

A number of rituals are still practiced in Belize with regard to agriculture and death. Whether it is called Primicia, Mayehac or Kanankin, it refers to an agricultural ritual in which the various spirits of rain, lightning and thunder are invoked for blessings for a good harvest. For example, according to the Maya Atlas, “Upon reaching the cornfield, he (the farmer) walks into the middle, he stoops down while the sun is rising to pray, and to burn incense to call all the Hills and Valleys. In his praying he calls all the names of the hills and mountains: Ka’na Santa Maria, Ka’cua Cojak, Ka’caw Xacab Yut, Ka’caw Yequikee, Ka’caw Santiago, Ka’caw Raxhon Zunem, Ka’caw Siyab, Ka’caw Cahibay, Ka’caw Caxlan Jeen, Ka’caw Lege, and Ka’caw Chi Chen. These are the names of all the mountains and valleys. When a person plants corn traditionally, these names should be called.”

Atuk/hetz, hetzmek is a ritual which assigns a gender role child also binds the child to its godparents.

HOUSE BLESSING

When a family moves into a house for the first time, the four main posts of the house have the blood of turkey (or chicken blood) smeared unto it as an offering. The person leading the prayers also addresses the four directions. Food, candles and incense are burnt and special prayers are said. Once again, the idea is to protect the family from ill. The Mopan wait for three days before moving in.

CH’A CHAK

One of the ceremonies is the Ch’a Chak or rain ceremony. The Ch’a chak is the ceremony performed by the Yukatec Maya to invoke the God of rain and normally takes place after a particularly long drought. The corn dough is prepared by women but the Shaman constructs the dough into many layers representing the layers of heaven, and the underworld. He is assisted by four chakob and little boys who croak as frogs throughout the ceremony.

MAYA TRADITIONAL HEALING PRACTICES

Each medicine was the result of experimentation just like modern medicine today. Sometimes they worked, sometimes they did not. Many people died from experimentation and many recovered. As an extension of the Maya worldview, healers treat both the physical and psychological/spiritual aspects of the patient.

This knowledge continues to be widely used. One of Belize's most famous Maya healers was Señor Don Elegio Panti, a Mopan Maya from San Antonio, Cayo. He used jackass bitters, Xiv, Man vine, rue, skunk root, Spanish elder, wild poppy, wild yam to cure a range of maladies such as rheumatism, arthritis, diabetes, anemia, and fatigue, insomnia, headaches, stomach ulcers, kidney infection, burns and menstrual cramps.

LAND

For indigenous people living in the rural areas, land is the source of life, culture and identity. Land is not a commodity but something that is borrowed and taken care of for the next generation. The Maya are stewards. This is a concept that western environmentalists have just begun promoting in the last century but has been an integral part of the Maya worldview.

Due to controversy over logging in the reservations in the late 1990s, the Government of Belize has signed a ten-point agreement with the Maya people that “recognizes their rights to lands and resources in southern Belize based on their longstanding use and occupancy” in 2000. Furthermore, the Agreement stated that any development in this area would be in consultation and partnership with the Maya affected. So far these agreements have been seen to be merely for show as indicated by the issuance of the oil exploration permits in 2005 without consultation of the affected communities.

DANCE

Dance was a social component of social, religious and political endeavours for the ancient Maya. Kings and other nobles danced dressed in elaborate costumes as portrayed on ancient texts and artwork. By dancing, the portals of the Otherworld were opened and the dead released. Today the Maya have no lords or kings but dance to reinforce their sense of community and identity.

The Deer Dance

The deer dance pays homage to the Maya Cosmovision. It represents a deer hunt and two aspects of humanity: the hunters and their wives and dogs who respect mother Earth and those in black who disrespect the environment. The tiger and the deer symbolise the animal world and the ultimate sacrifice of the animal i.e. the deer to sustain the Maya. The supernatural element represented by the costumes and masks come alive through offerings of food, prayers, and incense before and after the dance. The dancers become Ways and are no longer men dressed in costumes but the characters themselves. There are thirteen sequences with the last sequence culminating in the death of the main deer and each character paying homage.

These dances are community commitments and the individual dancers need to make personal offerings and abstain from sexual activity and certain food. To wear the costumes without the rituals is sacrilege. There are stories of dancers who got ill because they deviated from the proper behaviour and offerings. It is for these reasons, that the Deer dance can never be performed on demand or only have certain pieces performed or the dancer not believe in what they are doing. The dance begins and ends with incense offering normally done by the wives of the dancers.

The Cortez, Moro (Moors)

Cataclysmic events such as the Spanish Conquest were dramatized in the Cortez and Moro Dance. In the Moro dance, the Maya assume the role of the Muslim Moors of Spain who were expelled by Catholic forces in 1492.

The Cortez Dance (named after the conquistador Hernan Cortez) chronicles the conversion and conquest of the Maya by the Spaniards. It is also called the Conquest Dance. It is one of the more popular dances in Guatemala. After all it is said that the story is based on the last king of the K'iche Maya, Tekum Uman, and his defeat at by the Spaniards in 1524 at the battle of Xelahun. The Spanish conquistadors have come to assume roles as ancestors in the dance. Despite what their namesakes did in this world, in the Otherworld, the names of Alvarado, Grijalva and Cortez command as much respect as those of Tekun Uman and other Maya leaders.

Twelve dancers make up the following protagonists: foot soldiers dressed in black and priest in white and the Maya kings and princesses dressed in red. A single rhythmic drumbeat and a reed flute accompany the dancers. The full dance can take all day or several days. The story centers on the Maya chiefs as they protect the princesses from capture by the soldiers. As the chiefs themselves succumb one by one, the last section chronicles the capture of the king, C'ooxol who dances with his axe. The K'iche Maya have the Kaqi'oxol "Red K'oxol and the Saqikk'oxol "White Koxol" who dress in red and carry a red hatchet. The axe is a symbol of Chak unleashing his power through lightening. Even today stone axe heads are thought to be made when lightening strikes the earth.

Monkey Dance

This dance has not been performed in Belize for a couple of decades. The dance asks the gods for milpa protection from animals and bad weather. The dancers are accompanied by guitar and flute music. There are thirteen monkey dressed in black costumes and red masks. What is interesting is that the people in the third creation were turned into monkeys. Also in the Popul Vuh, the older brothers of the Hero Twins were turned into monkeys. The fourteenth dancer is a devil wearing a mask with a beard and three horns. Monkeys are the patron of scribes among the Classic Maya.

MUSIC

For village festivals, the harp and marimba dominate as musicians from different villages compete. The violin, harp and marimba are not from the ancient Maya but rather introduced in the 1500s from Europe and Africa. Florencio Mes, with his harp music, is one of the better known musicians in Belize. As far as can be ascertained, there are no Maya songs, although Christian songs are performed.

FOLKTALE

Maya stories are about tales of origin, creation of the world, of magic, jokes and anecdotes, animals and family relationships to name a few. Many of these stories are common throughout the Maya area and some are unique to the Belize. Stories were usually told during ceremonial vigils, communal work days, and at other community festivals. As communal work patterns erode, they are being told less frequently to the detriment of younger generations and to Maya and Belizean culture. The repetition of three occurs in story telling.

The rabbit is a popular character. It frequently appears as a trickster. In the Popul Vuh, the rabbit takes the place of a bouncing ball to deceive the lords of Xibalba. There has been some debate as to whether the origin is European or African rather than Maya. The Mayas and other indigenous people see a rabbit on the moon and some refer to it as Our Lady the Rabbit. It is argued that the cycle of the coyote and the rabbit exists in many North American groups into which African and European themes could be inserted. There is an image of the rabbit as a scribe from the Classic Maya period. In addition, the Dresden Codex has a passage with Chak and a rabbit illustrating vast units of time. It is quite possible, therefore, to suppose that the same animal would have been part African and the Maya folklore as both come from similar environment. There was a fair amount of African-Maya people mixing in both Mexico and Guatemala. Runaway Africans have been known to make their way to the Yucatan while Peten was another point of refuge.

The origin of the Sun and Moon story is not disputed. This was a popular tale among the ancient Maya and is still related in the Toledo District, Belize. It's about how the Sun god woos his wife and their subsequent adventures in elopement and marriage. He gets her back from the Vulture King and she becomes the moon and he, the sun. Whenever there is an eclipse or the sun is shining while it's raining, the Mopan say that the moon and sun are having a marital quarrel. Also the moon is not as bright as the sun because he gave his wife a black eye in one of their fights.

Other stories revolve around the origin of corn which was gotten through the help of animals such as the raccoon or fox, bird, snake, or dog and deer. Today, corn is still handled with great care and is not wasted even when used as animal feed. From seed to consumption, children are told stories of its importance and how to care for it.

ARTS, CRAFTS AND HOUSEHOLD UTENSILS

Textile

While spindle whorls litter ancient house compounds, textiles are scarce due to poor preservation conditions. Nevertheless, images on polychrome ceramics, lintels, stelae, and wall murals reveal design motifs used in textiles. The most common design motifs from the Classic period are based on natural surroundings and geometric patterns that symbolize natural phenomena such as hills or snakes, and toad (for rain and fertility as in the ch'ak chak ceremony). The same stylized toad can also be found on the huipil worn by Lady Xoc on Lintel 26 of Yaxchilan.

The diamond shaped design may be the most common design theme in both ancient and contemporary. The shape of the diamond represents the Maya world characterized by its distinctive four corners. Inside the center is another smaller diamond or geometric shape that represents the sun. Crosses are seen on the huipils worn by Lady Balam of Ix Witz in Lintel 17 of Yaxchilan, Lady Xoc in Lintel 24 of Yaxchilan, Lady Evening Star in Lintel 32 of Yaxchilan, and Lady 6-Tun in Lintel 15 of Yaxchilan. The Mopan Maya continue to be recognized in Belize for their beautiful sewing and embroidery. Wall hangings, basket weaving, and calabash carving are also crafts practiced by the Maya.

Household utensils used by the rural Maya include the grinding stone (mano and metate) used for preparing corn for making tortillas, A griddle (comal) for baking tortillas, calabash or gourd containers for drinks, a colander and storage.

EARNING A LIVING

The Maya today continue to live mainly in rural areas, with many of their villages sited along rivers. While many continue making a living from milpa farming, many others are leaving their homes in search of work in the agriculture, fisheries and the tourism industry. Many Maya are getting formally educated and entering the work force as teachers, police, nurses and other professions.

Among the ancient Maya, cacao was used for currency and as a drink. Today, however the Toledo Maya farmers are selling their cacao beans for a good price.

“Cadbury purchases “Maya Gold”

“Belizeans who love their Cadbury chocolate may be interested to learn that Cadbury Schweppes has purchased a company that uses cacao beans grown right here in Belize. That’s right, Green & Black’s, the makers of Maya Gold organic chocolate bars is now part of this international corporation. Cadbury has retained the same management team and is letting Green & Black’s operate as before, but with the benefit of additional expertise, advice, and wider market access. Manager of the Toledo Cacao Grower’s Association, Gregor Hargrove, told News Five that the purchase is “all good news for Belize.” He reports that Toledo cacao farmers sold thirty-three tons of the beans last year and expect their sales to climb to fifty tons in 2006, with double that amount projected for 2007. Green & Black’s says they can purchase as much cacao as Belizean farmers can produce as the market for organically grown cacao is booming.”

Excerpt from News 5 February 6, 2005

MAYA DISHES

The Maya do not only eat tortillas, beans and chile. As foragers, they harvest wild banana shoots, chib, jipijapa, cohune cabbage, callaloo or amaranth, mahbei, chikay and mushroom. Planted around the house would be pumpkin, achiote, chaya, chayote (cho-cho), chile and other plants for cooking and medicinal purposes. Many homes today still have chaya and annatto plants in the garden.

The main source of protein came from curassow, toucan, turkey, deer, agouti, gibbon, armadillo, pheasant, iguana, peccary. It stands to reason that if you live near a forest, you would eat food from there and if you were from the coast your food would reflect that. Aquatic animals such as crabs, crayfish, eels, jutes (in 2006, a BDF soldier, lost for some time in the jungle of Toledo reported how he survived on eating raw jute and other riverine animals) and fish were part of the diet especially during the dry season when the Maya used a natural poison to collect food. Animals and plants are consumed in stews, soups and fillings.

Maize, the staple food is consumed in a variety of way: raw or boiled into porridge and baked. It was also fermented. For big events, the dough is wrapped in waha leaves and boiled. It is easier to make than tortillas. According to food archaeologists, fat was not a part of the diet. There is some debate as to whether the ancient Maya ate tortillas as there is little evidence of griddles or comals in the archaeological record. Tortillas were believed to have been added in the Postclassic period.

The Spanish colonists brought over crops and animals such as the pig, chicken, sheep, and cattle that quickly became staples. The pig is a mainstay of big events such as weddings and festivals.

The most popular food of the rural Maya is a soup called caldo (Spanish). It contains cilantro and culantro, pepper and meat (game or domestic). From time to time, ground food such as yam, chayote, cassava and coco are added to it. Other ways of cooking are baking food in a fragrant leave called obale and waha leaf over coals. Game is normally dry roasted before being cooked as a stew or soup. Frying food is thought to be relatively new. The Q'eqchi add ginger to their soup. Like other Belizeans, the Maya enjoy a delicious plate of rice and beans, burgers, pizzas and other new food.

CONCLUSION

The three Maya groups have a diverse and vibrant culture. Yet while they continue many of the traditions of their ancestors, they are very much a part of modern Belize influencing and being influenced by new ideas. For instance, many of their thatch houses have electricity and all the conveniences of modern life.

SKILL CHECK

EXERCISE 1

1. Describe the three main groups of Maya who live in Belize, and their origins.

2. Name ten Mayan villages located in Belize and locate them on a map.

3. What is the Popul Vuh?

4. Describe the structure of the world, according to the Popul Vuh and Mayan belief.

5. Describe three aspects of Mayan culture that continue to be practiced today.

EXERCISE 2

Research an aspect of Maya culture and prepare a five-minute interpretative presentation to present to the class. Topics might be a religious festival, a traditional method of farming or healing, a special dish and its preparation, or a particular craft and how it is made

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CHAPTER 5: THE WORLD OF THE MAYA

INTRODUCTION:

Archaeological sites are one of the most frequently visited destinations in Belize. Belize is one of five Mundo Maya countries in Central America: Belize, Mexico, Guatemala, Honduras and El Salvador. The idea of archeological tourism has brought a lot of attention to Belize's Maya sites. As a result, a major project to improve the accessibility to the different sites and to provide convenience for visitors has been undertaken by the Government of Belize. With this in mind, it is important for you as a guide to know the facts about these first inhabitants of our country. This chapter will provide you with an overview of ancient Maya civilization, with special emphasis on the Maya of Belize.

OBJECTIVE:

At the end of this chapter, you will be able to describe:

1. The history of the ancient peoples who first settled in Belize.
2. The history and time periods of the Maya civilization.
3. The impact of the Spanish conquest, important attributes of Maya culture.
4. The location and pertinent facts of the most important Maya sites in Belize.

ASSESSMENT:

A written multiple choice and open-ended test will be administered. Questions will be based on the key concepts discussed in this chapter.

AT A GLANCE:

- Unit 1: The History of the Maya
- Unit 2: Life in the Maya World
- Unit 3: Archeological Sites of Belize

UNIT 1: THE HISTORY OF THE MAYA

This unit will provide an overview of the history of the Maya in Belize. You will be introduced to the Paleo-Indian and Archaic Peoples of Mesoamerica and Belize, who preceded the Maya, learn about the Prehispanic Maya of Belize: Preclassic to Postclassic Periods, and the Spanish Conquest and its aftermath.

OBJECTIVE:

At the end of this unit, you will be able to:

1. Describe the setting and the chronological framework of the Mayans in Belize.
2. Explain the existence of the Paleo-Indian and Archaic Peoples of Mesoamerica
3. Describe the Prehispanic Maya of Belize during the Preclassic to Postclassic Periods
4. Describe the status of the Mayans after the Spanish conquest.

AT A GLANCE:

1. Introduction to the Maya World
2. The Paleo-Indian and Archaic Peoples of Mesoamerica and Belize
3. The Prehispanic Maya of Belize: Preclassic to Postclassic Periods
4. The Spanish Conquest and its Aftermath



TIME LINE OF MAYA CULTURAL EVENTS IN BELIZE

Date	Events
10,000 – 7,000 B.C.	First human occupation of Belize. Nomadic Paleo-Indians hunt large Pleistocene animals along coastal and savanna areas.
3,000 – 2,000 B.C.	Evidence of plant manipulation (and domestication) by early settlers near Pulltrouser Swamp and San Antonio Village, Orange Walk.
1,500 – 1,000 B.C.	Earliest evidence for actual Maya settlements in the Belize River Valley (Cahal Pech) and in northern Belize (Cuello, Santa Rita, Colha)
600 – 400 B.C.	First monumental architecture for ritual purposes erected (Cahal Pech) and increasing contact between Belize Maya and the Olmec people
200 – 100 B.C.	Earliest carved stela in Belize (Stela 9 from Cahal Pech)
100 – 200 A.D.	Construction of large temple pyramid (N-10-43) at Lamanai and Str. 5C-2nd at Cerros. Maya civilization fully established throughout region.
400 – 550 A.D.	Earliest stelae with calendrical dates (i.e. Blackman Eddy and Pacbitun) and increasing trade relations with Teolihuacano culture in central Mexico.
556 – 562 A.D.	Conflicts between Caracol and Tikal. Ruler of Tikal (Double Bird) eventually captured and sacrificed by Lord Water of Caracol
626 – 631 A.D.	Caracol continues aggression with Peten sites and defeats city of Naranjo
700 – 800 A.D.	Rise of southern Belize sites such as Lubaantun, Xnaheb and Nim Li Punit
800 – 900 A.D.	Sites in central and northern Belize begin to decline and many are abandoned
1,000 – 1,200 A.D.	Major drop in population in Belize and only few sites continue to thrive (e.g. Lamanai, Santa Rita, Baking Pot, and Tipu)
1,200 – 1,400 A.D.	Increasing relations between sites in Belize and northern Yucatan cities of Mayapen and Tulum, Murals discovered by Gann at Santa Rita are produced
1,502 A.D.	First contact between Spanish (Columbus) and Maya in Bay of Honduras
1,511 – 1,519 A.D.	Shipwrecked Spaniards land on Yucatan Coast. Spaniard Gonzalo Guerrero marries daughter of Nachan Can, ruler of Chetumal (Santa Rita).
1,550 – 1,650 A.D.	Spanish friars begin missionary activities in Belize and construct churches at Lamanai, Zaczuuz, and Tipu.
1697 A.D.	Last independent Maya city, Tah Itza (Flores, Peten), falls under Spanish control. Several small villages in Belize continue to thrive independently.

INTRODUCTION TO THE MAYA WORLD

The Setting

The Maya area is located within the southeastern corner of a larger region known as Mesoamerica. Long before the coming of the Spanish, from 600 B.C. to A.D. 1000, many cultures settled, rose to prominence and collapsed within this diverse land. Along the gulf coast of Mexico, the Olmec people were one of the first to develop a complex civilization. They were followed by other cultural groups such as the Zapotecs and Mixtecas in Oaxaca, the Teotihuacanos, Toltecs and Aztecs in the Valley of Mexico and the Tlaxcalans and Uaxteca of the east coast. The Maya people, who were contemporaries of all these great nations, settled and developed in the southeast, in an area that includes the modern countries of Belize, Guatemala, El Salvador, western Honduras, and the Mexican states of Tabasco, Chiapas, Yucatan, and Campeche.

The Maya area is generally divided into three subregions: the Southern Highlands, the Central Lowlands and the Northern Lowlands. The Southern Highlands are so named because they rise in altitude from 305 to 4,267 meters (1,000 to 14,000 feet) above sea level. These highlands extend from southeastern Chiapas through Guatemala, El Salvador and far to the south into Nicaragua. These cordilleras (ridged mountains), containing numerous active and inactive volcanoes, were the source of important raw materials to the ancient people of Mesoamerica.

Obsidian, a volcanic stone, was a principal export of those who lived in this subregion. It was used for producing knives, weapons, and sacrificial blades. The highlands were also the source for jade, Quetzal bird feathers, granite, and hematite. Important cities in this subregion included Kaminaljuyu (on the outskirts of Guatemala City), Utatlan, Iximche, El Baul, and Chalchuapa (El Salvador).

The Central Lowlands encompass an area that extends from Tabasco across southern Campeche and northern Chiapas, through the Department of Peten in Guatemala, and a cross most of Belize. This subregion is marked by dense tropical forests and rolling terrain. Several large rivers, like the Usumacinta to the west, the Hondo, New and Belize Rivers to the east, and the Sittee, Swazey and Motagua to the south, cut across its rolling terrain. These navigable rivers served as major avenues for trade, exchange and contact. Many products animal (jaguar, etc.) skins used as symbols of power by the elite, flint for tools and weapons, marine shells for jewelry, slate and granite for manos and metates were exported by trading canoes that journeyed along these waterways. Some of the largest and best known Maya cities were established in the central area cities such as Tikal, Uaxactun, Naranjo. Seibal and Mirador in the Peten, Calakmul and Becan in Campeche, Kohunlich and Tzibanche in Quintana Roo, and Caracol, Xunantunich, Lamanai, and Altun Ha in Belize (to name a few).

The Northern Lowlands are represented by the flat, almost featureless, expanse of the Yucatan peninsula. The only relief in the region is a low range of hills in Campeche that are known as the Puuc Hills. The rest of the subregion is relatively semiarid, with low scrub forests and no surface streams or rivers. Because of the soft, porous, limestone bedrock, the primary sources of water are found in cenotes sinkholes where collapsed bedrock has exposed underground streams. It is along most of these geographical features that settlements in the north settled and thrived.

Despite these limitations, the Northern Lowland people produced and exported most of the salt consumed by their neighbors to the south. Other important exports included marine shells, cotton for clothing and honey from domesticated bees. The largest and bestknown cities in the north include Edzna (Campeche), Uxmal, Kabah, Chichen Itza (Yucatan), Coba and Tulum (Quintana Roo).

The Timeframe

The chronology, or cultural sequence, of human activity in Mesoamerica (and the Maya area) is traditionally subdivided into six periods: Indian, Archaic, Preclassic (or Formative), Classic and Postclassic. The Preclassic, Classic and Postclassic are further divided into early and late facets.

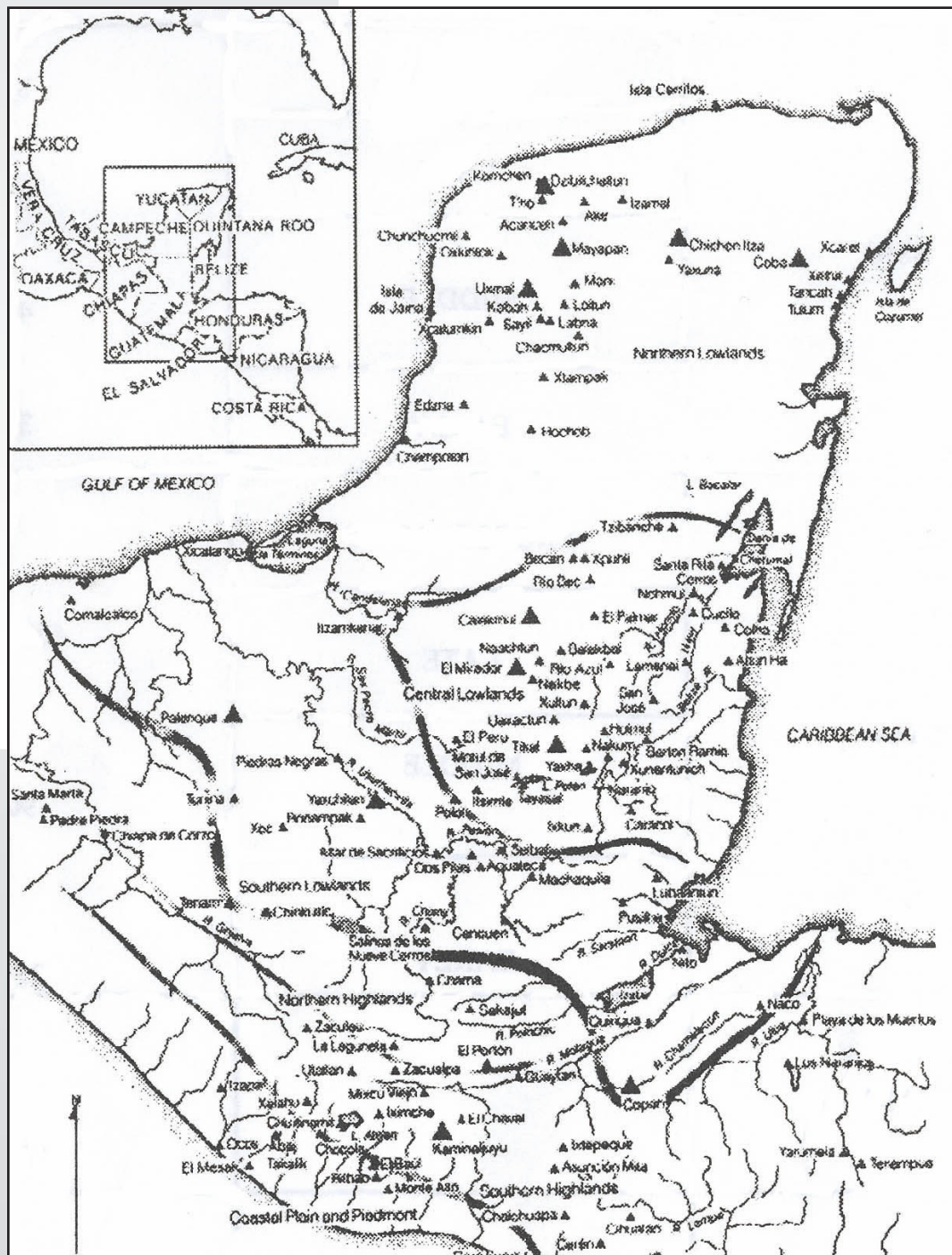


Figure 15. Chronological Chart indicating Major Periods of Maya Cultural Development

Major Periods	Phases	Dates
Historic	Contact	1502 A.D
POST CLASSIC	Late	1500
	Middle	1200
	Early	900
CLASSIC	Terminal	800
	Late	600
	Middle	400
	Early	300
PRECLASSIC	Proto Classic	0
	Late	400 B.C.
	Middle	900
	Early	2500
ARCHAIC		
PALEOINDIAN		

THE PALEO-INDIAN AND ARCHAIC PEOPLES OF MESOAMERICA AND BELIZE

THE PALEO-INDIAN PERIOD (15,000 – 7,000 B.C.)

The Paleolndian Period (15,000 Indian period spans from approximately 15,000 B.C. to the end of the Pleistocene Ice Age, about 7000 B.C. The period marks the first colonization of the New World by Homo sapiens. It is generally agreed that these early people came to the Americas from Asia, either by way of a landbridge that formed across the Bering Strait or possibly by use of simple watercraft that they could paddle from island to island. We are certain that these early inhabitants migrated to the New World, because even after a century of intensive research, no discovery has ever been made of earlier human ancestors. Scientists believe that the Paleo-Indians may have followed herds of large animals such as mastodons mammoths, camels and bison as they crossed the Bering landbridge from Siberia to Alaska. The landbridge was made possible by the formation of huge glaciers and ice sheets that caused water levels to drop more than 46 meters (150 feet). As water levels fell, the Aleutian Islands, which spread across the Bering Strait, would have been joined together, linking Asia to America.

Figure 16. Map of the Americas denoting areas affected by Pleistocene Ice Sheets. Arrow also denotes the direction of Paleo-Indian colonization of the New World



Evidence of these climatic and geological events has been noted in many countries. In Belize, the Blue Hole at Lighthouse Reef, with its underwater cave system, is now submerged some 122 meters (400 feet) below sea level, as we learned in Chapter 3. During one of several Ice Ages, this cave, like the Bering landbridge, was above ground level because stalactites that adorn its ceiling could only have been formed by drip water laden with calcium carbonate deposits. Elsewhere in Belize, seashells and marine fossils have been found in the Crooked Tree area, and in the Orange Walk and Cayo Districts.

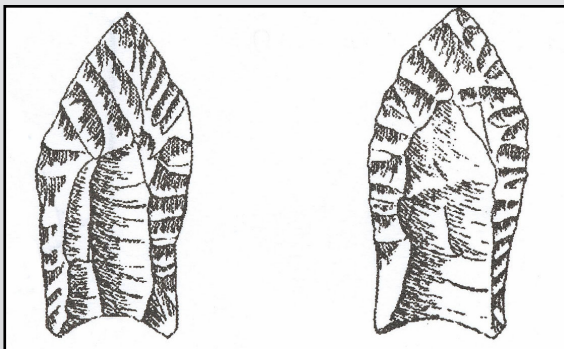
The Bering landbridge was also not the only landbridge formed in the New World. Millions of years ago, North and South America were not connected as they are today. Central America existed as two islands: one made up of Chiapas, Guatemala, Honduras, El Salvador and Belize; and another island consisting of the present day Chiriqui Mountains of Costa Rica and Panama. The animals of North America evolved separately from those on the southern continent. Eventually, and as a result of tectonic activity, these islands became attached to the North and South American continents. With the formation of this other landbridge, animals that had been previously isolated on these two continents began to migrate from the north to the south and vice versa, with mingling at its greatest in Central America, as we have also seen in Chapter 3.

Who were the PaleoIndians and why did they come to the New World? Anthropologists and archaeologists believe that they were of Asiatic origin, and that they migrated to the Americas in pursuit of the large Pleistocene animals that they relied on for subsistence. From Alaska these early hunters spread to the south, moving into Canada, the United States and Mexico, and eventually reaching South America by 10,000 B.C. Because of their nomadic way of life, these early ancestors left few clues to assist us in determining their cultural lifestyles. The few campsites that have been found suggest that they had few material objects mostly wooden, bone and stone tools.

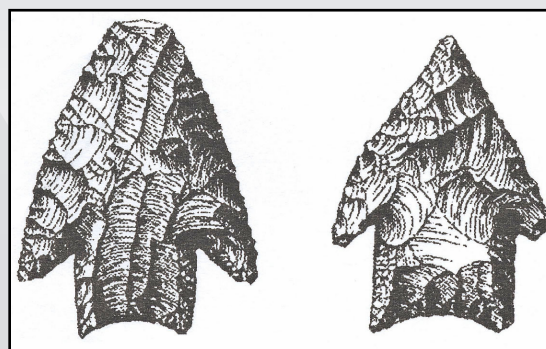
Their most diagnostic hunting implement was a fluted projectile point that is generally referred to as a Clovis point. These characteristic “spear” points have been discovered throughout the United States and Canada and as far south as Panama. In the Maya area, only a few examples have been found. The first was discovered in the 1960’s at San Rafael, near Guatemala City. About a decade later, two other sites in highland Guatemala, Los Tapiales and on the outskirts of Huehuetenango, produced similar remains. In the Yucatan, at a site known as Loltun Cave, archaeologists also found evidence that these early people may have been using the entrance to the cavern as a campsite. Deep below the present ground surface, they discovered several stone tools, along with the bones of extinct mastodon and horse.

Figure 17.

Drawing of fluted, PaleoIndian, projectile points



Drawing of Archaic period projectile points

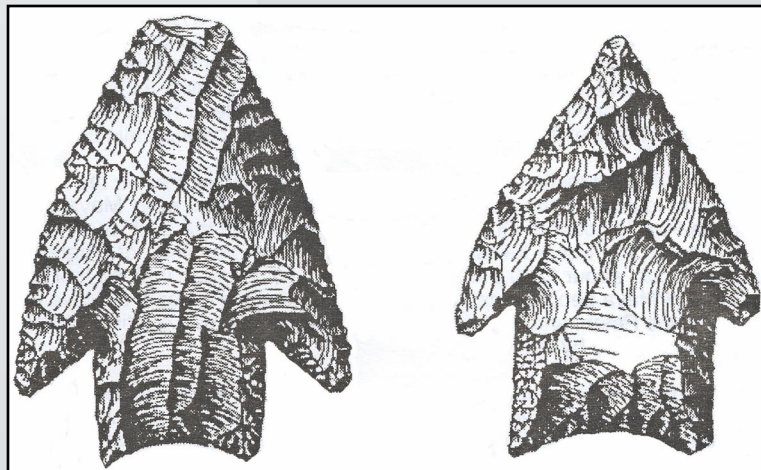


What about Belize? For a long time, we had no evidence to suggest that these Paleo-Indians were ever present here. The first clue came to light in the early 1960's. Two bones discovered by farmers near Santa Familia Cayo District, were identified as those of an extinct giant sloth. Cut marks on the bones further suggested that hunters may have killed the animal, who subsequently cut the bone to get to its protein-rich marrow. Conclusive evidence for Paleo-Indian presence in Belize, however, was not recovered until the mid 1980s, when a farmer near Ladyville discovered the first fluted projectile point in the country. A few years later, a farmer in the Toledo District found another fragment of a similar spear point. Since then, teeth of an extinct mastodon have been discovered in Bullet Tree Falls and simple stone tools associated with extinct horse remains have been recovered from a cave in the Cayo District. What these scant pieces of evidence tell us is that here, too, in Belize, early humans arrived between 10,000 and 7000 B.C. With their few stone tools and other implements, they gathered edible plants and fruits, and they hunted the large animals that once were present along the open savannas and river valleys of the country. Because they moved around on a regular basis, they constructed no permanent houses, and it is for these and other reasons that traces of our earliest Belizean ancestors will continue to be difficult to discover.

ARCHAIC PERIOD (7000 – 2,500 B.C.)

Sometime around 7000 B.C., most of the world began to experience changing climatic patterns. As the weather became wetter and warmer, the Pleistocene era came to an end, and many of the large animals that once flourished in the Americas (mastodons, giant sloths, horses and camelids) began their decline to extinction. These changes also had important effects on human populations. With the growing absence of large animals, these Archaic people began to rely more and more on plants and smaller animals for food. These changes led to the invention of new tools for use in the exploitation of different resources. Three of the most diagnostic implements used by the Archaic people of this time are large stone bowls, pestles, and smaller, but wider, projectile points. The stone bowls and pestles are similar to (but slightly smaller than) manos and metates and were used for processing plant food. The new projectile or spear point looked somewhat like a fishtail, and was used for hunting smaller Post-Pleistocene animals.

Figure 18. Drawing of Archaic Spear Point



The best evidence for Archaic human activity in Mesoamerica was recovered by archaeologists working in the Tehuacan Valley of Mexico. They noted that after the end of the Pleistocene era, people began to collect and eat a variety of plants such as peppers, squash, avocado and early forms of corn. Much of this food was carried to their rock shelter campsites in bags that were woven from plant fibers. With the passage of time, many of the plants originally collected by these people became domesticated. Plant domestication eventually led to the establishment of the first permanent settlements.

Evidence for Archaic human activity in Belize is only slightly better than the preceding period. In most cases, this evidence is limited to the diagnostic projectile points left behind by these nomadic people. The first of these artifacts were discovered in the 1980's near the Lowe Ranch to the north of Ladyville. Because of this archaeologists in Belize refer to them as Lowe points. Up until 1999, about twelve Lowe points had been reported in the Belize, Orange Walk and Corozal Districts. In 2000, three more points were discovered in the Cayo District one in San Ignacio, another near Spanish Lookout and the third in the Roaring River area.

THE PREHISPANIC MAYA OF BELIZE: PRECLASSIC TO POSTCLASSIC

PRECLASSIC PERIOD (2500 B.C. - A.D. 300) 1

To better understand the developments that ensued during the Preclassic period, we will subdivide this segment of Maya prehistory into three phases: early, middle and late.

Early Preclassic (2500 1000 B.C.)

Despite many years of research, this phase of Maya prehistory remains largely undocumented and poorly understood. What we do know is that sometime between the end of the Archaic period and the start of the Early Preclassic, some of the first agricultural communities were established in the Maya area. Research by Dr. Mary Pohl (Florida State University) in the Orange Walk and Corozal Districts noted that the earliest settlements were relatively small and that people were still experimenting with the process of plant domestication. The early settlers also relied heavily on the consumption of terrestrial and aquatic animal resources for protein. Some of their primary tools included large stone hoes, grinding stones, and wooden implements. Because there is little or no evidence for the production of pottery, some researchers refer to this transitional stage as the preceramic period.

The most difficult question facing archaeologists with an interest in the Early Preclassic has to do with the cultural identity of the early settlers. Most believe that early Maya-speaking farmers first settled along the Pacific coast of Guatemala and Chiapas or in the Gulf Coast of Veracruz-Tabasco, and did not move into the Maya lowlands (Belize, the Peten Province of Guatemala and Mexico's Yucatan Peninsula) until about 1200 B.C. If this is true, it could mean that the first agricultural settlements were not those of Maya people. Instead, it would suggest that people of Maya culture immigrated later into Belize and the Peten, and either displaced or intermarried with existing Archaic (pre-ceramic) populations like those recorded by Dr. Pohl.

Today, the best evidence for early Maya communities in Belize has been discovered in the Orange Walk and Corozal Districts in the north, and in the Cayo District to the west. It should be noted, however, that none of these communities appear to have been occupied prior to 1200 B.C. In other words, they were settled toward the end of the Early Preclassic

period. The earliest Maya villages found in northern Belize were discovered at Cuello, Colha (Orange Walk), and Santa Rita (Corozal). Work by Dr. Norman Hammond (Boston University) at Cuello documented that the site was settled around 1200 B.C.

The early Cuello inhabitants constructed apsidal (oval) platforms on which they erected their thatch houses. Although most structures were residential, a few were reserved for ritual purposes. One such building at Cuello contained the skeletal remains of more than 20 individuals, who may have been sacrificed to commemorate the construction of the shrine. The Maya at Cuello subsisted primarily on shellfish, deer, several small mammals, corn, beans, squash and a variety of other plants. They also produced ceramics referred to as Swasey pottery which were relatively simple in form and predominantly red in color.

Investigations in the Cayo District by Dr. Jaime Awe (Department of Archaeology) at Cahal Pech and Dr. Jim Garber (Southwest Texas State University) at Blackman Eddy recorded patterns that are broadly similar to that of Cuello. The first Maya settlers in Cayo appear to have moved into the area around 1200 B.C. They established their villages on the hills overlooking the major river systems. From their hilltop communities, they farmed the rich alluvial valleys, “hunted wild game, and collected many freshwater snails (such as jute, pomacea, and mussels) for consumption.

Like the colonizers of Cuello, the early Belize Valley Maya constructed large and small apsidal platforms on which they built wattle-and-daub buildings with thatched roofs. Fragments of preserved stucco at Cahal Pech suggest that the plaster walls of these buildings were painted in red and white bands. Some structures also served as shrines where important rituals were conducted by members of the community. Work by Dr. Awe further noted that the Early Preclassic Maya of Belize traded and exchanged goods with local and distant people. From the highlands and Motagua Valley of Guatemala, the Cahal Pech Maya imported obsidian, jade and iron pyrite. From the Caribbean coast they acquired conch shells for jewelry and salted reef fish for consumption. Contact with the Olmec people in Veracruz is suggested by the presence of various Olmeclike symbols that were carved and painted on their relatively sophisticated pottery.

Middle Preclassic (1000 - 300 B.C.)

The Middle Preclassic period was a time of rapid expansion across the Maya lowlands. Following the establishment of the first agricultural settlements, many new areas were colonized and villages grew in size and number. With these changes in population, we begin to witness the first indications of social and political complexity and increasing interaction with distant centers in the Maya region, and with the Olmecs and other Mesoamerican cultures.

Maya communities of the Middle Preclassic period were likely organized into chiefdoms. These chiefdoms were characterized by distinctions in social, political and economic status. Farmers comprised the largest segment of the population, while other specialists produced goods for local consumption and for trade with other distant areas. Rulership of Middle Preclassic communities lay in the hands of chiefs. Their power was primarily based on kinship and their social status was determined by heredity. In other words, rulers derived their power from family and community support, from perceived supernatural sanctions, and from their control of the economy. Supernatural support was inherited from the gods and from deified ancestors. Rulers maintained authority by distributing surpluses and by maintaining allegiance of other line ages through sponsoring key rituals and feasts, and by bestowing favors and gifts that were collected from tribute.

Important Middle Preclassic sites include Cahal Pech, Lamanai, Cuello, Santa Rita, Colha, and Blackman Eddy in Belize. In the Peten, sites such as Tikal, Uaxactun, Nakbe, Seibal and Altar de Sacrificios were also developing into important centers at this time.

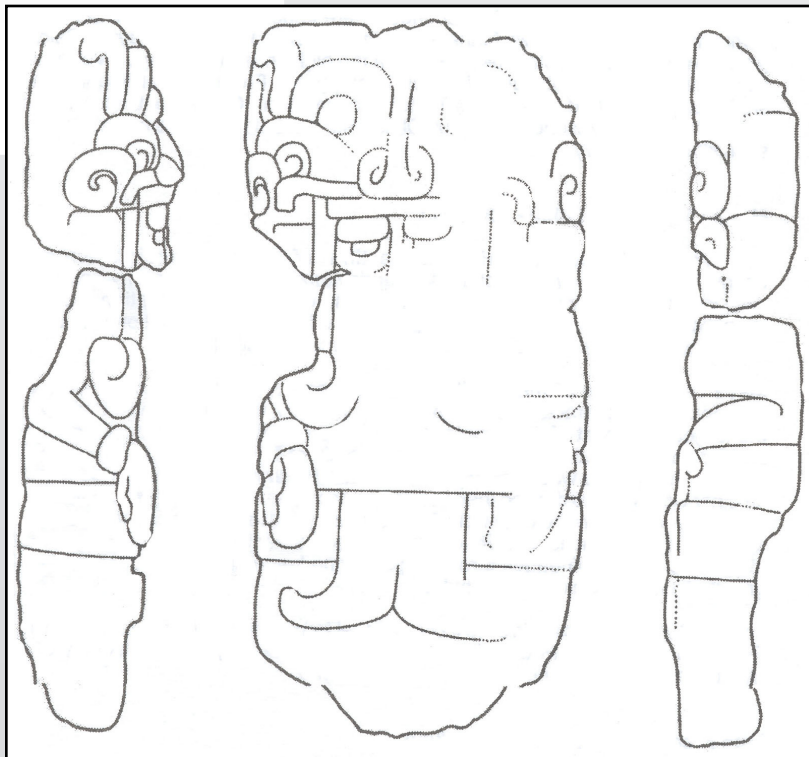
Late Preclassic (300 B.C. - A.D. 300)

During the Late Preclassic period, the population continued to increase throughout the Maya area. Many new sites were founded and those that were already established continued the developments that had begun in the Middle Preclassic period. As noted above, many important centers lay along trade routes that connected this area with the highlands and the coastal regions of Mesoamerica. Increased trade fostered contact with other communities and new ideas were constantly exchanged from region to region.

Previously, it was assumed that Maya civilization was a product of the Classic period. Today this view has changed, and we now know that all the major achievements of ancient Maya civilization were in place by the Late Preclassic period, prior to the commencement of the Christian era. Characteristic features of Late Preclassic Maya culture include the use of mathematics, calendrics, and writing. It is during this time that we first begin to see the production of carved monuments such as stelae (vertically standing monolithic rocks) and altars. Present evidence suggests that these monuments were initially produced in the highlands and the Pacific coastal regions of Chiapas and Guatemala (particularly at sites such as Izapa, El Baul, Kaminaljuyu and El Porton), in the lowlands of Belize and the Peten, a stucco mask tradition (with masks flanking stairways) may have preceded the use of monuments. Preclassic Stelae, however, have been found at Cahal Pech, Actuncan, Cuello, Nakbe and El Mirador. The Cahal Pech stela (Stela 9) is dated before the time of Christ and represents the earliest carved monument yet discovered in Belize if not the Maya lowlands.

During the Late Preclassic period, monumental architecture becomes more common and we see the earliest corbelled vaults erected within tombs that are enclosed by important temples. Ceramic styles also become more uniform cross-regionally, and the production of polychrome pottery begins to become both popular and more widespread. Most of the new painted pottery was placed in the tombs and burials of elite rulers, who now displayed marked differences in status with their subjects.

Figure 19. Drawing of Cahal Pech Stela 9 (Nikolai Grube)



Important Late Preclassic cities in Belize include Lamanai, Cerros, Cahal Pech, Actuncan, Nohmul, and La Milpa. At Lamanai, the most imposing temple pyramid, Structure N43, rises more than 31 meters (100 ft) and was completely constructed in Late Preclassic times. Of similar age is Str. 5C 2nd at Cerros. Both the Lamanai and Cerros temples have large sun god and Venus masks flanking the central stairways of their respective structures.

In the Peten, large Preclassic architecture has also been discovered at Uaxactun, El Mirador and Tikal. The El Tigre and Danta Groups at El Mirador represent the most imposing Late Preclassic architecture yet found in the Maya lowlands. Indeed, this predominantly Late Preclassic city rivals any of the later Classic period sites in the Maya area. Coeval developments in the Peten can be found in Group E at Uaxactun and the Mundo Perdido section of Tikal.

To the north, in the state of Campeche, Mexico, lie the sites of Edzna and Calakmul. Preclassic developments at Edzna include a system of canals that extend some 22 kilometers (15 miles) from the site center. Farther east in the Yucatan are other important centers such as Komchen, Yaxuna, and Dzibilchaltun. Located along the north coast of the Yucatan, Komchen is known to have served as the primary exporter of salt at this time.

CLASSIC PERIOD (A.D. 300 - 900)

Early to Late Classic Period (A.D. 300 - 800)

The Early Classic is often referred to as the intellectual and artistic highpoint of the Maya lowlands. Besides further population increase, there was a proliferation of new sites in every sub-region of the Maya area. There is apparent evidence, too, of a clustering of the populace around the larger cities, representing a change from a previously rural to a predominantly urban style of living. With the increase of new communities came even more specialized functions in the arts, public works, administrative duties and commerce. The expansion of trade networks and increased contact with other communities led to greater cultural similarities, particularly in the styles of architecture, implements, and pottery as well as parallels in hieroglyphic inscriptions plus cosmological and religious concepts.

Nearly all the carved stelae in Belize and the Maya area date to the Classic period. These monuments predominantly contain historical data. They record the births, marriages, accessions, deaths and exploits of deified rulers. Following their deaths, these rulers were generally laid to rest in large corbelled vaulted tombs that were constructed within the most important shrines or temples of the city centers. Along with the elite remains were placed many of their earthly treasures. At times, their attendants were sacrificed to accompany them into the afterworld.

Studies of ancient settlement patterns demonstrate that the populations of Classic period centers were far greater than previously thought. Belize alone contains more prehistoric mounds than modern houses, and conservative estimates suggest that the country probably supported close to a million inhabitants by A.D. 600. This information has subsequently led to the negation of an earlier hypothesis, which argued that the ancient Maya were predominantly milpa farmers. The milpa system, also known as swidden, or slash-and-burn agriculture, is an extensive system of land use that requires land that has been farmed to remain fallow for several years after it has been used. On its own, the milpa system cannot support large or dense populations.

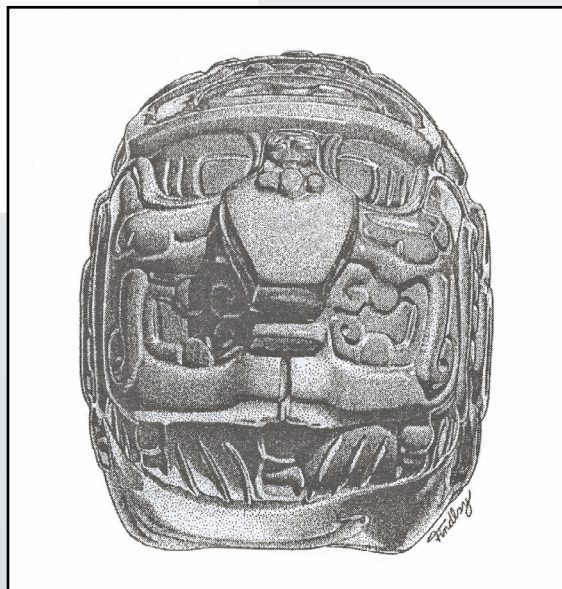
New research has actually recorded evidence of a variety of intensive agricultural systems that were utilized by the Maya during the Classic period. In the Vaca Plateau, for example, archaeologists have mapped thousands of stonewalled terraces some more than 2 meters (6 feet) high and 90 meters (300 feet) long around every major site (like Caracol) in the region. In the Belize Valley, near Duck Run, other archaeologists have noted that the Maya excavated a series

of ditches to control water levels during the rainy season. Further to the north, particularly near Pull-trouser Swamp, San Antonio, and along the New River and Rio Hondo, ancient Maya inhabitants created an expansive system of raised fields. This type of agriculture is very intensive, capable of producing far more food than either milpa or terrace agriculture.

Further increases in population during the Classic period led to greater competition for decreasing resources. This, in turn may have strained relations between centers and resulted in widespread conflict and warfare. Evidence for the latter was recorded on mural scenes painted on the walls of palaces at sites such as Bonampak and on many of the carved monuments that were erected at other site centers. Many stelae and lintels in the Maya lowlands, for instance, portray scenes of warfare and the capture of prisoners. Captive warriors were forced to work as slaves for the construction of buildings and other public works, and often were sacrificed in rituals to the gods or those commemorating important religious events.

Excellent evidence for increasing conflicts and competition is provided by the inscriptions found on monuments at Caracol, Tikal and Naranjo. For example, Altar 21 (the ballcourt marker) at Caracol records the defeat and death of Tikal's Double Bird by Caracol's Lord Water on May 1, A.D. 562. At Tikal, this event coincides with the defacement of several stelae and monuments (i.e. Stela 31 was wrenched from its original location and dumped in the plaza). Thereafter, no monuments were commemorated at Tikal for nearly 150 years. Lord Kan II, who later succeeded Lord Water as ruler of Caracol, continued the earlier aggression against other Peten sites. Ten years after the fall of Tikal Naranjo was subjugated in A.D. 626. Shortly thereafter, Naranjo was probably forced to dedicate a hieroglyphic stairway to Caracol. As at Tikal, no new monuments were inscribed at Naranjo for 40 years following their defeat.

Figure 20. Drawing of Jade Head of Kinich Ahau discovered in Tomb B4/7, Altun Ha



Most sites found in the Maya area contain evidence for Classic period occupation and activity. Sites in Belize with substantial information for developments at this time include Altun Ha, Caracol, La Milpa, Lubaantun, Nimli Punit, Pacbitun and Buena Vista. Coeval sites in Guatemala and Mexico include Kaminaljuyu, Tikal, Yaxha, Uaxactun, Calakmul, Kohunlich, Becan, Palenque, Bonampak, Yaxchilan, Piedras Negras, and Dzibanche.

TERMINAL CLASSIC AND EARLY POSTCLASSIC PERIODS (A.D. 800 - 1200)

The Terminal Classic period is characterized by dramatic changes in the Maya lowlands. Few cities contain evidence for the construction of large civic architecture, there is little or no evidence for the commemoration of new monuments, and there is a rapid decline in population, followed by the subsequent abandonment of most large centers. Throughout the study of Maya prehistory, these events have traditionally been associated with the collapse of Maya civilization. Over the last 50 years, many theories have been proposed for the decline of the Maya. These can be divided into two categories: I. Theories that emphasize external factors; and II. Theories that emphasize internal factors.

1. Theories that emphasize external factors

- a. **Foreign invasion from the west** - Proponents of this theory argue that Mexican-related cultures (the Putun Maya from Tabasco) invaded from the west and disrupted Maya society to such a degree that it eventually led to their demise. While evidence does exist that some sites along the Usumacinta River (like Seibal and Altar de Sacrificios) may have been taken over by other groups, this evidence is lacking at nearlv all other sites in the lowlands.
- b. **Changes in exchange (trade) patterns** - Proponents of the trade hypothesis suggest that at the start of the Terminal Classic period, there was a major change in trade networks. Whereas earlier trade routes predominantly used an overland system, the Terminal Classic merchants primarily relied on maritime trade routes. As a result of these changes, many of the large, landlocked cities (i.e. Tikal, Caracol, Calakmul) were bypassed. Isolated from the rest of the Maya area, sites in the interior thus began to decrease in importance, their economies began to falter, and they were eventually abandoned for other cities in the network.

2. Theories that Emphasize Internal Factors

- a. **Natural catastrophes** - Those who propose natural catastrophes as the primary cause for the collapse argue that earthquakes, volcanic eruptions, hurricanes, or epidemics (e.g. yellow fever) could have greatly disrupted Maya life and forced people to leave the area. Although interesting, there is little or poor geological evidence to support widespread catastrophic disasters during this time. Rarely, too, do people completely evacuate an area following short-lived catastrophes.
- b. **Social upheaval** - This hypothesis was proposed by British archaeologist Sir Eric Thompson more than 50 years ago. Thompson argued that following centuries of oppression, the lower classes of Maya society may have revolted against the elite rulers. Following this upheaval, commoners refused to continue supporting the elite with tribute and discontinued maintaining the large cities. This type of revolution would have disrupted sociopolitical control, eventually leading to anarchy and the decline of Maya social order. Accepted as a plausible explanation for many years today there are few archaeologists who continue to support this idea.

c. **Warfare** - Other archaeologists have argued that increased warfare could have been the most important cause and effect of the collapse. They propose that Maya warfare may have changed substantially during the Terminal Classic period. Unlike the preceding periods, they suggest that Terminal Classic armies may have purposely destroyed conquered cities and enslaved or sacrificed their population. This would have eventually disrupted the economic system to the point where life was no longer sustainable in the region. As we noted above, there is considerable evidence that conflicts between Maya cities were more widespread toward the Late Classic period. Monuments at many sites both record and vividly display the militaristic pursuits of their leaders.

Despite this evidence, however, there is limited data that suggest that Maya armies wantonly sacked the cities of defeated adversaries. Furthermore, this hypothesis does not adequately explain why it is that the first sites to be abandoned were predominantly the larger, more populated and presumably the most powerful centres (e.g. Caracol, Tikal, Calakmul). In fact, many sites, particularly those along major rivers, continued to thrive into the Postclassic period (e.g. Baking Pot, Lamanai, Santa Rita).

d. **Ecological failure** - Perhaps the most credible, recent, explanation for the collapse has to do with ecological failure. We know, for example, that by A.D. 800 most of the Maya area was occupied. As indicated before, Belize alone could have had nearly one million inhabitants. To feed all these people, most of the available land would have had to have been cleared and used for food production. Besides food, however, ancient Maya people would have also needed a considerable supply of hardwoods. Wood would have been necessary for cooking, for construction, and particularly for producing white lime. The white lime, or cal, was used in great quantities for processing corn before grinding and for plastering the floors and walls of the large temples, palaces and monumental architecture.

In conjunction with extensive land clearing for agriculture, the high demand for hardwoods would have led to widespread deforestation. Under these conditions, there is no doubt that heavy rainfall would have led rapidly to soil erosion. Conversely, if the region experienced a long period of drought (which can be exacerbated by deforestation), most crops would have undoubtedly failed. What if these conditions persisted for any length of time? Farmers would have likely depleted their corn seed and would have been unable to produce enough food to meet the demands of the large population. A decrease in diet would have led to poor nutrition that would in turn have increased the occurrence of debilitating diseases. In an effort to acquire the necessary resources to sustain their people, cities may have gone to war with each other, but instead of achieving solutions, this type of conflict would simply have added to the existing problems. If these conditions persisted for a couple of years, people would have eventually had to make the only choice left to them, to abandon their communities and move elsewhere.

Recent scientific investigations suggest that this may have indeed occurred. Studies of lake sediments in the southern Yucatan, Belize, and the Peten suggest that the area suffered long periods of very dry weather in the 9th century A.D. This drought did not affect all of the Maya area, but it was particularly intense in the most heavily populated Central Lowlands. In effect, ecological degradation was regional and particularly devastating in the most populated region of the Maya lowlands. This phenomena is supported by archaeological data, which notes that as cities such as Tikal and Caracol were abandoned, sites in the less affected north, like Uxmal, Kabah, Sayil, Labna, and Chichen Itza increased in size and population. It was after the fall of the large central lowland cities, in fact, that northern centres rose to prominence

and truly began to flourish. In the Yucatan, Chichen Itza became the dominant centre during the Early Postclassic period. Maya traditions and civilization did not, therefore, collapse or disappear. The cultural heartland of the Maya simply changed from the Central Lowlands to the Northern Lowlands. It is here in the north, too, that Maya civilization continued to thrive well into the Postclassic and Postconquest periods.

Despite these changes, however, one should not assume that every single site in the central region was abandoned between A.D. 800 - 900. In truth, several communities continued to prosper. Baking Pot in the Cayo District was occupied until at least the start of the Late Postclassic (A.D. 1200). In contrast, Tipu (Negroman), Lamanai and Santa Rita remained important centres that maintained contact with the cities in the north. Later, they would also play pivotal roles in Maya Spanish relations.

LATE POSTCLASSIC (A.D. 1200 - 1502)

At the start of the Late Postclassic period, Chichen Itza, Mayapan and Izamal were among the most prominent cities in the Yucatan. The ruler of Chichen was a man named Chac Xib Chac and that of Mayapan was Hunac Ceel. Legend has it that Hunac Ceel convinced the ruler of Chichen to steal the bride of the ruler of Izamal. In response, the city of Izamal and their allies attacked Chichen and drove the Itza from their city. Many of the surviving Itza eventually left the Yucatan and moved south to the Peten, where they founded a new island capital by the name of Tah Itza (the present location of Flores, Peten).

Following the fall of Chichen, the Cocom family of Mayapan became the most powerful lineage in the region. To centralize their control over the eastern Yucatan peninsula, the Cocombs demanded that the leaders of all allied provinces had to live at Mayapan. This "League of Mayapan," as it was known, included about 16 provinces or city states. One of these provinces, the province of Chetumal, extended from southern Quintana Roo to the Belize River; its capital was located just outside of Corozal Town at the site of Santa Rita. The city of Santa Rita, or ancient Chetumal, was under the control of the Can family.

In 1441, the Xiu lineage led an uprising against the Cocombs, who were eventually defeated, their leaders sacrificed, and their followers driven from Mayapan. Thereafter, the League of Mayapan disbanded and what had been a unified Maya state reverted back to sixteen rival provinces that became embroiled in civil wars until the arrival of the Spanish.

THE SPANISH CONQUEST AND ITS AFTERMATH

A Late Postclassic Maya chronicle, known as the “Book of Chilam Balam of Chumayel,” notes that “11 Ahau was when the mighty men arrived from the east. They were the ones who first brought disease here to our land, the land of us who are Maya, in the year 1513.”

The first contact between Europeans and the Maya, however, had been made in 1502 when, during his final voyage to the New World, Columbus came across a trading canoe near the Bay Islands in the Gulf of Honduras. Columbus recorded that the canoe was very long, about 8 feet wide, and that it had a crew of 24 men plus a number of women and children. The cargo in the canoe included cotton clothing, cacao, copper bells and axes, pottery and macanas (wooden clubs inlaid with obsidian chips). It is believed that the trading party was headed from the Yucatan to the Motagua valley.

The next recorded contact between the Spaniards and the Maya came in 1511. A Spanish vessel under the command of an officer named Valdivia was sailing from Panama to Santo Domingo (Dominican Republic). The boat sank on the way, but Valdivia and 18 of his men managed to escape in a small boat. For fourteen days, they drifted westward and seven crew members perished from exposure and dehydration. The small boat eventually beached along the east coast of the Yucatan. The exhausted survivors were captured by the Maya, and Valdivia and four of his men were shortly thereafter sacrificed during a feast. Eventually, only two Spaniards, Geronimo de Aguilar and Gonzalo Guerrero, remained alive. When Cortes reached the Yucatan in 1519, Aguilar was still serving a Maya lord, while Guerrero had married the daughter of Nachan Can, ruler of Chetumal (Santa Rita, Corozal).

Between 1515 and 1516, a great pestilence known as the *mayacimil* (or “easy death”) devastated the Maya people along the eastern coast of the Yucatan peninsula. Characterized by great pustules that rotted their bodies with great stench” (Sharer 1994: 733), it is believed that this epidemic may have been caused by small pox that had been introduced by the Spanish. Not having any immunity to this new disease, many Maya died within days of contracting it.

The years between 1515 and 1524 witnessed several more encounters between the Maya and the Spaniards. It was also during this time that Cortes sailed to Veracruz and proceeded with the conquest of the Mexica (Aztec) people. Another of his trusted captains, a man named Pedro de Alvarado, subsequently attacked the Cakchiquel and Quiche people in Guatemala. Following his brutal conquest of the highland Maya, Alvarado established the first Spanish capital of Guatemala at Iximche.

Cortes made the most astounding expedition of the time in 1524. Having received word that one of his captains, whom he had sent to control Honduras, was rebelling against him, Cortes decided to march from Mexico City to Honduras to deal with the problem. This long (6 months) tortuous journey took Cortes, his 140 soldiers, and about 3,000 native allies through the heart of the Maya lowlands. On the way, they briefly stopped at Tah Itza (Flores, Peten) where they met with the Peten Itza ruler Canek. From Flores they traveled to the southeast, crossing the Sarstoon River at the Gracias a Dios rapids near the border between Belize and Guatemala.

The conquest of the Yucatan was undoubtedly the most prolonged and difficult campaign attempted by the Spanish. Francisco Montejo the elder led the first unsuccessful attempt. Following 13 years of failure, Montejo eventually (in 1540) entrusted the conquest of the Yucatan to his son, Francisco Montejo the younger. Several more years of difficult campaigning followed and finally, in 1546, most of the northern portion of the peninsula came under Spanish control. The city of Merida was founded in 1542 and served as the capital of the region and the base for further Spanish incursions to the south.

Like their brethren to the north, the Maya of Belize and the Peten remained defiantly independent long after the fall of other Mesoamerican people. Many years after the conquest of the northern Yucatan, the Spanish moved into the province of Uaymil. They erected a fort on the shores of Lake Bacalar and there attempted to convert and subjugate the Maya to the south. In 1618, two Spanish priests, Fray Bartolome de Fuensalidas and Juan de Urbita, journeyed from Bacalar to Tah Itza. On the way these Franciscans journeyed up the Dzuluinicob (or New) River, making stops at Lamanai, Zaczuus (near Roaring Creek), Tipu (Negroman), and eventually reaching Tah Itza about six months later. We know that at Lamanai, Zaczuus and Tipu, the Spaniards constructed churches for the christianization of the Maya. At Tah Itza, they were not so welcomed and the padres eventually left and returned to Merida.

A second expedition was led into the interior by Francisco Mirones in 1622. Mirones was accompanied by another Franciscan missionary, Fray Diego Delgado. 20 soldiers and about 140 native allies. Annoyed at Mirones' treatment of the Maya, the priest decided to leave the expedition at a community known as Sacalum. Following their arrival in Tipu, the padres headed west with several Tipuans, but when they reached Lake Peten, they were captured and sacrificed. Two years later, the Maya also attacked Sacalum, where they captured Mirones and his men and sacrificed them as well. The next few years saw revolts by the Maya of Tipu, Zaczuus and Lamanai. Churches that had been built in these communities by the Spanish were all burnt and destroyed. Eventually, the Spaniards built a second church at Lamanai, but they made few other incursions into the south for nearly 75 years.

Between 1695 and 1696 the Spanish decided to subjugate the Peten Itza by force. Several battles followed, but the Itza managed to stave off the Spaniards. Finally, on January 14th, 1697 an expedition headed by Ursua left Campeche on a newly constructed road to Lake Peten. Following their arrival, the Spanish began preparations to storm the city. On the 13th of March, they placed their guns on galleys and headed out to the lake. After repeated requests to the Maya to surrender, the Spaniards opened fire. The last independent Maya city was finally destroyed on that 13th day of March in 1697.

Beginning over 450 years ago, the Belize Maya faced the then greatest power, Spain, and fought courageously to defend liberty. The examples of these early inhabitants of Belize should instill in us the courage and pride to keep our heads high in today's world and not lose the basic sense of what it means to identify ourselves as Belizeans and have a true and lasting commitment to Belize.

SKILL CHECK

This Skill Check is designed to prepare you for the assessment that will be administered at the end of the chapter.

ANSWER THE FOLLOWING QUESTIONS

1. Describe the origins of the first native Americans. How did they come to Central America? How did they live (were they hunters, farmers, etc.)?

2. When do archeologists think that the first Maya arrived in Belize? What evidence do they have to support their ideas?

3. Describe three important aspects of Maya culture that arose in the Preclassic age.

4. What is the Classic Period when did it occur, how long did it last, and what were the major achievements of the Maya during this period?

5. Maya civilization is thought to have suffered a major decline between 800-900 A. D. Describe two major theories that explain this decline. What is currently the most widely held theory for this decline?

6. When did the Spanish arrive in the Maya world? Describe the nature of early Spanish-Maya contacts?

7. What was the last Maya city to be conquered by the Spanish? When? What subsequently happened to the Maya of Belize?

UNIT 2: LIFE IN THE MAYA WORLD

This unit will provide an overview of the cultural achievements of the ancient Maya, looking at the sciences, arts and architecture, rituals and religion.

OBJECTIVE:

1. At the end of this unit, you will be able to:
2. Explain some of the science that was used by the ancient Maya in the different periods highlighted in the previous section.
3. Describe the cultural achievements of the ancient Maya.
4. Describe the arts and architecture of the ancient Maya
5. Discuss the rituals and religion of the ancient Maya.

AT A GLANCE:

1. The Maya of Belize and their Neighbors
2. Cultural Achievements of the Ancient Maya
3. Commonly Asked Questions about the Maya



THE MAYA OF BELIZE AND THEIR NEIGHBOURS

Throughout the preceding section we have noted that, from the time of their arrival in Belize, the Maya of this nation never lived in isolation. A growing body of evidence suggests that from Preclassic times there was increasing contact between them and their neighbors. During the early years of development (1200 - 600 B.C.), much of their ideology reflects influences from the Olmec people of the Tabasco-Veracruz area. These influences are manifested by the incorporation of many Olmec-like symbols on their ceramics and by the presence of Olmec-like artifacts at many Maya sites.

During the Classic period, contacts with other regions continued to be maintained for the acquisition of exotic materials that served both utilitarian and nonutilitarian purposes, and for sociopolitical reasons. Jade was imported from the Motagua valley, obsidian from the Guatemalan highlands, and marine shells from the Caribbean and Atlantic coasts. The Belize Maya also exported many objects and produce to their neighbors. The raw material for the large slate stela at Calakmul, for example, was undoubtedly shipped by river and overland routes from the Maya Mountains. Contacts with even more distant locations, like Teotihuacan, are indicated by the presence of Pachuca obsidian from sources near Mexico City. This green-colored obsidian has been found at Altun Ha, Pacbitun and several other sites in Belize.

Unlike the tangible remains of trade items, sociopolitical relations with other states are predominantly inferred from hieroglyphic data carved on the monuments of important sites. The conflicting relations between Caracol and Tikal, for example, are recorded on the central marker of the ballcourt at Caracol. In the same way, relations between Copan and sites in southern Belize are indicated by the presence of the Copan emblem glyph on one of the stelae at Nim Li Punit. During the Postclassic period, trade and contact was even more widespread than before. A beautifully painted mural that was discovered at the turn of the 20th century by Thomas Gann at Santa Rita reflects strong influences from the Mixteca people of Oaxaca. During this same period, the Maya of Belize imported highly fired Plumbate pottery from the Pacific coasts of El Salvador and Guatemala. The introduction of metallurgy and/or the presence of gold and copper objects during the Late Postclassic also provide evidence of contacts with areas (Costa Rica to Columbia) even further to the south.

CULTURAL ACHIEVEMENTS OF THE ANCIENT MAYA

Maya Society

It was in the lowland areas of Central America that Maya civilization reached its cultural pinnacle. Testimony to their achievements are the many splendid cities with towering temple pyramids, large palaces, courtyards, monuments and shrines that are found in the jungles of Guatemala, Belize, Honduras and southern Mexico. These centers were all constructed without beasts of burden or wheeled vehicles, and many were connected by causeways or roads known as *sacbeobs*. The longest *sacbe* currently known extends more than 100 kilometers (62 miles) and connects the sites of Coba and Yaxuna in the Yucatan.

Within the center of the large cities lived the elite rulers of ancient Maya society. The right to rule was hereditary and power was predominantly passed from father to son. There are, however, records of occasional female rulers at some lowland sites. *Mos** members of the community lived beyond the city centers. This support population generally lived in large thatched buildings that were constructed above masonry platforms. Like the elite, their buildings were also organized in *plazuela* fashion. At times, large underground chambers, known as *chultunes*, were constructed near the plazas and used for cisterns, storage or other purposes.

Recent archaeological discoveries have noted that Maya social and political structure was far more complex than previously believed. There was extensive interaction between cities: intermarriage among elite families, economic as well as military alliances. Certain major cities served as regional capitals as well as religious centers. These would exert considerable control over smaller neighboring principalities.

Archaeologists working at Caracol and other sites believe that Maya society was not simply divided into two classes (the nobility and peasantry), but that they had a large middle class. They argue that the middle class included artisans, craftsmen, merchants, administrators, warriors and overseers who also had the means to acquire many of the fine objects that the aristocratic elite enjoyed. At the bottom of the social ladder were commoners and slaves. The latter were predominantly individuals captured in battle or poor families who were unable to support themselves.

Agriculture

Ancient Maya agriculture can be divided into two types: extensive systems and intensive systems. Extensive systems are primarily represented by milpas. This slash-and-burn method of farming required large tracts of available land, because fields had to lay fallow every so many years. Intensive forms of agriculture included kitchen gardens, terrace systems, raised fields, drainage canals, tree cropping, and alluvial valley systems. Evidence for extensive hillside terracing has been discovered throughout the Vaca Plateau and Maya Mountains. Raised fields and canals have been studied in northern Belize (i.e. Pulltrouser Swamp in Orange Walk) and in the Belize River Valley (near Baking Pot). The Maya cultivated diverse crops including maize, beans, squash, amaranth, chili peppers, sweet potatoes, manioc, cotton, tobacco, and chaya. Fruit trees were also plentiful and were represented by avocado, cacao, kinop (Waya), anona (custard apple), caimito (star apple), and craboo.

To supplement their diet, the ancient Maya harvested shellfish from the rivers and sea and they caught both freshwater and marine fish. They also hunted many of the small and large mammals inland. Spanish records further report that they had domesticated turkeys, dogs, possibly deer and a stingless bee which provided honey for sweetening drinks (Cacao) and other foods.

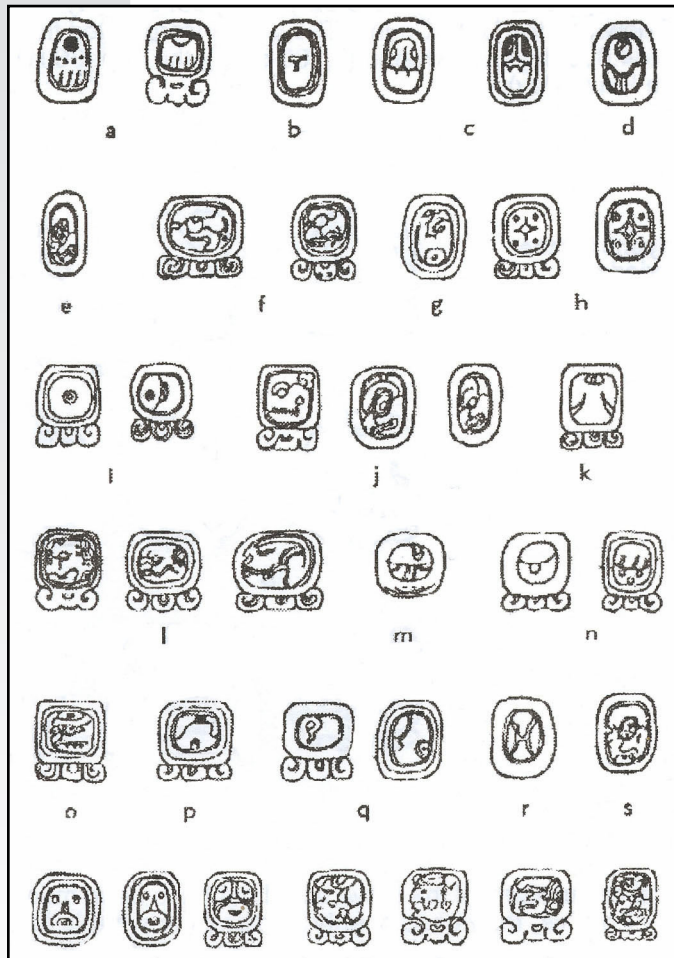
Astronomy, Calendrics, and Mathematics

The Maya were among the most advanced astronomers of their time. They used monuments, buildings and wooden implements to make fixed lines of sight for observing celestial bodies. Evidence has been found to confirm that they recorded the passage of the sun, moon, and Venus, and that they also measured the changing location of the Pleiades. They predicted lunar eclipses and computed the length of a tropical year as 365.2420 days. Modern astronomy, with the use of sophisticated scientific instrumentation, records this year as actually consisting of 365.2422 days and demonstrates that, despite their stone tool technology, the Maya were incredibly accurate. The astronomical data compiled by the Maya were used to develop two calendrical systems that served both practical and religious purposes. These included the Haab, or solar calendar, and the Tzolkin, or ritual calendar.

The Haab was divided into eighteen months (uinals) of twenty days each. To this total, of 360 days (tun) were added five days (uayeb) that some people suggest were unlucky days.

The tzolkin, or sacred, almanac was made up of 13 months of 20 days that summed up to 260 days *When combined, dates in the two systems only reoccurred every 52 years. This event would mark the completion of a Sacred Round.

Figure 21. Drawing of Glyphs for the twenty Maya Days



To compute time spans longer than the 52 year cycle, the Maya developed a system of recording known as the Long Count. The latter incorporated five segments of time: the Baktun (144,000 days); the Katun (7,200 days); the Tun (360 days); the Uinal (20 days); and the Kin (1 day),

Figure 22. Diagram illustrating the meshing of the 260 almanac (left wheel) with the 365 day year (right wheel)

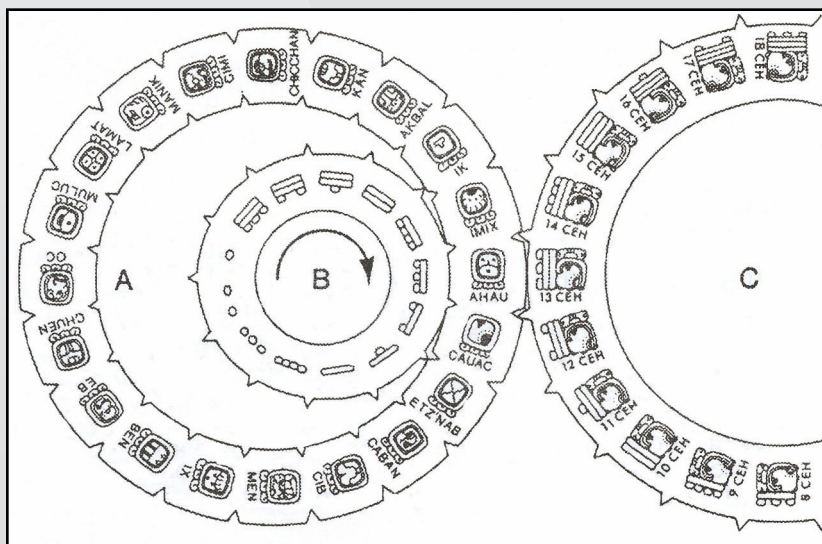
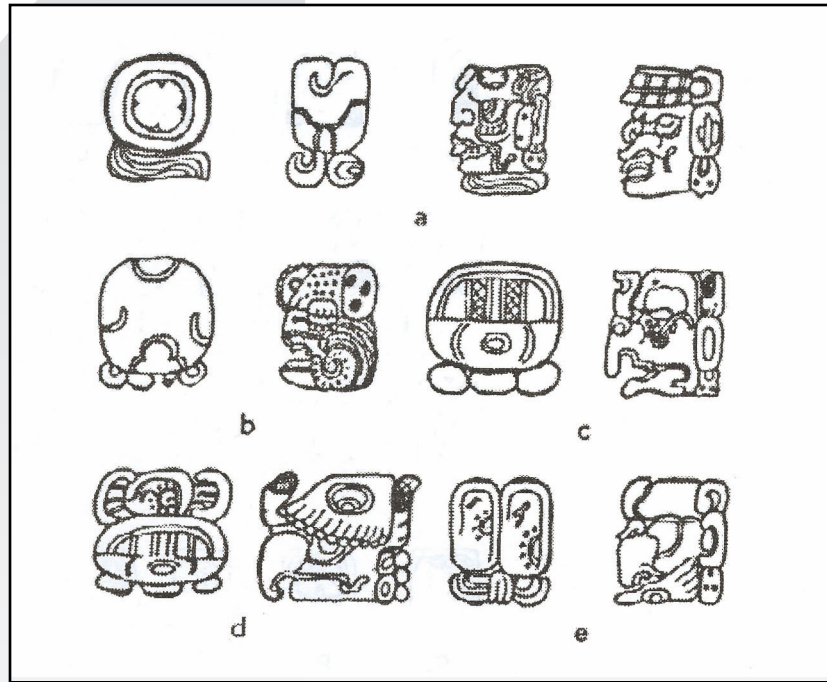


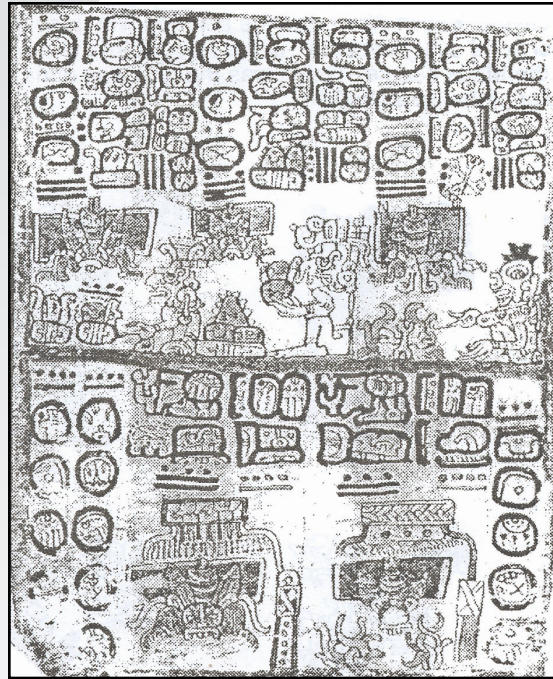
Figure 23. Drawing of Glyphs for the Maya time periods

The calendrical calculations of the Maya could not have been made without a sophisticated system of mathematics. For this, they used twenty numerals in what is known as a vigesimal (rather than a decimal) system. The numbers 1 to 19 were recorded in two ways: as bar and dot symbols, where a bar equaled 5 and a dot equaled 1, and by head variant numerals, where glyphic symbols of human or god heads represented the actual number. Another facet of Maya mathematics was the use of zero. Only two other cultures in the world, the Babylonians and Hindus, are known to have developed the concept of zero independently. The use of zero and the decimal system of mathematics were only introduced to Europe in the Middle Ages. The Maya were using their mathematical system long before the birth of Christ.

Writing

Maya hieroglyphic script represents the most advanced system of writing in all of PreColumbian America. Referred to as a logographic system, it combines phonetic symbols with logograms. Hieroglyphic inscriptions were predominantly used by the elite to record events such as the birth, accession and death of an important ruler, their hereditary right to rule, and their success in military campaigns. Other uses included almanacs that contained important ceremonial events and their accompanying rituals. The medium used for much of their writing were large stelae and monuments, ceramics, ornaments, wooden lintels, and bone. Most Maya script, however, was likely recorded on folded books that were produced from the bark of the wild fig tree and lime plaster. Today, four of these codices, dating to the Postclassic period, have been discovered. Known as the Paris, Madrid, Dresden and Grolier Codices, they are presently preserved in Europe and the United States,

Figure 24. A Page from the Madrid Codex containing information on beekeeping



Cosmology and Religion

The Maya perceived their universe as having a four-sided earth that, like a crocodile or turtle, floated in the primordial sea. Each cardinal direction was associated with a color: North – white; South – yellow; East – red; and West – black. Vertically, their universe had three levels. Above were the heavens, home to various gods and sky deities, In the middle was earth, with four deities, or bacabs, at its corners and the sacred Ceiba (Yaxche) tree of life at its center, Below was the watery underworld. Known as

Xibalba or Metnal, the underworld was filled with evil gods, diseases, and the spirits of dead ancestors. The sacred Ceiba transcended all levels because its branches held up the heavens, its stem was planted on earth and its roots descended into the underworld.

The Maya believed that the world had been created and destroyed several times. Humans had been created three times. In the first creation, they were made from clay, in the second, from sticks; and in the third, from corn. The last creation dated to 3114 B.C. and was expected to end in the year 2012 A. D.

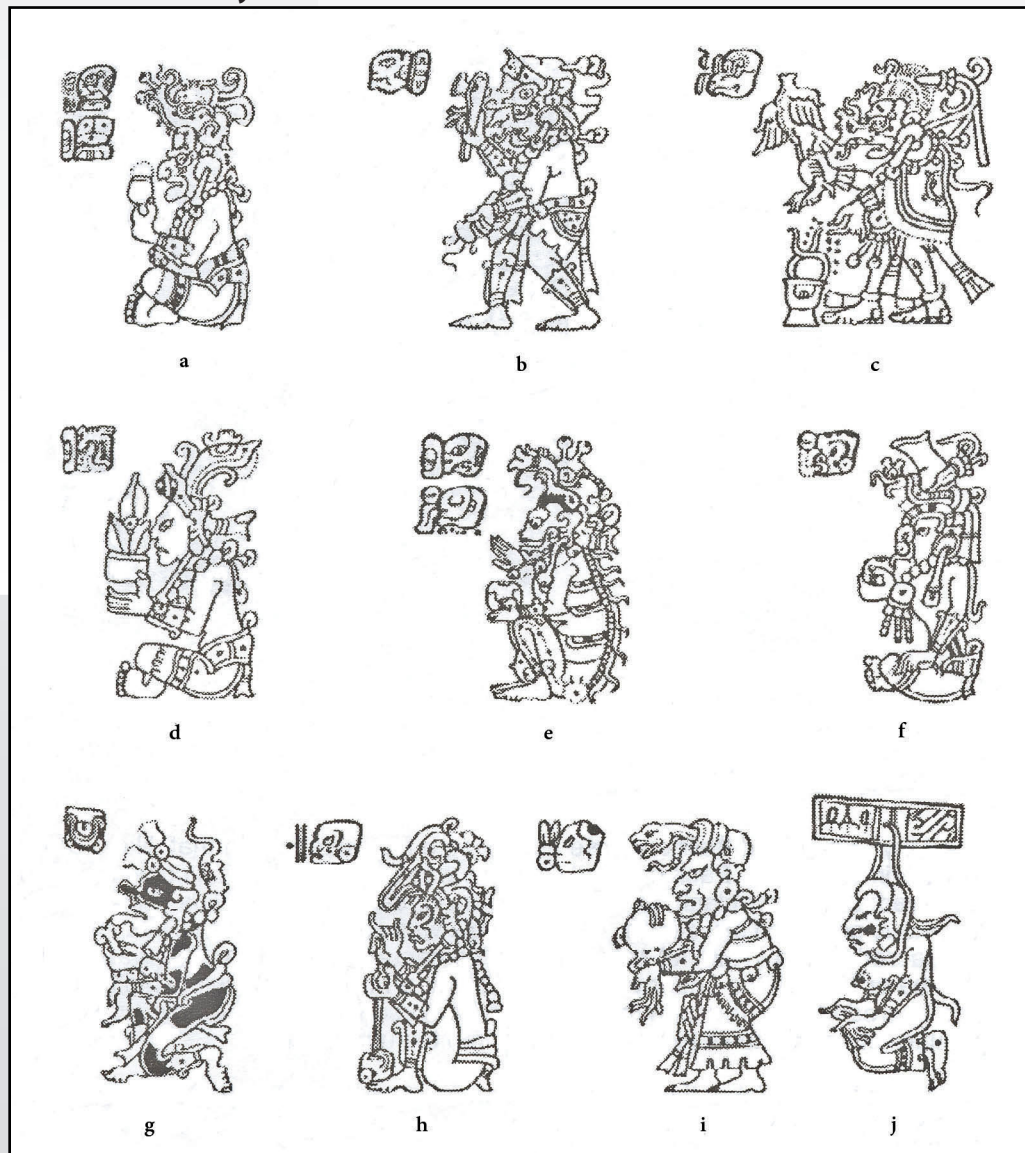
In Maya religion, objects that we consider to be inanimate had spirit. They believed in numerous gods that were dualistic (two-sided) in nature. For example, a benevolent Chac (rain god) brought rain to nourish crops, a malevolent Chac brought hurricanes, hailstorms and floods. Their supreme deity was known as Hunab Ku, and because he was believed to have no body or form, they never produced effigies or other graphic representations of him.

Most of their other important gods were associated with agricultural fertility. The four Chaos controlled the corners of the world and resided deep within the underworld. In times of drought, important rituals that included offerings of agricultural products, plants, and the sacrifice of men, women and particularly children were made to the rain god deep within caves. Kinich Ahau was the sun god who rose in the east and withdrew into the underworld every evening. Itzam Na, one of the most important deities, was the provider of all things to the Maya people. Ixchel was the goddess of healing and Yum Cimil or Kisin was god of death and ruler of the underworld.

Maya life was closely guided by the many gods in their pantheon. Every ceremony had its prescribed ritual, which generally included the burning of copal incense, votive offerings and, every so often, autosacrifices, human sacrifices, or ritual bloodletting. One of their most important ceremonies was the ritual ballgame. The number of players was generally influenced by the size of the court. The game was played with a hard rubber ball that was directed from one side of the court to the other by use of one's legs, hips and shoulders. The bouncing ball was synonymous with the movements of the sun from its birth in the east to its death in the west. Games that followed the capture of important elite warriors traditionally ended with the symbolic defeat of the enemy and the sacrifice of the captured noble.

Another important ceremony was the Cha Chac ritual. This event was predominantly celebrated at the start of the agricultural cycle and its main purpose was to petition the rain gods to bring needed rain at the end of the dry season. For this ceremony, people would gather around a wooden altar placed near the entrance of caves or cenotes. Offerings of atole (corn porridge), beans, tamales, tobacco, and other goods were then presented to the Chacs by one or more priests and their assistants.

Figure 25. Depictions of several Maya Deities



Architecture and Art

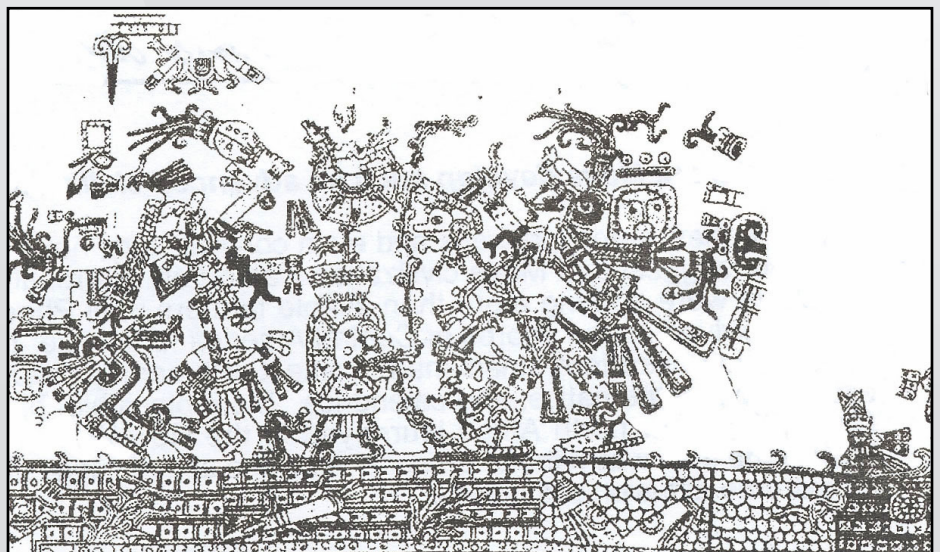
Maya architecture traditionally enclosed a patio or courtyard. These so called “plazuela groups” formed the basic living unit or household. Within site centers, many of the large and important temple pyramids were located on the east side of the courtyard. Long, range type buildings or palaces flanked these temples and served as residences for the ruling elite and for administrative purposes.

Many of these structures were roofed by use of the corbelled arch. This arch consists of two sloping walls that converge until the space between them can be spanned by a single slab of stone. Because massive weight from above is required to hold the arch together, the rooms within vaulted buildings seldom could exceed ten to twelve feet in breadth, but there was no limit to their length. Outside the site core, people of high status duplicated the architecture of the core but on a much smaller scale. In contrast, common folk constructed low platforms on which they erected thatched wattle and daub buildings that served as both residences and shrines. Beside palaces, temples and residences, the Maya also constructed astronomical observatories, sacbeobs (causeways), reservoirs, bridges, ballcourts, sweat baths, chultunes (underground chambers), and dams. The most famous observatory is a structure known as the “Caracol,” located at the site of Chichen Itza. In Belize, remains of Maya bridges have been found at Pusilha and Baking Pot, and a large dam is situated at a small site near the Raspaculo Branch of the Macal River.

Maya art is often divided into two types: monumental and portable. Monumental art was predominantly produced on stone or from lime plaster that was stuccoed on to buildings. The former includes carved stelae and altars, three-dimensional sculpture such as the zoomorphic figures discovered at Quirigua and Copan, and painted murals like the ones found by Thomas Gann at Santa Rita, Corozal, or that found on the interior palace walls at Bonampak. Art produced from lime plaster generally consists of masks which flanked the stairways of temples (e.g. at Lamanai) or stucco friezes like those from Xunantunich.

Portable art is far more common at Maya sites and was produced using diverse mediums such as bone, wood, shell, stone, ceramic, and other perishable materials. Ceramic figurines were particularly common during the Middle Preclassic and Terminal Classic periods. Wooden objects were also undoubtedly popular throughout Maya prehistory but because they do not preserve well, few objects made from this material have been discovered.

Figure 26. Illustration of a Postclassic Mural discovered at Santa Rita by Thomas Gann in the early 1900's



CONCLUSION

Classic period Maya culture was, without doubt one of the world's most complex and advanced prehistoric civilizations. Even after their arrival in Central America, for example, the Spanish were still using the very inaccurate Julian calendar that was developed by Roman emperor Julius Caesar. In comparison, the Maya had been using their 365 day Haab or solar calendar centuries before the Spanish crossed the Atlantic.

Maya society was responsible for producing some of the most celebrated prehistoric art. Using nothing more than stone tools, they carved beautiful images in jade, granite, basalt and limestone. Their artisans painted lifelike images on temple walls and on finely made ceramics. Their merchants traveled far and wide exchanging local goods for exotics that served to quench the desire for status objects and needed raw materials.

In the countryside, it was the farmer's responsibility to produce more and more food for an ever-growing population. Indeed, as the populace increased, farmers were forced to bring more and more land under cultivation. In the mountains, they responded by constructing miles upon miles of stonewalled terraces. In the low-lying areas, they created drained fields and floating gardens, while the rich river valleys were used for raising cacao groves and the production of surplus corn.

Competition for resources led to conflicts between cities, the formation of regional alliances and ultimately war. And to ensure that the cycle of life continued unbroken, priests and rulers gave of their blood, or offered children and captives in sacrifice to their ever-capricious gods.

Maya culture was, therefore, as humanistic as it was violent. It was as creative as it was destructive, and like cultures in every part of the world, it made every effort to assure its own survival. This resiliency continues today, as the Maya people continue to fight for their survival in an ever-changing and sometimes oppressive world.

COMMONLY ASKED QUESTIONS ABOUT THE MAYA

1. Why did the Maya develop such an advanced civilization?

Many theories, some ludicrous and even contradictory, have been proposed. Some researchers, for example, suggest that Maya civilization was purely the result of external influences. They argue that the Maya were nothing more than simple farmers Phoenicians Carthaginians, or people from Atlantis arrived on the shores of Central America to “civilize” them. Still others, like Eric Von Daniken suggest that extra-terrestrials made contact with earthly cultures and in the process taught them their astronomy, mathematics, and calendrics. More plausible, but difficult to prove, is that seafarers from China, Japan or north Africa journeyed to the New World and brought with them more advanced knowledge than was hitherto present. All of the above suggestions can be placed in what we categorize as extreme diffusionist theories.

Less extreme diffusionists propose that civilization was first developed in highland Mesoamerica and subsequently introduced into the Maya lowlands. Several Mexicanists have also argued that the Olmec represent the primary complex culture in Mesoamerica and deserve to be considered the “cultura madre” (mother culture) of the Maya, Zapotecs, Huastecs and other peoples of the region.

Few archaeologists, however, believe that the development of civilization can be so easily explained. Most argue that it was a gradual process that combined a number of interrelated factors: ecological adaptation, temporal and spatial diversity, unity of elite subculture, interaction, competition and ideology.

The Maya region, like greater Mesoamerica, is diverse in terms of its environment and resources. The exploitation of local resources and the development of intensive agriculture led to a steady increase in population. Over time, villages became towns and towns gradually evolved into large city centers.

Different regions of the Maya area were also occupied by a diverse group of people who spoke one or more dialects of Maya (Choi, Chontal, Yucatec, Tzeltal, Mam, Quiche, etc.). Because Maya cities were probably independent chiefdoms, the territory controlled by one group changed over time or under different rulers. As a result of interactions, conflicts and alliances with other communities, the character of these Maya cities and their civilization was constantly changing. The different character of Maya cities, the elite desire for exotic status symbols such as jade, quetzal feathers, and marine products, their use of writing and calendrics for propaganda, and their construction of monumental palaces and temples all helped to fuel the economic development of civilization. Trade between the Maya people and Mesoamericans to the northwest and lower Central Americans and South Americans to the southeast also led to the movement of many resources, people and especially ideas. Trade and exchange therefore fostered increasing economic activities that may have led to the development of specialization and regional markets.

Sometimes competition for resources (land, etc) and for economic control of exchange goods led to conflict between communities and cities. Victorious leaders were able to control captured regions, enact tribute, and thereby increase their prestige and influence. All these things in combination, along with a strong belief in the power of their gods and religion, were what undoubtedly led to the establishment of the New World’s most sophisticated civilization.

2. Were the Maya peaceful people?

Our previous image of the Maya as peaceful, primitive farmers practicing a rather complex religion and being guided by priest-astronomers is no longer valid. Their art, architecture and monuments provide overwhelming evidence that they were fiercely warlike. That they used advanced systems of agriculture, had developed extensive trade networks, and participated in bloody religious rituals that included various forms of auto and human sacrifices.

3. Did the Maya ever develop the wheel?

It is commonly believed that the Maya never developed the wheel, but recent evidence suggests otherwise. Several small figures, or toys have been found that have animal effigies on top of platforms with wheels. This suggests that they did know of this technology, but chose not to use it in the way that Europeans and other cultures employed it. The fact that the Maya did not have beasts of burden may have also influenced their choices.

4. Where did the Maya go? Did they simply disappear?

The Maya never truly left the region. Some areas, like the Central Lowlands were abandoned, but Maya civilization continued to thrive in the northern Yucatan Peninsula and in the highlands of Guatemala. When the Spanish arrived, they were also still living in Belize and the areas mentioned above. Today, these enduring and resilient people live on in Central America. In places like Guatemala and Chiapas, they make up more than half of the population. In modern Belize, descendants of the ancient Maya are represented by the Mopan and Kekchi groups in Toledo District, and by the Yucatec groups that inhabit the Cayo, Orange Walk and Corozal Districts.

5. What did the Maya use for money?

The Maya never really had a currency in the true sense of that word. Their system of exchange was primarily based on barter, where goods were exchanged for other goods of equal value. In some cases, however, goods were valued at rates based on a number of Cacao seeds. Because of this we can say that the use of Cacao in their system of exchange was the closest thing they had to a monetary system.

6. Why did they make their steps so high?

People often remark that the steps that lead to the top of Maya temples are incredibly high when one considers the fact that the Maya were relatively short people. In truth, their steps are high but one must understand that their temples were not made for anyone and everyone to climb. These places were sacred, they were only used for important rituals, and were only accessed by elite rulers, priests and their assistants. Their height also influenced the way these people climbed them. In other words, rulers, priests, etc., would have had to climb them with much dignity and obeisance, possibly on hands and feet in a sign of respect to the deities they were about to worship.

7. Did the Maya use gold?

The Maya did use gold, but only began to do so during the Postclassic period. Gold was not their precious stone jade was. Most of the gold they used was also acquired from lower Central America and from Mexico. Several small pieces have been found at Lamanai and Santa Rita, and many more were dredged out of the cenote at Chichen Itza.

8. What did they use for paints?

Most paints used by the Maya were produced from plants, minerals, and small creatures. Red, for example, was produced from either hematite (ochre), the anato seed, or from the cochineal bug. The color blue was derived from a special type of clay called atapulgit.

SKILL CHECK

This Skill Check is designed to prepare you for the assessment that will be administered at the end of the chapter.

EXERCISE 1: ANSWER THE FOLLOWING QUESTIONS

1. How do archeologists currently believe Maya society was structured?

2. What types of agricultural systems did the Maya use? Why did they use these systems? What crops did the Maya domesticate and grow?

3. Describe two ways in which the Maya were advanced in the area of astronomy and mathematics.

4. What system of writing did the Maya use? _____

5. What was the traditional form of architecture used by the Maya?

6. Where did the Maya go when they abandoned their large cities?

EXERCISE 2: INTERPRETATION

1. Give a 5minute interpretative talk on how the Maya calendar works, and the reasons they may have used such a calendar.

2. Explain Maya beliefs about the universe and its structure, using interpretation to tell the story.

UNIT 3: ARCHAEOLOGICAL SITES OF BELIZE

This unit will provide an overview of the different Maya sites in Belize, information about what is currently known about the sites, their time of occupation, their importance, and the research that has taken place and is taking place at these sites. This will further your knowledge and understanding of the ancient Maya world and enable you to incorporate important information into your interpretative presentations.

OBJECTIVE:

At the end of this unit, you will be able to identify and provide archaeological sites that exist in Belize.

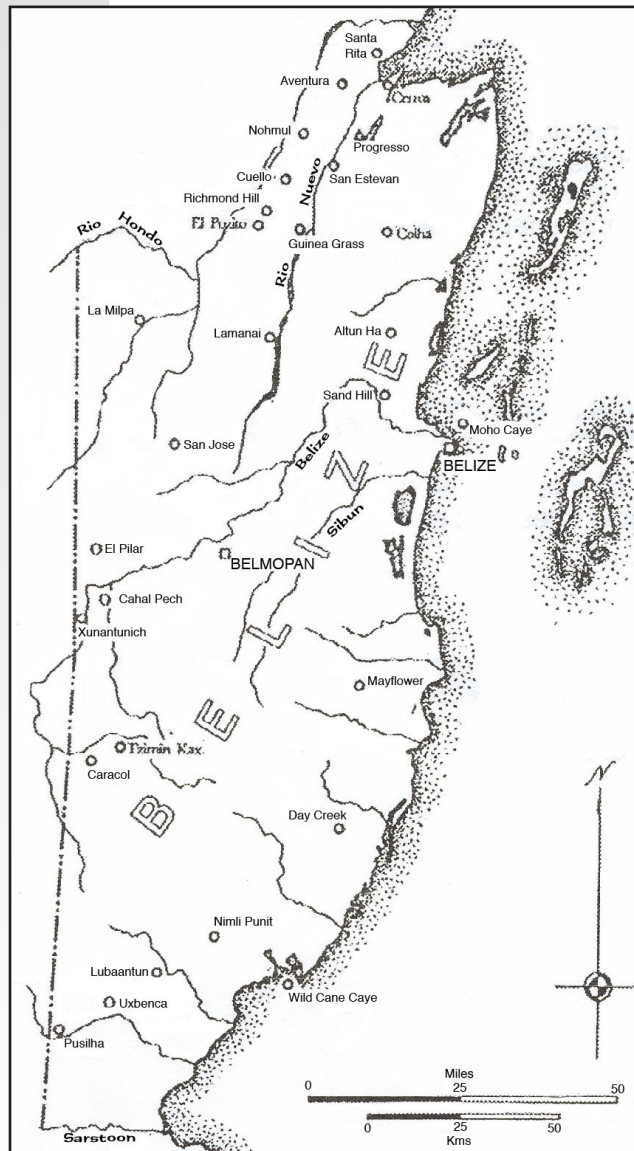
AT A GLANCE:

1. Maya Sites of Belize



THE MAIN MAYA SITES OF BELIZE

Map 11. Map of Belize indicating major archaeological sites opened for tourism



The following provides a brief background on the major Mayan sites of Belize. Other centers, such as Chan Chich and La Milpa, can also be accessed, but presently there have been no developments of these sites for tourism purposes. The latter are also on private property and permission to visit them must be approved by Chan Chich Lodge and the Programme for Belize, respectively.

The Maya have been in Belize for close to three thousand years. During that time, they have occupied our coastal swamps such as those near Cerros and Colson Point, they have inhabited many of our cayes, such as Ambergris, Moho, Wild Cane, and Caye Caulker. exploited our mountains, and conducted ceremonies in caves like those at Barton Creek, Rio Frio, Eduardo Quiroz, Petroglyph and the Chiquibul. In many cave sites, the Maya also collected precious sacred water and even mined for clay and minerals. On many of our coastal savannas, they left behind mounds of flint chips as they worked these stones to produce projectile points and other implements for local use and for export. The ancient city of Colha on the old Northern Road represents one of the largest flint tool factories in the Maya world, if not also in Mesoamerica. In the mountains, particularly near Mountain Pine Ridge, can also be found small single mounds or cairns adjacent to granite quarries, where durable materials for metate and mano-making implements have been discovered.

The following information will highlight 14 accessible Maya sites in Belize, providing general information for tour guiding at these centers. Like the archaeologists who study and excavate these ancient sites, tour guides can learn more about the ancient people who lived in these cities by visiting the sites and by comparing and contrasting them with each other. The sites examined are:

- a. Santa Rita
- b. Cerros
- c. Lamanai
- d. Nohmul
- e. Cuello
- f. Altun Ha
- g. Xunantunich
- h. Caracol
- i. Pacbitun
- j. CahalPech
- k. El Pilar
- l. Lubaantun
- m. Nim Li Punit
- n. Uxbenka

In ancient times, the Maya occupied parts of Mexico, all of Belize, Guatemala, El Salvador and parts of Honduras. Maya borders did not follow the political boundaries of today. Just prior to European conquest, the northern part of one Maya province lay in what is today's Quintana Roo the southern part was in Belize, with the southern extremes including Guinea Grass and Northern River.

1. SANTA RITA

Santa Rita is located on the outskirts of Corozal Town and is bordered on the east by the Caribbean Sea. It is near the Coca Cola factory just off the main road leading to the border town, Santa Elena, on the way to Mexico.

Santa Rita was probably the ancient coastal trading city known as Chetumal during the Late Postclassic period. Ancient Maya Chetumal was not today's Mexican Chetumal, but what is now Santa Rita. The area at one time had extensive raised fields that supported large cacao plantations, and the proximity to the sea also made marine products widely available. Ancient Chetumal, wealthy because of the large production of cacao and honey, ruled the areas on both sides of the Rio Hondo.

Ancient Chetumal belonged to a federation of principalities or ministates called the League of Mayapan. At first, membership in this league was voluntary, but soon one family group, the Cocombs from Sotuta, became dominant and the other principalities were forced to remain members, since their royal families were held by force in Mayapan. In 1441, the Xui family led an uprising against the Cocombs and as a result, the League of Mayapan fell. The ancient Belizean state of Chetumal, run by the Can family, allied itself loosely with the Cocombs, fighting side by side in one of many Maya civil wars just prior to the Spanish arrival.

The Maya chieftain of ancient Chetumal had an unusual son-in-law, a renegade Spaniard named Gonzalo Guerrero. Guerrero and other Spanish soldiers had been shipwrecked in 1511, south of Jamaica. It took the survivors about 13 days to reach the coast of Yucatan. Five Spaniards were sacrificed immediately, but the rest escaped. When Hernan Cortes, conqueror of the Aztecs, reached Yucatan in 1519, only two of the original Spanish shipwrecked survivors were alive: Geronimo de Aguilar and Gonzalo Guerrero.

Cortes naturally wanted to see them and sent messages for them to come and see him. Apparently Guerrero refused the offer, saying he was not free. According to Geronimo de Aguilar (who later became an indispensable translator for Cortes), Guerrero was ashamed to visit Cortes because he had his nose and ears pierced, and his hands and feet tattooed, according to Maya custom. He also had a Maya wife and three children. Guerrero eventually rose to become military advisor to Nachancan, the ruler of Chetumal. Gonzalo Guerrero is looked upon as “the father of the Mestizos” in this area and as the first European to adopt Belize as his own and to fight in its defense.

The Spanish attempted to conquer Chetumal following their success in conquering the Maya of the northern Yucatan. The Spanish conquistador, Francisco de Montejo the younger, sent his lieutenant, Alonso de Davila, south to pacify the Maya principality of Chetumal. Davila requested Chetumal to submit to Spain and pay tribute, but Nachancan, the ruler, disdainfully replied that he did not desire peace and that the only tribute he would pay would be “turkeys in the shape of spears and maize in the shape of arrows.” Davila found the town of Chetumal abandoned, and renamed it Villa Real.

However, the abandonment of Chetumal was part of a well-thought-out Maya plan. They withdrew into the bushes and from there, carried on a campaign of hit-and-run guerilla tactics against the Spanish as they stepped out to obtain food. This proved successful the Spanish forces gradually weakened and, as a result, became prisoners in Chetumal, surrounded by the Maya. Eighteen months later, the surviving Spanish fled south to Omoa, Honduras after a journey of terrible hardships.

The site of Santa Rita dates from around 1200 B.C. Archaeologists determined this date through ceramic comparisons with Swasey pottery from Cuello, one of the earliest types in the area. The Classic period is represented by a building with a series of interconnected doorways and rooms. The central room had a niche where offerings were burnt. Two burials were unearthed here. One burial is of a woman with distinct jewelry and polychrome pottery. The second burial dated to around A.D, 500 and was found inside a large tomb. This burial is probably that of a warlord interred with a ceremonial flint bar representing leadership and a stingray spine used for bloodletting rituals. Postclassic Santa Rita is characterized by the introduction of turquoise and gold ear-flares of an Aztec style.

At the start of the 1900's, British medical doctor Thomas Gann, an amateur treasure-hunter, discovered a beautiful mural in Mixtec style at Santa Rita. Unfortunately, the mural of fresco was destroyed shortly after its discovery by superstitious locals. It was not until Arlen and Diane Chase of the Corozal Postclassic Project carried out systematic excavations between 1979 and 1985 that substantial research was done at Santa Rita.

Today, because of Corozal Town's expansion, much of the site is being destroyed.

2. CERROS

Cerros, also called “Maya Hill”, consist of nearly 53 acres and is located on the Caribbean coast where the New River empties into Corozal Bay. The site appears to have been first settled in the Middle Preclassic, rose to prominence during the Late Preclassic, and was gradually abandoned during the Classic period. According to David Freidel, the economy of the site went from a “local resource dependency during its initial occupation in the Middle Preclassic to regional interaction of goods and services during its final occupations.” Cerros, he argues, was a trading center that relied on the seaborne import of exotics such as jade and obsidian and the export of these and other items inland.

The site includes three large acropolises with several plazas and pyramidal structures. Cerros is particularly famous for having two structures that were decorated with large stucco masks depicting the sun god and Venus. The site also yielded tombs and ballcourts, along with numerous other artifacts. The ceremonial center covers an area of about 8 square kilometers (5 square miles). The tallest structure is 22 meters (72 feet) high. The proximity to the sea has resulted in considerable erosion and, because of this, the beautiful stucco masks have been covered to avoid further erosion.

Thomas Gann was the first to recognize the site of Cerros at the turn of the last century. In 1969, Peter Schmidt and Joseph Palacio visited Cerros and registered the site with the Department of Archaeology. For a brief period, the site was chosen for development as a Maya tourist site. The plan failed to materialize and it was finally surveyed, excavated, and partially consolidated from 1973 to 1979 by David Freidel of Southern Methodist University, Texas. In 1983, further studies on ancient canals, pollen and organic remains were carried out by Cathy Crane of Southern Methodist University.

3. LAMANAI

Lamanai is the Maya word for “submerged crocodile.” The site’s name “Lamanay” or “Lamayna” - was recorded by Franciscan missionaries in the 17th century. It is one of the only sites retaining its original name. Most other sites derive their names from the archaeologist who discovered or investigated them. Archaeologist Dr. David Pendergast, who worked at the site from 1974 to 1988, comments that the name helps to explain the numerous crocodile motifs at the site. Crocodile effigies appear on figurines, vessel decorations, and on the large headdress on a limestone mask at one of the principal structures at the site.

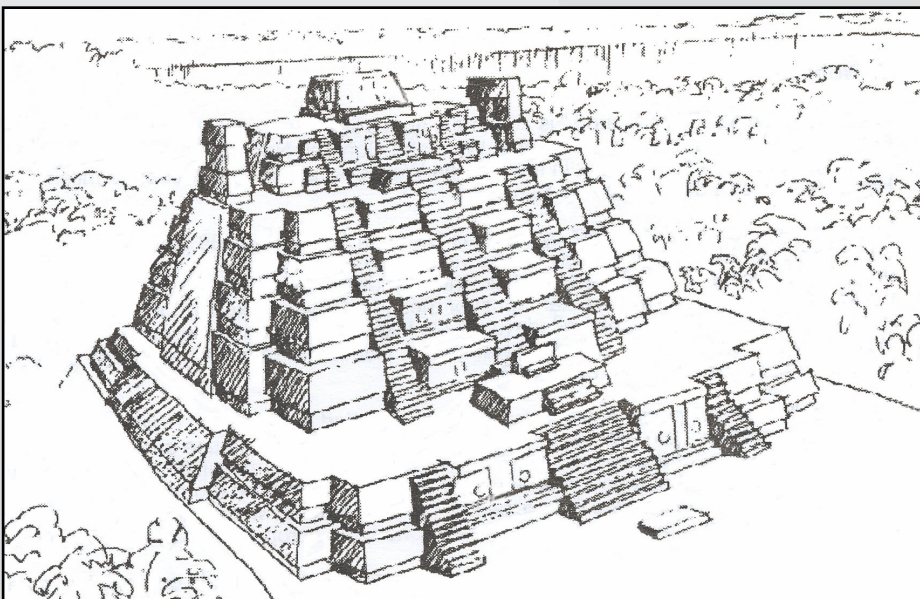


Figure 27. Reconstruction Drawing of Structure N43 at Lamanai, one of the tallest Late Preclassic Temples in the Maya Lowlands

Lamanai lies on the New River Lagoon, and the most spectacular manner to travel to the site is by means of water taxi. Numerous species of water birds live along the river and lagoon. A trip to Lamanai is a nature-lover's heaven. You may even be lucky enough to view iguanas and crocodiles as they bask in the sun on the river banks. There are also interesting flora and fauna to be seen at the Lamanai reserve. Another way to reach Lamanai is by road from Orange Walk through the village of San Felipe.

Lamanai occupies 1.13 square kilometers (.5 square miles) of magnificent rainforest. Evidence gleaned from pollen remains dates the initial settlement of the site to approximately 1200 B.C. Pottery has been found dating to 900 B.C. There is a well preserved Late Preclassic temple with plaster masks dating from around 100 B.C. Later in the Classic period, it appears that areas that were formally ceremonial were transformed into residential areas. In the Post Classic era, the buildings are less imposing, perhaps due to a smaller labor force.

Besides incredible Maya structures, the site of Lamanai boasts the remains of two 16th century Christian churches and a 19th century sugar mill. Lamanai is particularly interesting because the area was pied by three distinct cultures: Maya, Spanish and British. Many Chinese laborers were also brought to the site (in the 1800's) by the British to work on their sugar plantation.

Again it was Thomas Gann, medical officer, who in 1917 first revisited the site of Lamanai. J. Eric Thompson toured the center in the 1930's and William Bullard Jr. did preliminary studies in the 1960's. It was not until 1974 that Dr. David Pendergast of the Royal Ontario Museum, Canada began extensive excavation and some restoration and consolidation of the site. Pendergast's research lasted to 1988. More recently, Dr. Elizabeth Graham of York University and the University of London has resumed work at this important center.

4. NOHMUL

Nohmul, meaning "Great Mound," is 20 meters above sea level and is situated on a low, limestone ridge east of the Rio Hondo between Orange Walk and Corozal. Nohmul lies among sugarcane fields and is actually the highest landmark in the Orange Walk/Corozal area. It is about a mile from the Northern Highway between San Pablo and San Jose.

The site was first recorded 1897 by Thomas Gann. In 1908 and 1909 Gann returned to the site to dig burial mounds which contained polychrome vessels and human effigy figures. Gann continued excavating up to 1936, uncovering tombs and caches which yielded human bones, jade jewelry, shells, polychrome vessels, chultuns, flint and obsidian. Most of these finds were taken to the British Museum. Later on, A. H. Anderson and H. J. Cook visited Nohmul to inspect damages to the site. In 1973, 1974, and 1978, mapping was conducted by Normand Hammond. Hammond returned in 1982 to do a more intensive Nohmul Project, which lasted until 1986.

Hammond's work suggests that Nohmul was first occupied in the Middle Preclassic period. Occupation of the site during the Late Preclassic period was associated with the use of drained fields at Pull-trouser Swamp, to the east of the center. By Early Classic times, it is possible that the site functioned as a regional center, and that it governed much of the area around the modern communities of San Jose and San Pablo. During the Late Classic period, the site's fortunes waned and it was gradually abandoned, used as a residential area. During the Terminal Classic/Early Postclassic period, the acropolis was re-used as a residential area.

Today the ruins of Nohmul represent a major ceremonial center with twin ceremonial groups, ten plazas and a sacbe (raised causeway). There is at least one ballcourt. The main structure is a 50 by 52 meter (162 x 169 feet) structure that is 8 meters (25 feet) high.

Unfortunately, the site continues to be destroyed by road construction crews who bulldoze the mounds for gravel.

5. CUELLO

Cuello is located at the site of the Cuello Rum Distillery about 4 miles from Orange Walk on the Yo Creek road. Cuello is one of the earliest known Maya sites in Belize. Its ceremonial area consists of two adjacent plazas, each with its own pyramid or temple. Two underground chambers known as chultuns are also present near the core site

Normand Hammond was the first archaeologist to investigate Cuello. In 1974, the site was formally registered by Joseph Palacio, then Archaeological Commissioner. In 1975, Duncan Pring and Michael Walton, students working with Normand Hammond, excavated and collected burnt wood for radio carbon dating. In 1976, a six-week excavation season was begun by Normand Hammond. Several burials and caches dating from the Middle to Late Preclassic period were unearthed.

Investigations by Norman Hammond discovered some very early pottery at the site which he subsequently called Swasey pottery (after the Swasey River in southern Belize). Radiocarbon dates initially suggested that this pottery may have dated from between 2600 B.C. and 1500 B.C. Recent dates, however, now confirm that the site was actually first occupied around 1200 B.C. (Andrews and Hammond 1990). Despite this controversy, Cuello has produced some very important information on early Maya communities in Belize.

Evidence suggests that from quite early, the Maya were tracking valuable goods over long distances. Excavations further revealed that formalized religion and religious ceremonies were an important part of daily life in Middle Preclassic communities. Other excavations revealed more than 20 skeletons, some complete and others with detached skulls, that may represent victims who were sacrificed during a ceremony to dedicate a new temple.

6. ALTUN HA

Altun Ha is located 50 kilometers (31 miles) north of Belize City on the Old Northern Highway. A 3 kilometer (2 miles) dirt road connects the main road to the site. The area around Altun Ha is rich in wildlife, including armadillos, bats, squirrels, agouti, paca, foxes, raccoons, coati, tyra, tapir and the whitetailed deer. Two hundred species of birds have been recorded, and there are large crocodiles that inhabit the Maya water reservoir.

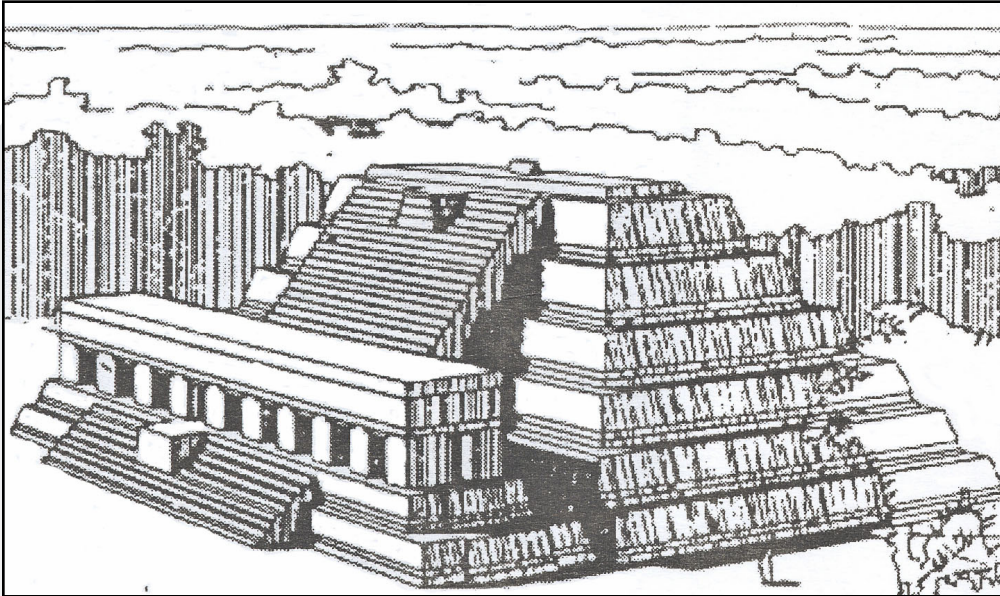
Altun Ha was a wealthy ceremonial center boasting two main plazas, and thirteen structures including the Temple of the Sun God or the Temple of the Masonry Altars). Altun Ha is not very far from the Caribbean Sea, and it formed part of a unique cultural zone along with other coastal sites. There are also no stelae at Altun Ha, but the discoveries of rich tombs indicate that the ruling elite enjoyed access to substantial amounts of exotic goods.

Another interesting feature of this site is the presence of a large water reservoir called "Rockstone Pond." The bottom of this reservoir is lined with yellow clay, giving the bottom a firmness capable of retaining water. There are indications that a fairly extensive settlement was present at Altun Ha by around 200 B.C. Indications include bits of pottery or an occasional burial. By the 1st century B.C., the Maya of Altun Ha had begun to erect permanent buildings,

Figure 29.
Drawing
of the
Jade Head
discovered
at Altun Ha



Figure 28. Perspective view of B4 at the stage which contained the Sun God's Tomb, dating from about A.D. 600



most of which were situated around the reservoir. The beginning of the 2nd century A.D. boasted a settlement of sufficient size and stability to undertake the first major construction effort to have been the focal point of ceremonial life of the site in the Late Preclassic times, lasting to about A.D. 250, when the Classic Period the pinnacle of Maya civilization began. Construction around this area lasted around six centuries and included temples, residences and other buildings.

Altun Ha was first explored by A. H. Anderson in 1957. In 1961, W.R. Bullard also did some superficial exploration. In 1983, while quarrying for stone, villagers unearthed a carved jade pendant. This discovery led to a more thorough, full-scale archaeological project by Dr. David Pendergast from 1964 to 1971. Funding for this excavation came from the Royal Ontario Museum. Between 1971 and 1976, Joseph Palacio did restoration work and in 1978, Elizabeth Graham did further restoration.

7. XUNANTUNICH

Xunantunich, meaning “maiden of the rock” or “stone woman” in Maya, is situated on the Western Highway across the river from the village of San Jose Succotz. It can be reached by ferry daily between 8 a.m. and 5 p.m. This site is less than 1.5 kilometers (one mile) from some lovely rapids of the Mopan River and provides an impressive view of the entire river valley.

Xunantunich is a Classic Period ceremonial center. The site core occupies only 300 square meters (2,700 square feet) but the periphery covers several square kilometers, Recent investigations by Dr. Richard Leventhal of the University of California, Los Angeles and Dr. Wendy Ashmore from the University of Pennsylvania indicate that the site may be even more extensive than previously thought. In Group A, Structure A6 (El Castillo) rises 40 meters (130 feet) above plaza level, making it one of the tallest buildings in Belize. On this structure there are two temples. The lower temple is famous for its large stucco frieze. A mask with larger ears probably represents the sun god. Next to this mask, there is a moon sign with a border of signs representing Venus. Data from excavations at Xunantunich suggest it was successful in the Terminal Classic (A.D. 750-900) period, about the time of the “Maya collapse”. At this same time, Tikal, about 48 kilometers (32 miles) away, was already abandoned.

Xunantunich has been studied for about 100 years. Beginning with Thomas Gann in the 1890's, in 1904, Teobert Mahler of the Peabody Museum of Harvard University took photos and began a plan for Xunantunich. In 1924, Gann examined and removed burial goods and carved hieroglyphics. It is said that Gann used dynamite to carry out his "investigations". In 1938, archaeologist J. Eric Thompson excavated Group B - a Middle Classic residential area. In 1952-53, Michael Stewart uncovered burials and caches and these were "donated" to the Cambridge University Museum and the Museum of Volkerkunde in Hamburg, Germany. Evan Mackie, of the Cambridge University Expedition, carried out further excavations, followed by A.H. Anderson and Peter Schmidt, who excavated and consolidated various structures.

Recently, the most intensive project at the site was conducted by Richard Leventhal of U.C.L.A and Dr. Wendy Ashmore of the University of Pennsylvania. Work at Xunantunich had two primary goals:

- 1) To determine the sociopolitical development of this Maya city; and
- 2) To develop the site as a tourist destination.

During the 1992 and 1993 seasons, further expansions of Xunantunich and surrounding areas were made. Three sacbeobs (causeways) were identified within the central part of ancient, downtown Xunantunich. More mapping of a secondary center at Actuncan continued. This southern site includes a series of plazas, buildings and a ballcourt. Knowledge about Xunantunich, its size, and potential importance continues to grow.

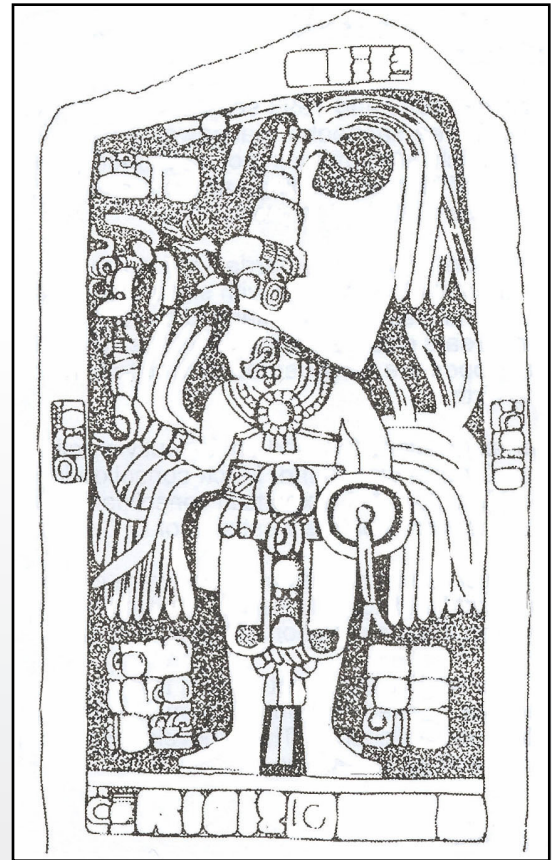
Excavations were also carried out on the west side of El Castillo. These excavations revealed a monumental plaster frieze with skyland frames frequently associated with accession. There is a three dimensional seated figure flanked by leaf-like elements terminating in knots. A seated figure, probably a ruler, wears elaborate knotted anklets. There is another figure in a dancing position clutching at ropes. These ropes are identified as birth ropes, which extend from a house beam for women to hold while giving birth.

Other excavations focused on the outlying elite residential plaza Group D. Here, a sacbe running from Group D north was found. Much consolidation work is being carried out at Xunantunich on the north side of Structure A1. Experts in consolidation were brought in from Mexico INAH to preserve the plaster frieze uncovered on the west side of El Castillo.

Two major tourist related changes were completed in 1993: 1) The creation of a visitor's center and monument building (to house four carved stelae), and 2) The conservation of Str. A-1 in the main plaza, as well as the preservation of the west frieze.

The Tourism Development Project that commenced in December of 2000 will continue improvements at the site. Slated for conservation are Structures 14 and 15, the stairway and superstructure of the Castillo, and Ballcourt 1. These developments are being coordinated by Dr. Jaime Awe of the Department of Archaeology, Belmopan.

Drawing of Stela from Xunantunich



8. CARACOL

Caracol is located 83 kilometers (55 miles) from San Ignacio, Cayo in the Vaca Plateau. The latter is part of the greater Chiquibul Forest Reserve, which contains stands of mature rainforest and is home to a wide variety of insects, plants and ani

mals. About 12 kilometers (8 miles) south of Caracol are the huge Chiquibul caves, longest in Central America. The trip to Caracol takes one through the Mountain Pine Ridge which, in itself, is a wonderful tour. Once you reach Augustine in the Mountain Pine Ridge, it is only a 45 kilometer (30 mile) drive to Caracol. Compared to a couple of years ago when the road was rough, rocky, and impassable during the rainy season, today's road is substantially improved.

Caracol is the largest known Maya site in Belize. A.H. Anderson named the site "Caracol", Spanish for snail shell, in 1938. It is a Classic Period urban center made up of a central ceremonial area upon which several sacbeobs (causeways) converge. The site is approximately 2 square kilometers (.9 square miles) in area, with structures extending out over approximately 4 square kilometers (1.75 square miles). The tallest structure at Caracol, Caana, stands at 42 meters (137 feet) above the plaza level. Special features at Caracol include buildings around Group A which served as an astronomical observatory. Many of the site's pyramids date to the Early Classic period.

Other findings at Caracol include several royal and elite burials. One of these is 1,600 years old, and contained the remains of an important ruler of the site. Another tomb 1,300 years old held members of the family that reigned over a kingdom of some 15,750 square kilometers (7,000 square miles). Out of several hundred excavated burials, about 70 formal tombs have been studied. Two intact chambers were related to the royal dynasty that dominated the 124 square kilometer (55 square mile) city to about 150,000 people.

Prior to the Caracol investigations, it was generally believed that the Maya buried their dead rulers and royals separately. Shared patterns at Caracol include the interment of more than one person within the same tomb, the movements of bodies, bones and offerings to another, and the use of identical ritual deposits. The Maya actually integrated the dead into the world of the living by placing their dead in specially constructed buildings that were part of their living complex.

Another popular theory has been brought to question by the Caracol data: that of Maya society being composed of two classes: - a small, wealthy elite and a larger suppressed peasantry. According to the Chases, a large middle class arose because of Caracol's success in warfare in A.D. 563 with the conquest of Tikal. The Caracol archaeological data points to even more destructive and long-term warfare, eventually leading to Caracol's violent end: "Its buildings were burned and a child was left unburied on the floor of an elite palace." (Chase and Chase 1994).

In the early 1950s, Linton Satterthwaite of Pennsylvania University excavated to reveal various carved stone monuments. In 1954, Anderson, Gordon Willey, William Bullard, and John Glass of the Peabody Museum of Harvard and Michael Stewart and Charles Wright excavated a masonry chamber. In 1977, Pennsylvania University Museum sent Carl Beetz to complete a book begun by Satterthwaite on the Caracol monuments. In 1978, Elizabeth Graham had Stela 21 brought to Belmopan to the Department of Archaeology. Three of Caracol's finest monuments are displayed at the Bliss Institute in Belize City. In 1978 and 1979, Paul Healy of Trent University studied Maya terraces around Caracol. In 1985, Arlen and Diane Chase of Central Florida University began full-scale excavations, which continue today. The excavations focus on all aspects of Maya society and culture, particularly 'the role of the Maya "middle class"'.

In 2001, the Ministry of Tourism will launch a four-year project designed to develop Caracol, Xunantunich, Cahal Pech, Lamanai, Altun Ha and Santa Rita for tourism purposes. The project will be coordinated by Belizean archaeologist Dr. Jaime Awe, and will include both infrastructural and archaeological improvements. Infrastructural work will include the upgrading of the access road to Caracol, plus the construction of a monument house, a second visitor's center, a research building, new bathrooms and picnic areas. Archaeological work will focus on the excavation and conservation of Caana, the Barrio Group, Plaza A, the Central and Southern Acropolis, and the plaza of the two stelae.

9. PACBITUN

Pacbitun is situated in the Cayo District, about 3 kilometers (2 miles) east of San Antonio Village. It is about a 20 minute drive from Santa Elena on the Cristo Rey road, located on private land owned by Mr. Tzul. The site is set on land that has been largely cultivated. The trip to Pacbitun can include a visit to San Antonio Village, home of the late Don Elijio Panti, Maya traditional healer, and a visit to the Tanah Museum, owned and run by the Garcia Sisters, who are slate carvers.

Pacbitun, meaning "stones set in the earth," was first occupied in the Middle Preclassic period around A.D. 250) and the Late 1000 B.C. The site flourished at the end of the Late Preclassic (400 B.C. Classic (A.D. 600 - 900). Terraced hillsides, an ancient Maya intensive agricultural method, abound in the periphery of Pacbitun. In Late Classic times, Pacbitun was a major ceremonial center encompassing 75 acres. There are several temples on the site, as well as elite residences, a ceremonial ballcourt, eight carved and uncarved stelae, and raised sacbeobs (causeways). The earliest carved stela at the site dates to A.D. 475. Artifacts found at Pacbitun include musical instruments made of carved and molded pottery.

In 1971, the site was registered at the Department of Archaeology by Peter Schmidt. In 1980, students of the Trent University project examined the site while studying Maya terracing in the area. Surveys were done in 1984. In 1986, Paul Healy of Trent University began the first excavations at the site. Both consolidation and reconstruction were carried out in 1986 and 1987. In the early 1990's, the Belize Archaeological Reconnaissance Project, directed by Jaime Awe, focused investigations on the Preclassic occupation of the site.

10. CAHAL PECH

Found on a hill overlooking San Ignacio town, Cahal Pech is one of many sites located in the Cayo District. Cahal Pech means "place of the ticks," and was given this name due to the number of ticks that flourished there when it was cattle pasture in the 1950's. The site sits in a rich jungle environment, in contrast to the urban development that encircles the site core and reserve. The main plaza of Cahal Pech is located on a hill on the west bank of the Macal River and provides the visitor with a wonderful view of San Ignacio and the Belize River.

The site center is made up of 34 structures located around several courtyards, including temple pyramids and residential buildings. The tallest structure here is 23,5 meters (77 feet) high. There are also 2 ballcourts, 8 stelae and 1 altar. Preliminary investigations carried out in 1988 revealed that Cahal Pech was settled by 1200 B.C. and abandoned around A.D. 850. This makes Cahal Pech one of the earliest Maya sites in the Belize region of the Maya lowlands, contemporaneous with Cuello in the north. A carved monument discovered at Cahal Pech, Stela 9, is also the earliest carved stela yet discovered in the eastern Maya lowlands.

Reports about the existence of Cahal Pech date back to the 1950's, when Linton Satterthwaite of the University of Pennsylvania did some mapping and excavations there, but little information came from this study. In 1955, Gordon Willey of Harvard University toured the site. A brief description of Cahal Pech appears in his 1965 Belize Valley Report. By 1969, Peter Schmidt did some work at the site, concentrating on a royal tomb in a large temple. Here, a ruler had been laid to rest with a number of ornate jade objects, obsidian blades, shell and bone ornaments, and several ceramic vessels. The most outstanding find at Cahal Pech was a jade and shell mosaic mask, which may have possibly been decoration for a belt. This mask was found in the tomb excavated by Schmidt.

Between 1970-1985, the site was looted extensively. The Belize Tourism Industry Association (BTIA) organized a thorough archaeological investigation, carried out by Belizean archeologist Dr. Jaime Awe in 1988, and leading to the discovery of Stela 9. Dr. Joseph Ball of San Diego State also excavated several of the palaces and directed the reconstruction/consolidation of the exposed architecture. Currently, work has begun anew at Cahal Pech and is being directed by Dr. Awe and Canadian Archaeologist Carolyn Audet. This new work, part of the Tourism Development Project, is excavating structures B2 and the ballcourt (Strs. C5 and C6). Following their excavation, the structures will all be stabilized and conserved.

11. EL PILAR

El Pilar is located north of Bullet Tree Falls in the Cayo District, about 16 kilometers (10 miles) from San Ignacio. El Pilar means "pillar" in Spanish, and it was named after an army camp in the area. El Pilar lies in an area that had been cultivated for many years with numerous milpas. The road, recently cut and bulldozed, is dry and dusty in the dry season, but becomes quite difficult to pass in the wet season. The site is located on high terrain, giving the visitor a beautiful view across the Belize River Valley.

El Pilar is one of Belize's largest Classic Maya sites, with a well-defined ceremonial section, including both private and public areas. There are at least 15 courtyards or plazas covering an area of 50 acres. The center has one ballcourt in the south, a major palace in the north, and a sacbe (causeway) leading to Guatemala. The site covers approximately 75 acres. Some buildings reach 15-18 meters (50-60 feet) in height. Aguados, or water reservoirs, are located throughout the site and provided much needed water during the dry season. Tikal in Guatemala is only 48 kilometers (32 miles) from El Pilar,

Excavations at the site have shown a long development of ancient Maya construction. Main buildings were already being constructed in 250 B.C. Ceremonial platforms and temples continued to be constructed through the centuries of the Preclassic and Classic periods. According to Anabel Ford, many of the largest structures were built in the Late Classic period, at the height of Maya civilization. Some constructions, however, were completely built during the Terminal Classic period.

The earliest report about El Pilar came in 1972, when the Archaeology Commissioner toured the site following reports of looting. Anabel Ford of the University of California at Santa Barbara began her Belize River Archaeology Settlement Survey (BRASS) in 1982. Since that time, Ford has mapped and surveyed the area. In 1993 and 1994, extensive excavations took place at the site. One of the site's greatest attributes is its panoramic view. In the mid 1990's, El Pilar became a protected reserve.

12. LUBAANTUN

Lubaantun is located on a hill above a valley about 30 kilometers (20 miles) inland near the Columbia River in the Toledo district. On the banks of the Columbia River lies the Maya village of San Pedro Columbia, about 2.25 kilometers (1.5 miles) from the site.

The pyramids of Lubaantun are comprised of large stone platforms on which stood wooden and thatch structures. The only carved monuments at the site were three ballcourt markers. There are five main plazas. According to one archaeologist, the site was probably occupied for one or two centuries. There are religious buildings, a ballcourt, and residential buildings. The structures here at Lubaantun seem to have been systematically shaped and faced with stones, to give it a vertical look. Structures here were probably constructed without the aid of mortar, with each stone having been carefully measured and cut to fit perfectly with the other stones.

The site of Lubaantun was first visited by Thomas Gann in 1903. In 1915, R.E. Merwin of Harvard University did further investigations, revealing a ballcourt and three carved stone markers depicting ball players. These carvings are presently at the Peabody Museum of Harvard University. In the 1920's, further studies were carried out by T.A. Joyce and J. Eric Thompson. In 1970, Norman Hammond began excavations and mapping and produced the first extensive report of the site.

More recently, in the 1980's, Dr. Richard Leventhal of the State University of New York included Lubaantun in his studies to show interrelationships between sites in the Southern Toledo Complex. Later, in the 1990's, the Maya Archaeological Sites Development Project (MASDP), under the supervision of the Belize Department of Archaeology, conducted a major conservation program for the development of the site as a tourist destination. The latter project erected a visitor's center and stabilized several of the monumental structures at the site.

13. NIM LI PUNIT

Nim Li Punit meaning "Big Hat" in Maya, is a small site in the Toledo District. It is situated on a ridge in the foothills of the Maya Mountains just off the Southern Highway, 38 kilometers (25 miles) north of Punta Gorda.

Nim Li Punit is regarded as a ceremonial center, consisting of two plazas, one higher than the other. There are 25 stelae, of which 8 are carved. The largest structure is 1040 feet) above the plaza level and is constructed of dry sandstone, typical of sites in southern Belize. There are 3 plaza areas and a ballcourt. The concentration of so many stelae make this a unique site. The south group stelae are the most impressive, with one stela in particular showing a warlord with a fancy headdress, giving it the name "Big Hat." The site was largely occupied in the Late Classic period.

Nim Li Punit was "discovered" by oil company workers in 1976. Government Archaeologist Jaime Awe and Norman Hammond began to clear and investigate the site shortly thereafter. Later, Barbara McLeod did a preliminary survey of the hieroglyphic inscriptions on the carved stela. In 1983, Richard Leventhal surveyed the site and in 1986 sunk test pits. Another stela was found, as well as a royal tomb, which yielded 36 ceramic vessels and other valuable artifacts. As with Lubaantun, the MASID Project in the 1990's also excavated and conserved several structures at the site and erected a new visitor's center.

During excavations, a carved Late Classic Period stela was discovered and a royal tomb was found in the central acropolis. The carved stela is particularly interesting because it contains the emblem glyph of Copan. This indicates that the sites in southern Belize may have had political relations with their larger neighbor in Honduras.

14. UXBENKA

Uxbenka is a fairly small Maya site situated about 13.5 kilometers (9 miles) east of the Guatemala border in the Toledo District. Located in the foothills of the Maya Mountains, the site overlooks a vast panoramic view. To reach Uxbenka, one travels west from San Antonio towards Santa Cruz village.

Uxbenka means “Ancient Place” and consists of one main ceremonial plaza on the top of the hill, with smaller plazas located lower down on the slopes. There are six structures which surround the sides of the central plaza. There are 21 stelae, 6 of which are carved. The tallest structure rises 8.2 meters (27 feet) above the plaza. One stela appears to be Early Classic, suggesting occupation in a period not commonly encountered in southern Belize.

In 1984, caretaker Placido Ash investigated a report of looting near Santa Cruz. He found two sculpted stelae. The site was briefly investigated by Richard Leventhal. He produced the first maps of the site, and a preliminary report of its monuments.

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CHAPTER 6: BASIC SWIMMING, SNORKELING, WATER SAFETY/SURVIVAL SKILLS, NON-SWIMMING RESCUE AND BOATING SAFETY

INTRODUCTION:

Belize offers many opportunities for recreation in water environments. Rivers, ponds, lagoons, mangrove channels, seagrass beds, hard bottom and, of course, the coral reef habitats all offer marvelous opportunities for exploration of the flora and fauna that inhabit them and cooling off on hot days. As a tour guide, it is important that you be both knowledgeable about these varied habitats and about the aquatic skills that will allow you and your guests to safely explore and enjoy them.

In this chapter we will focus on the skills you will need to develop for you to be able to safely participate in and monitor the aquatic activities of guests on your tours. We will focus on three main skill areas:

- Basic swimming skills
- Basic personal safety/survival and non-swimming rescue skills
- Snorkeling skills and etiquette

We will also review aspects of boating safety issues you need to be knowledgeable of when conducting aquatic tours.

The material presented is intended to provide trainees who are beginning swimmers with the opportunity to *learn about and begin the process of developing* basic swimming, snorkeling, water safety/survival, and non-swimming rescue skills. Trainees who possess intermediate or advanced swimming skills will benefit from review and practice of these basic skills. All trainees will learn about the recreational benefits of swimming and snorkeling. Snorkeling etiquette appropriate to mangrove, seagrass and reef habitats will be discussed. Chapter coverage will be in two modes: classroom presentation and discussion of the material presented and a practical application to develop the basic skills and the opportunity to receive certification in aquatic skills dependent on the trainee's ability level. It is important to note that not all beginning swimmer trainees will develop the basic necessary skills at the same rate – some will master the skills more quickly than others, most will need a good bit more time than that allotted to coverage of this section. Trainees who are advanced swimmers may not need to practice the skills and may opt to submit to the certification process at the earliest opportunity. The overriding objective is for all trainees to develop the basic aquatic skills listed above to a level where they can begin the process of receiving certification and for trainees to become knowledgeable about safety issues for aquatic tours.

It is important to note that there is a potential risk involved in any course involving fitness training and testing. Each trainee is required to accept responsibility for his/her own exposure to such risks and where indicated obtain a medical doctor's approval before commencing the practical activities. Trainees with health related conditions such as: high blood pressure, high cholesterol, cardiovascular disease, diabetes, sedentary lifestyle must seek the advice of a medical doctor.

It is also of great importance that beginning swimmers understand that swimming is a physical skill that develops with practice over a period of time. The more practice and time invested, the better one becomes at it. Think of learning to ride a bike, playing caparuche or a sport, how many times did you have to practice before you were any good at it? Swimmers should not ever overestimate their abilities. The material presented in this chapter is not intended to prepare trainees to be responsible for performing swimming assists or rescues. It should, however, alert trainees to the need for them to develop their skills if they intend to participate in water based tours of any kind.

OBJECTIVES:

At the end of this chapter, trainees will be able to:

1. Demonstrate knowledge of basic swimming, snorkeling, water safety/survival and non-swimming rescue skills.
2. Discuss the recreational benefits of swimming and snorkeling.
3. Demonstrate increased endurance and versatility in the water and the ability to coordinate the parts of a stroke into whole strokes.
4. Successfully complete certification test in Basic Swimming, Water Safety/Survival, Snorkeling, and Non-swimming Rescue.
5. Demonstrate knowledge of general boating safety requirements.

ASSESSMENT:

The assessment will be comprised of a written test and a practical test for certification.

AT A GLANCE:

- Unit 1: Basic Swimming Skills
- Unit 2: Basic Safety/Survival and Non-swimming Rescue Skills
- Unit 3: Basic Snorkeling Skills and Snorkeling Etiquette
- Unit 4: General Boating Safety

UNIT 1: BASIC SWIMMING SKILLS

This unit focuses on basic knowledge of physical principles applied to swimming and on the skills deemed essential for safe conduct in and enjoyment of aquatic environments.

OBJECTIVES:

At the end of this unit you will be able to:

1. Recall and discuss how the physical principles of buoyancy, gravity and movement affect a swimmer's stability and movement in water.
2. Define rhythmic breathing and explain what is meant by "bobbing" and "rotary breathing".
3. List three ways of floating
4. List three ways of propelling oneself through water
5. Demonstrate the arm movements required for the front crawl, elementary backstroke, sidestroke and breast stroke.
6. Demonstrate the leg movements required for the flutter kick, scissors kick, and frog kick.
7. List the four basic swimming strokes and the movements of the head for rhythmic breathing that accompany each stroke.
8. List three types of surface dive and describe the body movements required for each.

AT A GLANCE:

1. Adjusting to the water environment
2. Moving in water
3. Four basic swimming strokes
4. Surface Diving



ADJUSTING TO THE WATER ENVIRONMENT

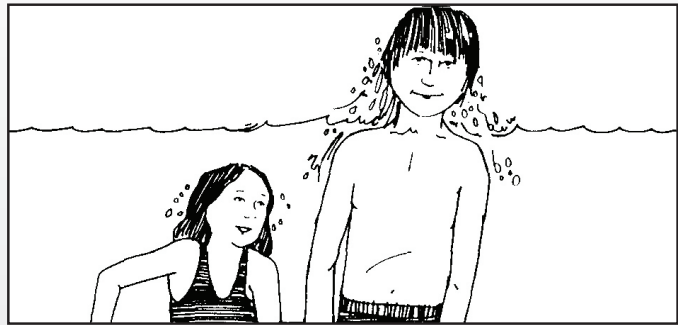
It is important for swimmers, particularly beginning swimmers, to become comfortable in water by adjusting gradually to factors such as the temperature, depth, wave action or current, clarity or turbidity of the water. It is also important to enter the water using an entry method best suited both to the person and the particular water body.

Becoming comfortable in an aquatic environment is dependent on mastering certain skills which give a sense of control over one's actions. These skills include submerging the entire body, keeping the eyes open underwater, breath control, and floating. We will look at each of these skills individually.

1. Submerging the entire body

There is no guarantee that even in shallow water a swimmer will not experience their entire body being submerged in the water. One common fear beginning swimmers may have is that of submerging their head, specifically their face, in the water and this fear keeps them from entering the water, moving about once they are in or moving beyond very shallow water areas. Although it is possible to learn how to swim without submerging the head, submersion is an important safety skill and is required for executing many swimming activities. Some techniques for overcoming the fear of submerging the head include:

- finding out WHY the person is afraid and alleviating the fear(s)
- practice putting the face in water at home in a basin, sink or bathtub
- gently splashing water in the person's face during other swimming activities to allow the person to gradually become accustomed to getting the face wet



2. Opening the Eyes Underwater

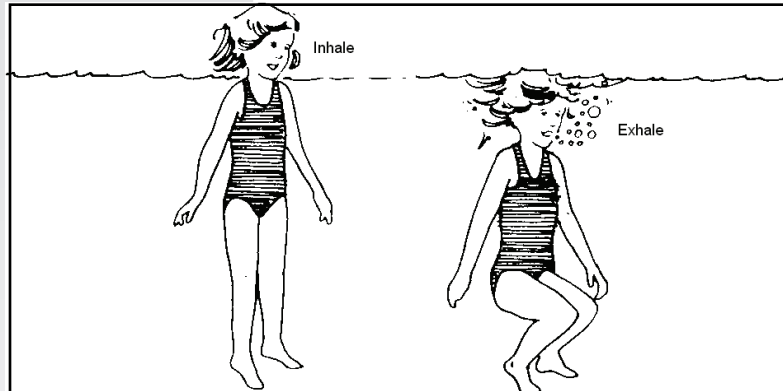
In the water, just as in air on land, we need to use our eyes to see where we are going. Water may be accidentally splashed into the eyes because of swimming activities or wave action. Well executed swimming strokes require the body to be in a streamlined position offering the least resistance and this often requires the face to be partially or totally in the water. Whatever the activity, being in the water means that water will get into the eyes sometimes. Beginning swimmers should practice opening their eyes underwater and gradually increase the length of time they can maintain them opened. Eye irritation should be relieved by blinking rather than rubbing them. It can be prevented by using swimming masks or goggles which have the additional advantage of allowing clearer visibility.

3. Rhythmic breathing

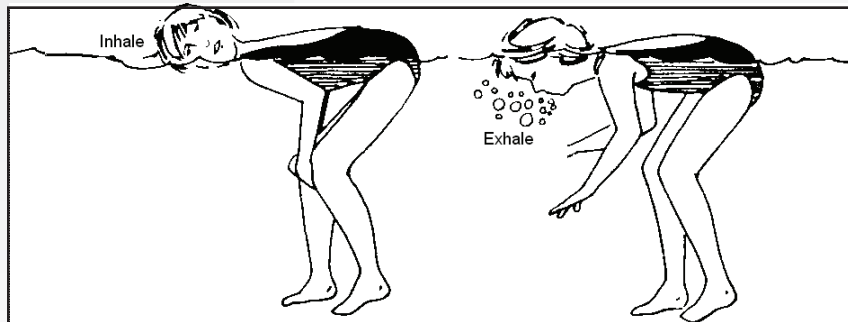
In this skill, the learner lowers the head into the water and exhales and then raises the head to inhale at the surface. Rhythmic breathing is done slowly and continuously as in normal breathing. Only one breath, one inhalation, is taken each time the head comes to the surface by taking a small 'bite' of air through the mouth. The air is exhaled slowly through the nose (or nose and mouth). A good way for beginners to learn to exhale through the nose is to close the mouth and hum while breathing the air out through the nose. It is better to learn to exhale through the nose as this prevents water from going up the nose - a very unpleasant and burning experience. This skill gives the swimmer breath control.

There are two positions in which rhythmic breathing is learnt –

- with the head in a Vertical Position, called ‘bobbing’



- and with the head in a Horizontal Position, called rotary breathing



4. Floating

Floating is defined as being borne up or suspended in a liquid (such as water) or a gas. There are two main forces that act on a floating object – buoyancy and gravity. Comfortable floating is affected by the ability to maintain balance and remain stable in the floating position.

Buoyancy and Gravity

Gravity is the force that acts on all matter by pulling it down towards the centre of the earth; it keeps things from floating up. Buoyancy acts against gravity; it is an upward force that pushes or lifts matter up in a liquid or gas.

The ability for persons to float in water varies – some people float easily while others do not seem to be able to float at all. Three characteristics of a person’s body that influence the ability to float are:

- body type – muscular body, lean body, fat body
- lung capacity – amount of air a person is able to take in and hold in the lungs
- body position – distribution of body weight in the water

Body Type:

The human body is composed of many types of tissues. Three tissues that determine how buoyant the body will be are: bone, muscle and fat. Bone and muscle tissue are very dense and therefore SINK in water; fat tissue is less dense than water and therefore will FLOAT in water. Persons with very muscular or lean bodies often experience difficulty floating. Persons with a higher proportion of fat to muscle will be able to float more easily.

Generally speaking, women have a higher proportion of body fat to muscle as well as lighter bones and find it easier to float than men whose bones are thicker and therefore heavier. Men often have difficulty floating in a prone or horizontal position; their legs, comprised mostly of muscle and bone, tend to sink and pull the rest of the body downward unless there is a sufficient layer of fat tissue under the skin.

Since swimming requires that the body be able to float in the water, body type makes it easier or more difficult for a person to learn how to swim.

Lung capacity:

The lungs are designed to hold air in the chest cavity of the human body. By holding his breath (keeping air inside the lungs) a person can increase his chest volume without significantly increasing his weight. It is therefore easier to float when the lungs are filled with air.

Body position:

Buoyancy can be increased by spreading the body weight out across the water surface. Men often find it easier to float with the body in an outstretched or 'X' position than with arms and legs straight alongside the body.

Keeping the body weight low in the water (crouch low in the water, then gently stretch out) also increases buoyancy since people float IN water rather than ON water.

A swimmer's ability to float can be determined by doing a simple Buoyancy Test described below:

1. Have the swimmer assume a tight tuck position in the water, take a breath, and submerge his head as shown in the diagram.



2. The swimmer should hold the position as long as possible.
3. Observe the movement of the swimmer's body to determine his buoyancy rating as given in the table on the following page

Buoyancy Test

Swimmer's Position in the Water	Buoyancy rating
The swimmer bobs right to the surface	Double positive (+2)
The swimmer slowly returns to the surface	Positively buoyant (+1)
The swimmer remains wherever he settles after taking a breath and tucking the head.	Neutral (0)
The swimmer slowly sinks to the bottom	Negatively buoyant (-1)
The swimmer sinks right to the bottom.	Double negative (-2)

Balance and Stability

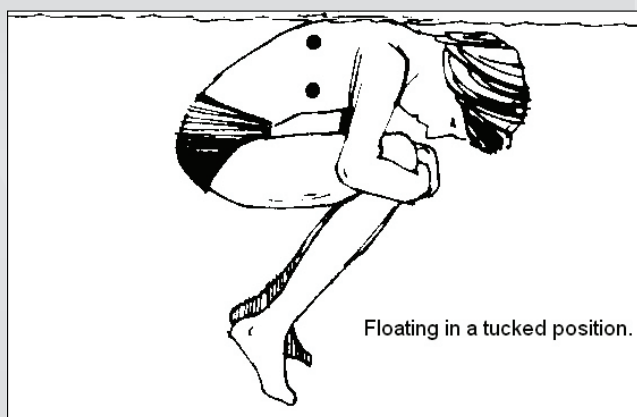
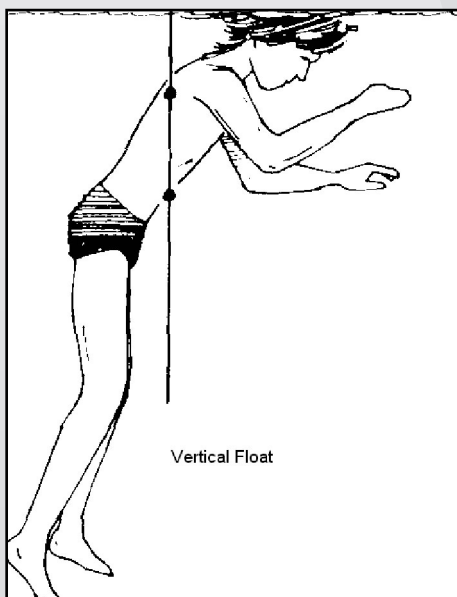
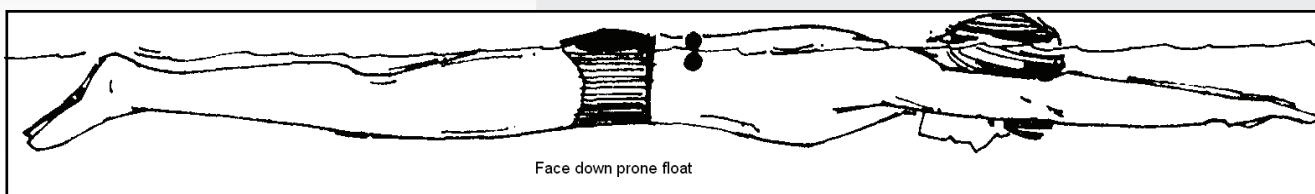
Beginning swimmers may find floating bit unsettling because they find the positions 'tipsy', that is, they feel somewhat unbalanced and unstable. Balance and stability in the water are affected by the body's

- centre of gravity which moves position every time the body's position is changed and,
- centre of buoyancy usually located in the chest region and which also moves.

These two centres are related as follows:

- 1) If the centre of gravity is located directly below the centre of buoyancy, the body will **FLOAT** and be **STABLE**
- 2) If the centre of gravity is located directly above the centre of buoyancy, the body will **FLOAT** but will be **UNSTABLE**.
- 3) If the centres are not aligned, the body will roll, or wobble, until they are aligned.

Study the diagrams below and notice how the centres (I) move as the position of the body changes.



When learning to float, it is important to relax and hold the floating position long enough for the centre of gravity to align with the centre of buoyancy so that the unsettling, wobbly feeling (which creates anxiety or fear) can go away as the body is stabilized. Four basic principles to remember when learning front and back floats are:

- i. starting position should always be low in the water (crouch down till chin touches the water)
- ii. take a big breath of air and hold it before starting the float
- iii. RELAX, RELAX, RELAX
- iv. go into the float slowly

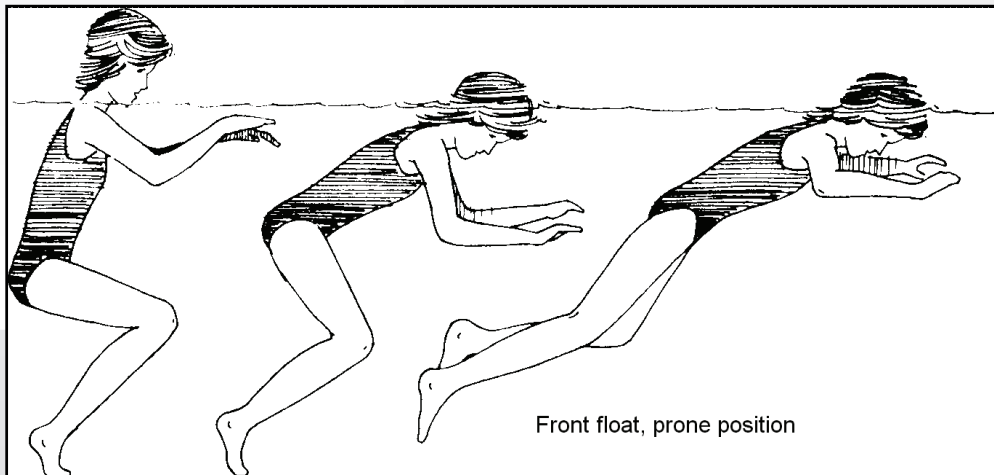
Three basic **float positions** are important for the beginning swimmer to master. These are:

1. Front float, prone body position -

The swimmer moves into this float using the following sequence:

- (i) crouch low in the water with your chin at the surface
- (ii) take a deep breath
- (iii) gently lean forward and put your face in the water
- (iv) look at the bottom with your hands and legs hanging loosely
- (v) let your feet move as the water pushes on them
- (vi) depending on your buoyancy rating, spread out your arms and legs as your feet come off the bottom

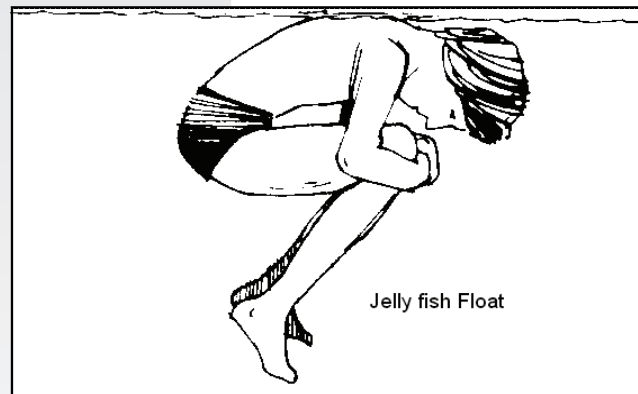
The diagram below illustrates the sequence you should follow in assuming a front float prone position.



2. Front float, tucked position (Jelly-fish float)

The swimmer moves into this float using the following sequence:

- (i) take a deep breath and hold it
- (ii) submerge and bring your legs up to your chest
- (iii) wrap your arms around your legs tucking your body into a tight ball
- (iv) let your body move as it wants, you will come to rest in a face down jelly-fish float as shown in the diagram below



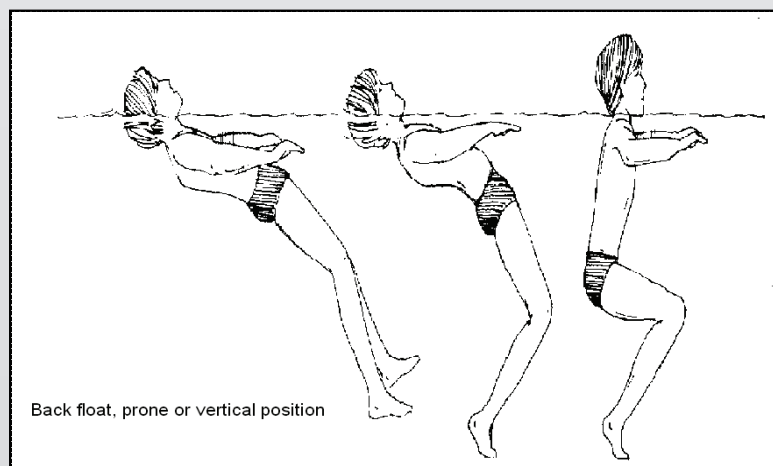
3. Back float, prone or vertical positions –

The swimmer moves into this float using the following sequence:

- (i) crouch with the chin at the surface and shoulders underwater
- (ii) take a deep breath and gently lean backward arching your back
- (iii) place the back of your head in the water such that your ears are underwater
- (iv) gradually stretch out, relax
- (v) let your arms hang loosely at your sides for balance
- (vi) let your feet and legs lift off the bottom
- (vii) depending on your buoyancy rating, spread out your arms and legs as your feet come off the bottom

Depending on buoyancy rating, your body will assume either a vertical floating position with the legs hanging down or a prone position with the legs rising to the surface. In either position, it is important to keep your back slightly arched and your head flat in the water. Breathe slowly through your mouth and RELAX.

The diagram below illustrates the sequence you should follow when assuming a back float position.



Standing up from either a front or back float position is best accomplished by putting your body in a face down position, bringing both knees to the chest at the same time, push down with your arms as you extend your feet to the bottom and lift your head up.

The ability to **change positions** in the water from a crouched to a standing position, from vertically upright to a prone or a head down position requires practice. The transfer of body weight from the feet to another part of the body in order to accomplish other tasks such as picking an object off the bottom goes hand in hand with development of breath control and recognition of the effects of buoyancy.

As these skills develop, you will become more comfortable being in an aquatic environment and better able to move deliberately in the water.

MOVING IN THE WATER

Propulsion and Resistance

Movement results from a force being applied to an object at rest. The force can be either a push or a pull. A resting object resists being moved so the force (push or pull) applied to move the object must be greater than the resistance of the object. A swimmer's movement through water is affected mainly by the forces of propulsion and resistance. Propulsion – forces producing movement - drives the swimmer through the water; resistance holds the swimmer back.

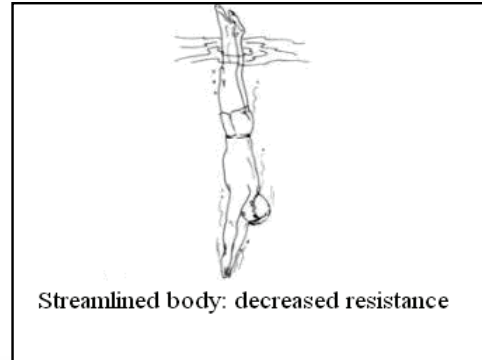
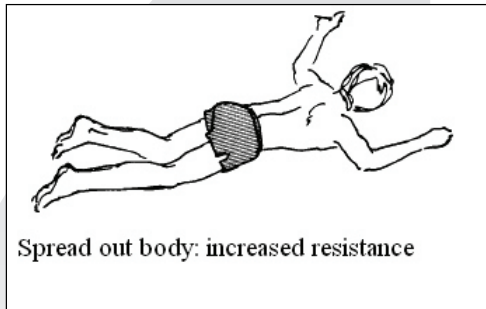
Propulsion:

Newton's third law of motion - the Law of Action-Reaction- states that for every action there is an equal and opposite reaction. For a swimmer, this means that a swimmer must push or pull water in the opposite direction than the one he wants to move in. If the swimmer:

- pushes water down, his body moves up
- pushes water up, his body moves down
- pushes water forward, his body moves backward
- pushes water backward, his body moves forward

Resistance:

Newton's first law of motion - Inertia - states that a body in motion wants to stay in motion; a body at rest wants to stay at rest. For a swimmer, this means that to start any movement through the water, a force strong enough to overcome the resistance of his motionless body must be applied. It also means that to stay in motion the swimmer must reduce the amount of resistance against his moving body. The most important factor determining the amount of resistance offered to the swimmer's body as it moves through the water is the cross sectional area of the body presented by the swimmer. For this reason, it is important that the swimmer maintains a streamlined - long, narrow position; like a pencil or rocket - body position to reduce resistance. A spread-eagled body presents a large cross sectional area which increases the resistance and the body will be slowed down or stopped. Look at the diagrams on the following page.



Once you have learnt to float, either front or back float, you are ready to start moving purposefully in the water. Movement can be as a result of propelling yourself by pushing off the bottom or off a vertical surface, for example, the side of a pool, kicking with your legs, or using your arms. When you move using a combination of leg and arm movements, with or without rotary breathing, you will be using swimming strokes. In this section we will describe how to move at the surface of the water as well as under the water using basic techniques for gliding, kicking, and arm movements.

MOVING ON THE SURFACE

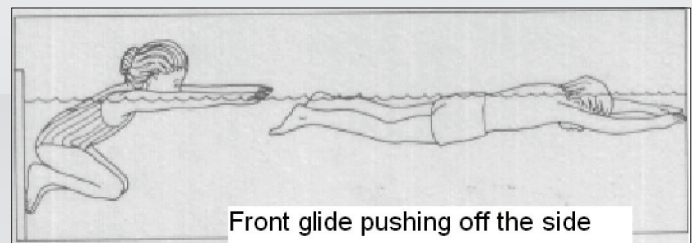
Gliding –

Gliding can be described as moving across the surface of the water in either a front or back float while holding the body in a streamlined position with arms held against the body, or extended in front of the body, and legs fully extended. Swimmers can cover large distances across relatively shallow water by pushing off the bottom and gliding along the surface. Very little energy is expended other than what is required to push off the bottom. Both front and back glides can be combined with kicking to further increase the distance traveled.

I. Front glide

The swimmer moves into a front glide using the following sequence:

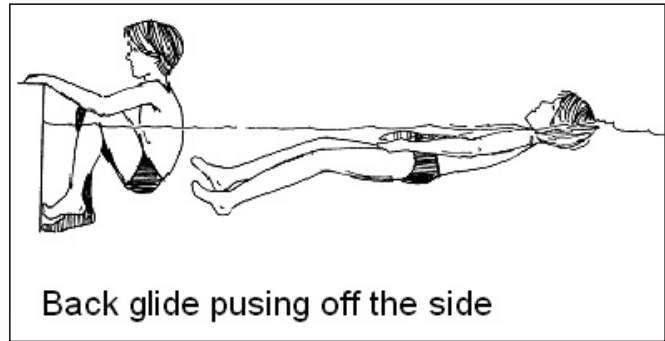
- i. crouch low in the water
- ii. take a deep breath and extend arms out in front
- iii. put face in water
- iv. push off the side or bottom slowly and assume a front prone floating position.



2. Back glide

The swimmer moves into a back glide using the following sequence:

- i. crouch with the chin at the surface and shoulders underwater
- ii. gently lean backward arching your back
- iii. place the back of your head in the water such that your ears are underwater
- iv. look up to the sky; place arms alongside the body or extend them behind your head
- v. take a deep breath and push off the side or bottom and assume a back float position



Propulsion

Propelling with legs

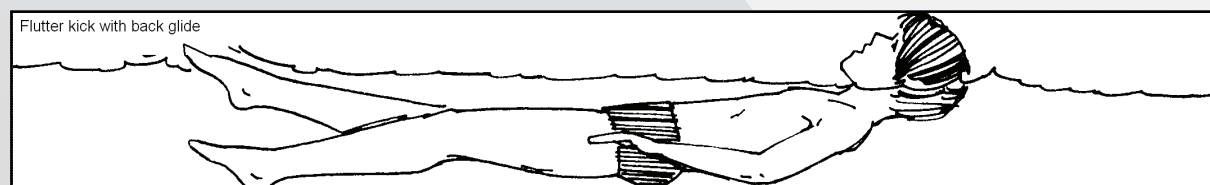
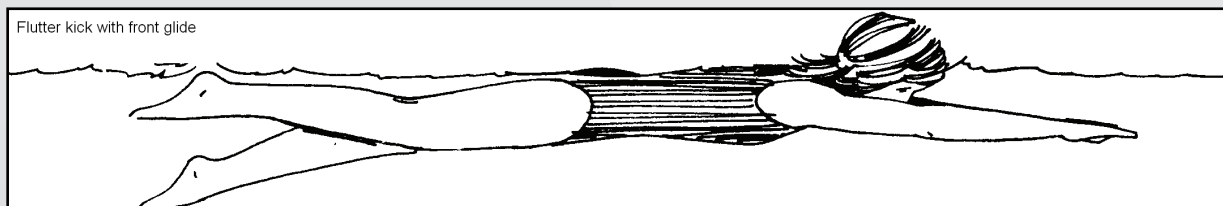
Most beginning swimmers find it easier to move through the water by kicking since, for most persons, the legs muscles are the stronger muscles. There are three leg movements, called kicking in swimming, important for a beginning swimmer to learn. They are: (i) flutter kick (ii) scissors kick and (iii) frog kick. The names are very descriptive of the actions required to execute the kick. All three can be combined with front and back glides for smooth movement through the water.

I. Flutter kick

The flutter kick is very easy to master. With the body in either a front or back glide, the legs move as follows:

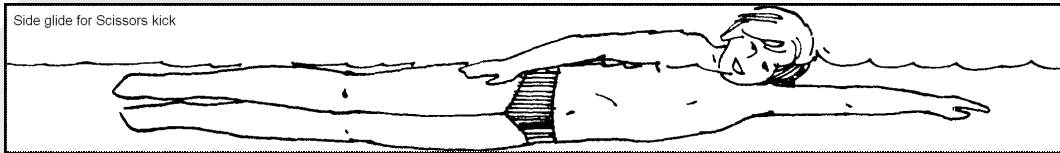
- i. stretch legs straight out and relaxed; toes pointed away from body
- ii. move (kick) the legs up and down alternately past each other
- iii. kick shallow and continuously with movement starting at the hips
- iv. toes just break the surface of the water making a small splash – back glide
heels just break the surface of the water making a small splash – front glide
- v. roll legs and body *slightly* with each kicking movement

Beginning swimmers may find that using swimming fins assists in keeping the legs straight especially if there is a tendency to bend the knees. The diagrams below illustrate the flutter kick with a front and back glide.



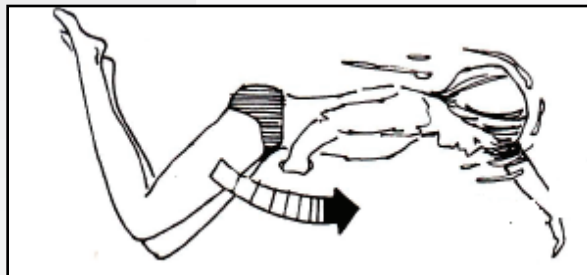
2. Scissors Kick

The scissors kick is a very relaxing kick requiring the body to be on its side with one hand extended forward and the other alongside the upper body. The swimmer glides on his right or left side keeping the head just above the water with the lower ear resting on the leading arm. The diagram below illustrates the position of the body in the side glide.

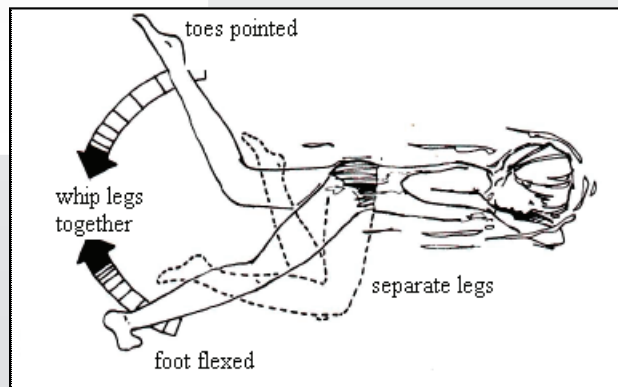


The movements of the legs in the scissors kick are:

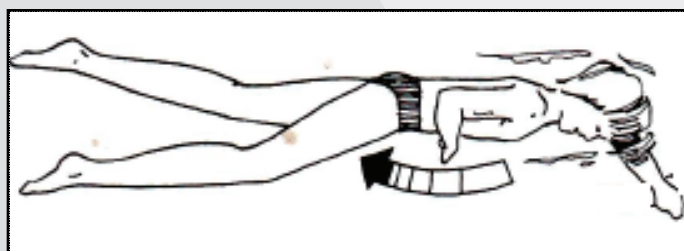
- i. extend legs and keep them together during gliding
- ii. pull heels up toward buttocks; bend knees and hips as illustrated below



- iii. separate legs – one leg goes forward, one leg goes backward
- iv. dorsi-flex the foot of the *forward leg* as if to take a step (Charlie Chaplin walk)
- v. point the toes of the backward leg
- vi. whip legs together to squeeze water rearward while extending them and bringing them back together as illustrated below



- vii. keep legs extended and together and glide as illustrated below

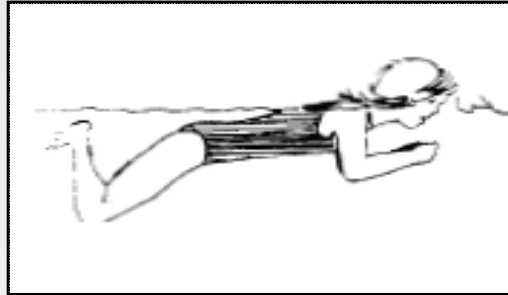


3. Frog kick

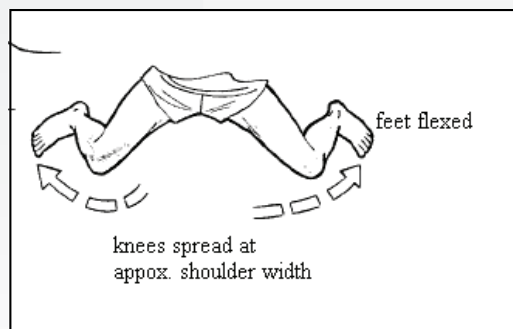
The frog kick can be used with both a front and back glide and gives the swimmer a strong push through the water. It is most often used with a front glide.

The movements of the legs in the frog kick are:

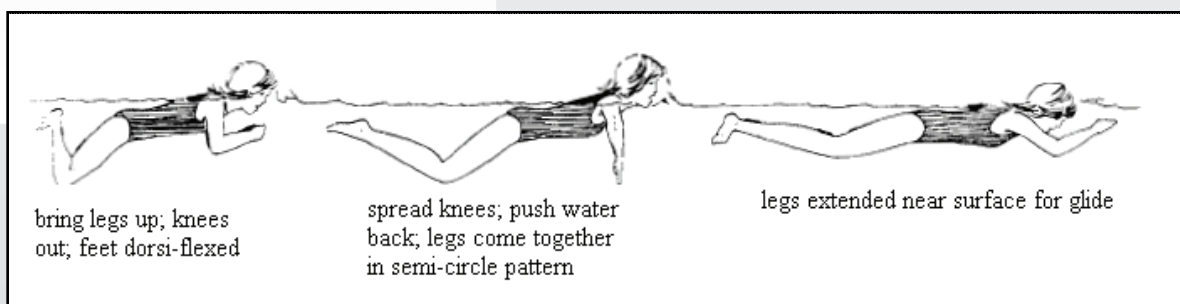
- i. draw the heels towards the buttocks keeping the heels and knees relatively close together



- ii. spread knees approximately shoulder width apart and dorsi-flex feet



- iii. use feet to push water back and bring them together through a semi-circle pattern
- iv. extend legs near the surface and glide



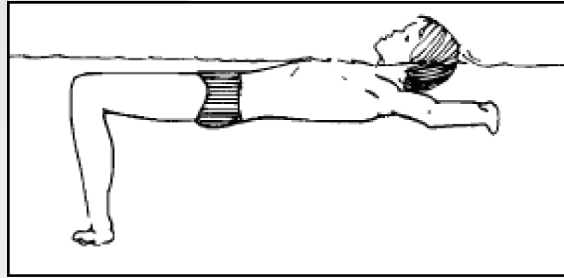
Note: keep feet near the water's surface and accelerate throughout kick. Leg movements are symmetrical and simultaneous.

4. Whip Kick

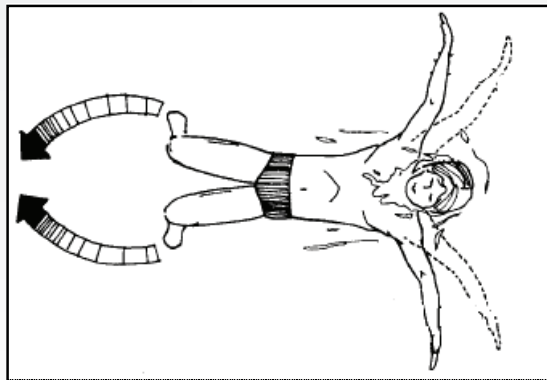
The whip kick can be used with back glide and gives the swimmer a strong push through the water.

The movements of the legs in the whip kick are:

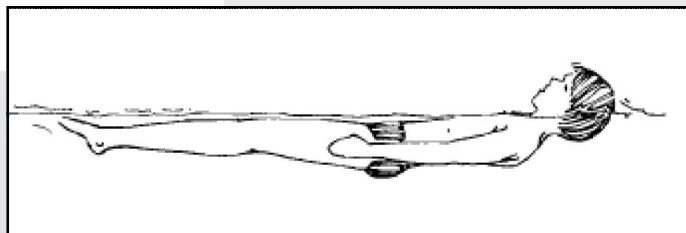
- i. drop the heels back towards the buttocks until knees are bent at approximately 90° angles



- ii. spread legs until knees are approximately shoulder width apart with feet dorsi-flexed
- iii. trace a semi-circle with feet while whipping legs together



- iv. straighten legs, point toes and glide



Propelling with arms

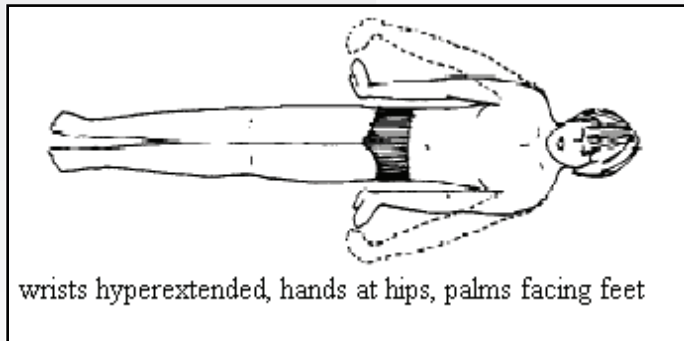
Just as a swimmer can move through the water using the legs, it is possible to pull or push through using your arms. We will look at five arm movements, called strokes in swimming, important for a beginning swimmer to learn. They are: (i) freestyle (ii) sculling (iii) crawl stroke (iv) side stroke and (v) breast stroke. The names are very descriptive of the actions required to execute the stroke.

I. Sculling

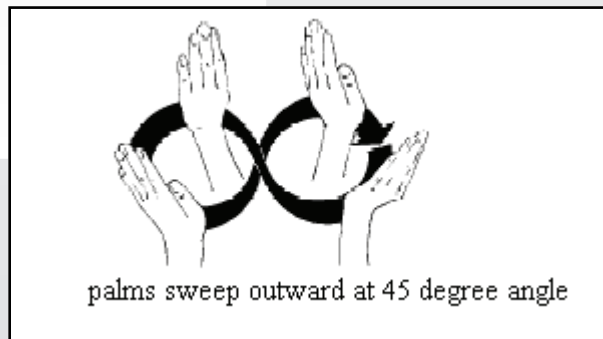
Sculling is used to support the body, move feet first, and keep the body stationary using the hands only to push water. Sculling is done with the body in a back, front or vertical float position.

The arm movements for sculling are:

- i. place hands beside hips with the palms facing the feet; fingers together
- ii. hyperextend the wrists but keep them flexible



- iii. sweep palms outwards (little finger up), then inwards (thumb up), keeping them at approximately a 45° angle making a figure 8
- iv. hand actions should be simultaneous and symmetrical

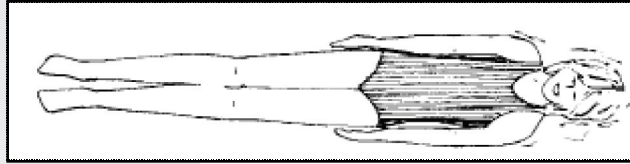


2. Finning

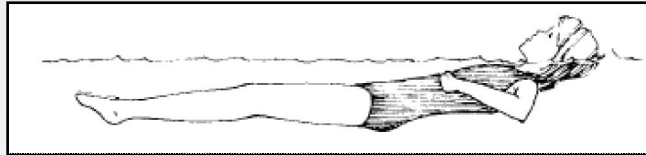
Finning is used to move head first through the water using the hands only. It is performed with the body streamlined in a back float position.

The arm movements for fining are:

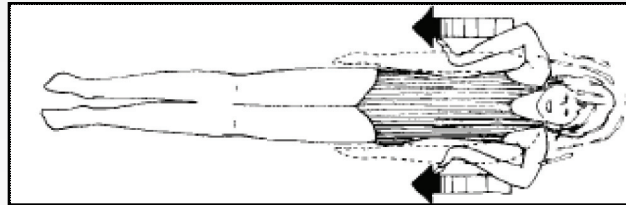
- i. place hands beside hips, fingers together



- ii. bend elbows while bring the upper arm up alongside the body to the rib region; keep hands close to the body



- iii. point hands and fingers outward (away from the body)
- iv. push water towards the feet with the palms facing the feet



Arms stay close to the body throughout the movement and recover from the thighs to the ribs. The arms move at the same time and symmetrically (both push with the same force).

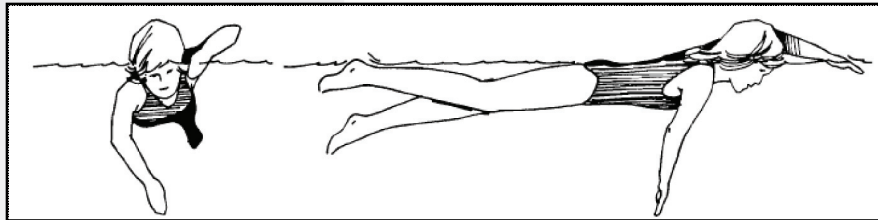
Swimming strokes are a combination of arm and leg movements, with correct breathing technique, that result in smooth movement through the water. The four swimming strokes presented below are among the easiest for beginning swimmers to learn. The front crawl and breast strokes offer a choice for swimming with the face in the water while the sidestroke and elementary backstroke allow for swimming with the face out of the water.

I. Front Crawl Stroke

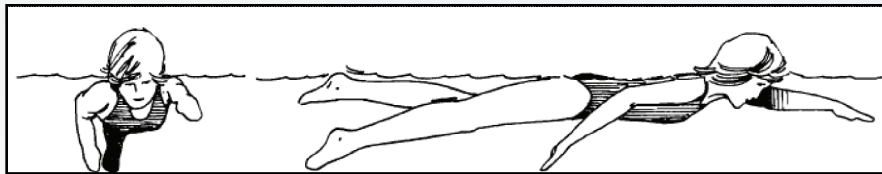
The front crawl stroke is used to move quickly through the water. The body should be in a front float position up near the surface with the head 'cradled' in the water (water at hairline) while the arms alternately pull the body forward. The body rolls slightly and equally to each side as the arms alternate their movements.

The arm movements for the front crawl are:

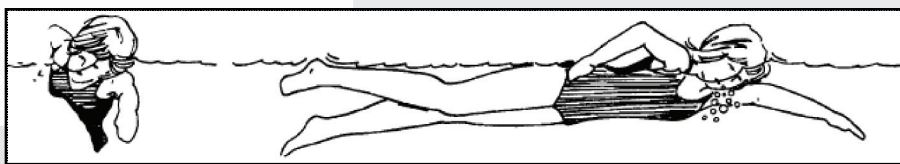
- i. extend one arm in front of body
- ii. raise the other arm out of the water with the elbow bent and held high
- iii. bring arm forward; hand flat with fingers extended
- iv. put hand into the water in front of the head; fingers entering the water first and the thumb inline with the armpit



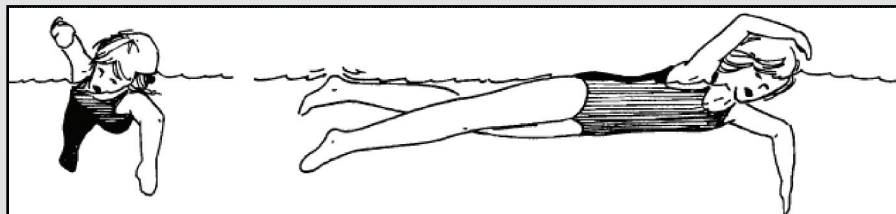
- v. slice hand through the water until the arm is almost fully extended



- vi. pull the hand under the body with the elbow kept higher than the hand
- vii. push the hand back towards the thigh until it is almost fully extended
- viii. lift arm out of the water, elbow first and held high with arm relaxed



Arms alternate in carrying out these movements.



These arm movements combined with the flutter kick and rotary breathing make up the front crawl stroke. The front crawl is the fastest swimming stroke; it is used in freestyle swimming competitions. Without proper breath control (rotary breathing) it is very tiring to the swimmer.

2. Sidestroke

The sidestroke is a very relaxing stroke since the position of the head allows the swimmer to both breathe and see his surroundings more easily and there is a period of gliding during which the swimmer can rest in any each stroke. The body is held in a side glide with one hand extended forward (the leading arm) and the other held alongside the body (the trailing arm).

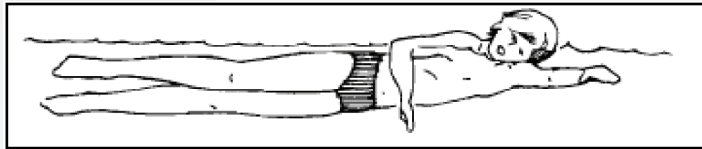
The arm movements for the sidestroke are:

Trailing arm:

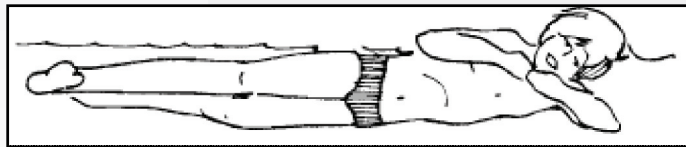
- i. slide the trailing arm, elbow bent, up the body to just under the chin
- ii. reach with the hand toward the opposite shoulder

Leading arm:

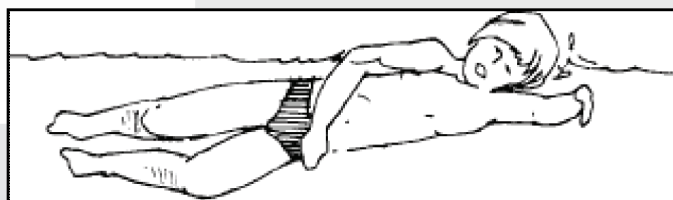
- iii. pull leading arm, elbow bent, rearward to the shoulder; lead with the hand and push water downward towards the feet
(the head will rise slightly; breathe in)



- iv. hands meet just under the chin



- v. slide leading arm back up to the glide position (exhale as head dips back into the water)
- vi. push water towards the feet with the trailing arm



The arms move at the same time and symmetrically (one pulling the body forward, the other pushing).

These arm movements combined and coordinated with the scissors kick and rhythmic breathing make up the *sidestroke*. Variations of the sidestroke are used for swimming assists where an object is towed. It does not matter which leg is extended forward in the scissors kick, except in swimming assists where it is more desirable that the bottom leg extend forward. Sidestroke is more appropriate for swimming in calm water; it is a quiet swimming stroke since all the leg and arm movements are performed under the water's surface.

3. Breaststroke

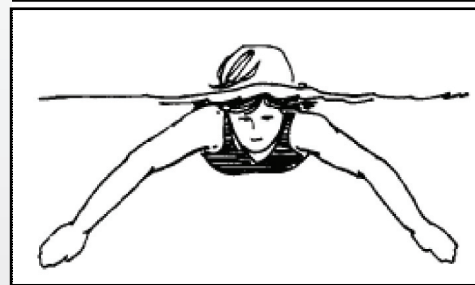
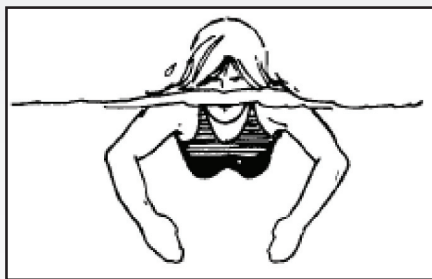
The breaststroke is a very powerful swimming stroke that propels the swimmer quickly through the water in short rapid bursts. To begin the breaststroke, the body is in a front glide position with both arms and legs fully extended out from the body, and head in the water to the hairline.

The arm movements of the breaststroke are:

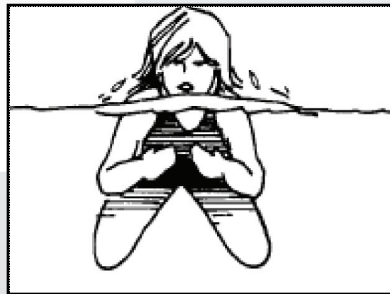
- i. turn palms diagonally outward



- ii. bend elbows; pull hands downward and slightly outward (exhale)
- iii. keep elbows high until hands are in line with the shoulders



- iv. make vigorous inward circular motion with hands; hands make a heart-shaped pattern; (tilt head up; inhale)



- iv. make vigorous inward circular motion with hands; hands make a heart-shaped pattern; (tilt head up; inhale)



- v. bend elbows, bring hands in front of chin

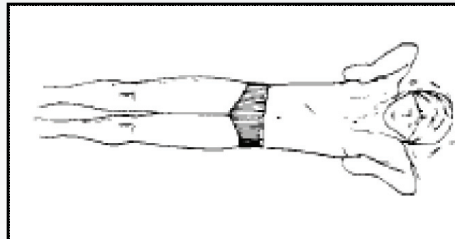


These arm movements combined and coordinated with a modified frog kick and rhythmic breathing make up the *breaststroke*. Breaststroke is appropriate for swimming in rough, choppy water; it is a quiet swimming stroke since all the leg and arm movements are performed under the water's surface.

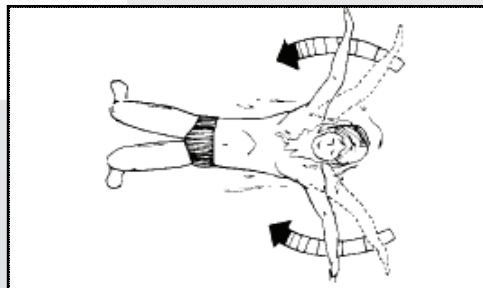
4. Elementary Backstroke

The elementary backstroke is useful to a tired swimmer since it allows for the opportunity swim with the face completely out of the water and normal breathing. It is a good stroke in rough or choppy water. The body should be in a back float position maintaining a horizontal, streamlined back glide with the arms along the sides. The arm movements involve:

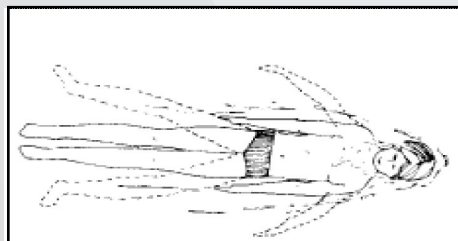
- i. slide the arms up along the body bending the elbows and pointing them towards the shoulders



- ii. reach arms outward with fingers leading and close to the ears when arms are at shoulder height (or higher)



- iii. pull – push with hands, palms facing the feet, just below the surface



Arms should work together and symmetrically. Combined with the whip kick, these arm movements make up the elementary backstroke.

Swimming Underwater

The swimming strokes described previously can be performed underwater just as they are at the surface. However, movement will be much slower since the resistance offered by the water will be greater. Think of running on land, then think of running in water; it is harder and slower to run in the water, isn't it?

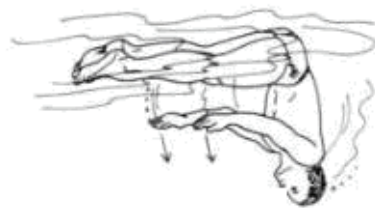
Surface dives are used to submerge quickly and change from swimming at the surface to swimming underwater. They are very useful when snorkeling and you want to go down and get a closer look at something, to retrieve an object, to swim under something in your path or to avoid potential danger. Before diving, it is important to ensure that the depth of the water is at least 8 feet since the force with which the body is thrust down toward the bottom can result in you striking your hands, head or toes on the bottom if the water is too shallow. Three surface dives important for beginning swimmers to learn will be described in this section: (i) *head first surface dive – pike surface dive and tuck surface dive* (ii) *feet first surface dive*.

Head First Surface Dive - Pike

To perform a pike surface dive from a head up approach while swimming with the front crawl or breaststroke, the swimmer needs to:

- i. take a large breath and hold it
 - ii. pull back with a wide sweep of both arms until they are at your sides; turn hands palm down
 - iii. bend at the waist and thrust head and chest downward to a vertical position
 - iv. press arms downward against the water and *simultaneously* lift both straight legs, toes pointed, up above the surface of the water, as high as possible
 - v. stop arm press when they are pointing straight down; press or squeeze legs together tightly, straight up, making the body streamlined
 - vi. stretch the body downward so the weight of the legs drives the body downward
- Look at the diagrams below.

Pike:



Thrust head downward by bending sharply at the waist



Press & lift: Press downwards with arms while lifting straight legs vertically upwards



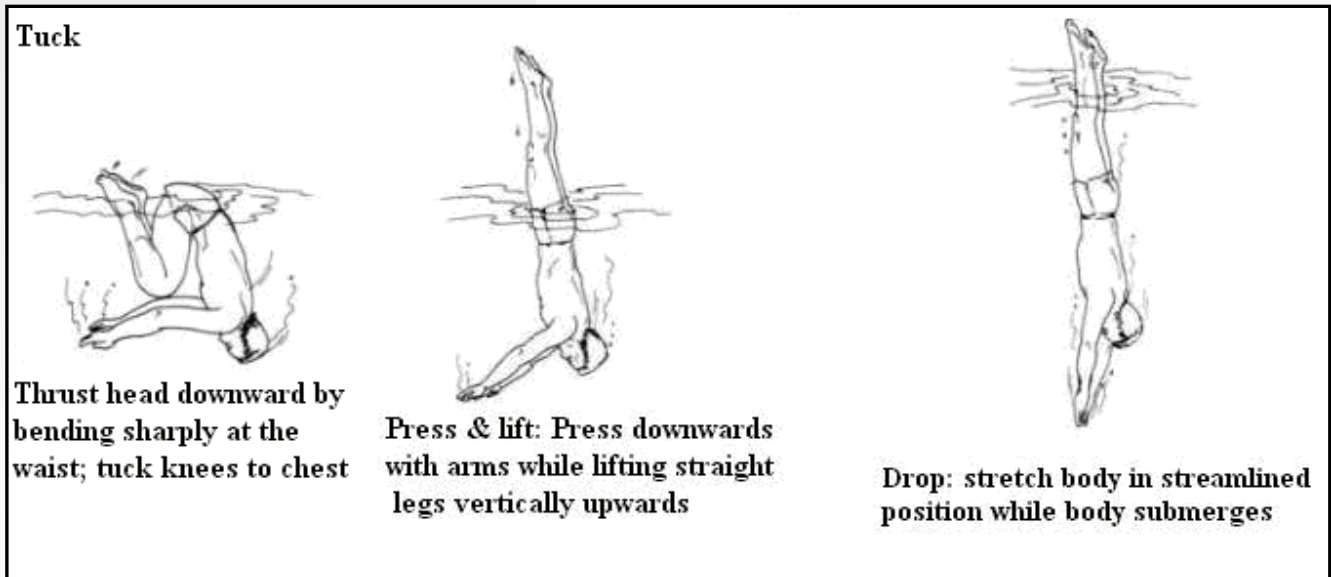
Drop: stretch body in streamlined position while body submerges

Head First Surface Dive – Tuck

The tuck surface dive is slightly different from the pike in that the legs are not straight when they are lifted out of the water. Instead, they are tucked up to the chest before being lifted out.

To perform a tuck surface dive from a head up approach while swimming with the front crawl or breaststroke, the swimmer needs to:

- i. take a large breath and hold it
 - ii. sweep arms outward and back to your sides; turn palms down
 - iii. bend waist sharply to 90°; thrust head downward
 - iv. press downward with arms and quickly tuck knees up to chest
 - v. thrust legs vertically upward, point toes, keep legs tightly together to streamline the body
 - vi. stop arm press once legs are up to avoid body rolling over
 - vii. stretch the body downward so the weight of the legs drives it downward
- Look at the diagrams below.



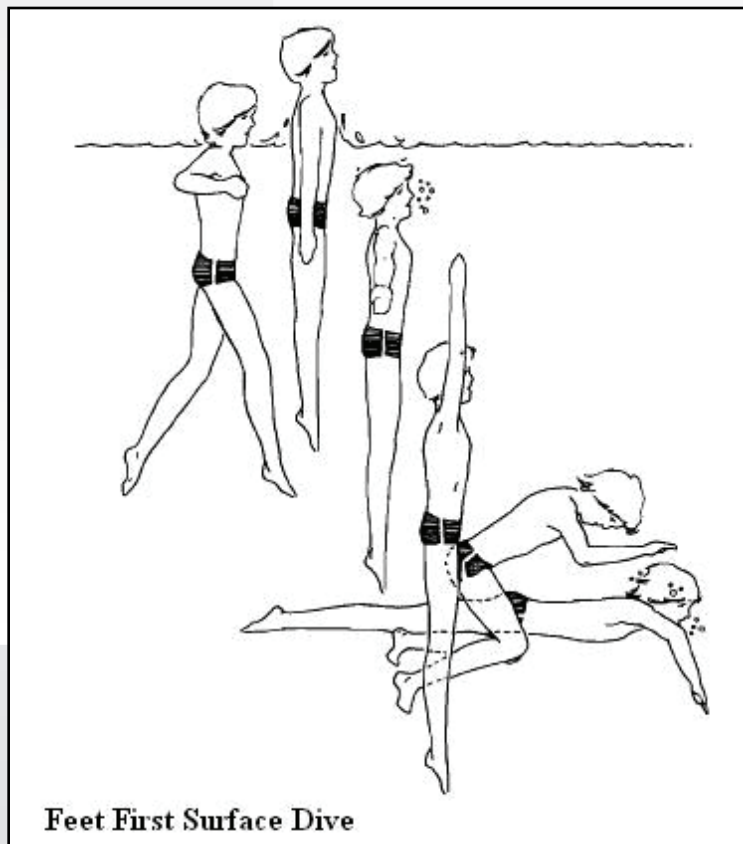
For both the pike and tuck surface dives, once the body is completely submerged, pull with both arms (breaststroke) to go deeper down or to level off for swimming.

Feet First Surface Dive –

To perform a feet first surface dive, the body starts out in a vertical, upright position with the chin at the water level. The swimmer then:

- i. positions legs to make a scissors kick and spread arms out to the side at the water surface
- ii. lifts the body vertically out of the water by making a powerful scissors kick and pressing downward with the arms at the same time
- iii. hold arms tightly alongside the body; hold legs straight, tightly together, point toes as body lifts
- iv. sweep arms upward alongside the body, palms up, to assist descent of body; keep hands underwater
- v. tuck body to level off from a vertical to a horizontal position for underwater swimming

Look at the diagram below



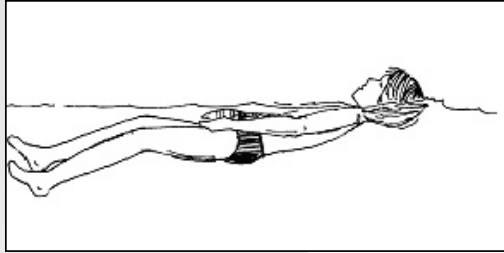
Swimming underwater causes increased pressure on the air spaces in the head – mainly the ears and sinuses. Sometimes teeth that have been filled also have air trapped in them. As you descend in the water, the air pressure in the air spaces is less than the pressure outside resulting in discomfort which can become painful if the pressures are not *equalized*. The deeper down you go, the more the pressure is felt and equalizing has to be repeated. To protect yourself and prevent injury, it is necessary to equalize the pressure inside the ear with the pressure outside. There are three techniques commonly used to make the pressure inside the air space equal to the pressure outside the air space:

1. Perform a swallowing action while wiggling the jaw from side to side.
2. Hold the nose (squeeze the nostrils to block them) and gently blow through it while keeping your mouth closed.
3. Perform both of the above techniques at the same time.

A crackling sound is heard when the pressure has equalized and the discomfort goes away. It is not possible to equalize pressure in a tooth.

SKILL CHECK

Study the diagram below and answer questions 1 and 2.



1. In swimming, what is meant by floating?

2. (a) Name the two main forces that act on a body during floating.

(b) In your own words, briefly tell what each of the forces named in (a) above does.

3. List and briefly explain the three characteristics of a person's body that determine how well the person will be able to float.

4. (a) List three ways the body can be positioned in a float.

(b) Describe how you would assume one of the three basic float positions starting from a standing position in the water.

5. Briefly explain the role of propulsion and resistance in a swimmer's ability to move through the water.

6. Define rhythmic breathing. Name two methods of rhythmic breathing.

7. List three ways of propelling oneself through water.

8. Complete the table:

Body Position	Leg Kick	Swimming Stroke
Face down	_____	Breast Stroke
Face _____	Flutter Kick	Front Crawl
Side (left or right)	Scissors Kick	_____
Face _____	Whip Kick	Elementary Back Crawl

9. (a) What is a surface dive?

(b) List three types of surface dives.

(c) Describe one method of equalizing pressure in the ears while diving or swimming underwater.

UNIT 2: BASIC SAFETY/SURVIVAL AND NON-SWIMMING RESCUE SKILLS

This unit focuses on basic knowledge of personal safety and survival skills and non-swimming rescue skills deemed essential for safe conduct in and enjoyment of aquatic environments.

OBJECTIVES:

At the end of this unit you will be able to:

1. Discuss why it is important to be safety conscious in, on and around water.
2. Identify correctly the swimming strokes appropriate for swimming in calm and rough water.
3. Describe five personal survival techniques.
4. Describe one group survival technique.
5. Demonstrate knowledge of proper use of a Personal Flotation Device.
6. Demonstrate knowledge of two non-swimming rescue techniques.

AT A GLANCE:

1. Water safety rules
2. Personal survival techniques
3. Group survival techniques
4. Personal Flotation Devices
5. Non-swimming rescue



WATER SAFETY

The roles and responsibilities of the tour guide listed in Chapter 2, Unit 1 of this manual include “To ensure the safety and well-being of your visitors at all times”. Before you can assist another in being and remaining safe, you must be safe and able to keep yourself safe.

GENERAL WATER SAFETY RULES

1. Learn how to swim - This is essential for personal safety.
2. Swim with a buddy - It is never a good idea to swim alone or to not let someone else know where you will be swimming.
3. Supervise children and weak swimmers - Many drown victims are the result of poor supervision.
4. Obey all safety rules - It is important that you be aware of any special precautions that should be taken for the particular place in which you and your guests will be swimming or snorkeling.
5. Use buoyant objects wisely - Buoyant objects designed for play and fun should not be used as personal flotation devices. They may deflate easily or get blown away putting you in danger if you are in deep water.
6. Know when to swim - Do not swim during thunderstorms or in bad weather. Water conducts electricity.
 - Be aware that swimming after dark is dangerous since you can not be seen nor will you be able to see obstacles or help others if needed. Additionally, large predatory fish feed at night.
 - Vigorous swimming after a large meal is not recommended since the exercise may cause exhaustion and nausea.
 - Avoid swimming when your body is feeling exhausted because of exercise or being hot. Cool off before entering the water slowly to allow for temperature adjustment.
7. Know where to swim - Stay in supervised areas; near a boat in open waters.
 - Dive only where the water is deep enough.
 - Be wary of unknown waters. Enter slowly; check bottom for hazards (e.g., rocks, glass, weeds, logs); check water depth and temperature, currents, visibility.

The table below lists examples of entry methods and conditions in which each may be appropriate.

Entry Method	Suited to persons	Circumstance
Climb down a ladder	not accustomed to high levels of physical activity who are beginning swimmers	Entering a swimming pool Entering water from a boat
Wade in	who are beginning swimmers not accustomed to high levels of physical activity	Shallow water; entering from a beach or river bank Strong current or wave action
Dive in	Intermediate and advanced swimmers	Deep water Entering from an elevation
Jump in	Beginning, intermediate and advanced swimmers	Water of suitable depth
Ease (lower) in	Any person	Deep water Entering from an elevation Entering a swimming pool Entering water from a boat Strong current or wave action

WATER HAZARDS, AND WHAT TO DO

Let's look at two groups of water hazards - Personal Danger and Environmental Dangers - and the safety/survival skills that can be used in each situation.

1. Personal Danger

a.) Panic - Finding yourself in a new situation in which you feel unsure or threatened can create a sense of great fear or panic. There are no sure ways to prevent panic but practicing the various survival skills and imagining yourself in situations where they may be needed will help you to mentally prepare yourself to use them.

b.) Cramps - Muscle cramps, particularly in the legs, may occur during strenuous swimming when the muscles are tired. Most important is **DO NOT PANIC**. Dependent on the water depth, temperature and conditions, there are several actions you can take.

- i. Stop swimming and walk out to shore or get back into the boat. Massage and stretch the muscle to relieve the cramp.
- ii. Float face down and massage the muscle. If you are wearing fins, grasp the tip of the fin and pull it toward you to stretch a cramped calf muscle and relieve the cramp.
- iii. Flip over onto your back and swim using your arms only.

c.) Choking - This is most likely to occur if you swim too soon after a heavy meal. Most important **DO NOT PANIC**. Two actions you can take are:

- i. Tread water until your throat is clear.
- ii. Float on your back until your throat is clear.
- iii. If you are near a boat, hang onto the buoy line

Of course, it is best to avoid strenuous swimming activity after a large or heavy meal.

d.) Exhaustion - It is important that you know your strengths and limitations in the aquatic environment. Know how far and/or long you are able to swim before needing to rest. Things to bear in mind when swimming long distances or for long periods of time are:

- i. Swim parallel to the shore and stay in shallow water as much as possible when swimming long distances.
- ii. Always make sure someone is watching or knows where you are.
- iii. Switch to a more resting stroke, for example, from front crawl to sidestroke.
- iv. Roll over from a face down position to a face up float and rest.
- v. It is good snorkeling practice to swim up-current first toward the reef or your objective, then return down-current so the push of the current assists your return.

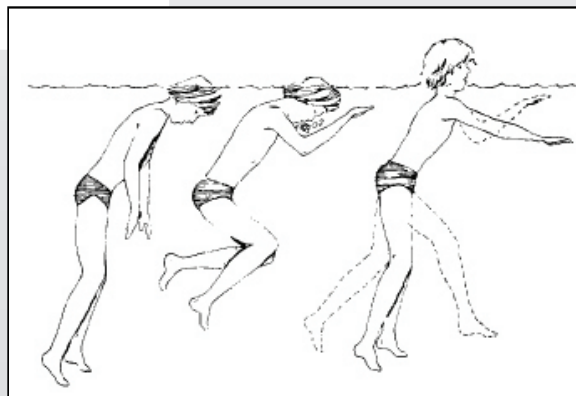
2. Environmental dangers

1.) Deep water - There are times when you may find yourself either accidentally or intentionally in water of a greater depth than you anticipated. Most important **DO NOT PANIC**. Conserve your energy especially if you may have to be there for some time.

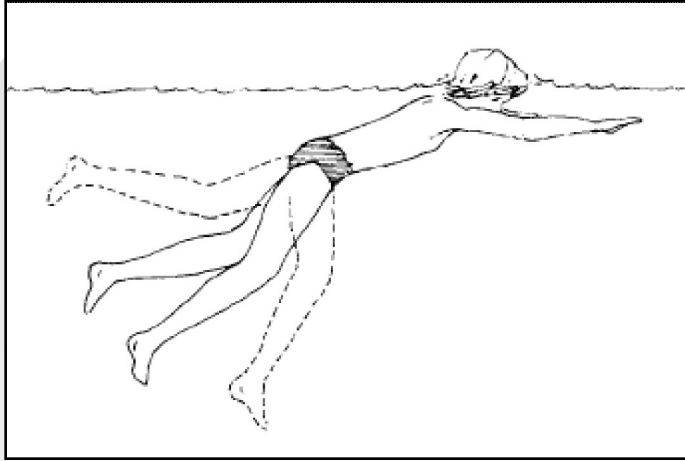
If a safer area is close by, the easiest and most obvious solution is to get back out of the deep area as soon as you can - swim to the side of the pool, to a nearby boat, to the shore, to the shallows.

Given that the water temperatures off our coast are usually warm, dependent on the distance away from a safer area, choose one of the following survival techniques:

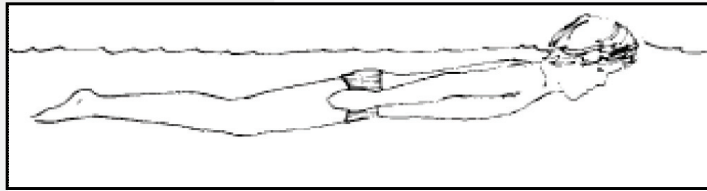
- i. Bob off the bottom towards shore if the depth of the water allows.
- ii. Swim to a safer area using the Travelstroke - a combination of floating vertically, scissors kick, rhythmic breathing and front glide to 'travel' using very little energy.
 - a. Begin with body hanging relaxed in a motionless, almost vertical face down float; lungs fully inflated
 - b. exhale slowly, gently
 - c. lift head and rest chin on water (use a small kick and/or arm pull if necessary; gentle movements)
 - d. inhale through mouth and nose



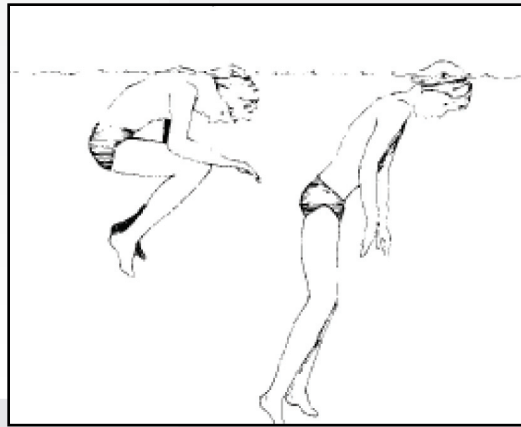
- e. submerge - bend head forward, look down while extending arms forward in a front glide (prevents sinking too far)
- f. scissors kick to bring body up into horizontal, streamlined position at the surface
- g. pull arms rearward (long breaststroke pull); keep legs together



h. glide until forward motion slows down



- i. pull knees to chest and press down with hands
- j. return to motionless float



k. Repeat cycle.

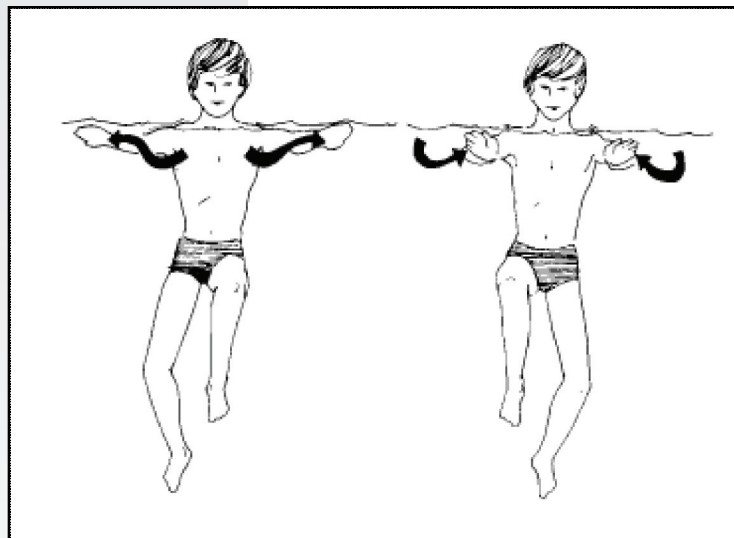
A variation of the travelstroke where the actions are only intended to allow the person to hang motionless in a relaxed position and breathe as often as he wants to for long periods is referred to as *Drownproofing* or the *Survival float*.

- iii. If someone is nearby to throw a flotation device to you or pick you up in a boat, it is better to *Tread* water while you wait for assistance. Treading water allows you to hold your head above water, wave your arms to attract attention, reach out to grab on, see what is happening around you and most importantly, breathe normally.

Treading can be achieved from either a face down or face up position.

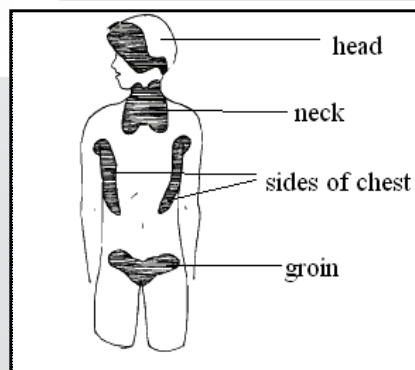
- a. bring body to a “standing” position (with a slight crouch) in the water with ears out of the water and chin at the surface
- b. move legs in one of several ways: rapid flutter, ‘pedaling’, scissors kick, or ‘eggbeater’ action
- c. use arms in a smooth, wide sculling movement

Look at the diagrams below.



The ‘eggbeater’ action and scissors kick are more effective and less tiring than ‘pedaling’ and fluttering. Both arm and legs should be moved in wide slow motions. It is possible to tread water using only the legs or only the arms to support the body.

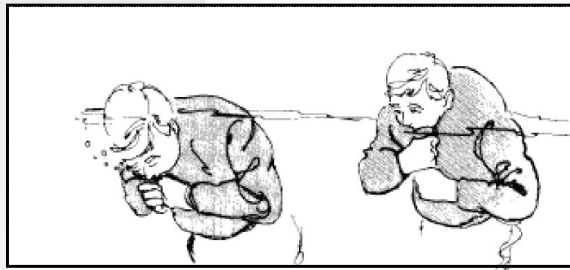
- iv. Even in the warm waters of Belize, it is possible to experience some degree of *hypothermia* - a decrease in body temperature. In the event that you are in deep water for an extended period of time you will need to conserve your body heat. You will need to protect the parts of the body from which heat is lost rapidly - the head, neck, groin and sides of the chest.



a. Clothing, even light clothing, aids in conserving body heat in the water especially if it is inflated so that a layer of air is kept between the skin and the water. It is not difficult to inflate a shirt once the cuffs and waist can be secured to prevent the air from escaping rapidly.

- i. With the shirt on, button all shirt buttons except the third one from the top; if no buttons, grasp shirt collar
- ii. secure the cuffs and waist of shirt
- iii. take a deep breathe, lower head underwater, exhale air into shirt opening (air will rise around the body forming an air pocket in the shirt)
- iv. hold opening tightly closed while you tread water or float with the chin just above the water

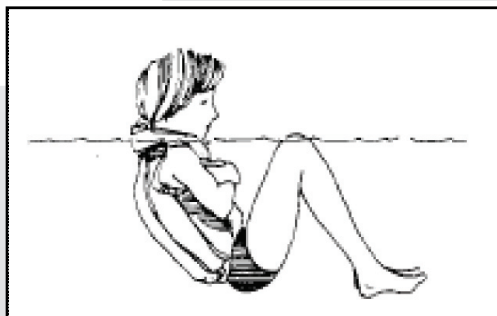
Look at the diagram below.



b. A technique called *HELP - Heat Escape Lessening Position* - greatly assists in reducing heat loss and is credited with an almost 50% increase in survival time. It involves:

- i. wearing a personal flotation device (PFD)
- ii. holding the inner side of the arms over the sides of the chest indicated in the diagram above
- iii. crouching the body and pressing the thighs close together over the groin (crossing the ankles helps)
- iv. floating near the surface keeping the head above water

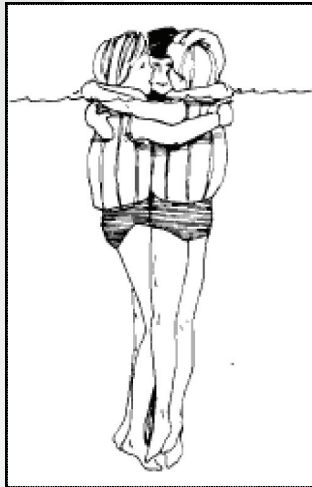
Look at the diagram below.



A PFD with buoyancy high up on the body greatly assists the swimmer to hold this position in the water.

- c. The Huddle is a variation of HELP in which different people hold onto each other pressing their bodies together. A 50% increase in survival time has also been demonstrated through the use of this technique.

Look at the diagram below.



2.) Semi-submerged ropes, weeds, branches - It is possible to become caught or tangled in debris that is half submerged or floating in the water. It is best to avoid swimming in areas where these are found. If you do encounter these hazards, move carefully into a horizontal swimming position and swim away using slow arm and leg motions.

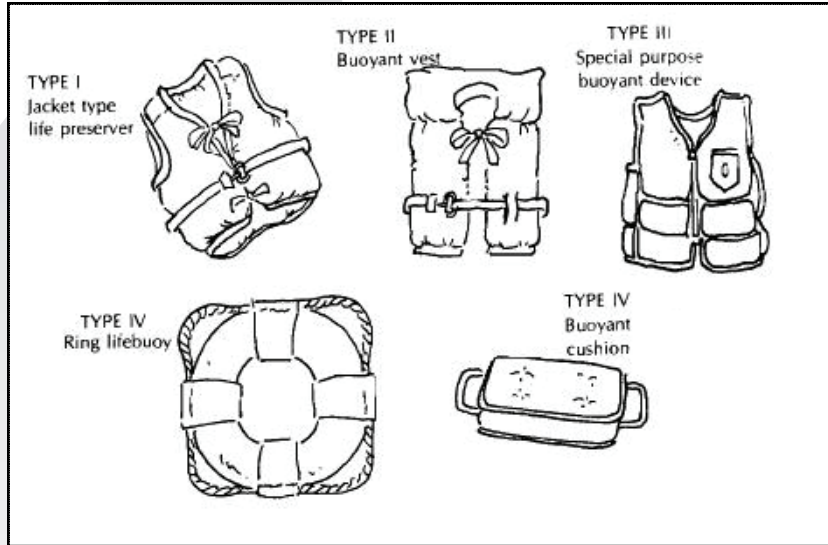
3.) Currents - areas of fast moving water - are found in rivers and tidal areas. Never try to swim against a current. Swim diagonally with the current to safety - the shore, shallow water or water outside the path of the current.

4.) Caught in coral - If you find yourself in a dead end or blind pool surrounded on all sides by coral, DO NOT PANIC Stop where you are, bend your knees up to your chest and keep your fins still; rotate in the water while you look for a way out, then stretch out slowly and exit slowly.

PERSONAL FLOTATION DEVICES (PFD'S)

Personal flotation devices (PFD's) are life jackets or vests designed to assist swimmers and act as personal lifesaving devices. There are four types of PFD's approved as life saving devices. These are:

- Type I** Off-Shore Life Jacket: life preserver appropriate for any type of vessel; best PFD for open, rough or remote water with little traffic where help may be slow in coming.
- Type II** Near-Shore Buoyant vest appropriate for all recreational vessels in calm, inland water or where quick rescue is very likely
- Type III** Flotation Aid or Special type buoyant devices appropriate for all recreational vessels in calm, inland water where there is a good chance of getting help quickly
- Type IV** Throwable device, e.g., Ring lifebuoy and buoyant cushion appropriate for all recreational vessels in calm, inland water where help is always nearby. Cushions are not considered the best option for a PFD.



The laws of Belize, specifically The Harbour and Merchant Shipping Act Chapter 234, Revised Edition 2003, Section 2.2.2 (iv), require every licensed vessel to have “serviceable and approved life jackets for each passenger/person on board including, children and crew members”. As a guide on an aquatic tour, you should ensure that this regulation is enforced at all times. Many drownings occur because persons do not wear a PFD.

PFD’s are designed to provide the additional 7 to 12 pounds of buoyancy required to ensure that your body will float comfortably until help arrives. For this reason, it is important that in selecting a PFD, you ensure that you have chosen one that will give you the amount of buoyancy appropriate for your body weight and size, and the water conditions you are likely to be in. PFD’s should fit snugly and keep your head tilted slightly backward or in an upright position with your chin above the water.

Proper care and storage of PFD’s is important for ensuring that they will be keep you safe when the need arises. PFD’s should be kept clean, dried in a well ventilated area and protected from crushing or tearing.

NON-SWIMMING ASSISTS

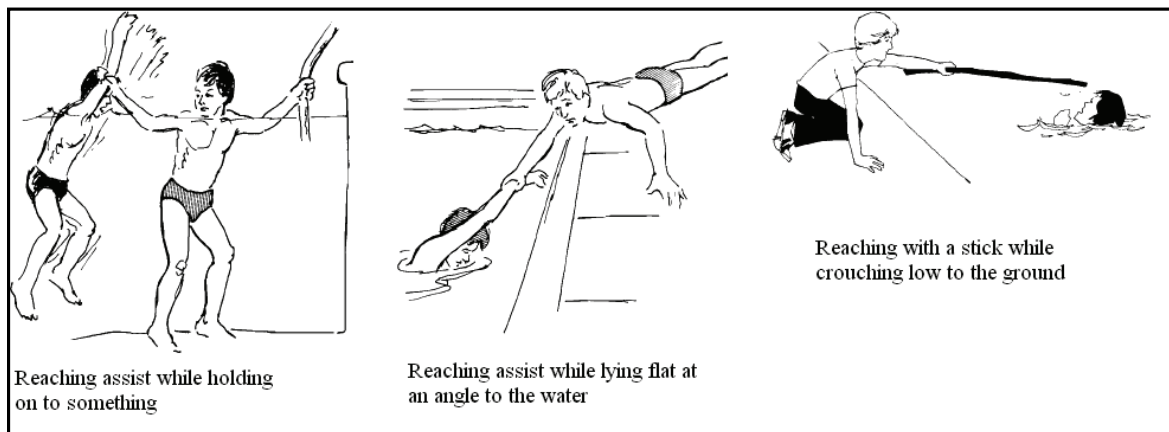
Non-swimming assists are the safest and most effective way of helping a swimmer having problems without you endangering yourself or other persons. Beginning swimmers should never attempt any rescue attempt other than a non-swimming assist. The first assistance anyone can offer is calling out for help to persons nearby. This may seem to be so obvious that you may think it should not be included here. However, often a person gets so caught up in the moment that calling “**HELP**” as loudly as possible completely slips the mind.

Non-swimming assists are of two types – *Reaching Assists* and *Throwing Assists*

Reaching Assist

A *reaching assist* involves extending an object to the person who is having a difficult time and pulling him to safety. Sometimes your hand or leg is sufficient for the person to grasp and be pulled in. In this type of assist, ensure that you are securely anchored or holding onto something before reaching out. You should position yourself low to the ground or lie flat at an angle to the water to prevent being pulled into the water.

If the person is at some distance away, then an object which will act as an extension of your arm may be needed. An object that is long enough, strong, buoyant and easily managed is best. A pole, paddle, towel, rope, branch, belt or any number of objects like these can be used as extensions. In shallow water, you should never go further than chest deep water. Once the person having difficulty has securely grasped the object, you should pull him in steadily but slowly. It is a good idea, where possible, to talk with the person while assisting him.

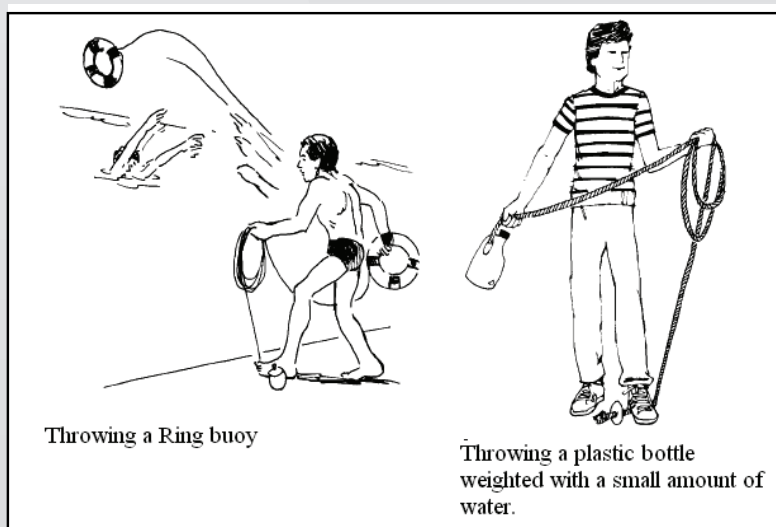


Throwing Assists

In situations where a person having difficulty is beyond your reach, even with an extension, a throwing assist is the best way of helping. It involves throwing a buoyant object for the person to hold onto until help can get to him or he has rested and is able to swim to safety. If a heaving line has been tied to the object, then the person can be pulled to safety. Practically any object that will float can be used in an emergency but it is advisable to have the necessary equipment readily available and to practice using it beforehand.

When making a throwing assist with a buoyant aid or float attached to a heaving line, you should remember to:

- 1) throw the float past the person, then manoeuvre it within easy reach of the person
- 2) stand on the free end of the heaving line to prevent loss of the line
- 3) allow for wind and current when throwing
- 4) if the float falls short of the person, pull in the line quickly and rethrow without coiling the line



SKILL CHECK

1. List four rules for general safety for touring or recreation in, on and around water.

2. (a) Name five personal survival techniques.

(b) Describe when and how you would use two of the techniques listed at (a) above.

3. (a) What is a Personal Floatation Device (PFD)?

(b) Briefly explain how you would determine which type of PFD is appropriate for a specific outing.

4. Complete the table below:

Non-swimming Technique	When to use
1.	
2.	

5. What swimming strokes are best suited for swimming in rough or choppy water?

UNIT 3: BASIC SNORKELING SKILLS AND SNORKELING ETIQUETTE

This unit focuses on basic knowledge snorkeling skills, the necessary equipment and its care and the behaviours deemed essential for safe conduct in and enjoyment of aquatic environments.

OBJECTIVES:

At the end of this unit you will be able to:

- 1 Name the equipment needed for snorkeling.
- 2 State the purpose of a mask, snorkel and fins.
- 3 List features desirable in a mask, snorkel and fins to ensure comfort.
- 4 State the two most important factors in selecting a mask, snorkel and fins.
- 5 Prepare a new mask, snorkel and fins for use.
- 6 List general maintenance procedures to care for a mask, snorkel and fins.
- 7 Discuss good snorkeling etiquette.

AT A GLANCE:

- 1 What is Snorkeling?
- 2 About Masks
- 3 About Snorkels
- 4 About Fins
- 5 About snorkeling etiquette



WHAT IS SNORKELING?

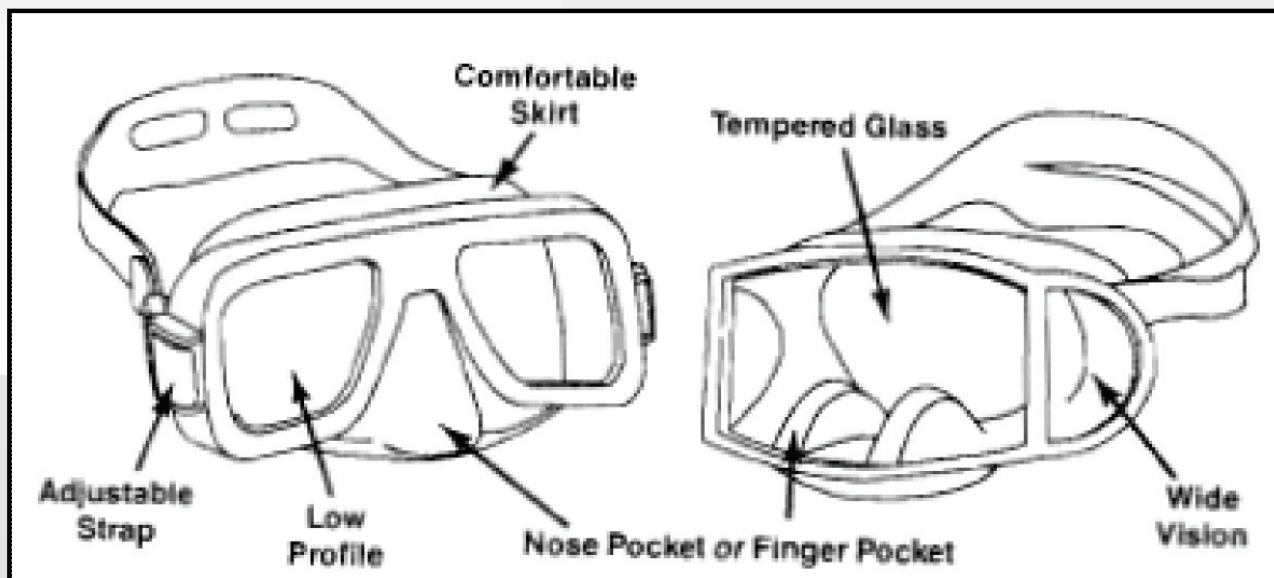
Snorkeling is swimming with fins, a mask, and a tube called a snorkel that allows you to have your face down in the water and still breathe. It is different from scuba diving in that it does not require expensive equipment, specialized training and certification; it can be enjoyed by people of all ages in just about any body of calm water with good visibility.

Properly fitted mask, snorkel and fins are essential for a rewarding and relaxing snorkeling experience. The two most important factors to consider when selecting snorkeling equipment are *fit and comfort*.

ABOUT MASKS

A diving mask has three main parts: (i) a lens or face plate (ii) a skirt made of flexible material (neoprene or silicone) (iii) a head strap. Mask styles fall into two general categories - wraparound and low-profile. You should try on a variety of models and choose one that best suits you. In making your choice, look at the following features:

1. lens made of tempered glass - less likely to shatter into small slivers.
2. comfortable skirt that fits your face closely and forms a good seal
3. nose or finger pockets - allow for easier equalizing of ear pressure
4. low profile lens - allow easier equalizing and clearing if mask floods
5. adjustable strap that locks in place
6. wide field of vision - allows good peripheral vision



It is important to test that a good seal has been formed between your face and the skirt of the mask. The mask should stay in place even without the strap around your head; the purpose of the strap is largely to keep you from losing the mask if it is accidentally knocked off or you remove it while still in the water. To test, place the mask against your face and inhale through your nose; the suction created should hold it in place as long as you hold the breath. Before putting on your mask, ensure that your face is free of any material (lotion, oil, sunblock) which may interfere with forming a seal and that no hair is trapped between the skirt and your face. Hair can act as a wick letting water into the mask.

You should prepare a mask, *especially a new one*, before using it. The easiest way of doing this is by scouring the lens (inside and outside) with a soft cloth and *non-gel* toothpaste; rinse well. Other things that work well to clean the lens are: commercially prepared anti-fog liquids, saliva (spit), and the gel from Sargassum. Rinse the “cleaner” out after rubbing it on the lens. Cleaning reduces fogging of the lens thereby allowing you to see well. Adjust the strap so that it fits snugly across the back of your head. Do not make it too tight as this may cause a headache. It may be necessary to clear your mask of water or ‘fog’ while snorkeling.

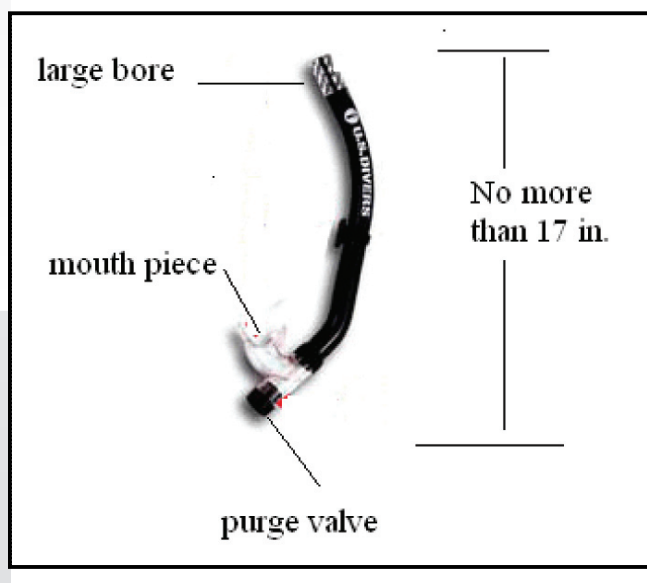
If it is necessary for you to remove your mask to clear it, bring your legs up to your chest and float face up while you do so. Fins are very buoyant and will help you to float in this position. Never put your mask on the top of your head as it may easily be knocked off and sink or be washed away. Let it hang around your neck.

ABOUT SNORKELS

A snorkel is a hollow curved tube with a mouth piece that fits in your mouth and allows you to breathe while you are face down in the water. While you are looking down into the water, the snorkel is sticking out of the water on one end while the other end is in your mouth so that you can swim around without having to lift your head every time you need to inhale.

Three features to consider in selecting a snorkel are:

- 1 tube has a large bore - easy passage of air
- 2 tube no longer than 17 inches - easier to clear any water that enters it due to wave action or you swimming
- 3 design has smooth interior



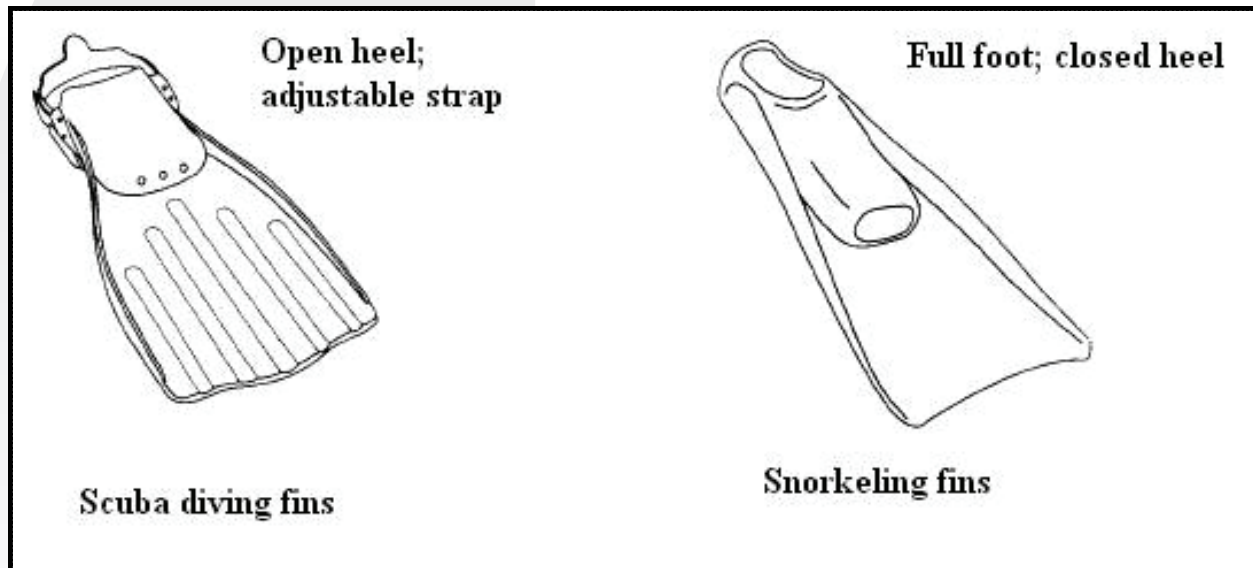
Many snorkels available have a purge valve at the bottom end which makes emptying or clearing the tube of water easier. You simply exhale forcefully into the mouth piece; however, you need to be careful that the tube is completely cleared or run the risk of inhaling water with your next breath.

Most persons attach the snorkel with the rubber ring or clip that comes with the snorkel to the mask strap on the left side in front of your ear. It should be adjusted so the mouthpiece is in easy reach of your mouth when the mask is in place and you do not have to hold it in place using your mouth muscles. The mouthpiece should remain in your mouth even if you open your mouth.

ABOUT FINS

Fins are oversized shoes for swimming. They have a *pocket* for your foot to fit into and a paddle-like front, *blade*, that provides your feet with a large surface area to propel you through water, far more efficiently than your feet alone, allowing you to “swim like a fish”. There are 2 kinds of fins:

- 1 **full foot** (close heeled) - especially suitable for snorkeling in the calm, relatively shallow, warm waters of the reef, grass beds and mangrove channels of Belize, and
- 2 **open heeled** (adjustable heel strap) - requires a special boot (bootie) and is more suited for Scuba Divers or for colder waters.



In selecting fins, make sure that the fins are a good, snug fit or else you will either be cutting off circulation to your feet, or they will easily come off. They should be a snug fit but you should be able to wiggle your toes, and not get blisters, while using them. Choose fins appropriate to the activity you will be engaging in, where you will be snorkeling, your size and your swimming ability. Open heel fins have larger, stiffer blades that require more leg strength, provide greater propulsion and stir up more sediment in their wake. This last factor is primarily why open heel fins are not suitable for snorkeling in sensitive aquatic habitats where stirring up sand or sediment severely upsets the delicate balance needed by the resident organisms.

The better you are able to swim, the more rewarding and relaxing your snorkeling experience will be. So, how do you snorkel? Once you have prepared and put on your mask, snorkel and fins:

- Relax in a **front float** with your arms at your sides and your legs straightened out behind you.
- **Keep your face down** - water at the hairline - open your eyes and look through the mask.
- **Breathe** normally through your mouth - inhale and exhale through the mouthpiece of the snorkel.
- **Flutter kick** slowly and gently so that the fin tips **do not** break the surface of the water - keep your legs straight with only a very slight flexing of the knees and ankles.

A couple notes, keeping your arms at your sides while snorkeling is more resting and frees your arms to hold things and help in steering (changing direction). However, if there are objects in the water you might bump into, it is better to hold your arms out in front to protect your head. Always lead with your hands when you dive down into the water. Using a snorkeling vest is particularly advisable if you are a beginning swimmer or do not float well. This will positively improve your experience while safeguarding the health of coral and other organisms that are destroyed by people standing on them or smothering them with sand or sediment stirred up by their kicking to stay afloat.

Finally, how do you take care of snorkeling equipment? Mask, snorkel and fins should be rinsed in fresh water after each use and allowed to air dry. Store them in a cool, well ventilated, dry area away from direct sunlight or other heat source.

ABOUT SNORKELING ETIQUETTE

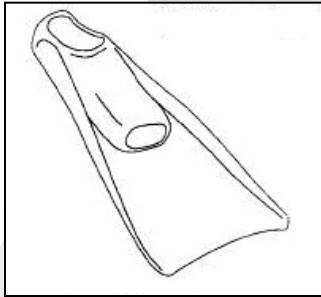
Snorkeling is a relaxing activity but it can become stressful if some simple courteous rules are not followed, especially when there is a group of persons snorkeling together. Some general rules are:

1. Pick your snorkeling spot with consideration for others - snorkeling next to a fishing boat, an area with heavy boat traffic, a honeymooning couple or a group of swimmers is not a good idea.
2. Use a dive flag and float when snorkeling from a boat. Remember that in the water, you're difficult to see from above.
3. Drive your dive boat at a speed of 5 knots or less when within 200 feet of any dive flag or others in the water.
4. Bring your own equipment and anti-fogging liquids - relying on being able to borrow equipment sets you up for disappointment.
5. Wear protective clothing and/or sunblock if you burn easily or intend to be out for a long time - a shirt (long sleeved shirt and slacks for very fair skin), sunblock the back of your legs, behind your neck, the tips of your ears.
6. Be quiet, move gently and calmly, remember snorkeling should be a relaxing experience - trashing about in the water; hitting others with your arms, kicking up water or sediment, screaming underwater, ... will destroy the moment
7. Look only, take pictures, make memories - remember that touching can be dangerous to you and can make many organisms vulnerable to infections that can kill them
8. Leave the habitat the way you found it - shells, rocks and logs are often "someone's" home; carcasses are food for organisms living there.
9. Stay with your group - use the 'buddy system' and keep track of time and distance.
10. Mangrove channels and the roots of red mangroves are best explored in a slow leisurely manner. Fins are not really needed and, in fact, often stir up the loose sediment in the channel clouding the water. Unless you are a weak swimmer, consider snorkeling without fins in mangrove habitats.
11. Agree on hand signals you and your buddy or group will use to communicate with each other underwater, especially one that means you need help.

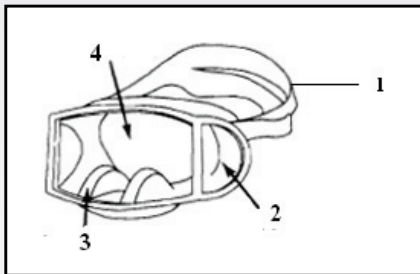
As you become more experienced at snorkeling, modify this list to suit the particular areas you work in.

SKILL CHECK

1. Identify each of the following and complete the accompanying statements.



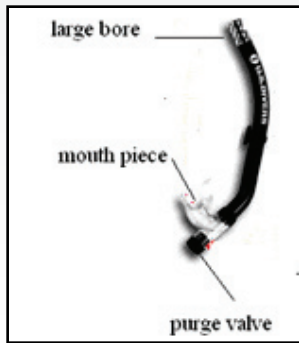
This is called a _____ footed fin. It is worn on a person's _____ during snorkeling. When snorkeling in mangrove channels, it is better _____ to use any fins.



This piece of snorkeling equipment is called a _____.

The names of the labeled parts are:

1. _____
2. _____
3. _____
4. _____



Snorkels are used to allow easy _____ while the snorkeler's face is underwater.

The purge valve allows the snorkeler to expel _____ from the tube.

The large bore of the tube allows easier flow of _____ while the snorkeler is _____.

2. The two most important factors to consider when selecting snorkeling equipment are:

3. Briefly describe:

(a) how to prepare a new mask for first use

(b) how to take care of snorkeling equipment after each use

4. Develop a short interpretive presentation in which you give at least five examples of good snorkeling etiquette and explain the reason why each should be observed.

UNIT 4: GENERAL BOATING SAFETY

This unit focuses on basic knowledge tour guides should have of the requirements for boating safety as stipulated by the Belize Port Authority in their **MARINERS' HANDBOOK** and deemed essential for safe conduct in and enjoyment of aquatic environments.

OBJECTIVES:

At the end of this unit you will be able to:

1. Recall that Belize has a law used by the Belize Port Authority to enforce its regulations.
2. Demonstrate knowledge of boating safety practices recommended by the Belize Port Authority.
3. Recall and define basic nautical terms.
4. Demonstrate the recommended procedure to follow when someone falls overboard.
5. Explain the Rules of the Road that apply to all vessels.

AT A GLANCE:

- 1 Legal Aspects
- 2 General boating safety provisions
- 3 Basic nautical terms
- 4 Man Overboard!
- 5 Rules of the Road



LEGAL ASPECTS

The Belize Port Authority (BPA) is legally authorized through the Harbour and Merchant Shipping Act Chapter 234, Revised Edition 2003 to enforce regulations governing the safe conduct of all seagoing vessels operating in Belize. The regulations enforceable by the BPA are set out in the *Belize Port Authority Mariners' Handbook, 2nd Edition – 2005 (BPA Mariners' Handbook)* supplied to you as a resource for this Unit.

GENERAL BOATING SAFETY PROVISIONS

This is probably a good place to review some of the items in the Checklist, “Getting Ready: Pre-tour Preparation” given in Chapter 2, Unit 3. The checklist items listed below are in line with the general provisions for boating safety identified in the *BPA Mariners' Handbook* and which you, as a tour guide responsible for the “safety and well being” of the visitors, must ensure before leaving on a tour.

“Getting Ready: Pre-tour Preparation” Checklist Item:

- Boat Readiness includes:
 - Check that engine fluids and fuels are topped off and there are no leaks.
 - Ensure that a bilge pump, bailer and adequate anchor are on board.

BPA Mariners' Handbook, Sections 1.1.1, 2.2.2 (iii)
- Boat Safety and Legality includes:
 - Ensure that there are sufficient life jackets on board.
 - Check that life ring or other flotation device has rope attached to it.
 - Ensure that proper lights and warning flags for diving or snorkeling are on board.
 - Check that fire extinguisher, sound signal device such as a whistle, and proper license documents (stored in a dry place) are all on board.

BPA Mariners' Handbook, Sections 1.1.3, 1.1.4, 1.1.5, 1.2, 1.3, 1.10, 2.2, 2.3 5.5
- Communication Devices includes:
 - Have a charged cell phone with charger.
 - Have a well charged radio with call sign or code.

BPA Mariners' Handbook, Section 1.6, 1.10 (iii)
- Supplies (First Aid) includes:
 - Have a standard first aid kit with medication for most ailments that can result from activities during the tour including vinegar, X-Ema Death, or other relief for marine stings.

BPA Mariners' Handbook, Section 1.1.5, 2.2.2 ((vii)
- Itinerary and Logistical Items includes:
 - Have a copy of the itinerary
 - Have a copy of passenger list that contains transfer points for all guests

BPA Mariners' Handbook, Section 1.4

BASIC NAUTICAL TERMS

Clear communication is essential in any situation and most occupations have words that are specific to them. Proper use of the words is essential for clear, concise communication. The following nautical terms are listed in the *BPA Mariners' Handbook*, Section 3.1 and you should learn them.

Nautical Term	Ordinary Word	Example
Port	Left	"Throw the anchor over the port side."
Starboard	Right	"Approach the boat on the starboard side."
Wake	Disturb water	"This is a No Wake Zone."
Bow	Forward of Boat	"Store the lifejackets in the bow compartment."
Stern	Back of a boat	"The smoothest ride is in the stern."
Deck	Area where you can walk on a vessel	"Please walk only on the deck."
Beam	Width	"Place the heavier equipment across the beam."
Abaft	Mid-way between 90° and 180°	"The buoy is abaft the skiff's bow."

Knots, Bends and Hitches

In nautical language,

- a KNOT is the result of tying a line to itself ;
- a BEND is a knot resulting from tying one line to another line; and,
- a HITCH is the result of tying a line to an object.

See Section 3.2.1 of the *BPA Mariners' Handbook* for descriptions of commonly used knots, bends and hitches.

MAN OVERBOARD!

Unfortunately, for various reasons ranging from rough seas to inebriated individuals, there are times when a person will fall out of a moving vessel. Section 3.3 of the *BPA Mariners' Handbook* describes the recommended procedures to be followed in these events. Simply put, these are:

- i. Sound the alarm – shout "**MAN OVERBOARD, _____ SIDE**" – indicating where the person fell.
- ii. If possible, immediately throw a floating device to the person.
- iii. Keep the person in sight while the boat captain turns the boat to retrieve the person.

You or one of the boat crew should assist the person with first aid, as necessary, once he is taken out of the water.

RULES OF THE ROAD

As in all situations where there is traffic of persons or objects, some rules to avoid congestion and collisions, must be observed. In order to be aware of the transportation of your guests, you must be aware of the Rules of the Road that apply to aquatic transports. The regulations as set out by the BPA are listed in Section 5.0 of the *BPA Mariners' Handbook*

SKILL CHECK

1. Match the following nautical terms with the words that best give their meaning

Nautical Term	Best meaning
Knot	Forward part of a boat
Starboard	Right side of a boat
Beam	What is formed when you tie a line to itself
Hitch	Width of a boat
Port	Area of boat where you can walk
Stern	Tie a line to an object
Deck	Left side of a boat
Bow	Back of a boat

2. Prepare an interpretive presentation you could present to a group you are escorting on an aquatic tour in which you give information on:

- (i) The correct actions to take if someone falls overboard and
- (ii) The reasons why each person must use a PFD. Give at least two reasons.

3. Design a form you can use as a Checklist for recording important information on the guests on your aquatic tours. Include:

- Guest Name and age
- Water comfort level
- Swimming buddy
- One other detail you consider important for monitoring their safety.

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Forsten, D. I., & Murphy, M. M. (Eds.). (1986). *On the Guard*. USA: Human Kinetics Publishers, Inc.

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Irish Water Safety. (2000). *Lifeguard Handbook [Electronic Version]*. Retrieved June 21, 2007, from <http://www.iws.ie/pubs/Manuals/LifeguardHandbookOptimized.pdf>

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CHAPTER 7: FIELD EXPERIENCE & DELIVERY

GOAL:

Upon completion of this chapter course participants will be able to apply very specific field techniques in presenting and creating memorable experiences to visitors to Belize. This will be accomplished by putting into practice, in real field situations, presentation techniques acquired in Chapter One, specific techniques from this present chapter and their own personal experiences.

OBJECTIVES:

Participants will:

1. be able to adapt presentations and activities based on visitors' need for outdoor recreation
2. have specific presentation interpretive field skills to present Belize's anthropology and natural history
3. be able to give mix Belize's anthropology and natural history presentations
4. be able to adapt to different visitor criteria in order to be able to handle most visitor situations
5. have ample opportunity to practice presentation skills both in the classroom and on the field

ASSESSMENT:

1. During course, participants will take part in group discussions of presented as well as published material facilitated and guided by course presenter.
2. At intervals during the actual course participants will be individually making presentations utilizing techniques presented
3. On completion of course, participants will take part in an oral assessment of presentation techniques as presented in this course segment. The oral assessment will consist of the preparation of a **FULL** "Tour Plan/Blueprint" and an actual tour presentation.

UNIT 1: UNDERSTANDING THE NEED FOR OUTDOOR RECREATION

OBJECTIVE:

To be able to adapt presentations and activities based on visitors' need for outdoor recreation.

UNIT 2: SPECIFIC INTERPRETIVE TOOLS FOR PRESENTING BELIZE'S NATURAL ENVIRONMENT

OBJECTIVE:

To have specific presentation interpretive field tools to present Belize's Natural environment:

UNIT 3: SPECIFIC INTERPRETIVE TOOLS FOR BELIZE'S ANTHROPOLOGY

OBJECTIVE:

To have specific presentation interpretive field tools to present Belize's anthropology.

UNIT 4: DELIVERING THE PRODUCT EFFECTIVELY

OBJECTIVE:

To have ample opportunity to practice presentation skills both in the classroom and on the field.

To be able to give memorable presentations based on either Belize's anthropology and natural history or mixes of both.

UNIT 5: DELIVERING THE PRODUCT ON FIELD - ASSESSMENT

OBJECTIVE:

To be able to use presentation techniques on field effectively thus creating memorable experiences for the visitor to Belize.

To assess course participants at a real tourism destination.

UNIT 1: TAKING VISITORS' NEEDS & EXPECTATIONS INTO CONSIDERATION ON FIELD

OBJECTIVE:

To be able to adapt presentations and activities based on visitors' need for outdoor recreation.

INTRODUCTION

Tour guides work almost exclusively outdoors. This may be a major factor in deciding to choose Tour guiding as a career in that guides are rarely desk bound. The tour guide has to deliver a positive memorable experience out doors whether the focus of the tour is archaeology, natural history or as in most cases some mixture of both. In all cases, the visitor seeks outdoor recreation.

The total recreational experience always includes the following:

1. Anticipation
2. Planning
3. Participation
4. Recollection

If travel fulfils certain human needs therefore; the objectives of Outdoor Recreation are:

1. Appreciation of nature
2. Personal satisfaction & enjoyment
3. Physiological Fitness
4. Positive Behavioral Patterns
5. Stewardship

Five Important Components of A Good Outdoor Experience

1. Collection of physical objects, or a trophy-seeking experience
2. Feeling of isolation in nature
3. Fresh air & scenery
4. Perception of natural processes
5. Sense of husbandry

This unit should serve as a recap of Chapter One as well as for tying together matters covered in ALL the courses.

SKILL CHECK

EXERCISE 1:

1. Individually or as a group, prepare a list of major steps/objectives, in chronological order, that have to be completed for any one of the following activities:

- A sporting activity where you are a fan: Football game, softball game, etc.
- A family picnic/outing to a caye or riverside
- Trip to Chetumal, Mexico with a spouse
- A fishing trip/boating trip/bicycling trip with a group of fellow enthusiasts

2. Link each item to one of the components of the total recreational experience.

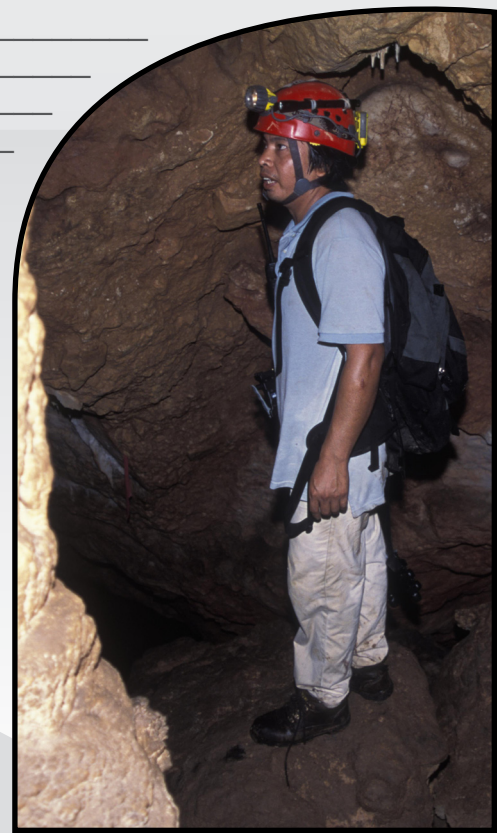
3. Link each item to one or more of the objectives of Outdoor Recreation.

4. Link each item to one or more of the components of a good outdoor experience.

5. Prepare a short presentation on what would make your choice of outing a success based on the links listed above.

EXERCISE 2:

Individually or as a group, prepare and present a convincing argument for taking part in an outdoor activity/tour/trip to a spouse, friend, or a work colleague. Based the argument on the information above with the awareness that the person you are making this presentation may not be too eager to participate in the said activity.



UNIT 2: SPECIFIC INTERPRETIVE TOOLS FOR PRESENTING BELIZE'S NATURAL ENVIRONMENT

OBJECTIVE:

To have specific presentation interpretive field tools to present Belize's natural environment.

INTRODUCTION

Travel motivations to Belize always take into account that Belize has approximately 40% of its landscape under some sort of environmental protection. The perception abroad is that Belize has large and easily reached wild and natural areas. Almost every printed advertisement displays some tourism aspect with a natural background. It should not be any wonder that visitors come to enjoy our natural environment.

Remembering that the field is very different from a classroom, tour guides have at their disposal very specific tools or techniques for presenting the natural side of Belize,

Techniques/Tools for interpreting the Natural Landscape:

Natural Histories of anything natural in Belize need to answer questions about anything about the development of the plant, animal, habitat or geological formation. How does this "item" in question develop? Questions about the conception, birth, development, growth, transitions, and death/disappearance need to be answered.

Cultural Significance of anything natural is of importance to specific group of people. Questions relating to symbolism, religion, mythology, style, folklore, history, etc. need to be answered.

Traditional Uses of anything natural is much related to cultural significance as individual groups of peoples utilize natural material in different ways. A good example is food. One group sees something to be made exclusively in to soups while another may prefer the same as a roast. Still one sees another food item as side dish and the other sees it as dessert. Building material, herbal medicinal, farming practices all fall into this category.

Ecology There is always a good story when it comes to how anything natural relate to other natural things. Nothing exists in isolation and its survival or existence depends on how it relates to other natural settings.

The **Mechanics of nature** is a major method of showing how and why anything natural exists. If it is standing up or lying down, if it creeps as opposed to running or flying then there are reasons for these activities found in the way an organism is built. This applies to geological formations also. Natural landscapes look a certain way because of the "mechanics" of the particular formations.

Names of anything and anyone are always a source of very entertaining experiences. Every name has a story. The scientists, country, language groups, ethnic groups down to sub-cultural groups all may have very different names for the same natural item. Try explaining them!

Your experiences and stories about anything natural will be of great interest to your audiences. This is your experience, this actually happened to you or someone you know. Strange truths are easier to accept if the audience knows a survivor (or someone who knows a survivor.) Contrived situations can be used very effectively here.

Most tasks need the use of more than one type of tool. Similarly, interpretive presentations on nature require the use of a combination of the above components.

Reference: Adapted from Wright, Terry, 1998?, Interpretation of Belizean Flora & Fauna, Unit 2.

UNIT 3: SPECIFIC INTERPRETIVE TOOLS FOR BELIZE'S ANTHROPOLOGY

OBJECTIVES:

To have specific presentation interpretive field tools to present Belize's anthropology.:

INTRODUCTION

A major reason for travel has always been to experience cultures different from that of the visitor. There is no escaping having to present at some segment of a tour something about the people of Belize. If Anthropology is the study of humankind in all its aspects, then there is always much to talk about the Belizean People's, past, present and future.

The following interpretive techniques/tools can be used in any situation where people in Belize presently exist or may have existed. These tools are useful in making presentations regarding places where perhaps people are not present but influence, use or are altering presently or have done so in the historical or distant past.

TECHNIQUES/TOOLS FOR INTERPRETING ANTHROPOLOGICAL INTERESTS IN BELIZE:

Presenting the experiences of the Belizean peoples both past and present can be done in the form of answering questions based on the following major topics:

Settlement Patterns relate to where people presently live or have lived. Population centres have certain layouts, architecture peculiar to culture, ethnicity, geography, flora and fauna, availability of building material, availability of manufacturing material, availability of subsistence, defenses, mythological/religious experiences and others.

Subsistence relate to how and what make people survive. Very common questions that visitors ask relate to what industries bring money to a country or community. What is produced/manufactures at home? What has to be imported? What type of trade exists or existed? How does this information relate to past failures or successes of population centres? How people feed themselves are major factors in the rise and fall of any community whether the subject matter is Belize City, a district town or village or an ancient Maya site.

Socio-Political Infrastructure relates to the actual relationships between and among peoples within population centres, communities, ethnic groups and sub-cultural groups. What sort of government exists or existed? How do different strata of these societies interact? What are/the conflicts/alliances? What are/were the causes and effects of these conflict/alliances?

Ideology relates to what is in the minds of people. What do they believe in? How does religion exist and affect population centres, communities, ethnic groups and sub-cultural groups. Ideology can affect settlement patterns, subsistence practices as well as socio-political infrastructures. Compare political, business and religious signage and architecture of present-day Belize to that of the ancient Maya. Look at cemeteries today and compare them to the way colonial Belize and the ancient Maya buried their dead.

Methods used by anthropologists in obtaining and verifying information and arriving at theories and concepts. This includes anecdotal information of experiences during excavations or any research carried out on sites, points of agreement and disagreement among researchers, authors and others. This is where points of views based on culture, pseudo-science, religion and philosophies are considered and discussed.

Reference: Adapted from Hoare, Manual, Corozal Town & Belize City 2000 & 2005, Personal Communication.

UNIT 4: DELIVERING THE PRODUCT EFFECTIVELY

OBJECTIVES:

To have ample opportunity to practice presentation skills both in the classroom and on the field.

To be able to give memorable presentations based on either Belize's anthropology and natural history or mixtures of both.

INTRODUCTION

The real test comes when real visitors are riding in a vehicle or standing in front the tour guide waiting to see or experience something interesting, exciting and/or memorable. This may happen at anytime from the first welcome handshake until the last goodbye. What will the visitor really take back to his country of origin?

DELIVERING THE TOUR/THE TOUR PLAN/BLUEPRINT

Divide the tour into workable segments. A tour should be managed as a single presentation made up of many sub-presentations. A well-planned and executed tour results in long lasting positive memories. ALL presentations have a definite opening, a main body and a closing. This also applies to the sub-presentations.

OPENING: WELCOME AND TOUR BRIEF

With the first eye contact and handshake, a tour guide has to established authority and full control over the itinerary about to be delivered. This is where tour guide correct false or misguided assumptions visitors may have acquired. This may be the consequence of biased or vague advertisements, their own prejudices, and wrong or biased information about the total destination, or the very specific destination advertised by the published itinerary.

the moment of guide and visitor contact the published or advertised itinerary becomes an experience not ending until the last farewell. Welcomes and briefs should be compact and to the point. All information given at this time still has to be served using techniques required for interpretive presentations. (See also Chapter One, Unit 2 for Welcome & Brief outline)

MAIN TOUR BODY – DESTINATION PRESENTATIONS

The advertised tour may be to a specific Maya site, national park, modern community, island, reef segment or a specialized activity. However, it is a great disservice to our visitors not to include points of interests or even activities while getting to or returning from the advertised destination.

Some tour guides would confine all commentary and presentations to a very narrow scientific discipline, interest or activity and not allow outside, non-specific presentations. If they are at a Maya site, then only "information" given would be that of the Maya and particularly exclusively that of the site itself. Similarly, A dive guide would confine "information" strictly centered on reef and fish. In techniques outlined previously, opportunities are always present to bridge our natural environment to our anthropological environment.

A tour should not comprise of a series of declarative sentences. A "This is..." or "that is..." sentence should be more of a conclusion than an opening. Pointing out tour items with simple declaratives is certain to result in very boring tours. The entire tour should be a running

conversation with your guests. It is as if a group of friends is traveling together with a running lively conversation. This means that at times the guide is not the one talking instead a visitor is giving a point of view or reaction to something said.

A good storyteller expects interruptions. This is a sure sign that at least someone is listening to you. These interruptions include questions or exclamations, either related or not related to the presentation. More senior and experienced tour guides many times would say something deliberately causing a reaction.

Many great tours, with near perfect experiences are suddenly totally spoiled by unexpected or not programmed events. Such unexpected situations may have positive or negative consequences. While the programming may not be under the tour guide's control, most times, the consequences can almost always be controlled by the tour guide.

Positive events include animal sightings and parades, carnivals, races and many other things. Negative events include equipment failure, accidents, injuries, loss of valuable personal items and other things. With positive unexpected tour experiences, the guide has to be able to bridge the unexpected experience with the programmed items. However the negative experiences test a guide's abilities and attitudes. Here are some suggestions in handling such situations:

1. Staying calm and composed in all situations demonstrates maturity and capacity to handle effectively the situation. Panic from the guide results in guest panic and having then to the task of also calming down the group.
2. Using common sense after calming down in analyzing the situation. Many times potentially bad situations become very manageable by just taking a short pause to calm down and using common sense.
3. Use resource people as part of the solution to the problem. These include professional personnel at the destinations, other tour guides and even the guests.
4. Inform and consult with your supervisor as soon as possible with a greater objective of submitting a written report. The good tour companies always have contingency plans for most situations so advising persons in authority may ease the situation by having added personnel and specialized equipment waiting or even coming out to meet the group.
5. Heading off problems before they occur is the best method for avoiding negative situations. Be constantly aware of limits not only of yourself but also the company you work for, the equipment assigned, weather of the day, road and sea conditions, alternative routes and many other factors. Tour guides have to be vigilant of the entire environment to foresee difficult situations in order to avoid them and if necessary be prepared if having to go through anyway.

WRAP-UP: CLOSING AND GOODBYES

Wrapping up a tour properly assures long lasting memories. Perhaps some of the tour experiences fell below guest expectations. In wrapping up many times this can be put right. Good wrap-ups position tour guides as having done much more than expected, having it done willingly and lastly make guests feel special and unique. (See also Chapter One, Unit 2 for Wrap-up outline)

SELF-ASSESSMENT

A tour guide is always a work in progress. There has to be a constant correction of past errors and adjustment of activities to greater suit individuals within each group. This is done by self assessments after each tour.

Tour guide have to always ask themselves the following:

1. Was I properly prepared for this particular tour?
 - a. Personally: aptitude and attitude?
 - b. Personal attire?
 - c. Personal equipment?
 - d. Up to date information?
2. Did I actually deliver the itinerary as advertised?
3. Could the guest understand me?
 - a. English usage?
 - b. Clear voice?
 - c. Complicated technical terms?
4. Were the guests actually listening?
 - a. Were they reacting to what I was saying?
 - b. Were they asking relevant questions
 - c. Were they making relevant comments
 - d. Were they laughing at your funny stories
5. Was everyone happy/content while on tour?
 - a. If anyone was not, why?
6. What is one thing that your guests will remember about the tour when back in their homes?
7. What was the worst moment of the tour?
8. What was the best moment of the tour?
9. What personal limitation manifested itself on this tour?
 - a. How will this be addressed?
10. What would I do differently next time I am on this particular tour or with a similar group?
11. Were they very thankful at the conclusion of the tour?
12. Did I enjoy myself in the company of my guests today?

SKILL CHECK

Photocopy tour Plan/Blueprint at the end of Chapter 6 Unit 5. Using one of the scenarios assigned from Chapter Six Unit Five or one which the course facilitator assigns; fill in the plan/blueprint.

Be prepared to make a several individual presentations from these sections:

1. Welcome & Tour Brief (Sections 1,2,3 of Plan/Blueprint)
2. From the Main tour, one or two items presentation (Section 4 of Plan/Blueprint)
3. Tour Wrap-up & Farewell (Section 5 of Plan/Blueprint)



UNIT 5: DELIVERING THE PRODUCT ON FIELD ASSESSMENT

OBJECTIVE

To be able to use presentation techniques on field effectively thus creating memorable experiences for the visitor to Belize

To assess course participants at a real tourism destination

THE TOTAL TOUR

All tours have a definite beginning and ending. Therefore then, all tours require a well thought out and presented Tour Brief and Tour Wrap-up. In reality a tour consists of a constant cycle of very short briefs followed by very short item presentations, followed by very short wrap-up. In this cycle, note that the wrap-ups merge and is continuous with a following brief.

Most if not all tours are advertised and sold as destination or activity specific. The Interpretive Tour Guide has to always remember that the entire “tour experience” starts with the first greeting and does not really end until the last good-bye

THE MAIN TOUR

Identifying and separating the main tour from the rest of the tour can be difficult and next to impossible. Although the tour has been sold as “going to...” and/or “doing...” the experience really commences upon embarkation on the transfer vehicle and does not really end until the tour guide releases the visitor to another segment of the tourism industry such as a hotel, transfer company, another tour operator or even another guide.

For the purposes of this writing, the main tour will be considered as the actual advertised destination and/or activity.

The assumption must be made that the visitor bought this particular tour because there was at least a fleeting interest on matters concerning this destination and/or activity. The assumption, however, should not be made that the visitor’s interest is solely or totally locked down on the advertised destination/activity. The guide has to then decide what aspect of the destination and activity will be highlighted and how this will be presented. It is obvious then, that the tour guide is expected to be articulate, well-read and therefore be prepared for very specific questions as well as questions which may seem to have absolutely no relevance to the destination/activity.

DECIDING HOW TO PRESENT

From the first hello, the guide has to figure out who is on the tour and what motivation caused an actual purchase resulting in being a willing (or sometimes unwilling) participant of this particular group. In considering what to present, the special interests of the group as well as the individual comes into play. Other considerations are group size, group make-up, weather, trail conditions, other environmental situations, physical limitations and time limits. The guide who really wants to give the best possible service has to be able to decipher the needs and motivations of the visitor in order to decide on the method of delivery of the tour.

DECIDING WHAT TO PRESENT

Deciding what to present hinges on the needs and motivations of the visitor. Keep in mind that the visitors' experience with the tour guide will result in either an easily forgotten or long-lasting (positive or negative) memory. Consider the following when presenting:

1. Do not lecture. Always keep a lively conversation running.
2. Tell a story (Theme). Keep linking one experience to the other experience.
3. Use facts to assist with the story. Facts alone are boring!
4. Create a series of questions that need to be answered in order to keep the story going.
5. Remember that the guide is answering questions about what they are experiencing as they listen to the story.
6. Use the tools of the trade: these are the props and techniques used by the tour guide.

Remember that visitors have many questions that they are not asking. A look of wonder, surprise or any emotion is actually a question that is begging to be reacted to. Remember also that not all questions need to be answered. Sometimes it is good to keep that emotion going as to answer the question may only spoil the moment.

Always keep in mind the focus of the tour. The focus may be related to nature or to people.

Never keep the presentations very focused only on nature; sprinkle some people interests on the nature biased presentations. Similarly, with people oriented presentations colour it with some nature interests.

The following are sample itineraries for use throughout the tour guide training manual. Facilitators as well as assessors may utilize these or variations of these itineraries.

Just after the itineraries is a tour plan/blueprint. Course participants are encouraged to make several photocopies for use in both Chapters One and Six.

Last is an assessment guide for facilitators and assessors when appraising classroom as well as field presentations.

NOTE: On some activity oriented tours, the above may have to be covered in its majority during the briefing as effective verbal communications may very difficult or not possible.

ASSESSMENT EXERCISES

1. On a tour to a destination to be set by the course managers, participants will have to prepare for a full tour based on the destination chosen. Participants will have to hand in to the assessor a completely filled in Tour Plan/blueprint based on this specific assessment tour.
2. Each participant will be required to present along the way a welcome and tour brief following the prescribed outline and methods.
3. At the destination, the group will walk through the site making stops at the discretion of the assessor. At these stops participants will present some aspect of the site/destination that can be seen or experienced from the spot where the group is standing. The participant will have to make a short and very precise presentation using techniques and knowledge acquired throughout the entire course.
4. During the return to the tour end destination, each participant will have to present a wrap-up and farewell presentation following the prescribed outline and methods.
5. The facilitator/assessor will fill in an assessment sheet/guide for each presentation made. These graded assessment sheets will represent a final grade for this particular Course Chapter.

ITINERARIES

Photocopy tour Plan/Blueprint and fill out using one of the scenarios below:

- a. A small family, Mom, Dad, two pre-teen children booked a day tour to a terrestrial national park. Pick-up and drop-off will be at the same hotel. You are also the hotel's in-house tour guide. The tour desk clerk promised seeing many birds, plants and beautiful scenery. A hike is to be included but no information was given on length and limitations. Lunch and refreshments are included as well as entrance fees.

(Alternative: You are a tour guide with your own vehicle and the guests bought the tour from you directly outside the hotel property. Lunch, refreshments and entrance fees are not included.)

- b. A small family, Mom, Dad, two pre-teen children booked a snorkeling day tour to a nearby island on the barrier reef. Pick-up and drop-off will be at the hotel's private dock. You are also the hotel's in-house tour guide along with other hotel guide staff and boat personnel. This small family group will be joining a larger snorkeling group perhaps being as much as twelve guests total. Lunch and refreshments are included as well as snorkeling equipment.

(Alternative: You are a tour guide with your own boat and equipment and the guests bought the tour from you directly outside the hotel property. Lunch and refreshments are not included.)

- c. Two couples in their mid thirties booked a half-day tour to an archaeological site. Pick-up and drop-off will be at the same hotel. You are also the hotel's in-house tour guide. A hike is to be included but no information was given on length and limitations. Lunch and refreshments are included as well as entrance fees.

(Alternative 1: You are a tour guide with your own vehicle and the guests bought the tour from you directly outside the hotel property. Lunch, refreshments and entrance fees are not included.

Alternative 2: Same tour but with a mixed group of thirty. The tour will be done in an air-conditioned coach. You are a cruise ship company tour guide. Only cold bottled water and entrance fees are included.)

- d. A one hour city/community tour is sold by a hotel's guest services desk attached to a longer half day tour to either a Maya site or natural area. The eight guests are mostly couples of several age groups. (Alternative 1: You are a tour guide with your own vehicle and the guests bought the tour from you directly outside the hotel property. Alternative 2: Same tour but with a mixed group of thirty. The tour will be done in an air-conditioned coach. You are a cruise ship company tour guide. Only cold bottled water and entrance fees are included.)
- e. A transfer from Belize City hotel to an inland hotel (or the other way around) with tour stop at either a national park or a Maya site was booked through an international agency. You are a company guide assigned to this tour consisting of a small group of college friends.
- f. You are receiving a mixed group of ten persons coming from a hotel in Belize City or a district town. You work for a resort specializing in any one of the following activities: diving, zip line, horse back riding, cave tubing, rappelling, bird watching, jungle hiking. Depending on the activity there may be other tour support personnel.

(Alternative: You are solely uncharged of the entire tour.)

General suggested alternatives:

1. Groups may be altered for cruise ship scenarios.
2. Groups may be of special interests such as churches, unions, social groups, hobbies and sports.
3. Tour destinations may be listed as specific places.
4. Tour activities may be very specific such as scuba, fishing, caving, etc. This is in order to establish an understanding of safety consciousness with course participants.

TOUR PLAN/BLEUPRINT

Student Name: _____

Contact Information: _____

Section 1: Personal Information: (Parts to be used for Welcome & Brief)

Name of main guide: _____ License #: _____ Expiry Date _____

Names & positions of accompanying staff: _____

Section 2: Tour Information (Parts to be used for Welcome & Brief)

Advertised Name of Tour: _____

Pick-up time & point _____ Drop-of time & point: _____

Tour destination(s): _____

Distance in Miles from Pick-up point: _____ Mode(s) of transportation: _____

Safety & Other Instructions in regards to Transport Mode and equipment usage _____

Approximate Travel time(s): _____ Comfort level: _____

Summary/Outline of programmed activities: _____

Group Size: _____ Males: _____ Females: _____ Adolescents: _____ Children: _____

Age Range of Group: Adults: _____ Children/Minors: _____

Section 3: Visitor Expectations & Motivations

Special/Identified/Perceived Needs: _____

Special/Identified/Perceived Interests: _____

Visitors' Expectations (information on how the tour was sold): _____

Perceived/observed physical limitations affecting the delivery of tour: _____

Section 4: Main Tour Presentation

Tour Item	Details		
Tour Destination(s)			
Major Focus			
Minor Focus			
Type(s) of Presentation(s)			
General Topics to be discussed			
Special Topics to be discussed			
Special Activities			
Major Things/Items to point out			
Minor Things/Items to point out			
Interpretation techniques to be used with each item			
Relationships to other sites/experiences			
Time Frame	Travel time going:	On site time:	Travel time return:
Specific Benchmarks while on site			

Section 5: Tour Wrap-up & Farewell Presentation

Tour Highlights & Key messages to nforce: _____

Tour Summary _____

Assessment Ideas & Techniques: _____

Safety Reminders & Instructions: _____

Guests Departure Reminders/Guidelines _____

Inspirational Closing Remarks: _____

Section 6: Non-personal/Company/Employer Equipment Schedule

Equipment	Need to be secured	Does not need to be secured	Safety Test Notes

Section 7: Emergency Response Information

Procedure/Policy on reporting incidents

Primary Contact & Tel.#: _____ Working/Available Hours: _____

Secondary Contact & Tel.#: _____ Working/Available Hours: _____

Non-company emergency contact information: _____

ASSESSMENT SHEET/GUIDE

Student Name: _____ Contact Number: _____

#	Assessment Point	Very Good	Good	Fair	Not at all	Comments
The Tour Guide						
1	Proper/appropriate dress for tour?					
2	Seems happy/pleased to be on tour?					
3	Make good first impression?					
4	Is the presenter enjoying him/herself?					
5	How is nervousness handled?					
6	Spoke better than adequate English?					
7	Clear understandable voice?					
8	Was personable & well-received?					
The Tour Presentation						
9	Uses appropriate opening?					
10	Uses appropriate closing?					
11	Familiarity with subject material?					
12	Mixed/added related material?					
13	Mixed people and nature in presentation?					
14	Used presentation techniques effectively?					
15	Used prescribed models?					
16	Were guests listening attentively?					
17	Encouraged guest reaction/participation?					
18	Material presented relevant to tour?					
19	Use of time in presenting?					
Overall Commentary:						

Facilitator/Assessor: _____ Date _____

