

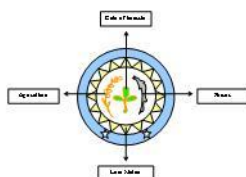


# Conservation Values, Issues & Planning in the Nino Konis Santana Marine Park, Timor Leste - Final Report



  
Arafura & Timor Seas  
Experts Forum

Timor Leste Coastal / Marine Habitat Mapping,  
Tourism & Fisheries Development Project



# Conservation Values, Issues and Planning in the Nino Konis Santana Marine Park, Timor Leste – Final Report

**Date:** November 2012

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Professor Karen Edyvane (Northern Territory Government – Charles Darwin University)  
Augusto Fernandes (Ministry of Agriculture & Fisheries, Timor Leste).

5 November 2012.



## How to use this document

The following report provides a key resource for planning and managing the Nino Konis Santana Marine Park, particularly the preparation of the zoning and management plan for the park, through:

- **Identification of Key Natural, Cultural, Social and Economic Values** (Section 3) – This information will inform the identification of key sites of natural, cultural and social significance (for protection), potential spatial management zones, and also, potential threats.
- **Key MPA Planning Issues Identified** – The text boxes throughout the report, highlight the critical planning issues that need to be considered in the planning of the park. For example:

**MPA Planning Issue 1: Approach to MPA Planning** - The establishment of Marine Protected Areas (and a representative MPA network) in Timor Leste, needs to utilise elements of both, ‘bottom-up’, community-based, marine conservation planning (ie. LMMAs, IPAs) and also, traditional ‘top-down’ models of planning (ie. MPAs), to ensure community stewardship and socio-cultural and economic benefits, and also, sound biodiversity conservation outcomes, supported by effective governance and management.

- **Key MPA Management Issues Identified** - The text boxes throughout the report, highlight the critical management issues (and potential management strategies) that need to be considered in the management of the park. For example:

**MPA Management Issue 2: Coral Monitoring and Management** – Monitoring and management of coral reefs within the Nino Konis Santana Marine Park is a high priority. Effective monitoring will not only identify potential issues such as coral bleaching, coral damage and disease, introduced pests and unsustainable harvesting, but will also importantly, provide a baseline to monitor the recovery of reefs. Current community-based, reef monitoring programs such as ‘*Reef Check*’ and ‘*Reef Watch*’ and ‘*Bleach Watch*’ have the potential to monitor reefs effectively and also, to involve NGO partners and donor organisations. As a matter of priority, the existing ‘*Reef Check*’ program run by NDFA (with assistance from the NT Government) needs to be extended to the Nino Konis Santana Marine Park.

- **Proposed Key MPA Goals, IUCN Definition, Boundary, Management Principles and Management Objectives** (Section 5) – This section provides potential MPA goals, objectives, principles, definition and boundary for the Marine Park, as well as guidance in the planning, consultation, zoning and management – including identifying key steps in planning and implementing the Marine Park.

## Executive Summary (English)

**Project Title:** Nino Konis Santana Marine Park – Timor Leste’s first Marine Protected Area

**Project Leaders:** Karen Edyvane (NRETAS), Augusto Fernandes (MAF-Fisheries)

**Other Project Participants:** Celestino Barreto de Cunha (MAF-Fisheries), Manuel Mendes (MAF-Protected Areas), Abilio da Fonseca (Environment)

### *Introduction*

Marine Protected Areas (MPAs) are recognised globally as an essential tool for ecosystems, habitats and fisheries and also, the economic well-being of coastal communities. In tropical ecosystems, MPAs not only provide real economic benefits in sustaining artisanal fisheries, but more significantly, MPAs provide a secure basis and driver for a rapidly growing marine tourism industry. While considerable progress has been made in South East Asia in developing MPAs, Timor Leste currently has no established MPAs.

The principal aim of this project is to develop a comprehensive, Marine Park conservation proposal for the Nino Konis Santana National Park. The Ministry of Agriculture, Forestry and Fisheries (MAFF) declared Timor Leste’s first national park, the Nino Conis Santana National Park, in Lautem district in 2007. The national park has been established as an IUCN Category V, protected area in order to reflect the area’s significant natural and cultural values, its importance for local livelihoods, as well as the human influence on the area’s spectacular landscape. The project integrates with coastal-marine mapping/surveys (Project 1); ecotourism project (Project 2); megafauna surveys (Project 3); fisheries development (Project 5).

Jaku (Jaco) Island in Lospalos (on the easternmost tip of Timor Leste), is a Protected National Park. The island is recognised for its “pristine waters and white sand beaches”, abundant coral reefs and marine life (eg. turtles, sharks, rays), and also, nearby ancient cave paintings and ancestor tombs. While the coast road to Jaku is highly scenic (particularly from Dili to Manatuto), accessibility to the Jaku is limited by the poor condition of the road (Com to Jaku) and the lack of access to the island, accommodation and local tourism infrastructure. The artisanal reef fishery on the north coast of Timor Leste is largely exploited by subsistence fishermen. Within the Jaku Island region, any MPA needs to recognise the strong cultural coastal connections, interests and significance of the indigenous Fataluku. While there are currently no MPAs in Timor Leste, traditional systems are in place in some areas, with locally enforced ‘no take’ periods, known as *tara bandu*.

The project comprised undertaking (i) detailed habitat mapping and biological surveys of the Marine Park (including corals, seagrass, fish, invertebrates and wildlife, ie. turtles), (ii) a natural-cultural inventory and formal conservation assessment; (iii) identification of key management issues and strategies; potential MPA management zones, prescriptions; and potential governance; and (iv) a 2-day MPA stakeholder’s workshop (7-8 April 2009) – to identify MPA planning, implementation and consultation activities, processes and priorities.

### *Biological Survey of the Marine Park*

- The fieldwork and mapping component for this project was coordinated with the fieldwork for Project 1 (Coastal-Marine Habitat Mapping of Timor Leste).

- Broad-scale mapping of the proposed Nino Konis Santana Marine Park has been undertaken, with the field work conducted during 19-30 November 2007 (see Project 1 Progress Report).
- Field ground-truthing of Landsat TM imagery for the Marine Park – was undertaken in 3 coastal regions (~10 km in length): Com, Tutuala and Lore. Analysis of ground-truthing data (in Darwin) following the field trip.
- Monthly aerial surveys for marine megafauna (see Project 3) have been extended to include low-level surveys of the Marine Park – to identify potential turtle nesting sites and other marine megafauna.
- Detailed coral, invertebrate and fish survey and monitoring within the Marine Park was undertaken in late November 2008 and included 150 dives over nine days undertaken by 5 divers. This collaborative expedition, the first of its kind in this area, was led by Dr Tony Ayling and Dr Avril Ayling (Sea Research).

#### *Natural-cultural Inventory & Conservation Assessment*

- Key natural, cultural and heritage values mapped within the park.
- Relatively intact coral reefs - low commercial fishing pressure – but absence of higher trophic level predators (sharks, rays, and large groupers, parrotfish and wrasses).
- Numerous Indigenous sacred sites, strong cultural attachments & values - coastal reefs & foreshores – annual ceremonies to gather 'sea worms' (*Eunice virides*)

#### *Marine Park – National Park Planning Workshop (7-8 April 2009)*

- The scope of the original project was significantly revised – following a formal meeting with MAFF staff in Dili on 5 November, 2007 – to ensure integration/coordination with the management planning for the terrestrial component of the Nino Konis Santana National Park. [NB: the terrestrial management plan for the park is expected to be completed within 3 years. As such, the timelines for marine planning needed to be revised to fit within this timeframe.] MAFF Fisheries will be leading the project (on behalf of GoTL) – but MAFF Protected Areas will be a key participant.
- A 2-day, Marine Park – National Park planning workshop was held in Dili on 7-8 April 2009, to identify key MPA planning, implementation and consultation activities, processes and priorities. The workshop was attended by key MAF-Fisheries and MAF-Protected Areas staff, technical advisors (NT Government) and also, key NGO partners (The Nature Conservancy and Conservation International). This forum was essential in engaging with relevant government stakeholders and NGO partners in identifying key steps in planning and implementing the Marine Park – prior to the completion of a final report. The workshop confirmed the following:
  - a. The boundary of proposed MPA will be 3 nautical miles from the coastal baselines – and include all the maritime estate adjacent to the proposed Nino Conis Santana National Park.
  - b. Marine Park - Category VI (multiple-use MPA) – to provide for a range of sustainable uses, consistent with the primary goal of biodiversity conservation.
  - c. While the planning and consultation will be undertaken by government, a community-based approach to planning will be adopted, ie. Locally Managed Marine Area (LMMA) model.
  - d. The assessment and development of sustainable livelihoods (ie. ecotourism, fisheries, aquaculture) within the Marine Park (and National Park) area needs to be initiated as a matter of priority – prior to the development of the zoning plan for the Marine Park.
  - e. Marine Park planning will require input from all relevant government agencies & civil society (including local representatives of customary custodial communities).



- f. Planning of the proposed Marine Protected Area (MPA) should be integrated with the planning of the adjacent Nino Konis Santana National Park.
- g. To facilitate this integration, a joint planning committee will be established with membership (among others) from MAF-Protected Areas (responsible for the planning of Nino Konis Santana National Park) and MAF-Fisheries (responsible for the planning of the Nino Konis Santana Marine Park).
- h. Governance and management of MPAs in TL – need for a strategic policy, planning and technical framework for identifying and establishing MPAs (ie. TL MPA Strategy), and particularly to clarify administrative, legal and institutional arrangements for managing MPAs.

#### *Capacity-Building and TL Engagement*

- A total of 9 MAFF staff participated in the marine field survey of the Nino Konis Santana Marine Park (November 2008).
- A total of 35 government agency staff (fisheries, protected areas, tourism) attended the Marine Park – National Park planning workshop (7-8 April 2009).
- MAF-Fisheries assisted with the survey of the Marine Park in November 2008 (Anselmo Lopes Amaral).

#### *Emerging Issues & Priorities*

1. The assessment and development of sustainable livelihoods (ie. ecotourism, fisheries, aquaculture) within the Marine Park (and National Park) area needs to be initiated as a matter of priority – prior to the development of the zoning plan for the Marine Park.
2. As much of the compliance and management for the Marine Park will be terrestrial-based, infrastructure assessment and planning, compliance and ranger training needs to be coordinated and initiated as a matter of priority for the Marine and National Park.
3. Data analysis and further data processing required to assemble all relevant spatial data-layers for the Marine Park. In addition, all available spatial layers for the Marine Park, natural and social (coastal infrastructure, land tenure, etc.) needs to be managed within a single GIS database, by a dedicated government agency responsible for data management (ALGIS).
4. Additional field work required to map habitats at the fine-scale for the proposed MPA (ie. 3 nautical miles from the coastal baselines – and include all the maritime estate adjacent to the proposed Nino Konis Santana National Park).
5. Customary practices, sea tenure, and ‘Tara Bandu’, needs to be identified within the Marine Park region.
6. The role and input of key NGO partners (TNC, CI) and MPA technical advisors (NT Government) needs to be clarified and coordinated in the planning, establishment and management of the Marine Park.
7. Clearer and formal demarcation of planning and consultation responsibilities within the National Park and Marine Park is required.
8. There is a priority need for a strategic policy, planning and technical framework for identifying and establishing MPAs (ie. TL MPA Strategy), particularly to clarify the governance and management of MPAs in TL (ie. administrative, legal and institutional arrangements for managing MPAs).
9. Ecotourism planning and development within the Nino Konis National Park and Marine Park needs to be integrated with wider land-use and marine zoning consultation processes and future management arrangements for the National and Marine Park.





## Sumáriu (Tetum)

**Projetu nia Naran:** Valór sira konsersasaun nian, kestaun sira no Planeamentu iha Parke Mariñu Nino Konis Santana – Timor-Leste nia Area Mariña Protejida Ba-Dala-Uluk

**Projetu nia lider sira:** Karen Edyvane (NRETAS), Augusto Fernandes (MAF-Peskas)

**Projetu nia Partisipante Sira Seluk:** Celestino Barreto de Cunha (MAF-Peskas), Manuel Mendes (MAF-Área Protejida), Shane Penny (NRETAS), Narciso de Carvalho (MAF-Peskas), Anselmo Lopes Amaral (MAF-Peskas), Pedro Pinto (MAF-Area Protejida), Abilio da Fonseca (NDES)

### *Introdusaun*

Área Mariña Protejida (Marine Protected Areas, (MPAs)) hetan ona rekoñesimentu globál hanesan instrumentu esensial ba eko-turizmu, habitat no peska no mós ba bem-estar ekonómiku populasaun sira iha kosta ninian. Iha eko-sistema tropikal, MPA sira la'ós de'it fó benefísiu ekonómiku real atu tane peska artezenál maibé, liliu, sira oferese mós baze ida ne'ebé metin no sei halo (driver) indústriia turizmu mariñu sa'e lalais. Iha Sudeste Aziátiku, dezvoltimentu ba MPA sira hetan ona progresu barak, iha Timor-Leste sei dauk harii MPA.

Projetu ne'e nia objetivu prinsipál mak atu dezvoltolve proposta abranjente kona-ba konsersasaun parke mariñu nian ba Parke Nasionál Nino Konis Santana. Ministériu Agrikultura, Floresta no Peskas (Ministry of Agriculture, Forestry and Fisheries (MAFF)) deklara primeiru parke nasional "Parke Nasionál Nino Konis Santana" iha distritu Lautem iha 2007. Parke nasional ne'e harii hanesan área protejida Categoria V IUCN hodi atu refleta ninia valór natural no kultural ne'ebé boot, nia importánsia ba populasaun lokal nia moris no mós influénsia umana ne'ebé mai iha área ne'e hodi haree ninia paizajen ne'ebé furak tebes. Projetu ne'e integra iha mapeamentu/peskiza kona-ba mariñu sira (Projetu 1); projetu kona-ba eko-turizmu (Projetu 2); peskiza kona-ba megafauna (Projetu 3); dezvoltimentu ba peska (Projetu 5).

Illa Jaku (Jaco) iha Lospalos (iha ponta-leste Timor-Leste nian) ne'e Parke Nasionál Protejidu. Illa ne'e hetan ona rekoñesimentu tanba ninia "bee antigu no tasi-ibun ho rai-henek mutin", au-ruin no vida mariña barak (ezemplu, lenuk, tubaraun, raio sira) no mós pintura bei'ala sira iha fatukuak no bei'ala sira-nia sepultura. Lurón liu husi tasi-ibun (kosta) ba Jaku ne'e iha senáriu aas tebes (liliu husi Dili ba Manatuto) maibé asesu ba Jaku limitadu tanba lurón nia kondisaun la di'ak (husi Com to'o Jaku), laiha asesu ba illa ne'e, laiha fatin-toba no laiha infraestruturá turizmu lokal. Liliu peskadór subsisténsia sira mak explora peska ba *recife artezanál* (artisanal reef) iha kosta norte (tasi-feto) Timor-Leste nian. Iha illa Jaku nia rejaun laran, MPA sira tenke rekoñese ema rai-na'in Fataluku ninia ligasaun kultural maka'as ho kosta nia kultura, nia interese no nia signifíkadu. Oras-ne'e sei dauk iha MPA iha Timor-Leste, maibé iha ona sistema tradisionál ida ne'ebé populasaun lokal sira hala'o iha fatin balu, naran *tara bandu* ("no take").

Projetu ne'e atu halo (i) mapa kona-ba *habitat* no peskiza jeolójika ba Parke Mariñu (inklui au-ruin, duut-tasi, ikan, invertebradu no animál sira iha tasi laran, ezemplu, lenuk); (ii) halo inventáriu kultural no natural no avaliasaun kona-ba konsersasaun; (iii) workshop durante loron rua husi MPA nia parte interesadu sira (7-8 Abril 2009) atu identifika MPA nia planeamentu, atividade implementasaun no konsulta, prosesu no prioridade sira (iv) identifika jestaun prinsipál nia estratejia no problema sira; MPA nia objetivu potensial sira, prinsipiu, objetivu jestaun ninian, zona, preskrisaun no governasaun potensial.

### *Peskiza Jeolójika ba Parke Mariñu*

- Komponente mapeamentu no servisu-kampu ba projetu ne'e halo husi koordenaun servisu-kampu ne'ebé halo ba Projetu 1 (Coastal-Marine Habitat Mapping of Timor-Leste).
- Halo ona mapeamentu ho eskala ida luan ba planu Parke Mariñu Nino Konis Santana, no hala'o ona servisu iha kampu entre 19-30 Novembru 2007 (haree Relatóriu Progresu nian iha Projetu 1).
- *Ground-truthing* iha kampu kona-ba imajen *Landsat TM* Parke Mariñu ninian, ne'ebé hala'o iha rejiaun kosteira tolu (-km 10 naruk): Com, Tutuala no Lore. Análize kona-ba dados *ground-truthing* (iha Darwin) tuir vizita-estudu.
- Hanaruk tan peskiza aérea ne'ebé halo fulan-fulan kona-ba megafauna tasi nian (haree Projetu 3) hodi bele inklui peskiza nivel-ki'ik ida ba Parke Mariñu – atu identifika lenuk knuuk/tolon potenciál sira no megafauna sira seluk tasi nian. Ne'e hetan apoiu husi peskiza ida ne'ebé hala'o iha kampu kona-ba lenuk tasi nia knuuk/tolon (kaer lenuk ilegalmente) iha Parke Mariñu nia laran (Dezemburu 2008).
- Hala'o peskiza no monitorizasaun ho detalle iha Novembru 2008 nia rohan kona-ba au-ruin, *invertebradu* (invertebrate) no ikan iha Parke Mariñu nia laran, ne'ebé inklui luku iha loron 9 nia laran husi luku-na'in 5. Dr. Tony Ayling no Dr. Avril Ayling (Peskiza Tasi nian) maka diriji expedisaun kolaborativu ne'e, ne'ebé akontese ba dala uluk iha área ida-ne'e.

### *Inventáriu natural no kulturál & Avaliasaun ba Konservasaun*

- Halo ona mapa ba marina kosteira naturál, valór kulturál no patrimoniál prinsipál sira iha Parke Mariñu nia laran. Valór prinsipál sira inklui:
  - *Altamente cénico* (highly scenic), intaktu ('fuik'), vista ba kosta no valór estétiku ('foho-tasi'), praia orijinal ka puru, Illa Jaco.
  - *Recife coral* ka au-ruin relativamente tomak – tamba presau husi peska komersiál ki'ik – maibé laiha animál aat sira ne'ebé iha nivel *trophic* aas liu (tubaraun, *rays* no *groupers*, *parrotfish* no laiha *wrasses* barak).
  - Diversidade megafauna tasi nian, liliu *cetáceos* (Port.), lenuk tasi, lafaek, *raias* (Port.) (ikan pelágico, ikan-atún).
  - Fatin lulik oioin, ligasaun & valór kulturál maka'as, - *recife coral* & fatin sira ne'ebé maran (foreshore) – serimónia *Metchi* ne'ebé halo tinan-tinan atu kaer 'ular tasi' (*Eunice virides*).
- Viziñu Parke Nasionál ne'e fatin ida ne'ebé iha patrimóniu kulturál no naturál ho significadu boot, inklui sistema cárstico (Port.) Patrimóniu Mundiál nian no paizajen kulturál, liliu fatuk-kuak prinsipál sira, arte rai-na'in no fatin sira okupasaun nian.
- Iha zona tasi-ibun nian, iha mós kultura ne'ebé la'ós rai-na'in iha Parke Nasionál nia sorin, ezemplu, legadu husi kolonizasaun portugues no okupasaun japonés no mós fatin sira ne'ebé iha importánsia kulturál ne'ebé aas tebes kona-ba rezisténsia polítika no armada ba independénsia.

*Parke Mariñu – Workshop kona-ba Planeamentu Parke Nasionál nian (7-8 Abril 2009)*

- Halo ona revizaun lubun ida ba projetu orijinál nia ámbitu – tuir reuniaun formál ne'ebé hala'ó iha Dili, iha 5 Novembru 2007, ho funsionáriu sira husi MAFF – atu garante integrasaun/koordinasaun ho planeamentu jestaun nian ba Parke Nasionál Nino Konis Santana nia komponente terrestre. (NB: hein katak planu ba jestaun terrestre ba parke ne'e sei ramata iha tinan tolu nia laran. Tanba ne'e, presiza halo revizaun ba kronolojia kona-ba planeamentu mariñu nian atu nia bele tama iha prazu ne'e nia laran.) MAFF Peskas mak sei diriji ka lidera projetu ne'e (lori GoTL nia naran), maibé MAFF Área Protejida sei sai hanesan partisipante prinsipál.
- Hala'ó workshop ida durante loron rua nia laran kona-ba Parke Mariñu iha Dili iha loron 7 no 8 Abril 2009 atu identifika MPA nia atividade planeamentu, implementasaun no konsultasaun, prosesu no prioridade sira. Workshop ne'e hetan partisipasaun husi funsionáriu prinsipál sira iha MAF Peskas no MAF Área Protejida, konselleiru tékniku sira (Governu NT) no mós parseiru NGO prinsipál sira (The Nature Conservancy and Conservation International). Forum ida-ne'e importante tanba envolve parte interesadu husi governu no parseiru NGO sira hodi atu identifika medida prinsipál kona-ba planeamentu no implementasaun Parke Mariñu nian, molok atu ramata ka kompleta relatóriu finál. Workshop ne'e konfirma pontu sira tuir mai ne'e:
  - a. Baliza ne'ebé MPA propoin, inklui milla náutika 3 husi liña kosteira no inklui mós propiedade marítima ne'ebé liga ba Parke Nino Konis Santana.
  - b. Parke Mariñu – Categoria VI (MPA nia uzu-múltiplu) atu prevé uzu sustentavel lubuk ida, konsistente ho konservasaun bio-diversidade ninia objetivu prinsipál.
  - c. Deklarasaun formál kona-ba MPA husi GoTL sei fó poder lejislativu no regulamentár ne'ebé nesesáriu atu bele halo jestaun ida efikás ba Parke Mariñu Nino Konis Santana (no nia valór sira), liliu loka dalan ba jestaun no oinsá atu hala'ó atividade no uza sasan iha parke nia laran.
  - d. Biar Governu mak sei halo planu no konsulta, planu ne'e sei halo tuir abordajen ida ne'ebé bazeia ba comunidade – ezemplu, tuir modelu *Locally Managed Marine Area* (LMMA) - hodi kria apoiu lokál, tau matan ba no halo jestaun konjuntu.
  - e. Presiza hahú halo, nu'udar kestaun prioridade ida, avaliasaun no dezvoltamentu ba moris sustentavel (ezemplu, eko-turizmu, peska, *aquaculture*) iha Parke Mariñu nia laran (no Parke Nasionál), molok atu hahú dezvoltave planu zoneamentu ba Parke Mariñu.
  - f. Planeamentu ba Parke Mariñu ne'e sei presiza input ka partisipasaun husi Governu nia ajénsia relevante hotu-hotu no sosiedade sivil (inklui representante lokál sira husi comunidade sira ne'ebé hola konta patrimóniu tradisionál ne'e).
  - g. Planeamentu ba planu *Marine Protected Area (MPA)* tenke integra iha planeamentu ba Parke Nasionál Nino Konis Santana, ne'ebé ligadu
  - h. Atu fasilita integrasaun ne'e, presiza harii komisaun konjuntu planeamentu nian, ne'ebé sei halo mós parte nu'udar membru MAF Área Protejida (responsavel kona-ba

planeamentu Parke Nasionál Nino Konis Santana) no MAF Peskas (responsavel kona-ba planeamentu Parke Mariñu Nino Konis Santana).

- i. MPA ninia governasaun no jestaun iha Timor-Leste - presiza iha estratéjia política ida, kadru planeamentu no tékniku atu identifika no harii MPA sira (ezemplu, Estratejia MPA iha Timor-Leste), no liliu atu klarifika arranju administrativu, jurídiku no institusionál hodi halo jestaun ba MPA sira.

#### *Kapasitasaun no engajamentu TL nian*

- Funsionáriu na'in 9 husi MAFF mak partisipa iha peskiza mariña iha kampu kona-ba Parke Mariñu Nino Konis Santana (Novembru 2008)
- Funsionáriu husi ajénsia governu 35 (peskas, área protejida, turizmu) partisipa iha workshop kona-ba planeamentu Parke Nasionál no Parke Mariñu (7-8 Abril 2009)
- MAF Peskas fó assisténsia ho peskiza kona-ba Parke Mariñu iha Novembru 2008 (Anselmo Lopes Amaral).

#### *Problema & Prioridade ne'ebé mosu*

1. Presiza hahú halo, nu'udar kestaun prioridade ida, avaliasaun no dezenvolvimentu ba moris sustentavel (ezemplu, eko-turizmu, peska, *aquaculture*) iha Parke Mariñu nia laran (no Parke Nasionál), molok atu hahú dezenvolve planu zoneamentu ba Parke Mariñu.
2. Hanesan ho kumprimentu no jestaun ba Parke Mariñu ne'ebé sei *baseia iha rai* (terrestrial-based), presiza mós koordena no hahú halo avaliasaun no planu ba infraestrutura, kumprimentu no formasaun ba guarda sira, nu'udar kestaun prioridade ida ba Parke Nasionál no Parke Mariñu nian. Iha oportunidade lubuk ida atu fó formasaun ka treinu kolaborativu no kooperativu ba guarda florestál sira no fahe programa ho *Parks and Wildlife Service* husi Territóriu Norte.
3. Presiza halo análise ba dadus no halo tan prosesamentu ba dadus hodi bele hatudu dadus nia kamada espasiál hotu-hotu kona-ba Parke Mariñu. Hatutan tan ne'e, presiza mós iha ajénsia ida husi governu kona-ba jestaun dadus (AGIS) atu dedika nia an hodi halo jestaun banku-dadus GIS ida de'it ba kamada espasiál ne'ebé iha kona-ba Parke Mariñu, natural no sosiál (infraestrutura kosteira, rai, no seluk tan).
4. Presiza halo tan servisu iha kampu hodi bele halo mapeamentu ba habitat iha *fine-scale* kona-ba MPA ne'ebé propoin atu harii (ezemplu, milla náutika 3 husi liña kosteira, inklui propriedade marítima ne'ebé liga ba Parke Nasionál Nino Konis Santana).
5. Presiza atu identifika prátika tradisionál sira, tasi, no 'Tara Bandu' iha rejaun Parke Mariñu nian hodi tulun halo planeamentu no zoneamentu ba MPA. Estudu kulturál ne'ebé iha (Haburas) halo iha Tutuala no presiza atu halo mós ba rejaun Parke Mariñu tomak.
6. Presiza klarifika no koordena parseiru NGO sira (The Nature Conservancy, Conservation International) no konselleiru tékniku sira (Governu Territóriu Norte) ninia knaar no input kona-ba Parke Mariñu nia planeamentu, estabesimentu no jestaun.

7. Presiza fahe responsabilidade ne'ebé formál no klaru liu kona-ba planeamentu no konsultasaun iha Parke Mariñu Nino Konis Santana nia laran.
8. Iha nesesidade prioritária atu harii estratéjia polítika ida, planeamentu no enkuadramentu tékniku atu bele identifika no harii MPA sira (ezemplu, Estratejia MPA Timor Leste), lilu atu klarifika MPA sira-nia governasaun no jestaun iha Timor-Leste (ezemplu, arranju administrativu, jurídiku no institusionál hodi bele halo jestaun ba MPA sira).
9. Presiza integra planeamentu no dezvoltimentu eko-turizmu nian iha Parke Mariñu no Parke Nasionál Nino Konis Santana iha prosesu konsultasaun ida luan kona-ba zonamentu mariñu no oinsá atu uza rai no arranju kona-ba jestaun Parke Mariñu no Nasionál iha loron aban.



## Sumário Executivo (Portugese)

**Título do Projecto:** Parque Marinho Nino Konis Santana – a primeira Área Marinha Protegida de Timor-Leste

**Líderes do Projecto:** Karen Edyvane (NRETAS), Augusto Fernandes (MAP – Pescas)

**Outros Participantes no Projecto:** Celestino Barreto de Cunha (MAP – Pescas), Manuel Mendes (MAP – Áreas Protegidas), Abílio da Fonseca (Direcção Nacional de Serviços Ambientais)

### *Introdução*

As Áreas Marinhas Protegidas (AMPs) são globalmente reconhecidas como uma ferramenta essencial para os ecossistemas, habitats e pescas e também para o bem-estar económico das comunidades costeiras. Em ecossistemas tropicais as AMPs, não só providenciam benefícios económicos reais, mas mais importante ainda, oferecem uma base segura e um incentivo a uma indústria de turismo marinho em rápido crescimento. Apesar de no Sudeste Asiático ter havido um progresso considerável no desenvolvimento de AMPs, Timor-Leste não tem, de momento, nenhuma AMP estabelecida.

O principal objectivo deste projecto é o desenvolvimento de uma proposta abrangente de conservação do Parque Marinho para o Parque Nacional Nino Konis Santana. O Ministério da Agricultura, Florestas e Pescas (MAFP) declarou o primeiro parque nacional de Timor-Leste, o Parque Nacional Nino Konis Santana, no distrito de Lautém em 2007. O parque nacional foi estabelecido como uma área protegida de Categoria V da União Internacional para a Conservação da Natureza (IUCN), de modo a reflectir os importantes valores naturais e culturais da região, a sua importância para a vida local, bem como a influência humana na espectacular paisagem da região. O projecto está integrado com o projecto 1 (mapeamento costeiro e marinho), projecto 2 (projecto de ecoturismo), projecto 3 (levantamento de megafauna) e projecto 5 (desenvolvimento das pescas).

A ilha de Jaco em Lospalos (na ponta Este de Timor-Leste) é um Parque Nacional Protegido. A ilha é reconhecida pelas suas “águas límpidas e praias de areia branca”, abundantes recifes de coral e vida marinha (e.g. tartarugas, tubarões, raias), e também, pinturas rupestres e túmulos ancestrais relativamente perto. Apesar da estrada costeira para Jaco ser altamente pitoresca (especialmente entre Dili e Manatuto), a acessibilidade a Jaco é limitada pelas más condições da estrada (entre Com e Jaco) e a falta de acessos à ilha, alojamento e infra-estruturas turísticas locais. A pescaria artesanal nos recifes da costa norte de Timor-Leste é maioritariamente explorada por pescadores de subsistência. Na região da ilha de Jaco, qualquer AMP tem de reconhecer as fortes ligações culturais à costa, interesses e importância dos Fatalucos indígenas. Apesar de não existirem actualmente AMPs em Timor-Leste, existem sistemas tradicionais em alguns locais, com uma proibição de capturas em certos períodos, conhecido como *tara bandu*.



O projecto incluiu (i) mapeamento detalhado de habitats e levantamentos biológicos do Parque Marinho (incluindo corais, ervas marinhas, peixes, invertebrados e vida selvagem, i.e. tartarugas), (ii) um inventário natural-cultural e levantamento formal para conservação, (iii) identificação das principais questões e estratégias, potenciais zonas de gestão da AMP, directivas e administração da AMP; e (iv) um seminário de 2 dias com os interessados (7-8 de Abril de 2009) – para identificação de actividades, processos e prioridades de planeamento, implementação e consulta sobre AMPs.

#### *Levantamento Biológico do Parque Marinho*

- O trabalho de campo e a componente de mapeamento deste projecto foi coordenado com o trabalho de campo do Projecto 1 (Mapeamento de Habitats Costeiros e Marinheiros de Timor-Leste).
- O mapeamento de larga escala do proposto Parque Marinho Nino Conis Santana foi efectuado, sendo o trabalho de campo realizado entre 19 e 30 de Novembro de 2007 (ver Relatório de Progresso do Projecto 1).
- Verificação no local das imagens Landsat TM para o Parque Marinho realizada em 3 regiões costeiras (cerca de 10Km de comprimento): Com, Tutuala e Lore. Ao trabalho de campo seguiu-se a análise em Darwin, dos dados da verificação no local.
- Os levantamentos aéreos mensais de megafauna marinha (ver Projecto 3) foram alargados para incluir levantamentos a baixa altitude do Parque Marinho – para identificar potenciais locais de nidificação de tartarugas e outra megafauna marinha
- Levantamentos e monitorização detalhados de corais, invertebrados e peixes no Parque Marinho no final de Novembro de 2008 e incluiu 150 mergulhos em nove dias realizados por 5 mergulhadores. Esta expedição colaborativa, a primeira do género nesta região, foi liderada pelo Dr. Tony Ayling e pela Dr. Avril Ayling (Sea Research).

#### *Inventário Natural e Cultural & Avaliação de Conservação*

- Foram mapeados os principais valores naturais, culturais e patrimoniais, no Parque Marinho.
- Recifes de coral relativamente intactos – baixa pressão da pesca comercial – mas ausência de predadores de níveis tróficos de topo (tubarões, raias, e garoupas, peixes-papagaio e bodiões de grandes dimensões).
- Numerosos locais indígenas sagrados, fortes ligações e valores culturais - recifes costeiros e zona intertidal - cerimónias anuais de apanha de poliquetas marinhas (*Eunice viridis*).

- O âmbito original do projecto foi significativamente revisto – após uma reunião formal com funcionários do MAFP (Ministério da Agricultura, Florestas e Pescas) em Díli, no dia 5 de Novembro de 2007 – de modo a assegurar integração e coordenação com o plano de gestão para a componente terrestre do Parque Nacional Nino Konis Santana. [NB: está previsto que o plano de gestão terrestre do parque esteja completo dentro de 3 anos. Deste modo, os prazos de planeamento marinho tiveram de ser revisto para coincidir com este calendário.] A DNPA será a agência líder do projecto (em nome do Governo de Timor-Leste) – mas o Departamento de Áreas Protegidas será um participante chave.
  
- Um seminário de 2 dias de planeamento do Parque Marinho – Parque Nacional teve lugar em Díli, para identificar as principais actividades, processos e prioridades de planeamento implementação e consulta relativas às Áreas Marinhas Protegidas. Participaram os principais funcionários das Pescas, Áreas Protegidas, consultores técnicos (Governo NT) e também ONG's parceiras (The Nature Conservancy e Conservation International). Este fórum foi essencial para empenhar as agências governamentais relevantes e os parceiros não governamentais na identificação dos passos principais do planeamento e implementação do Parque Marinho – antes da elaboração de um relatório final. O seminário confirmou o seguinte:
  - a. O limite da AMP proposta será de 3 milhas náuticas da linha de costa e incluirá todo o património marítimo adjacente ao Parque Nacional Nino Konis Santana.
  - b. Parque Marinho – Categoria VI (AMP de usos múltiplos) – para permitir um vasto leque de usos sustentáveis, consistentes com o objectivo principal de conservação da biodiversidade.
  - c. Apesar do planeamento e consulta ser feito pelo governo, será adoptada uma abordagem comunitária ao planeamento i.e. um modelo de uma Área Marinha Gerida Localmente (AMGL)
  - d. É prioritário iniciar a avaliação e desenvolvimento de meios de subsistência sustentáveis (i.e. ecoturismo, pescas, aquacultura) dentro da área do Parque Marinho (e Parque Nacional) – antes do desenvolvimento do plano espacial do Parque Marinho.
  - e. O planeamento do Parque Marinho vai necessitar da colaboração de todas as agências governamentais relevantes e da sociedade civil (incluindo representantes locais das comunidades tradicionais).
  - f. O planeamento da Área Marinha Protegida (AMP) proposta deverá ser integrado no planeamento do Parque Nacional Nino Konis Santana adjacente.
  - g. De modo a facilitar esta integração, uma comissão conjunta de planeamento será estabelecida sendo composta (entre outros) pelo MAP - Áreas Protegidas (responsável pelo planeamento do Parque Nacional Nino Konis Santana) e pelo MAP – Pescas (responsável pelo planeamento do Parque Marinho Nino Konis Santana).

- h. Administração e gestão de AMPs em TL – necessidade de uma política estratégica, planeamento e enquadramento técnico para identificação e estabelecimento de AMPs (i.e. Estratégia AMP TL), e particularmente para clarificar disposições administrativas, cegais e institucionais para a gestão de AMPs.

#### *Capacitação e Envolvimento de Timor-Leste*

- Um total de 9 funcionários do MAP participou no levantamento de campo do Parque Marinho Nino Konis Santana (Novembro 2008).
- Um total de 35 funcionários de agências governamentais (pescas, áreas protegidas, turismo) participou no seminário de planeamento Parque Marinho – Parque Nacional (7-8 Abril 2009)
- O MAP-DNPA ajudou ao levantamento no Parque Marinho em Novembro 2008 (Anselmo Lopes Amaral).

#### *Problemas Emergentes e Prioridades*

1. É prioritário iniciar uma avaliação e desenvolvimento de meios de subsistência sustentáveis (i.e. ecoturismo, pescas, aquacultura) dentro da área do Parque Marinho (e Parque Nacional) – antes do desenvolvimento do plano espacial do Parque Marinho.
2. Uma vez que a maioria das questões relacionadas com o cumprimento e gestão do Parque Marinho serão baseadas em terra, é prioritário coordenar e iniciar o levantamento e planeamento de infra-estruturas, bem como as necessidades de formação de guardas para o Parque Marinho e Nacional. Existem boas oportunidades de colaboração e cooperação com o Parks and Wildlife Service do Northern Territory na formação de guardas e programas de intercâmbio.
3. É necessário fazer análise de dados e mais processamento de dados para juntar todas as camadas espaciais relevantes para o Parque Marinho. Para além disto, é necessário que haja uma agência governamental dedicada (ALGIS), responsável pela gestão de uma base de dados SIG (sistema de informação geográfica) única que inclua todas as camadas espaciais disponíveis para o Parque Marinho (infra-estrutura costeira, propriedade de terras, etc).
4. É necessário trabalho de campo adicional para fazer mapas a escala fina dos habitats da AMP proposta (i.e. 3 milhas náuticas da linha de costa – e incluir todo o património marinho adjacente ao Parque Nacional Nino Konis Santana proposto).
5. É necessário identificar as práticas consuetudinárias, gestão de zonas marítimas, e “Tara Bandu” dentro da área do Parque Marinho, para ajudar no planeamento e divisão em zonas da AMP. Foram feitos estudos culturais em Tutuala (pela Haburas), que é necessário estender a toda a área do Parque Marinho.
6. É necessário clarificar e coordenar o papel das ONG’s parceiras (The Nature Conservancy, Conservation International) e dos assessores técnicos para AMP’s (Governo do Northern Territory) no planeamento, estabelecimento e gestão do Parque Marinho.

7. É necessário clarificar e demarcar formalmente as responsabilidades de planeamento e discussão dentro do Parque Nacional e do Parque Marinho.
8. Há uma necessidade prioritária de uma política estratégica, planeamento e enquadramento técnico para identificação e estabelecimento de AMP's (i.e. a Estratégia para Áreas Marinhas Protegidas de Timor-Leste), principalmente para clarificar questões de governação e gestão das AMP's em Timor-Leste (i.e. arranjos administrativos, legais e institucionais para a gestão das AMP's).
9. É necessário integrar o planeamento e desenvolvimento do ecoturismo dentro do Parque Nacional Nino Konis Santana com um processo mais amplo de discussão de ordenamento do território e com os futuros planos de gestão para o Parque Nacional e Marinho.

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## NINO KONIS SANTANA (1959 - 1998)



The death by accident of the Commander of FALINTIL - National Armed Forces of East Timor – Nino Konis Santana, on 11 March 1998, in Ainaro, constitutes a tragic loss for the People of East Timor.

Nino Konis Santana was born in Lospalos, 39 years ago. A leader of UNETIM (East Timorese Students' Organisation) until 1975, associated with FRETILIN. Konis Santana worked as a schoolteacher in a village in that same region before the invasion. He was a member of the Commission, which prepared, in 1974, the electoral process in Lospalos. After the Indonesian invasion and occupation he left for the mountains and was appointed assistant to the Lospalos Military Region. In 1981, after the dismantling of the Base Camps he was appointed member of the Liaison Group led by Xanana Gusmão. In the beginning of 1992, after Mau Hodu was captured, he was appointed Political Assistant to Xanana Gusmão. With the capture of Xanana Gusmão, in November 1992, Nino Konis Santana is appointed member of the Military Political Committee headed by Ma'Huno. In 1993, after Ma'Huno was

captured by the occupant forces, Nino Konis Santana became the operational Commander of FALINTIL and re-organised the Resistance by establishing the Executive Council of the Armed Struggle and of the Clandestine Front, which co-ordinates all the Resistance's activity inside the territory. Nino Konis Santana was Secretary of the Directive Committee of FRETILIN.

Nino Konis Santana was not only leader of the armed wing of the Resistance together with Xanana Gusmão but also an architect of East Timorese National Unity, reconciliation and tolerance. He worked tirelessly forging national consensus and unity. Although he was the operational leader of FALINTIL, Nino Konis Santana was also a peacemaker, a diplomat and statesman. He was acutely aware of the international dimension of the East Timorese struggle and was always fully aware and kept abreast of international developments. As one of his closest comrades and representative abroad, I was always impressed by the clarity of his thinking, intellect and vision.

Nino Konis Santana was always an unconditional supporter of the three-phased CNRM Peace Initiative. The Peace Initiative was presented to the European Parliament Sub-Committee on Human Rights in 1993 and aimed at assisting the UN Secretary General to find a solution to the East Timor conflict. In its first phase, the Resistance proposes the withdrawal of the occupant's military presence in East Timor and several measures to ensure the respect for human rights in the territory. The second phase prepares the conditions for the East Timorese to establish its autonomous political and social structures and, finally, a referendum on self-determination would be held in the third phase.

His death prompts us to renew our determination to pursue this noble combat for Peace and Freedom in every front with every legitimate means available to us. I reiterate my personal commitment and determination to seek a peaceful end, based on the respect for the right of the People of East Timor to self-determination as well as understanding Indonesia's national interest and pride.

As Indonesia faces the most serious economic, financial and political crisis in the 32 years of the regime, I hope that those in power in Jakarta realise that now there is a window of opportunity for Indonesia to cut its losses and withdraw from East Timor with honour and dignity. We will all honour the memory and legacy of Nino Konis Santana who will inspire us to forge ahead until Peace and Freedom are brought our Motherland: EAST TIMOR.

**C.N.R.M. - NATIONAL COUNCIL OF MAUBERE RESISTANCE**

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José Ramos-Horta  
Special Representative of the CNRM  
Personal Representative of Xanana Gusmão  
Nobel Peace Prize Laureate  
Lisbon, 30 March 1998



# 1 INTRODUCTION

## 1.1 Marine Protected Areas

### 1.1.1 *Why Marine Protected Areas ?*

Effective biodiversity conservation is recognised, globally, as relying on two basic strategies: (i) the establishment of a representative system of Marine Protected Areas and (ii) the ecologically sustainable management of natural resources. MPAs can help achieve the three main objectives of living resource conservation as defined in the World Conservation Strategy (IUCN, 1980):

- to maintain essential ecological processes and life support systems;
- to preserve genetic diversity; and
- to ensure the sustainable utilization of species and ecosystems.

Marine Protected Areas (MPAs) are not only recognised globally as an essential tool for ecosystems, habitats, biodiversity and fisheries, but also, can contribute significantly to poverty reduction and improve the economic well-being of coastal communities (IUCN 2003, Salm *et al* 2000, Cinner *et al.* 2005, Edyvane & Lockwood 2005, Lockwood *et al.* 2006, McClanahan *et al.* 2006, Govan *et al.* 2008). In tropical ecosystems, MPAs can not only provide real economic benefits in sustaining artisanal fisheries, but also, MPAs are increasingly providing a secure basis and driver for a rapidly growing marine tourism industry. For instance, the potential value of coral reef tourism in South East Asia (SEA) alone is estimated at 50% of the global total of US\$9.6 billion (Wilkinson 2004). This reflects the continued high dependence of SEA countries on coral reefs for food security and increasing tourism related revenue.

MPAs in Timor Leste can play a key role in marine biodiversity conservation and also, poverty reduction and the development of local sustainable livelihoods and employment, particularly in remote coastal areas.

### 1.1.2 *Marine Protected Area Networks*

Establishing a network of Marine Protected Areas fulfils Timor Leste's international obligations as a signatory to the *Convention on Biological Diversity* (UNEP 1992), which at a global level, through the International Union for the Conservation of Nature (IUCN), Commission on National Parks and Protected Areas (CNPPA), has been carrying out a program to promote the establishment of a global representative system of marine protected areas (MPAs) (Kelleher *et al.* 1995) (see Text Box 1).

Significantly, a global target to establish national networks of MPAs by 2012 has been agreed through commitments at the recent 2002 World Summit on Sustainable Development (UN 2002).

## Box 1 A Global Network of Marine Protected Areas

Article 6 of the Convention on Biological Diversity (UNEP 1992) states that signatory Nations shall:

- (a) *develop national strategies, plans or programs for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programs which shall reflect, inter alia, the measures set out in this convention relevant to the contracting Party concerned; and*
- (b) *integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plan, programs and policies.'*

At the global level, the International Union for the Conservation of Nature (IUCN), through its Commission on National Parks and Protected Areas (CNPPA), has been carrying out a program to promote the establishment of a global representative system of Marine Protected Areas (MPAs).

The primary goal of the IUCN-CNPPA Marine Protected Areas Program is:

*'to provide for the protection, restoration, wise use, understanding and enjoyment of the marine heritage of the world in perpetuity through the creation of a global, representative system of Marine Protected Areas and through the management, in accordance with the principles of the World Conservation Strategy, of human activities that use or affect the marine environment.'*

While protected areas are a key part of *in situ* conservation under the *Convention on Biological Diversity* (UNEP 1992), no protected area is likely to be sustainable if established or managed in isolation. As such, there are biological, social and economic interactions between different places and different system components, which require a 'systems thinking' approach. Importantly, global conservation models are moving away from a focus on protected areas as relatively small 'fortresses of nature' surrounded by environmental degradation, towards continental-scale exercises in designing and coordinating conservation and compatible land-use across millions of hectares, in collaboration with local peoples (IUCN 2003, Hill 2004). These new approaches include, identifying better approaches to protected area selection, implementing both community and continental conservation models, to finding ways of integrating across scales and between Indigenous knowledge and conservation science, and to supporting conservation-based economies.

### 1.1.3 Definition & Types of Marine Protected Areas

The IUCN has defined a MPA as "*any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment*" (Kelleher 1999). As such, any historical or cultural features contained within the area may also be protected and managed within an MPA.

There are essentially two ways of establishing MPA systems: either as many relatively small sites, each strictly protected, or as a few, large, multiple-use areas which contain strictly protected areas within them. To conserve biodiversity, both approaches should occur within an effective programme of ecosystem management covering the marine ecosystem and the adjacent land areas that affect it (IUCN 1999).

Globally, a wide range of names are used to describe MPAs. Generally, MPAs can range in size from small *Marine Reserves* to large regional *Marine Parks* and can include neighbouring coastal lands and islands. Marine Parks are usually multiple-use areas, allowing a variety of activities from tourism to recreational and commercial fishing. The Great Barrier Reef Marine Park in Australia is recognised

world wide as an example of a successfully managed, multiple-use MPA, established to conserve a unique marine environment whilst still allowing a variety of uses. A Marine Reserve, however, usually offers greater protection for the area and may allow passive recreation and tourism - or it could be a reserve for a particular species of marine life.

#### ***1.1.4 Primary & Secondary Goals of Marine Protected Areas***

While the primary goal of the MPAs is the conservation of biodiversity (IUCN 1999), MPAs can also be created to protect and manage many other important values such as geological, archaeological, historical and cultural attribute. As such, MPAs may also be compatible with a range of secondary goals and provide for a range of activities that are consistent with a general conservation objective. For example, MPAs can be reserved for conservation and fisheries management, research, education, social and historical importance, tourism or recreational use - or a combination of any of these, including to:

- protect a wide range of representative, rich and unique, marine habitats and biodiversity
- protect areas of high conservation value (including those containing high species diversity, natural refugia for flora and fauna and centres of endemism);
- provide for integrated ecosystem management;
- protect Indigenous cultural values, sites and customary practices;
- protect rare, threatened or endangered species and their habitats, and threatened ecological communities;
- protect special groups of organisms (eg. species with complex habitat requirements or mobile or migratory species, or species vulnerable to disturbance which may depend on reservation for their conservation);
- protect fish stocks, nurseries and fish habitat;
- protect areas of outstanding aesthetic values (ie. wilderness areas, dramatic vista's, etc.);
- provide areas for recreation, education and coastal-marine tourism (ie. diving, boating, sailing, underwater photography, wildlife watching, etc.);
- protect valuable geological, archaeological, historical (ie. shipwrecks, 'sacred sites', etc.)
- provide reference sites for scientific, fisheries and environmental research and monitoring, (including climate change).

In addition to the benefits or outcomes relating to biodiversity values, MPAs provide other significant outcomes that relate to the management and wise use of a range of other values. As such, MPAs can provide a wide range of benefits to the community, including:

- conserving coastal and marine biodiversity and ecological processes;
- conserving rare, unique, threatened or endangered species and their habitats
- providing a framework for sustainable, ecosystem-based management
- assisting and enhancing fisheries and fish habitat management (eg. fish propagation areas)
- facilitating the restoration of depleted species and degraded marine ecosystems;
- promoting management of marine areas and species by Indigenous communities in accordance with traditional cultural practices and affiliations;
- recognising and providing for the recreational, aesthetic, spiritual and cultural needs of Indigenous and non-Indigenous people;
- facilitating community participation and community-based management;
- providing local economic benefits through the development of alternative livelihoods and incomes;

- monitoring the environmental effects of human activities, including the direct and indirect effects of development and adjacent land use practices;
- providing reference sites for scientific research and long-term environmental monitoring;
- and educating the community about the environment and benefits of Marine Parks.

### ***1.1.5 Fully Protected or ‘No-Take’ MPAs***

The declining state of the oceans and the collapse of many fisheries has created a critical need for more effective management of marine biodiversity, populations of exploited species and the overall health of the oceans. Fully protected (or ‘no-take’) MPAs are a key tool that can help both, to protect against the impacts of global climate change, and also, to reverse the impacts of widespread over-fishing and habitat disturbance (Murray *et al.* 1999, Lubchenco *et al.* 2003). The important role of highly protected MPAs for protection of marine biodiversity, from all sources of human impact, is magnified by the fact that very little is known about most marine species and (crucially) their ecological interactions.

There is now widespread, international scientific consensus that the establishment of highly protected MPAs are essential for the protection and management of marine ecosystems, for building ecosystem resilience against the impacts of climate change, for use in sustainable fisheries management through protection of sensitive habitats and species, the provision of reference sites, and through assistance with stock management (Murray *et al.* 1999, Ward *et al.* 2001, Halpern 2003, Gell & Roberts 2003, Edyvane & Lockwood 2005). Significantly, in 2003, the 5<sup>th</sup> World Parks Congress recommended a global MPA network with a target of 20-30% of each bioregion for strict protection (IUCN 2003).

### ***1.1.6 Community-Based Conserved Areas***

Over the last ten years, indigenous people globally have become increasingly involved in declaring and managing areas over their traditional land and sea areas in accordance with internationally recognised standards and guidelines and traditional law and custom. This is usually done independently of legislation (ie. by agreement), although with support from conservation management agencies. Internationally, these areas are referred to by the World Conservation Union (IUCN) as Community Conserved Areas (or CCAs):

*“CCAs are natural and modified ecosystems, including significant biodiversity, ecological services and cultural values, voluntarily conserved by indigenous and local communities through customary law or other effective means (World Parks Congress 2003, Rec 5.26)*

CCAs tend to be based on traditional common-property regimes, and are multi-objective, combining livelihood, ecological function, self-empowerment, religious/cultural values, protection from industrialisation and concern for wildlife (Hill 2004). However, problems with CCAs lie around the erosion of common property systems, loss of traditional knowledge, alienation of the young and industrialisation. As such, multi-level systems that combine the strengths of customary law with governance at other levels can provide effective protected area management.

In Australia, indigenous people continue to have strong interests, affiliations, traditional and customary links to their ‘sea country’, and knowledge of the coastal and marine environments. Indigenous-managed conservation areas are known as Indigenous Protected Areas (IPAs) or Indigenous Marine Protected Areas (or IMPAs). In the Northern Territory, there are two declared IPAs, which include substantial coastal and marine areas, which are currently managed by

local indigenous communities, with support from government agencies (ie. Dhimurru, Anindilyakwa).

Significantly, the 2003 World Parks Congress, the 2003 World Conservation Congress and other international forums have urged governments to recognise and support CCAs as part of national protected area management frameworks (IUCN 2003).

Locally-Managed Marine Areas (or LMMAs), embody one model of community-based, marine CCAs which has been successful in establishing effective individual (and networks) of marine managed areas in many parts of Asia and the Pacific (Govan *et al.* 2008). As such, LMMA's conservation planning of traditional sea areas, emphasise 'bottom-up' management by local communities and are typically characterized by local ownership, planning and/or management. However, like other CCAs, LMMAs, lack legislation, statutory powers and regulations.

Importantly, both MPAs and CCAs (ie. LMMAs and IPAs) can provide significant opportunities for local community and indigenous participation, livelihoods and employment in the establishment and management of MPAs. This includes MPA management activities (eg. education, monitoring, surveillance, compliance) and also, activities managed within MPAs (eg. tourism, recreation, fisheries, aquaculture). To ensure that MPAs are successfully established, managed and effective, complementary and coordinated, indigenous training, livelihoods and development programs are required.

There is now increasing recognition of the need to utilise elements of both, 'bottom-up', community-based models of marine conservation planning (eg. LMMAs, IPAs) and also, traditional, 'top-down', models of planning (eg. MPAs) to establish and manage effective, community-based, MPAs. The former, provides a focus on community-based, planning and management and emphasises local and indigenous uses, rights and management aspirations, and also, socio-cultural and economic benefits. While the latter model provides a national, bioregional MPA system planning and management focus, with an emphasis on establishing ecologically representative MPA networks and significantly, provides a legislative, statutory and regulatory basis to support effective management.

**MPA Planning Issue 1: Approach to MPA Planning** - The establishment of Marine Protected Areas (and a representative MPA network) in Timor Leste, needs to utilise elements of both, 'bottom-up', community-based, marine conservation planning (ie. LMMAs, IPAs) and also, traditional 'top-down' models of planning (ie. MPAs), to ensure community stewardship and socio-cultural and economic benefits, and also, sound biodiversity conservation outcomes, supported by effective governance and management.

## 1.2 International/Regional & National Drivers

### 1.2.1 International/Regional & National Policies

Timor Leste has major international, regional and national commitments to establishing a representative system of Marine Protected Areas, including:

- **UNCBD** - In April 2006, Timor-Leste ratified the UN Convention on Biological Diversity (UNCBD). The Convention on Biological Diversity (UNEP 1992) requires all member nations to, among other things, establish a system of protected areas and to develop guidelines

for the selection, establishment and management of protected areas. The Convention recognises that protected areas are not the only mechanism for conserving biodiversity but that they are an important element of the overall approach. The Convention introduced the phrase 'comprehensive, adequate and representative' (or CAR) reserves as the central strategy for reserves to protect and manage global biodiversity (both terrestrial and marine). Establishing a CAR system of MPAs would fulfil Timor Leste's international obligations as a signatory to the *Convention on Biological Diversity* (UNEP 1992), which at a global level, through the International Union for the Conservation of Nature (IUCN), Commission on National Parks and Protected Areas (CNPPA), has been promoting the establishment of a global representative system of Marine Protected Areas (MPAs) (Kelleher *et al.* 1995).

- As a first step towards implementation of the UNCBD, the Government of Timor Leste has gone through a National Capacity Self Assessment (NCSA) which has resulted in the formulation of priority issues (RD/TL 2007a). The UNCBD addresses various issues of biodiversity including protection and equitable use of biological resources in the coastal zone. The national priority for the Thematic Area Coastal and Marine Biodiversity as formulated by the NCSA (RD/TL 2007a: 13) is the need for an 'integrated ecosystem approach to sustainable use of coastal and marine biodiversity, improved marine protected areas and community involvement in fisheries management, and data on the taxonomy, status and biological characteristics of fish species and habitats'. In addition, it also recommended the development of national guidelines for an 'ecosystem approach in marine and coastal biodiversity for integrated coastal management', and a draft a policy on coastal zone management (RD/TL 2007a: 15).
- **PEMSEA** - Timor-Leste is a member country of the Regional Programme on *Partnerships in Environmental Management for the Seas of East Asia* (PEMSEA). In December 2006 it signed the Haikou Partnership Agreement for the implementation of the *Sustainable Development Strategy for the Seas of East Asia* (SDS-SEA) (Ministerial Forum 2006). PEMSEA is a joint initiative between the Global Environment Facility (GEF), United Nations Development Programme (UNEP), and the International Maritime Organisation (IMO). It aims at building interagency, intersectoral, and inter-governmental partnerships for achieving sustainable development of the Seas of East Asia (PEMSEA 2008). It has developed a range of methodologies, techniques, working models and standards that help to improve coastal management, such as the Integrated Coastal Management (ICM) framework that has been successfully applied at numerous project sites (Weaver 2008).

For Timor Leste, one of the first steps under the Haikou Partnership Agreement was the formulation of an SDS-SEA Work Program for the country. The government has agreed with PEMSEA to jointly implement the *Integrated Coastal Resource Management Project 2007-2010* (RD/TL & UNDP 2007) (Weaver 2008). The main components of this project will be (a) the development and adoption of an integrated coastal and marine policy and a 'State of Coast' (SOC) reporting system; (b) the development and implementation of a community-based alternative livelihood program through seaweed farming and coastal resource conservation; and (c) the development and implementation of site-specific strategies and management plans for coral conservation and Marine Protected Areas within an Integrated Coastal Management (ICM) framework (MAFF 2007; PEMSEA 2008). NDFA is the main implementing agency on behalf of the government of Timor-Leste. The NDFA will collaborate with the Secretariat for the Environment and other agencies within MAF in developing a policy framework for ICM and site-specific management plans (NDFA 2005).

- **CTI** – The establishment of effective Marine Protected Area networks is a major objective of the regional *Coral Triangle Initiative (CTI) on Coral Reefs, Fisheries, and Food Security*. This major regional marine conservation program is an initiative that brings together six governments (or CT6) in the ‘Coral Triangle’ region (the recognised global epicentre of tropical marine biodiversity), including Timor-Leste, Indonesia, Malaysia, the Philippines, Papua New Guinea, and the Solomon Islands, and aims at protecting marine life, promoting sustainable fishing, and ensuring food security in the region (Aglionby 2007). It was initiated by the Indonesian government and was endorsed by participating governments during the APEC Summit in September 2007. At the ‘World Oceans Conference’ in Manado (Indonesia) in May 2009, the CTI Regional Plan of Action was endorsed by the CT6. Under Goal 3 of the CTI Regional Plan of Action (Region-wide Coral Triangle MPA System), Timor Leste is committed to 7 national actions in relation to establishing MPAs, including the declaration and zoning of the Nino Konis Santana Marine Park (see Text Box 2).

### **BOX 2 - Timor Leste CTI National Plan of Action**

The following are Timor Leste’s National Actions in relation to Marine Protected Areas under the *Coral Triangle Initiative (CTI) on Coral Reefs, Fisheries, and Food Security, Regional Plan of Action (2009)*.

#### **Goal 3 – Region-wide Coral Triangle MPA System (CTMPA's) in Place and Fully Functional**

Action 1: Advance core foundational activities needed to support MPAs in the future, such as education and public awareness, law enforcement, networking, and broader co-management.

Action 2: Implement capacity-building activities targeting MPA managers and fisheries staff.

Action 3: Strengthen tourism sector’s contributions to MPAs and sustainable management of marine and coastal resources.

Action 4: Declaration and zoning development of MPA within Nino Konis Santana National Park.

Action 5: Establish Atauro, Batugade, Manututu and Oecuse MPAs.

Action 6: Conduct biological connectivity and socioeconomic studies as a basis for the development of MPA network that provide benefits for fisheries and marine ecotourism.

Action 7: Develop cross-boundary MPA networks.

- **National MPA Policies** – While there are considerable national commitments through international and regional strategies, such as the UNCBD (RD/TL 2007a: 13), PEMSEA (MAFF 2007; PEMSEA 2008) and CTI Regional Plan of Action (2009), there are currently no specific national MPA policies or strategies for Timor Leste to guide the identification, planning, establishment and management of a national, representative system of MPAs.

**MPA Planning Issue 2: Timor Leste MPA Strategy** - There is a priority need for a strategic policy, planning and technical framework for identifying and establishing individual MPAs and a network of MPAs (ie. TL MPA Strategy), particularly to clarify the governance and management of MPAs in TL (ie. administrative, legal and institutional arrangements for managing MPAs). Clarity in governance and MPA management arrangements is also essential for the effective management of the Nino Konis Santana Marine Park.



### **1.2.3 International & Regional MPA Organisations**

The *World Conservation Union (IUCN)* is the world's largest conservation network that was founded in 1948 and brings together 82 States, 111 government agencies, over 800 non-governmental organizations (NGOs), and some 10,000 scientists and experts from 181 countries. The *IUCN Programme on Protected Areas* established the World Commission on Protected Areas (WCPA), a network of protected area expertise. Significantly, the Marine Working Group of the IUCN-WCPA produced a Regional Action Plan for Marine Protected Areas for Southeast Asia (2007-2012) (WCPA 2007). The IUCN also provides support to protected area managers through the Protected Areas Learning Network, a web-based portal with a wealth of resources to assist protected area planning and management.

The *Locally-Managed Marine Area Network (LMMA)* is a network of conservation projects mainly in the Asia-Pacific region that are applying the LMMA approach. LMMA promotes community-based marine/nearshore management and supports the role of traditional coastal management practices. The LMMA also provides web-based resources ([www.lmmanetwork.org](http://www.lmmanetwork.org)), including a broad range of case studies.

Conservation International also provides a web-based tool "*The Towards Best Practice eForum*", to support and connect practitioners involved in natural resource management ([www.nbii.gov/datinfo/bestpractices/](http://www.nbii.gov/datinfo/bestpractices/)) and also, supports the Rapid Assessment Program (RAP), which has documented the rich marine biodiversity of many areas and also, led to protected area declarations, ie. Milne Bay (Papua New Guinea) (Allen *et al.* 2000).

In addition to these MPA resources, a range of organisations and web-based tools are available to assist and support general protected area development including: "Tool Box for Protected Area Management", based on the experience in Latin America by ROARCA/APM (2003); tools for increasing support for international conservation, using proven social marketing techniques by RARE ([www.rareconservation.org](http://www.rareconservation.org)); and the Conservation Training and Resource Centre ([www.ctrc.or.id](http://www.ctrc.or.id)), established in Indonesia through a partnership between the Wildlife Conservation Society, the Center for International Forestry Research, the World Wide Fund for Nature, British Petroleum, The Nature Conservancy, Conservation International and other organisations.

The World Wide Fund for Nature undertakes global work on protected areas using a continental-scale approach. This is being progressed through the development of the Global 200 Ecoregions, targets, the creation of new protected areas, improved management, reduction of key threats, policy level (governance, laws) and community partnership approaches and assessments of trends through projects such as the "Living Planet Index" (declining) and the "World Ecological Footprint" (increasing) (Dudley & Stolton 2003).

## **1.3 Coastal-Marine Legal & Regulatory Framework**

UNCLOS (UN Convention on the Law of the Sea) 1982 defines a coastal state's jurisdictional rights for internationally recognized maritime zones, including inland waters, the territorial sea, the contiguous zone, and the Economic Exclusion Zone (EEZ) (UN 2007). In 2002 Timor-Leste enacted Law 7/2002 on Maritime Boundaries which is based on international law, in particular UNCLOS. Under this law, the country's territorial sea, continuous zone, and EEZ have been set at 12 nm, 24 nm, and 200 nm, respectively. However, the definition of precise maritime boundaries with Australia and Indonesia is still pending (Timor Sea Office 2007).

The National Directorate of Fisheries and Aquaculture (NDFFA) and the National Department of Environmental Services (NDES) are the 2 main agencies with responsibility for coastal and marine environments in Timor Leste, with the allocation of responsibilities primarily defined by national plans, policies and legislation. Marine conservation and the establishment of Marine Protected Areas in Timor Leste is the joint responsibility of both NDFFA and NDES, with legislation requiring both agencies to work together for planning (leadership of NDES) and implementation and monitoring (leadership of NDFFA). However, the specific roles and responsibilities, and particularly, the administrative, legal and institutional arrangements for managing MPAs, remain to be clarified.

The NDES has prime responsibility for National Parks and the designation of Protected Areas, while the NDFFA is responsible for the sustainable development of the fishing industry and to implement national plans linked to conservation of marine resources. While the NDFFA cannot declare a protected area, fisheries regulations are required to declare areas where fishing is restricted and/or managed to allow stock recovery. The main management tool is the use of species management plans based on specifying allowable catches, vessel and gear restrictions. The NDFFA presently has no mandate or legislation (or capacity) to manage fishery resources within a spatial ecosystem approach. As such, there is currently no legislation to support enforcement or tools to support spatial ecosystem-based management or integrated coastal zone management (ICM), either under the fisheries and environment sector. Despite this, the NDFFA has taken the lead in initiating several MPA and ICM pilot projects (see Section 1.4).

The regulatory framework in Timor-Leste is still incomplete and administration and law enforcement are weak (Weaver 2008). The lack of enforcement is due to both the highly limited financial and human resources and also, the incompatibility of the Indonesian law with the judicial system (Silva *et al.* 2003, Weaver 2008). As such, the legal system in Timor-Leste is a complex mosaic of Indonesian, UNTAET (United Nations Transitional Administration of East Timor), and RDTL (Democratic Republic of Timor-Leste) law. Indonesian law is used as subsidiary law that is successively replaced as new laws (largely based on Portuguese law) are passed by the government (Weaver 2008).

The principal piece of legislation governing protected areas in Timor Leste is UNTAET Regulation 2000/19 on protected places, which was an UNTAET emergency measure taken to protect the environment of Timor Leste from imminent destruction. The regulation specifically aims at establishing protected wild areas and protecting endangered species, coral reefs, wetlands, mangrove areas, and historic, cultural and artistic places (Weaver 2008). Any potentially harmful activities such as hunting, agricultural cultivation, construction activities and pollution are prohibited, with exception of some specified traditional local practices. Under Regulation 2000/19 (UNTAET 2000a), 15 protected areas were designated, seven of them including coastal areas (ie. Jaco Island together with surrounding rocks, reefs, and other surface and sub-surface features, Tutuala Beach and adjacent forest, Cristo Rei Beach and hinterland, Manucoco Reserve on Atauro Island, Riverlet Clere Sanctuary, Tilomar Reserve, and Lore Reserve). For effective MPA establishment and management, further policy and legal frameworks are required to articulate the administrative, legal and institutional arrangements for managing MPAs, and also, the technical, planning or consultative processes for establishing MPAs and MPA networks in Timor Leste.

The coastal-marine legal and regulatory framework in the Democratic Republic of Timor Leste (RDTL) is highly centralised. Within the four-tier governance structure (central-district-subdistrict-village), most of the legislative and financial authority lies with the central government (Weaver 2008) – this poses particular challenges for establishing and managing protected areas in regional and remote areas. All natural resources are owned by the State (Palmer & Carvalho 2008), with the entire coastline and national maritime waters of Timor Leste lying within the jurisdiction of the central government, with exception of the coastline of Dili that specifically falls under the

jurisdiction of the Port Authority of Timor-Leste. In the coastal zone, the unsettled issue of land ownership has implications for land-use and spatial planning. At present, land claims consist of a complex layering of customary tenures, holders of titles issued in the Portuguese era, holders of titles issued in the Indonesian era, and current occupiers – with many real estates have been illegitimately occupied or appropriated (Fitzpatrick 2002, East Timor Land Law Program 2005).

Currently, there is no explicit recognition of customary tenure within the Constitution. This poses challenges for Indigenous participation, customary and cultural practices and aspirations for management. In many parts of the country (particularly the Lautem District), natural resources, including coastal and marine resources, are managed primarily through a system of customary law and ownership (McWilliam 2002, 2007, Palmer & Carvalho 2008, Haburas Foundations 2007) (see Section 4.1). The Directorate of Land and Property under the Ministry of Justice is devising a legal framework for land ownership, however it is not clear to which extent traditional indigenous governance structures will be recognized within this system (Weaver 2008). Notwithstanding, the 5<sup>th</sup> World Parks Congress (IUCN 2003) sets several important global targets for recognition of the rights of Indigenous people in protected areas, including:

- All existing and future protected areas shall be managed and established in full compliance with the rights of Indigenous peoples, mobile peoples and local communities;
- Protected areas shall have representatives chosen by Indigenous peoples and local communities in their management proportionate to their rights and interests; and
- Participatory mechanisms for the restitution of Indigenous peoples' traditional lands and territories that were incorporated in protected areas without their free and informed consent established and implemented by 2010.

**MPA Planning Issue 3: MPA Legislative & Regulatory Framework** - The legislative and regulatory framework for implementing and managing community-based, Marine Protected Areas (and Integrated Coastal Management) in Timor Leste needs to provide for: an effective enforcement program; the aspirations, rights and participation of Indigenous people in the planning and management of MPAs; and incorporate the relevant objectives and tools to support ecosystem-based spatial management.

## 1.4 Progress in Establishing MPAs in Timor Leste

Several activities are currently underway relating to the establishment of Marine Protected Areas (MPAs) in Timor-Leste. The NDFA in collaboration with FAO and PEMSEA, is undertaking surveys to identify potential sites for MPAs in a number of locations in Timor-Leste, including Ataúro island, Manatuto and Liquiçá (dos Santos Silva *et al.* 2007; RD'TL and UNDP 2007). In response to declining fish catches, the fishing communities of Ataúro Island, with assistance from the non-government organisation, Roman Luan, have established 2 community-based, Marine Protected Areas (MPAs) in the Bikeli region (under the Bikeli Marine Management Project), together with regulations (Belo Soares, M., *pers. comm.*) (Pedi 2007, Weaver 2008). The FAO is currently cooperating with the NDFA to assess the prospects for establishing an MPA on Ataúro Island (dos Santos Silva *et al.* 2007). While considerable progress has been made in developing community-based MPAs on Atauro Island and also, in progressing the Nino Konis Santana Marine Park (this project), no other MPAs have been established in Timor Leste.

Basiuk (2006), in identifying key ecotourism issues, constraints and opportunities in Timor Leste for the WTO, highlighted the opportunities of Marine Protected Areas for community-based, ecotourism development (and alternative sustainable livelihoods), and the need to establish priority MPAs. The priority marine areas identified for protection and management included:

- Pertamina Jetty (exceptional marine life)
- Metinaro- Mantuto (K35- K57) (popular day-trip dive destinations and under increasing fishing pressure)
- Atauro (the whole island, exceptional quality of coral and marine life)
- Tutuala, Com, Jaco (exceptional quality of coral and marine life)

An understanding of the spatial extent and status of coastal biodiversity and resources – and developing frameworks for community-based management - are essential in MPA planning and establishment in Timor Leste. To this end, the NDFA (under the World Bank's Second Agriculture Rehabilitation Project) has also undertaken significant work in community-based, coastal resource management and training. Significantly, this included the development of a co-management or community-based, coastal resource management framework (Stockwell 2001). This included a detailed prototype ordinance for community resource management, some limited coastal community surveys and a coastal baseline survey, and also, the development of a coastal mapping system (Stockwell 2001, 2002). Unfortunately, after conclusion of the final report there was no follow-up on the proposed community-based, coastal resource management scheme (Stockwell 2003).

Notwithstanding, there exists considerable opportunity to support NDFA (and NDES) to further develop the community-based, coastal-marine mapping, databases and resource management framework – particularly, if it is supported through a broader, statutory, spatial planning and community-based resource management framework, addressing the objectives of establishing a Marine Protected Area Network and Integrated Coastal Management (ICM). Under the Strategic Plan for Fisheries, '*Fish for Sustainability*' (NDFA 2005), the NDFA have undertaken to collaborate with the NDES (National Directorate of Environmental Services) to develop and promote an Integrated Coastal Zone Management policy and develop site-specific management plans. The NDFA is also planning to encourage and facilitate community-based, fisheries management initiatives and aims at establishing a network of local, community-supported MPAs and encourage involvement of NGOs (NDFA 2005).

In 2006, the Ministry of Agriculture and Fisheries funded a series of 6 collaborative, coastal-marine research and training projects with a consortium of agencies in the Northern Territory (ie. Northern Territory Government, Charles Darwin University, Australian National University, Australian Institute of Marine Science), to assist in conservation and sustainable, regional economic development of marine industries (particularly ecotourism and fisheries). The projects included the current project: conservation values, issues and planning in the Nino Konis Santana Marine Park (Project 4); and also, significantly, 4 complementary marine projects: broadscale, coastal-marine habitat mapping of the north (and east) coast of Timor Leste (Project 1) (Boggs *et al.* 2009); coastal and marine ecotourism values, issues and opportunities on the north coast of Timor Leste (Project 2) (Edyvane *et al.* 2009); marine megafauna aerial surveys and identifying opportunities for ecotourism (Project 3) (Dethmers *et al.* 2009); and fisheries development in the Com-Tutuala-Jaco Island area (Project 5) (Lloyd *et al.* 2009).

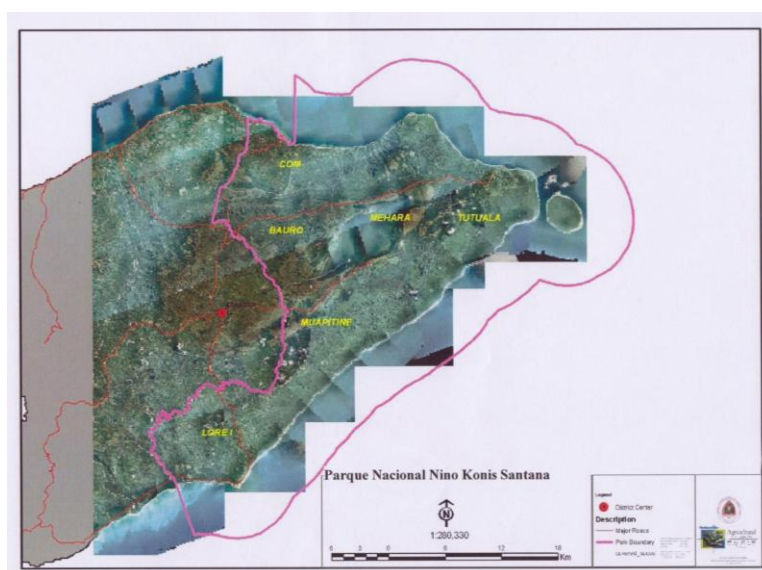
Importantly, together, these projects provide an integrated, ecosystem-based (and multi-disciplinary) approach to conservation and livelihood development, particularly within the Nino Konis Santana Marine Park and also, along the north coast of Timor Leste. While these projects provide significant information on the coastal-marine biodiversity, resources and opportunities for

community level, nature-based livelihoods, there is an urgent need for complementary, village-level socio-economic information (ie. food security, livelihoods), and formal livelihood assessments and community development and planning activities (ie. aquaculture, fishing, ecotourism).

**MPA Planning Issue 4: Community-based MPA and Fisheries Management** – In developing and establishing MPAs in Timor Leste, it is essential to recognise and support ongoing progress by the NDFA and NDES towards Integrated Coastal Zone Management and promote and facilitate community-based and site-based, fisheries management initiatives, including a network of local, community-supported MPAs. In particular, there is an urgent need for village-level, socio-economic information (ie. food security, livelihoods), coastal livelihoods assessments and community development and planning activities (ie. aquaculture, fishing, ecotourism).

## 1.5 Nino Konis Santana National Park

The Nino Konis Santana (NKS) National Park and Marine Park, declared on 27 July 2007 (RDTL 2007b), represents the largest area of terrestrial, coastal and marine habitat and biodiversity currently protected in Timor Leste. The park, situated in the Lautem district, encompasses an area of approximately 123,590 hectares, including 67,930 ha of terrestrial habitat (including the largest remaining area of natural forest in Timor-Leste and the island of Timor) and 55,660 ha of marine habitat (de Carvalho *et al.* 2007a, Edyvane *et al.* 2009) (see Figure 1).



**Figure 1.** Boundaries of the Nino Konis Santana Protected Area (National Park and Marine Park).

The forest within the terrestrial part of the park comprise some of the largest remain virgin forests in the region and links together three Important Bird Areas (IBAs) designated by BirdLife International: Lore; Monte Paitchau and Lake Iralalara; and Jaco Island (BirdLife International 2007). The National Park also includes outstanding geological diversity, particularly karst landscapes (ie. rugged limestone Paitxau Range, numerous caves, sinkholes and freshwater springs) and also, cultural heritage values of World Heritage significance - particularly, ancient cave paintings (O'Connor 2003, O'Connor & Oliveira 2007), ancient cave and occupation sites (O'Connor *et al.* 2002, O'Connor & Veth 2005, Pannell & O'Connor 2005, Veth *et al.* 2005), and ancestor tombs in the village of Ilequereque (Bock 2006, MAFF 2006). The park is also recognised for its historical significance, particularly as the centre for the resistance movement in Timor Leste's struggle for independence, with the many caves within the region (particularly

around the Paitxau Range and the Irasequiro River) used as hide-outs and a base by Falintil resistance fighters (including Xanana Gusmao and Nino Konis Santana) during the Indonesian occupation (Edyvane *et al.* 2009).

The coastal sections of the NKS park include the coastline of Lautem district and the island of Jaco (on the easternmost tip of Timor Leste), which is recognised for its “pristine waters and white sand beaches” and abundant coral reefs and marine wildlife (eg. turtles, sharks, rays). The marine component of the NKS Natural Park is located within the ‘Coral Triangle’ region (the epicentre of global tropical marine biodiversity), and comprises almost 15% of Timor Leste’s total coastline. As such, the health of the coral reefs and marine habitats within the park will be extremely important in terms of the sustainability of marine resources of the country as a whole (Ayling *et al.* in prep.). The Marine Park also contains both, southern and northern coastlines, encompassing the major coastal and marine habitats and reef types within the eastern region of the country.

In accordance with IUCN Protected Area Management Category V (Phillips 2002), a collaborative joint management approach (with local communities) is envisaged for the National Park and Marine Park, to protect the rights of use for local communities for sustainable traditional, spiritual and cultural needs, and respect for customary ownership (MAFF 2006) (see Text Box 3). As such, local communities are seeking an active role in the designation and management of any such national park, including recognition of extant resource management capacities and practices (such as the *mechi* harvest) (Palmer & Carvalho 2008).

### **Box 3 - Management Principles for Nino Konis Santana National Park**

The Nino Konis Santana National Park will be planned, established and managed as an IUCN Category V Protected Area. Based on the outcomes of a planning workshop (MAFF 2006), the following principles were endorsed for the park:

- Declaration as a Category V Protected Landscape/Seascape recognises that “*landscape arises from the interaction of people with their environment over time*”;
- The National Park will maintain culture and traditions and protect and manage the natural environment;
- Category V National Park provides for continued sustainable traditional land and natural resource use;
- Category V National Park ensures that forests, sea, flora, fauna, cultural and historic places are protected for future generations;
- Sustainable nature-based businesses such as ecotourism will be encouraged.

To date, a working group for the National Park has been established at the National Directorate (MAFF) level which has: established and mapped the boundaries of the terrestrial park; identified the planning principles (see Text Box 3) and management priorities (20) for the park; conducted multiple stakeholder surveys and community consultation; and drafted a legal and regulatory framework for management and enforcement (Carvalho *et al.* 2007a). An Interim Committee including representatives from government as well as from villages within the designated area is yet to be set up. Next steps identified by MAF include establishment of the management structure, completion of the legal and regulatory framework and formal declaration and establishment of the National Park as an internationally recognized, Protected Area (such as inclusion in World Heritage listing).

Given the limited extent of the inshore coastal environments, land-sea connectivities and the land-based management infrastructure for Nino Konis Santana Marine Park – there is strong need for integrated planning and management of the terrestrial and marine components of the NKS protected area. Within the proposed, multiple-use management framework for the Nino Konis Santana National Park and Marine Park, there is significant scope and opportunity to coordinate

and integrate the terrestrial and marine (particularly coastal) planning of the park, and also, build-upon and further plan and develop sustainable coastal-marine ecotourism within the park – particularly in line with the proposed management principles for the park (see Text Box 3, MAFF 2006).

**MPA Planning Issue 5: Coordination of Marine and Terrestrial Planning for the Nino Konis Santana Protected Area** – The planning (and management) of the terrestrial and marine (particularly coastal) components of the Nino Konis Santana protected area should be coordinated and integrated, ideally through the establishment of a joint planning committee.

## 1.6 Project Aims & Objectives

While the scope of the original project was to develop a draft management plan for the Nino Konis Santana Marine Park, discussions with staff from MAF-NDFA (fisheries) and MAF-NDPA (protected areas) (on 5 November 2007), resulted in the scope of this project being significantly revised – to ensure integration/coordination with the management planning for the terrestrial component of the Nino Konis Santana National Park. As the management plan for the terrestrial component of the park is expected to be completed within 3 years (Cathy Molnar, Birdlife International, *pers.comm.*), it was agreed by MAF that the timelines for the planning of Marine Park needed to be revised to fit within the timeframe for the terrestrial park planning.

As such, it was recommended by MAF, that the primary objective of the revised project would comprise the preparation of a conservation assessment of the Nino Konis Santana Marine Park or Marine Protected Area (MPA) and guidelines for implementation. This would include potential technical, planning and management issues and steps for implementation. It was further agreed that MAF-Fisheries would lead the project and Marine Park planning (on behalf of GoTL) – but MAF-Protected Areas would be a key participant.

## 2 METHODS

In undertaking a conservation assessment and Marine Park proposal, the following key tasks were undertaken: (i) mapping, survey and assessment of key coastal-marine natural values; (ii) a field survey and inventory and assessment of coastal natural-cultural values; (iii) a MPA planning and implementation workshop – to identify steps for MPA planning, implementation and consultation activities, processes and priorities; and (iv) identification of potential Marine Park management goals, objectives, principles, key management issues and strategies, management zones, prescriptions and governance.

### 2.1 Mapping & Biological Survey of the Marine Park

The project undertook broadscale habitat mapping and biological surveys within the Marine Park, including surveys of mangroves/saltmarshes, corals, seagrass, fish, invertebrates and also, marine wildlife (ie. turtles, crocodiles, cetaceans, dugongs, sharks/rays):

- The coastal-marine habitat mapping (and fieldwork) component for this project was coordinated with the fieldwork for Project 1 (Coastal-Marine Habitat Mapping of Timor



Leste). Broad-scale mapping of the proposed Nino Konis Santana Marine Park was undertaken, with the field work conducted during 19-30 November 2007 (see Boggs *et al.* 2009). Field ground-truthing of Landsat TM imagery for the Marine Park was undertaken in 3 coastal regions (~10 km in length): Com, Tutuala and Lore. While analysis of ground-truthing data was undertaken in Darwin following the field trip (see Boggs *et al.* 2009). Detailed methods, including data analyses, is available from Boggs *et al.* (2009).

- Monthly aerial surveys for marine megafauna (see Project 3, ‘Marine Megafauna Surveys in Timor Leste: Identifying Opportunities for Potential Ecotourism’) were extended to include low-level surveys of the Marine Park – to identify potential turtle nesting sites and other marine megafauna (see Dethmers *et al.* 2009). Detailed methods and data analyses for the aerial surveys is available from Dethmers *et al.* (2009).
- Detailed coral, invertebrate and fish survey and monitoring within the Marine Park was undertaken between 20-28 November 2008 and included 150 dives over nine days undertaken by 5 divers, and covered ~80% of the coastline of the park. This collaborative biological survey, with staff from NDFA and NT Government, was led by consultants, Dr Tony Ayling and Dr Avril Ayling (‘Sea Research’). The primary aims of the survey were to:
  - Assess the status of benthic communities on fringing reefs in the Marine Park.
  - Identify coral reef fish species were present in the Marine Park and assess their density.
  - Assess the density of invertebrates such as holothurians in the Marine Park.
  - Identify any special features of the fringing reefs in the Marine Park or any areas deserving of special protection.

Detailed methods and data analyses for the survey are available from Ayling *et al.* (in prep.).

## 2.2 Natural-Cultural Survey & Inventory of the Marine Park

The fieldwork and mapping component for this project was coordinated with the fieldwork for Project 2 (‘Coastal & Marine Ecotourism Values, Issues & Opportunities on the North Coast of Timor Leste’) (see Edyvane *et al.* 2009).

A heritage field survey was undertaken of the north coast and hinterlands of Timor Leste (25-30 September 2008) by NRETAS (K Edyvane) and ANU (A McWilliam). Key coastal-marine ecotourism sites, values, infrastructure and issues along the north coast were identified. The following categories of cultural significance were identified, recorded and mapped including:

- sites of religious significance and ceremonies (eg. churches, shrines, grottos, graveyards)
- sites of traditional or indigenous significance (eg. ancestral alter posts, *mani me*, shrines, sacred sites or *luliks*, cave paintings, traditional graves)
- sites of customary harvest and indigenous festivals (eg. natural/man-made fish traps, customary harvest of *Meci* or sea worms, fish)
- sites of architectural significance (traditional houses, Portugese forts, Portugese colonial offices, manors, houses)
- sites of political significance and ‘resistance history’ (eg. Indonesian military posts, graffiti, Fretlin outposts or safe houses, sites of massacres)
- sites of natural significance (eg. geological features/landscapes).
- sites of scenic or aesthetic significance (eg. scenic drives, mountain vistas, coastal vistas).

The survey did not include the southern parts of the Nino Konis Santana National Park (or Marine Park). Detailed methods and data analyses for the survey are available from Edyvane *et al.* (2009).

### **2.3 MPA Planning, Implementation & Consultation**

A 2-day, Marine Park – National Park planning workshop was held in Dili on 7-8 April 2009, to identify key MPA planning, implementation and consultation activities, processes and priorities (see Appendix 3).

The workshop was attended by key MAF-Fisheries and MAF-Protected Areas staff, technical advisors (NT Government) and also, key NGO partners (The Nature Conservancy and Conservation International). This forum was essential in engaging with relevant government stakeholders and NGO partners in identifying key steps in planning and implementing the Marine Park – prior to the completion of a final report.

### **2.4 Potential Marine Park Goals, Principles & Key Management Issues & Strategies**

Based on the outputs from the activities above (2.1, 2.2, 2.3), and a review of relevant literature, a desktop study was undertaken to identify potential Marine Park management goals, objectives, principles, key management issues and strategies, management zones, prescriptions and governance for the Nino Konis Santana Marine Park.

## **3 KEY NATURAL, CULTURAL, SOCIAL & ECONOMIC VALUES**

Below is an overview of the key natural, cultural and heritage values identified within the Nino Konis Santana Marine Park.

### **3.1 Physical Setting**

The waters of the Nino Konis Santana (NKS) Marine Park, on the easternmost tip of Timor Leste, encompass over 55,600 ha and occur within a region of globally-significant tropical marine biodiversity. Topographically, the coastal sections of the NKS Marine Park include the coastline of the Lautem district and Jaco Island. The north coast of the park is rocky and steep along most of its shoreline. The continental shelf is narrow, with coastal plains virtually non-existent or very narrow, with numerous white sandy beaches with interspersed rocky outcrops scattered along the coast. The sheltered waters on the north coast, adjacent to the Banda Sea (or *Tasi Feto*) are calmer, deeper and clearer than on the south coast.

In contrast, the exposed waters of the south coast of the Marine Park, adjacent to the Timor Sea (or *Tasi Mane*) are rougher, shallower and more turbid – resulting in long stretches of sandy beach with heavy waves and surf (Sandlund *et al.* 2001). As opposed to the low profile, extensive coastal margin and plains of the southern coast, the northern nearshore littoral zone is steep and very narrow - with the sea floor on the north coast dropping off sharply into a 3 km deep marine

trench at approximately 20 km from shore (RDTL & CDU 2006; Keep *et al.* 2009). The dominant vegetation type along most of the coast is arid woodland (RDTL & CDU 2006).

The north coast is also characterised by karst geology and landscapes, uplifted ancient coral reefs (see Audley-Charles, 2004; Hamson, 2004; Keep, *et al.*, 2009). The extensive karst systems include caves, freshwater springs and sinkholes, including the permanent flow and dramatic sinkhole disappearance of the Irasequiro River. In addition to the extensive karst landscapes, several isolated geological limestone features were identified in the coastal heritage survey (see Edyvane *et al.* 2009, Plate 3). All these important geological values require mapping and further documentation and assessment (including indigenous or customary significance).

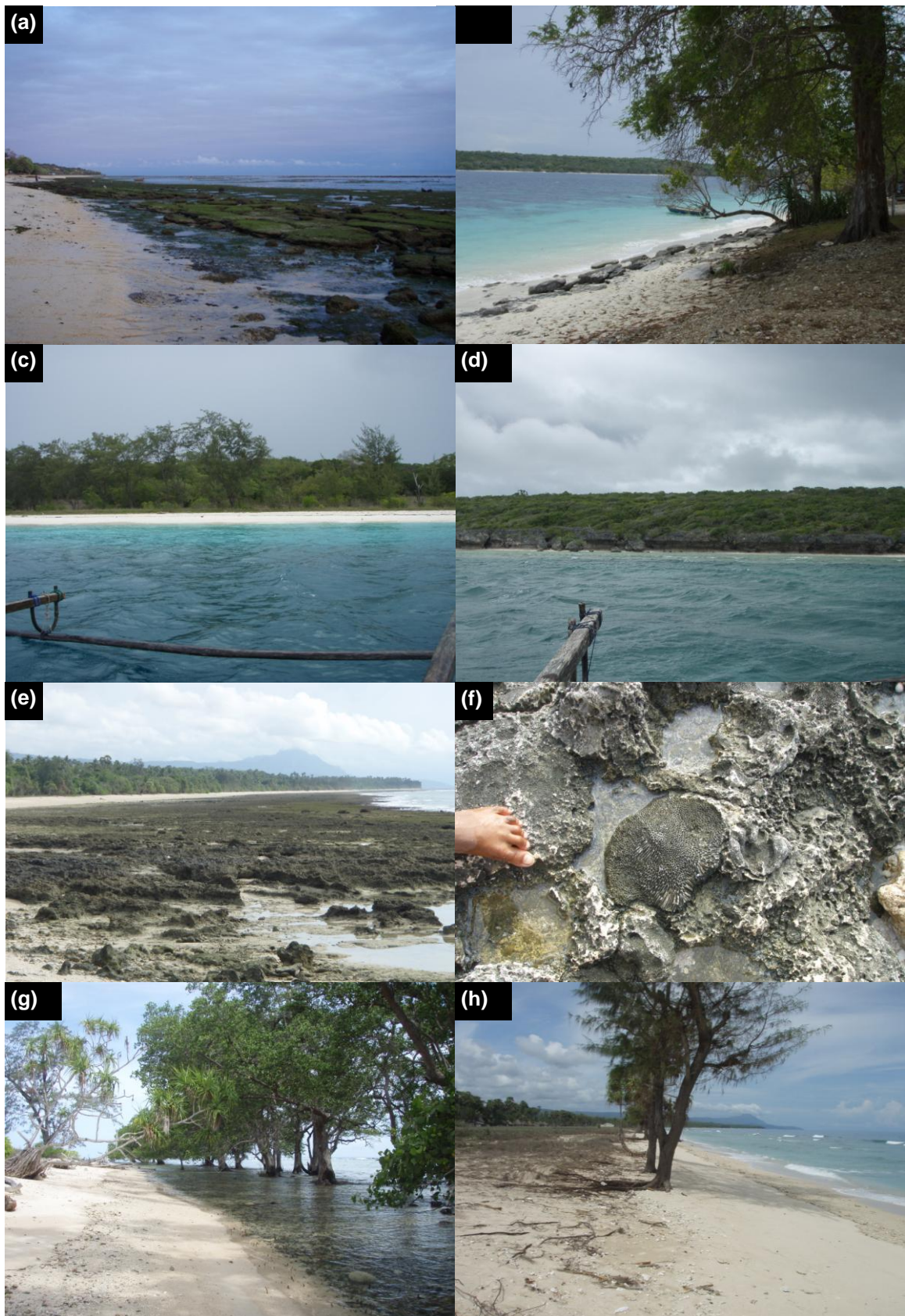
### 3.2 Coastal Marine Habitats

The coastal-marine habitats on the north coast of the Nino Konis Santana Marine Park (and Timor Leste) are limited – with most of the coastal estate being highly linear and narrow in extent (ie. approximately 3km in width with much of current mapping efforts confined to less than 1km in width) (Boggs *et al.* 2009). As such, coastal physiography (particularly the steep coastal gradient and the absence of significant coastal plains) has resulted in a northern coastline characterised by steep coastal cliffs and rocky headlands, interspersed with pocket beaches and narrow fringing reefs – with limited development of estuaries, mangrove forests, seagrass meadows and coral reefs (see Plate 1). In contrast, the low profile, extensive coastal margin and plains of the southern coast of the park, provide for greater development of nearshore coastal habitats (ie. estuaries, mangroves, seagrasses and coral reefs).

While the coastal and marine habitats of the north and east coast of Timor Leste have been mapped (and validated through field surveys) (Boggs *et al.* 2009), the mapping of Atauro Island, Oecussi and the entire south coast (including the Nino Konis Santana National Park and Marine Park) remain to be mapped.

The vast majority of the marine habitats within the Nino Konis Santana Marine Park (>90%) are deepwater habitats (>100m depth), due to the very steep offshore, coastal gradient in the region. As mapping conducted to-date within the Nino Konis Santana Marine Park has been limited to the shallow, nearshore environments of the north coast (and Jaco Island), only <2% of the area (ie. 990 ha) of the proposed Marine Park (59,308 ha) has been mapped (see Table 1) (see Boggs *et al.* 2009).

**MPA Management Issue 1: Coastal and Marine Habitat Mapping of the Nino Konis Santana Protected Area** – The coastal and inshore marine habitats of the park are subject to a high level of human use, activities and impacts. However, current habitat mapping efforts (ie. Boggs *et al.* 2009) have only mapped the northern sections of the Marine Park (and Jaco Island). As such, there is an urgent need to complete the broadscale, inshore coastal and marine habitat mapping of the Nino Konis Santana Protected Area, particularly the south coast of the park. This information is vital to inform the zoning of the Marine Park, and in the identification of management zones. Consideration should also be given to mapping the deeper water marine habitats of the Marine Park.



**Plate 1:** Coastal habitats of the Nino Konis Santana Marine Park; (a) fringing reef flat, Com; (b) beach, Valu Beach; (c) beach, north coast, Jaco Island-(d) low limeshore cliffs, south coast, Jaco Island; (e)-(f) limestone reef pavement and corals, Lore; (g) fringing mangroves, *Sonneratia alba*, Lore; (h) coastal *Casuarina* stand, Lore.

	Frequency	Area (ha)	% of MPA Area	% of mapped habitats
Area of NKS MPA (within 3nm boundary)	1	59,308.8		
<b>Habitat Types (omitting deep water with fringing shallow coral)</b>				
Bare Areas including Beaches, Salt Flats and River Channels	7	5.3	0.01	0.5
Coral Dominated Fore-Reef and Escarpment	23	469.8	0.79	47.4
Coral Dominated Reef Flat	42	69.4	0.12	7.0
Dense Seagrass Covered Reef Flat	58	102.6	0.17	10.4
Mangrove Coastal Forest	1	0.4	0.001	0.0
Mixed Coral, Seagrass and Open Reef Flat	68	144.6	0.24	14.6
Sparse Seagrass Covered Reef Flat	39	198.1	0.33	20.0
<b>Total</b>	<b>238</b>	<b>990.1</b>	<b>1.67</b>	<b>100.0</b>

**Table 1.** Coastal and marine habitats mapped to-date within the Nino Konis Santana Marine Park, based on broadscale, habitat mapping conducted during 2007 (adapted from Boggs *et al.* 2009).

The marine nearshore zone of the north coast of the park, is characterised by a narrow reef flat (often < 60m wide, but up to almost 1km), dominated by seagrass in shallower water and corals in deeper water and on the escarpment, with little lagoonal reef flat development (Boggs *et al.* 2009). Similarly, mangrove extent is also very limited in the park (particularly on the north coast), with most of Timor Leste's mangrove habitat occurring in an almost unbroken stretch approximately 12 km long in the Metinaro region (Boggs *et al.* 2009). Notwithstanding, detailed mangrove mapping (1:10,000) has identified a total of 20 mangrove communities with clear zonation patterns (Boggs *et al.* 2009). The coastal vegetation of the north coast is primarily dominated by savannas, ie. open woodland or shrubland, open forest or woodland and coastal forest.

### 3.2.1 Coral Reefs

Coral reefs are limited in extent in Timor Leste. Fringing reefs (reefs which closely follow the shoreline), form an almost continuous (and accessible) strip along the coast of Timor-Leste (Monk *et al.* 1997). The topography of fringing reefs along the north coast of Timor-Leste ranges from gentle slopes to sheer walls. Recent mapping on the north and east coast indicates that coral-dominated communities tend to dominate the fore reef and escarpment, particularly where the reef flat is narrow, with the most extensive nearshore coral habitats occurring in the Dili to Metinaro-Manututo region (ie. 40km coastline east of Dili) and in the Com-Jaco Island region (Boggs *et al.* 2009). While shallow, nearshore coral reef habitat in Timor Leste is limited (~2000ha), with little lagoonal reef flat development (~458ha) (Boggs *et al.* 2009), a further 1,266 ha of mixed coral-seagrass and open reef flat has been identified and also, 62,708ha of potential coral habitat has been identified in deeper waters (Boggs *et al.* 2009). The latter underscores the need for more detailed mapping of Timor Leste's deeper water coral habitats.

Coral reefs are a major feature of the inshore habitats within the Nino Konis Santana Marine Park, with fringing coral reefs forming an almost continuous coastal strip and representing over 50% of the inshore habitats (see Table 1). Within the park however, these shallow, nearshore coral reefs, are also, very limited in extent (approximately 683.8ha), comprising coral dominated reef flat (~69ha), coral dominated fore-reefs and escarpment (~469ha), and mixed coral-seagrass open reef



flat (~144ha) (see Table 1, Appendix 1, Plate 2). As such, the fringing reefs of the park are mostly very narrow with a limited width reef flat, no lagoon development and a reef slope that falls steeply into very deep water (Boggs *et al.* 2009, Ayling *et al.* in prep.). As a result the area of rich reef habitat is likewise limited in extent. In some places the reef is patchy with many areas of sand and rubble, further limiting the area of rich and diverse reef habitat. There is a critical lack of information on the deeper water habitats of the park.

A recent biological survey of the marine habitats of the Nino Konis Santana Marine Park (Ayling *et al.* in prep.), has identified the following key characteristics of the nearshore coral reefs habitats of the park:

- **Significant ‘North’ vs ‘South’ Reef Differences** – There are significant differences in the coral reefs benthos on the north and south coast of the Marine Park, with almost half of the benthic groups examined showing significant regional, ‘north-facing’ versus ‘south-facing’ differences in benthic cover. In general, coral reefs on the south coast have a higher cover of sponges, hydroids, algal groups (ie. *Halimeda*), ascidians and *Montipora* corals, while north coast sites have a higher cover of *Acropora* corals, poritid corals, *Heliopora*, *Millepora*, *Xenia* and *Briarium* and soft corals (see Plate 2). The coral reef benthic composition of Jaco Island (east coast) reefs are intermediate between these two regions, with some reefs resembling south coast reefs and others, north coast reefs.
- **Low Coral Cover** - Coral cover on the reef slope is low to moderate within the Marine Park (with a grand mean cover of only 18%). Hard coral cover was similar to that recorded on isolated and exposed oceanic reefs such as Ashmore, Cartier, Lihou and Middleton and was much lower than large more protected reef systems such as the Great Barrier Reef (Australia). On the other hand, soft corals and sponges on the reefs were similar in abundance to the highest recorded in the other Indo-West Pacific locations for which comparable data are available. Coral cover on south-facing sites appears to be limited by the wave action experienced through the SE trade wind season when large SE swells affect south-facing reefs of Timor Leste. Exposure to oceanic swell has been suggested as a coral cover limiting factor in previous studies (Choat *et al.* 2006, Ceccarelli *et al.* 2008, 2009). Coral cover was similar to that recorded in other Indo-West Pacific regions that are subject to regular disturbance but lower than that from more stable coral reef regions. On the north coast of the Marine Park grazing by *Acanthaster planci* sea stars has reduced coral cover at many of the sites and active outbreaks is affecting coral communities at several sites. It is well documented that grazing by this sea star can cause extensive damage to coral reefs (Moran *et al.* 1987, 1988).
- **Low Hard Coral Diversity** - Hard coral diversity is relatively low with only 124 species recorded. This is probably due to the low coral cover and the regularly disturbed reef communities, as well as the short observation period (40 hours) for the survey (see Table 2).

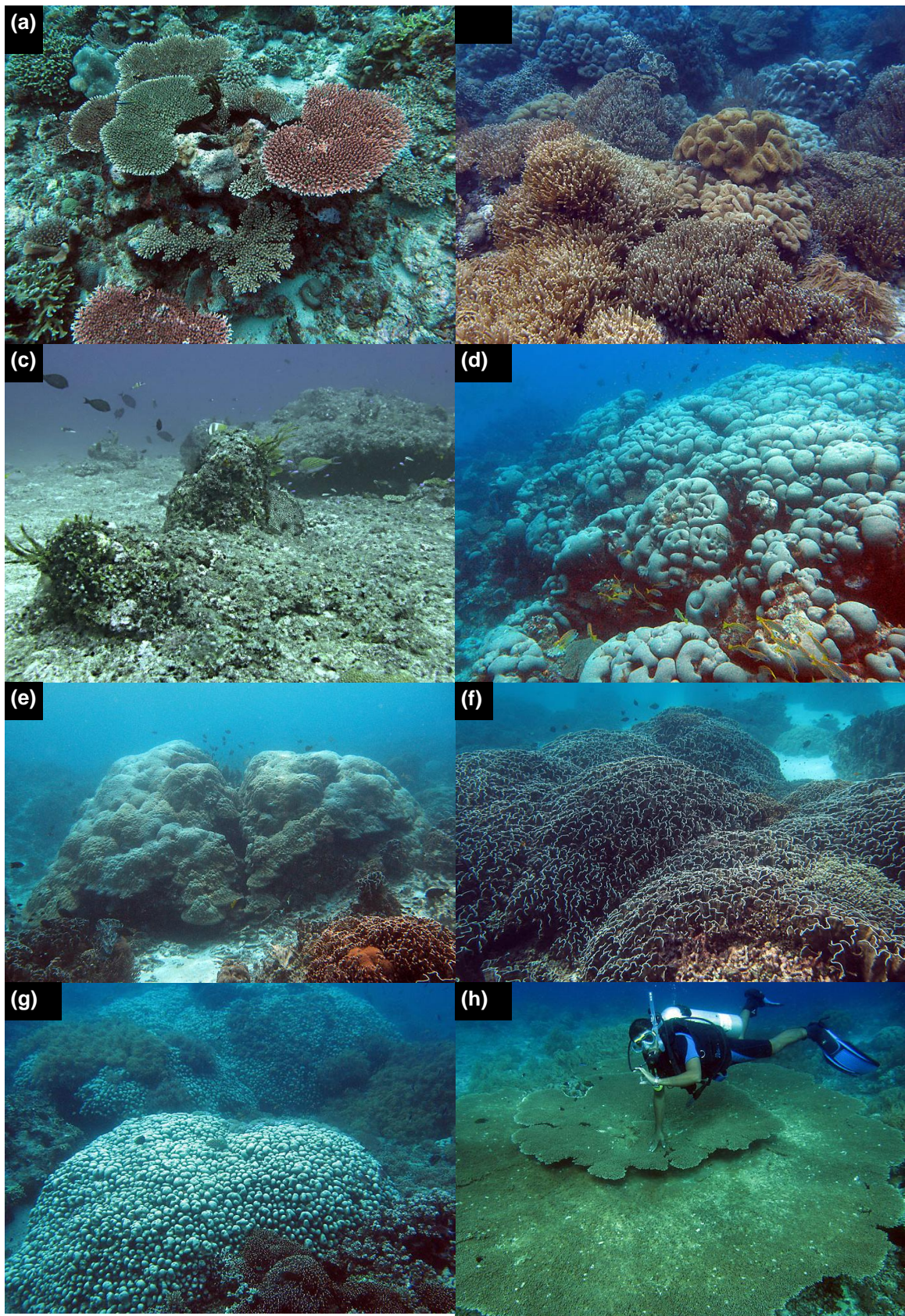
Location	Species Richness	Source
Milne Bay, PNG	442	Fenner 2003
New Caledonia	342	Pichon 2006
Northern Great Barrier Reef	324	Veron 1993
Marshall Islands	284	Richards and Wallace 2004
Rowley Shoals, WA	188	Veron 1986
Osprey Reef, Coral Sea	180	Fenner 2007
Ashmore Reef, WA	156	Kospartov <i>et al.</i> 2006
Coringa-Herald Reserve, Coral Sea	140	Ceccarelli <i>et al.</i> 2008

<b>Nino Konis Santana, East Timor</b>	<b>124</b>	<b>Ayling et al. in prep.</b>
Elizabeth Reef, SE Australia	114	Oxley et al. 2004
Lihou Reef, Coral Sea	106	Ceccarelli et al. 2009
Cartier Reef, WA	103	Kospartov et al. 2006
Cocos (Keeling) Islands, Indian Ocean	99	Woodroffe and Berry 1994
Christmas Island, Indian Ocean	92	Berry and Wells 2000

**Table 2.** Hard coral diversity in the Nino Konis Santana Marine Park compared with other localities in the Indo-West Pacific region (from Ayling *et al.* unpublished data).

- **Large, Long-lived Coral Colonies** - In spite of the disturbance occurring on reefs, a variety of unusually large, long-lived coral colonies occur within the park, with the largest measuring about 15 x 18 m. Non-scleractinian coral components of the benthic community are locally important on these reefs with extensive stands of the blue coral *Heliopora coerulea* and the fire coral *Millepora* recorded at four of the northern and eastern Jaco Island sites and on two of the north coast sites.
- **Dominance of Soft Corals** - Soft corals are unusually abundant on north-facing reefs where mean cover of this group was equal to that of hard corals and in some sites, soft corals covered more of the substratum than hard corals. This is not normally a common occurrence on coral reefs except at a very local scale (Fabricius & Alderslade 2001, A.M. Ayling unpublished data).
- **Dominance of Sponges** - Sponges are an important component of the benthic community in the park, especially on south-facing reefs where mean sponge cover was over 3%. On the deeper slope (<15 m) sponges were often the dominant component of the benthic community on these reefs with a variety of species forming colonies up to more than 5 m across. Although sponges may be locally abundant in protected lagoonal areas on coral reefs (Ayling & Ayling 1989) and are common (4% cover) on the reef slope of some Coral Sea reefs off Eastern Australia (Ceccarelli *et al.* 2009), they are not normally an important part of coral reef benthic communities.
- **High Site Variability, Unique Features** – Coral reef benthos within the park exhibits a high level of site variability and unique features. As such, there is very high site variability in species composition and abundance for almost all recorded benthic taxa. Hydroids are the only benthic group that does not exhibit significant site variability within the park. As a consequence of the high site variability, there are many unique features on coral reefs within the park (see Plate 2), including:
  - extensive colonies of *Pavona clavus* and *Coeloseria meyeri* at a site on the north coast that have not been recorded at any other sites within the park;
  - a single extremely large colony of *Gardineroseris planulata* on the south coast that was 15 x 18 m in size - the maximum size of colonies of this species is usually around a metre across;
  - the unusual dominance of blue coral at select sites on Jaco Island (although this species is also common at some sites on Jaco Island and on the north coast);
  - the unusually high cover of *Millepora* fire corals at a site on the north coast (5% of the substratum) (this species has low cover at many sites);
  - and the very high cover of sponges in the channel on the west coast of Jaco Island.





**Plate 2:** Coral reef habitats and features of the Nino Konis Santana Marine Park; (a) *Acropora* corals, south coast; (b) soft coral genera *Sinularia* and *Sarcophyton*, north-facing reefs; (c) bare substratum, common on exposed south-facing reefs, Jaco Island; (d) large colony (15 x 18 m) of the agariciid coral *Gardineroseris planulata*, south coast; (e) large *Porites* colonies, east coast of Jaco Island; (f) blue coral *Heliopora coerulea*, north-facing sites, Jaco Island; (g) large colonies of the agariciid coral *Pavona clavus*, north coast; and (h) large, intact *Acropora* colonies, north coast.



- **Coral Damage & Disease** - While shallow, nearshore coral reef habitat on the north coast of Timor Leste is limited, with little lagoonal reef flat development, there is little evidence of habitat damage (ie. dynamite blasting, coral bleaching) (Boggs *et al.* 2009). Within the waters of the Marine Park, there was little evidence of coral habitat damage. While patches of broken coral and blue coral colonies have been recorded on some of the northern and eastern Jaco Island reefs, the features of the impact scars (ie. elongated and following bottom gullies), suggest that the damage is probably the result of a high wave storm episode (Ayling *et al.* in prep.). No bleached corals were recorded in the park and only a very few diseased coral colonies were observed, with only a few *Montipora* colonies with black line disease recorded (on the south coast of Jaco Island).

Notwithstanding, a few broken colonies were observed at a site on the south coast and many dead standing colonies resulting from *Acanthaster planci* (Crown of Thorns starfish) grazing were present on some north coast reefs. *Drupella* grazing has also partially damaged a few coral colonies of south coast reefs (Ayling *et al.* in prep.). Coral loss caused by outbreaks of *A. planci* may represent a significant threat to coral reef biodiversity and there is a need to establish monitoring programs to quantify the abundance of sea stars and the damage caused. However, outbreaks remain a very poorly understood phenomena and the issue of whether or not outbreaks have an anthropogenic origin remains unresolved.

**MPA Planning Issue 6: Protection of Representative Habitats** – There are two major ecological regions within the Marine Park, with distinct reef communities occurring on north versus south-facing reefs, with differences in fish and benthic communities, as well as in the abundance of the common invertebrates (Ayling *et al.* in prep.). As such, one of the major determining factors of the reef communities in the park is exposure to the predominant SE seas. Planning of the Marine Park, particularly the identification of highly protected areas, will need to represent and protect both these major ecological regions within the park, if the full range of habitats and biodiversity within the park are to be protected.

**MPA Management Issue 2: Coral Monitoring and Management** – The mapping of deeper water habitats and monitoring and management of coral reefs within the Nino Konis Santana Marine Park is a high priority. Effective monitoring will not only identify potential issues such as coral bleaching, coral damage and disease, introduced pests and unsustainable harvesting, but will also importantly, provide a baseline to monitor the recovery of reefs. Current community-based, reef monitoring programs such as 'Reef Check' and 'Reef Watch' and 'Bleach Watch' have the potential to monitor reefs effectively and also, to involve NGO partners and donor organisations. As a matter of priority, the current 'Reef Check' program run by NDFA (with assistance from the NT Government) needs to be extended to the Nino Konis Santana Marine Park.

### 3.2.2 Seagrasses

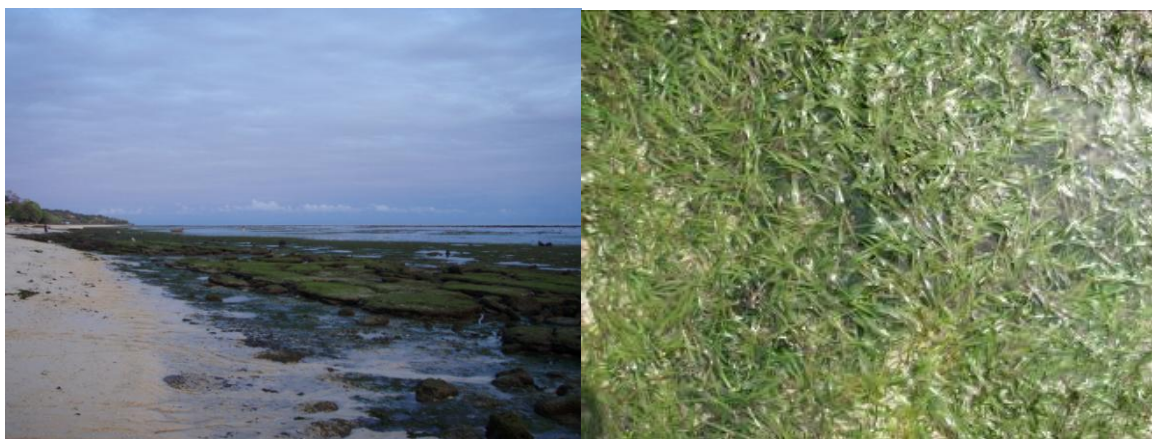
Due largely to the absence of estuarine environments and reef flats, nearshore seagrass meadows are very limited in extent in Timor Leste (Boggs *et al.* 2009). Along the north coast, nearshore seagrass beds comprise dense meadows (up to 100% cover) (occupying a total area of approximately 2,000ha), to mixed coral-seagrass and open reef flat areas with sparse or low seagrass cover (approximately 1,266 ha). Seagrass meadows tend to dominate the shallow waters of the reef flats adjacent to the shore, at an average depth of 1.0m and minimum of 0m, with more dense seagrass predominantly found in deeper water (> 1m) (Boggs *et al.* 2009).

Within the proposed Nino Konis Santana Marine Park, a total of 444ha of seagrass meadows have been recorded, comprising dense seagrass covered reef flat (~102ha), sparse seagrass covered reef flat (198ha) and mixed coral-seagrass, open reef flat (~144ha). Within the park, seagrasses are not present on the reef flats of the exposed, south coast reefs (Ayling *et al.* unpublished data). Similarly, seagrasses have not been recorded on the narrow reef flats of the more exposed sections of the north coast of the park.



**Figure 2.** Patches of the seagrass *Thalassia hemprichii* on the Jaco Island north reef flat (from Ayling *et al.* in prep.).

Within the park, areas of seagrass habitat include: sparse patches of *Thalassia hemprichii* meadow (5-8% seagrass cover) on the inner reef flat on the north and east coast of Jaco Island (Figure 2); dense but narrow seagrass meadow on the inner reef flat at the North Coast (east of Com) where there was a 30 m wide band dominated by *Halodule uninervis* with some *Thalassia* and *Syringodium isoetifolium*; and a wide dense seagrass meadow with all the above species as well as *Halophila ovalis* on the inner reef flat at Com on the western boundary of the Marine Park (Figure 3).



**Figure 3.** a): Exposed seagrass covered reef flat at Com; with b) high density seagrass cover (*Halodule uninervis*) (from Boggs *et al.* 2009).

**MPA Management Issue 3: Seagrass Monitoring and Management** – While seagrasses appear to be a minor component of the Nino Konis Santana Marine Park, it is still important to monitor their status and health. This includes the need to map potential deeper water seagrass beds within the Marine Park and also, to establish community-based, monitoring programs, such as the internationally-recognised, ‘*Seagrass Watch*’ program ([www.seagrasswatch.org/](http://www.seagrasswatch.org/)).

### 3.2.3 Mangroves, saltmarshes.

The north coast of Timor-Leste supports approximately 754ha of mangroves, with more than half of these occurring in an almost unbroken stretch approximately 12 km long in the Metinaro region (see Figure 16). Mangroves generally predominate on the north coast in inlets with calmer, protected waters, with the largest contiguous block of mangroves found in the Metinaro region (Boggs *et al.* 2009). In contrast, on the wave exposed south coast, mangroves are generally confined to the mouths of the streams, and marshy or swampy regions. Seven species of mangrove were identified and the field survey indicated a clearly defined pattern of zonation, typical in mangroves. Recent detailed coastal habitat mapping (based on aerial photography) identified approximately 20 communities based on structural and floristics characteristics (Boggs *et al.* 2009). The mangrove communities occupying the greatest area includes *Rhizophora* dominated closed forest (+/- *Sonneratia*), *Sonneratia alba* closed/open forest (+/- *Rhizophora*), *Sonneratia alba* closed forest and *Ceriops* dominated low closed forest (+/- *Avicennia/Lumnitzera*).

Within the Nino Konis Santana Marine Park, mangroves are very limited in extent (0.4 ha) – and are primarily confined to isolated stands of *Sonneratia alba* closed forest along the south coast, west of Lore [see Plate 1, (g)] and a small stand, west of Com (see Appendix 1).

**MPA Management Issue 4: Coastal and Marine Habitat Management** - The very limited extent of coral reef, seagrass (and mangrove) habitats within the Marine Park, impose strong limits on available marine resources and levels of harvest (particularly reef fisheries). With increasing pressure on coastal-marine habitats and their resources (for fuel, timber and food) in Timor Leste (Sandland *et al.* 2001) and their limited extent - these habitats are highly vulnerability to further loss and over-exploitation. This underscores the need for a precautionary, adaptive approach to MPA zoning and also, emphasises the need for urgent progress on developing alternative sustainable livelihoods and implementing coastal protection, regulations and rehabilitation measures.

## 3.3 Marine Biodiversity

Situated on the southern edge of the ‘Coral Triangle’ region, the maritime estate of Timor Leste occurs within a region of global significance for tropical marine biodiversity. The Coral Triangle covers an area of 5.7 million km<sup>2</sup> and is home to 75% of all known coral species, more than 3000 species of reef fish, six of seven turtle species, whale sharks, manta rays, and a diversity of marine mammals such as 22 species of dolphin, a variety of whale species, and the endangered dugong (WWF 2007).

The ocean current systems and nearshore, deepwater trenches and habitats that surround Timor Leste are increasingly being recognised as a global hotspot and migratory pathway for many species of marine megafauna including cetaceans, sharks and other fishes (Kahn 2005). Megafauna assemblages are highly diverse, with over a third of all known whale and dolphin species recorded in the region (Dethmers *et al.* 2009). Additionally, other types of marine megafauna such as whale sharks (*Rhincodon typus*) and manta rays (*Manta birostris*) are also known to inhabit the region. However, apart from some isolated marine research studies, primarily on the status of reef fish (Hodgson 1999, Deutsch 2003, Wong & Chou 2004, Dutra & Taboada 2006), the marine biodiversity of the waters of Timor Leste is relatively unknown.

The recent coastal and marine mapping and biological survey of the coastal waters and wildlife of Timor Leste (including the Nino Konis Santana Marine Park) (Boggs *et al.* 2009, Dethmers *et al.* 2009, Ayling *et al.* unpublished data), represent the first, broadscale, survey of the coastal and marine biodiversity of Timor Leste. The following is an overview of the marine biodiversity of the Nino Konis Santana Marine Park, based on the results of these surveys.

**MPA Management Issue 5: Research and Monitoring** – While the waters of Timor Leste are increasingly being recognised as a global hotspot and migratory pathway for many species of megafauna (Dethmers *et al.* 2009) - very little is known of the remaining marine biodiversity or importantly, physical and ecological processes and drivers of primary and secondary productivity, or the trophodynamics (and connectivities) of the coastal, inshore and offshore ecosystems. This information is vital for understanding and managing the key marine biodiversity values of the Marine Park. Jaco Island's unique geographical position (encompassing both southern and northern reef systems) could provide an ideal site for a research station for both, marine and terrestrial scientists (and also, a source of alternative income for local communities) (Lloyd *et al.* 2009).

### 3.3.1 Fish & Invertebrate Diversity

In a survey of inshore marine habitats of the Nino Konis Santana Marine Park, Ayling *et al.* (unpublished data) (see Appendix 2 and 3), identified the following major characteristics of the fish and invertebrate fauna of the Marine Park:

**High Fish Diversity** - The marine fish fauna of the Nino Konis Santana Marine Park is highly diverse. A total of 432 non-secretive fish species were recorded during the present survey. This estimate excludes small fishes such as gobies, blennies, trypterygiids and apogonids, or nocturnal species such as moray and snake eels. Using the Coral Fish Diversity Index (CFDI) (Werner & Allen 1998), an estimated total fish diversity for the Marine Park is 840 species. This latter estimate applies a correction factor to the combined diversity recorded for six diverse families of large, easily identifiable reef fishes: Acanthuridae (surgeonfishes), Chaetodontidae (butterflyfishes), Labridae (wrasses), Pomacanthidae (angelfishes), Pomacentridae (damselfishes) and Scaridae (parrotfishes). The total number of species in these six families is the CFDI, and the relationship of this Index to total diversity for restricted localities is:

$$\text{Reef fish diversity} = 3.39 \times \text{CFDI} - 20.6$$

The estimated reef fish diversity of 840 species is a very high local diversity compared to other regions in the Indo-West Pacific and is surpassed only by five more extensively surveyed areas in the heart of the Indonesian and Micronesian archipelagos where extensive survey work has been undertaken (Allen & Werner 2002) (see Appendix 3). Although the habitats covered during the survey were relatively limited and the diving time was only 40 hours, the diversity of the fish fauna recorded was very high. This estimate will undoubtedly increase as it normally takes a minimum of about 60 hrs of observation to reach a plateau in new species records (Kospartov *et al.* 2006). This confirms the high value of reefs within the Marine Park as representative examples of eastern Indonesian region fringing reef systems. The fish species present had strong links with the northern Australian and Central West Pacific region and very few links to the eastern Indian Ocean fish fauna (Kuitert & Debelius 2006).

**Low Densities of Sharks & Large Predatory Fishes** - The density of reef sharks within the Marine Park was very low compared to other localities within the Indo-West Pacific region for which comparable data are available. A total of only three reef sharks were seen during this survey all of them of the most southerly of the south coast locations. Mean densities for large target

predatory fishes were also generally low to very low within the Marine Park compared with other areas. It is probable that fishing pressure for large predators on these reefs over the past few decades has been beyond the sustainable level for these large, long-lived species.

Due to the narrow, limited extent of the fringing reefs in the Marine Park, the actual area of reef habitat (and associated resources) is very limited. As such, the area of shallow (<30 m deep) reef in the Marine Park is approximately 500 ha – an area equivalent to the reef area on only one of the 1200 or so large reefs on Australia's Great Barrier Reef (Ayling & Ayling 1988). Using mean densities from the counts, the estimated total number of reef sharks in the Marine Park is ~ 35, with approximately 200 coral trout (*Plectropomus laevis*), ~250 Maori wrasse (*Cheilinus undulatus*) and ~2200 emperors (*Lethrinus* spp.). As such, the sustainable catch from such limited populations is relatively low and any serious commercial exploitation of fish stocks would quickly reduce numbers (Ayling *et al.* in prep.).

**Density of Herbivorous Fishes** – Unlike larger predatory fish, the density of large herbivorous fishes such as parrotfishes, surgeonfishes and rabbitfishes and of large serranids (cods and groupers) was similar in the Marine Park to that recorded on oceanic reefs in the Timor Sea and in other Indo-West Pacific localities. Likewise, numbers of small prey species such as small labrids, pomacentrids and anthiines were also of a similar abundance in the park to other localities. As such, fishing pressure is the probable and most likely cause of reduced shark and large predator densities in the park.

The densities of colourful chaetodontids and pomacanthids on the Marine Park reefs are similar to those reported for other reef areas with low to moderate coral cover (Kospartov *et al.* 2006, Ceccarelli *et al.* 2009, Choat *et al.* 2006). An unusual feature of the reefs in Timor Leste is the high densities of several species of triggerfishes (balistidae). Combined density of balistids is almost 2000 per ha, several orders of magnitude higher than on reefs in northern and eastern Australia (Ceccarelli *et al.* 2009). Similar densities of balistids have only been recorded on reefs in the Seychelles in the western Indian Ocean (A.M. Ayling unpublished data).

**Distinct Reef Fish Assemblages** - When examined at the species level, 3 distinct regions based upon different reef fish species assemblages, can be identified within the Marine Park: north coast, south coast, and eastern Jaco Island. South-facing reef sites had higher densities of the small wrasses (*Thalassoma amblycephalum*, *T. janseni* and *Halichoeres nebulosus*), two triggerfishes (*Sufflamen bursa*, *Melychthis vidua*), several damselfishes (*Pomacentrus bankanensis* and *P. coelestis*), the omnivorous butterflyfish *Chaetodon kleinii*, the snapper *Lutjanus lunulatus*, the sweetlip *Plectorhynchus vitattus* and the surgeonfish *Acanthurus lineatus*. North-facing reefs were home to the parrotfishes *Scarus niger* and *Chlorurus microrhinos*, the surgeonfish *Zebrasoma scopas*, several damselfishes (*Neoglyphidodon xanthura*, *Pomacentrus brachialis*, *Chromis atripes* and *C. ternatensis*) two common butterflyfishes (*Chaetodon lunulatus* and *Forcipiger flavissimus*) and the basslet *Pseudanthias huchti*. Eastern Jaco Island sites were characterised by the acanthurids *Naso vlamingi* and *Acanthurus nigricans*, the snappers *Lutjanus fulvus* and *L. monostigma*, the parrotfishes *Scarus frenatus* and *S. spinus*, the triggerfish *Melichthys niger*, the large pelagic trevally *Caranx melampygus*, the small herbivorous damsel *Plectroglyphidodon lacrymatus* and the small wrasse *Pseudocheilinus hexataenia*.

**Low Density of Commercially Important Invertebrate Species** - Holothurians or beche-de-mer are not common within the Marine Park, with 5 species recorded at a total density of only 25 per ha. The high value species *Holothuria nobilis* and *H. fuscogilva* were particularly uncommon. Similarly, the commercially important species, *Trochus niloticus*, was rare, with only four individuals recorded in the survey. Likewise, rock lobsters in the genus *Panulirus* are also rare on reefs within the park, with a total of three individuals recorded (mean density of only 1 per ha). Table 3

outlines the benthic invertebrate diversity recorded within the survey of the Marine Park. Because of the short duration of this survey (40 hours diving at 36 sites), numbers of species from each group well may increase with a more detailed survey.

Group	No. species
Porifera (sponges)	42
Hydroida (hydroids)	16
Octocorallia (soft corals)	28
Hexacorallia (anemones etc)	9
Scleractinians (stony corals)	124
Antipatharians (black corals)	4
Ceriantharia (tube anemones)	3
Platyhelminthia (flatworms)	2
Nudibranchia (sea slugs)	7
Bivalvia (bivalves)	7
Asteroidea (sea stars)	12
Crinoidea (featherstars)	7
Echinoidea (sea urchins)	4
Holothuridea (sea cucumbers)	15
Ascidacea (sea squirts)	10

**Table 3.** Invertebrate diversity in the Nino Konis Santana Marine Park (from Ayling *et al.* in prep.). Figures are number of species seen during approximately 40 hrs of diving.

**Giant Clams** - Four species of giant clam in the genus *Tridacna* were recorded in the Marine Park, including *T. gigas*, *T. maxima*, *T. squamosa* and *T. crocea*. Densities of these clams in the Marine Park will be reported on separately by Shane Penny (Northern Territory Government).

**MPA Management Issue 6: Limited Reef Habitat & Low Fish & Invertebrate Densities** – The limited inshore coral reef habitat within the Marine Park, and relative absence of large, mobile and predatory fish species and commercially important invertebrates (despite the low level of commercial fishing activity), suggests that current levels of artisanal subsistence fishing within the park are already affecting some premium target fish species. Careful management of the fisheries resources within the Marine Park, including the establishment of highly protected management zones (ie. fish propagation areas), will be necessary to improve the numbers of large predatory fishes that are important for reef health (Myers *et al.* 2007, Griffin *et al.* 2008). As there are 3 distinct reef fish assemblages within the Marine Park, it is important that these be represented and protected within the zoning plan for the Marine Park. Protection of these fisheries resources also has the potential to benefit adjacent areas outside the park, through ‘spill-over’ effects (Murray *et al.* 1999, Ward *et al.* 2001, Halpern 2003, Gell & Roberts 2003).

### 3.3.2 *Dolphins, Dugongs, Whales*

The Savu Sea to the northwest is one of the world’s largest whale nurseries for six whale species including humpback whales, pilot whales and the highly endangered blue whales (Bock 2006). Whales frequently pass through the deep ocean trenches in the Savu and Alor Seas and come up to the reefs to feed. In contrast to some of the neighbouring islands of the Alor archipelago, Timor-Leste has no history of whaling, and whales therefore are confident to come close to the shore (Bock 2006).

The nearshore coastal waters of Timor Leste are characterized by an exceptional diversity and abundance of cetaceans (Dethmers *et al.* 2009). This is in part due to the nearshore, deepwater trenches and habitats and also, the steeply sloping coastal profile, that provide ideal cetacean habitat (deepwater habitats and coastal upwellings), close to the coast. This cetacean diversity and abundance also, provides a significant opportunity for development of ecotourism (e.g. whale and dolphin watching), particularly along the north coast of Timor Leste, and within the Nino Konis Santana Marine Park.

Recent aerial surveys of marine megafauna conducted in the nearshore waters of Timor Leste have identified a total of 13 different cetacean species, including the blue whale, sperm whale, Bryde's or Sei whale, short-finned pilot whale (*Globicephala macrorhynchus*), false killer whale (*Pseudorca crassidens*), pygmy killer whale (*Feresa attenuata*), melon-headed whale (*Peponocephala electra*), Curvier's beaked whale (*Ziphius cavirostris*), Risso's dolphin (*Grampus griseus*), Fraser's dolphin (*Lagenodelphis bosei*), spotted dolphin (*Stenella attenuata*), rough-toothed dolphin (*Steno bredanensis*), and the spinner dolphin (*Stenella longirostris*) (Dethmers *et al.* 2009) (see Table 4).

Common name	Scientific name	Indonesian name	IUCN status
Blue Whale	<i>Balaenoptera musculus</i>	Paus biru	EN
Sperm Whale	<i>Physeter macrocephalus</i>	Paus sperma	VU
Sei Whale	<i>Balaenoptera borealis</i>	Paus sei	EN
or Bryde's Whale	<i>Balaenoptera brydei</i>	Paus Bryde	DD
Short-finned Pilot Whale	<i>Globicephala macrorhynchus</i>	Paus sirip pendek	DD
False Killer Whale	<i>Pseudorca crassidens</i>	Paus pembunuh palsu	DD
Pygmy Killer Whale	<i>Feresa attenuata</i>	Paus pembunuh kerdil	DD
Melon-headed Whale	<i>Peponocephala electra</i>	Paus kepala semangka	LC
Cuvier's Beaked Whale	<i>Ziphius cavirostris</i>	Paus paruh Cuvier	LC
Rough-toothed Dolphin	<i>Steno bredanensis</i>	Lumba-lumba gigi kasar	LC
Rissos's Dolphin	<i>Grampus griseus</i>	Lumba-lumba abu-abu	LC
Spotted Dolphin	<i>Stenella attenuata</i>	Lumba-lumba totol	LC
Spinner Dolphin	<i>Stenella longirostris</i>	Lumba-lumba paruh panjang	DD
Fraser's Dolphin	<i>Lagenodelphis bosei</i>	Lumba-lumba Fraser	LC

**Table 4:** Cetacean species sighted during the boat survey and their IUCN status (EN = Endangered, VU = Vulnerable, DD = Data deficient, LC = Least Concern) (from Dethmers *et al.* 2009).

Due to the migratory and seasonal nature of cetaceans, it is difficult to identify their specific distribution and abundance within the Marine Park. As such, further surveys are required to identify potential localised or seasonal abundances, aggregations and migratory routes. However, sightings of marine megafauna, ranging from single individuals to large pods of up to several hundred animals, have been recorded along both, the north and south coast of Timor Leste, and within the waters of the Marine Park (see Figure 7, Dethmers *et al.* 2009) (Appendix 1).

While megafauna are recorded throughout the year, recent monthly aerial surveys recorded a peak in the diversity and abundance of cetaceans during November, when very large pods (several hundreds of animals) were recorded, with highest diversity occurring in north-western coastal waters, west of Baucau (Dethmers *et al.* 2009). The majority of the large whales (primarily Blue Whales) and whale shark sightings were made in the north-west, near Dili, while most of the large pods of dolphins and small marine mammals were observed along the north coast. In contrast,

recorded dugong (*Dugong dugong*) sightings in Timor Leste were relatively rare, with observations only in June (n = 1) and in November (n = 5) (Dethmers *et al.* 2009).

**MPA Management Issue 7: Cetacean Monitoring and Management** – The nearshore but deepwater habitats of the Marine Park are characterised by exceptional diversity of cetaceans (Dethmers *et al.* 2009). Further research and surveys are required however to identify potential localised or seasonal abundances, aggregations and migratory routes of cetaceans within the Marine Park region – and also, understanding key processes underpinning this diversity, including localised upwellings and productivity hotspots. As a matter of priority, the existing NDFA program of aerial (and boat-based) surveys for cetaceans and marine wildlife (Dethmers *et al.* 2009) should be continued – and form the integral component of the ongoing monitoring for cetaceans within the park.

### 3.3.3 Turtles

There are 5 recorded species of marine turtles in Timor Leste: *Eretmochelys imbricata* (Hawksbill turtle), *Dermochelys coriacea* (Leatherback turtle), *Chelonia mydas* (Green turtle), *Caretta caretta* (Loggerhead turtle), *Lepidochelys olivacea* (Olive Ridley turtle) (Sandland *et al.* 2001). The Hawksbill and Leatherback turtle are ‘critically endangered’, while the Green, Loggerhead and Olive Ridley turtle are ‘endangered’ (IUCN Red List).

While overall turtle numbers in Timor Leste are considered low, the Nino Konis Santana Marine Park appears to be a major site for both, turtle nesting and also, foraging. In a recent survey of marine megafauna in Timor Leste (Dethmers *et al.* 2009), turtle nesting sites have been recorded along the north coast of Timor Leste. Aerial surveys (conducted at an altitude of 1000m) indicate increased abundance of large turtles in nearshore waters during November, with the greatest density occurring around the far north-eastern tip of Timor Leste, in the Nino Konis Santana Marine Park region (offshore from the Lautem district and southeast of Jaco Island) (Dethmers *et al.* 2009) (see Appendix 1). While large numbers of turtles were observed foraging in the shallow coastal waters, surprisingly few tracks were sighted on the adjacent beaches during the two additional beach surveys (conducted at an altitude of 500m), which were specifically aimed at identifying key nesting areas and periods for turtles and crocodiles (Dethmers *et al.* 2009) (Appendix 1).

**MPA Management Issue 8: Turtle Monitoring and Management** - Baseline information on the status of nesting turtle populations within the Marine Park is essential for the ongoing management of turtle populations. Existing aerial and beach surveys of turtle populations within the park (Dethmers *et al.* 2009) should be continued – but developed into a formal community-based monitoring, education and extension program, to monitor and promote turtle conservation. Linkages and experiences of community-based, turtle monitoring (and education/extension) programs in Indonesia (WWF) and northern Australia (NT Government) should be promoted through technical exchanges.

Illegal harvesting of turtles remains a major issue in the Nino Konis Santana National Park and Marine Park (and Timor Leste). Community-based, turtle tourism in Timor Leste, particularly the establishment of community-based, monitoring programs and turtle hatcheries, have great potential to create alternative livelihoods and shift local villages from illegally harvesting turtles to generating income from turtle ecotourism. Within the park, the coastal villages of Tutuala, Com and Lore, have significant potential to develop community-based, turtle ecotourism.



### 3.3.4 Whale Sharks, Sharks, Rays, Sailfish, Tuna

The abundance of recorded cetacean sightings in Timor Leste contrasts with the limited number of recorded sightings of whale sharks and other large elasmobranchs (Dethmers *et al.* 2009). According to Bajo and other fisherman from Roti and Kera Islands, whale sharks occur regularly in the Timor Passage south of Roti Island and also offshore from Suai (south-western Timor Leste), as well as in the coastal waters near Kupang, West Timor and in the Savu Sea between Timor and Flores Islands (Stacey *et al.* 2008). However, in recent monthly aerial surveys for marine megafauna in the nearshore waters of Timor Leste, a total of three whale sharks (*Rhincodon typus*) were observed over three separate surveys (May, June and November) and all were small (<5 m), non-adult individuals (Dethmers *et al.* 2009). This suggests that this species is unlikely to form the basis of an ecotourism industry in the Nino Konis Santana Marine Park or Timor Leste.

Rays have been recorded in Timor Leste nearshore waters, from July – November, with peak abundance occurring in November (Dethmers *et al.* 2009). Several groups of five or more individuals were photographed during this month and identified as manta rays (*Manta birostris*). Anecdotal reports have also recorded resident grazing mantas and eagle rays at Dollar Beach, while whale sharks, orcas and mantas have been reported from the roadside site of Whale Shark Point (also known as Lone Tree) during the months of August-November. Several charter fishing operations also target large, deeper water, pelagic fish species, such as sailfish and tuna. These charter operations are largely confined to the calmer waters of the north coast of Timor Leste, particularly the Com-Tutuala-Jaco region (and also, Atauro Island). There is a critical need for further information on the status of deeper water pelagic fish stocks within the Marine Park, if charter fishing and recreational fishing opportunities are to be developed within the park (see Sections 4.3 and 4.4).

#### **MPA Management Issue 9: Monitoring and Management of Sharks, Rays & Large Pelagics -**

There is a critical need for further information on the status of large, deeper water pelagic fish stocks within the Marine Park, if charter fishing and recreational fishing opportunities are to be developed within the park. Significantly, the development of game fishing operations provide opportunities for both, local income generation to communities within the Marine Park, and also, a source of data on fish stocks through the capture-tag-release of game fish species (see Sections 4.3 and 4.4).

### 3.3.5 Crocodiles

The most popular ancestor figure in Timorese culture is the crocodile, which is believed to be the ‘greatgrandfather’, ‘king of the ancestors’, ‘king of the waters’ and ‘king of the mountains’ (Barrkman 2009). In Timor Leste, the estuarine saltwater crocodile (*Crocodylus porosus*) inhabits coastal rivers and swamps, as well as the open sea and island shorelines, and is primarily found along the south coast. Recent aerial surveys have recorded animals along the south coast in November (5 tracks, 1 animal) and also, the north coast (in June) (1 track, 2 animals), but none of these sightings were within the Marine Park (Dethmers *et al.* 2009). At least one large crocodile has been sited in the muddy Malaelada river to the west of Lautem township (Andrew McWilliam, *pers.comm.*).

Estuarine crocodile numbers, however, are thought to be increasing in number in Timor Leste, particularly in suitable habitats along the north coast (ie. Vermasse and Lautem coast) (UNMIT-JMAC 2008), including the waters of the Nino Konis Santana Marine Park. In recent years (2007-

2008), crocodile attacks have also been reported in a number of locations, including the Lautem coast, and have prompted the government to post warning signs on some shorefront areas in Com and also, warnings to international workers (UNMIT-JMAC 2008, Edyvane *et al.* 2009). Over this same time period, there have also been 3 attacks and 2 fatalities, including two attacks and two deaths at Com beach (April 2007, 4 June 2008) (UNMIT-JMAC 2008). Importantly, there remains very limited knowledge of the status and distribution of estuarine saltwater crocodiles within the Marine Park (and in Timor Leste). This information is urgently required for ongoing assessment, monitoring and management (particularly for public safety) of crocodiles within the park.

As the key animal totem for Timor, the crocodile has great potential to be a unique cultural icon for ecotourism. Crocodile tourism, in Timor Leste, particularly crocodile farming, also has great potential to both address critical issues of public safety (through the re-location of dangerous or problem crocodiles), and, also to generate local incomes for villages and communities. As such, there are considerable opportunities to learn and exchange technical expertise and experience with the crocodile farming industry in the Northern Territory and also, the Northern Territory Government Parks and Wildlife Service in crocodile management, survey, monitoring, removal and re-location and also, in crocodile farming.

**MPA Management Issue 10: Crocodile Monitoring and Management** - A comprehensive survey and assessment of crocodile abundance in the Nino Konis Santana Marine Park (and Timor Leste) is an urgent priority, in order to identify potential crocodile problem areas (and public safety issues) and also, to provide essential baseline information for the development of a crocodile management plan. Given the existing and potential for ecotourism development at Com, crocodile monitoring and management is a major and high priority issue for public safety and coastal ecotourism management within the park. There are considerable opportunities to learn and exchange technical expertise and experience with the crocodile management and farming in the Northern Territory, and to develop a regional cooperative partnership program.

## 4 KEY CULTURAL, SOCIAL & ECONOMIC VALUES

### 4.1 Indigenous Values

Coastal communities within Timor Leste, maintain strong cultural connections, traditional practices and management aspirations for coastal and marine environments, primarily through a system of customary law and ownership (McWilliam 2002, 2007, Palmer & Carvalho 2008, Haburas Foundations 2007). These complex customary systems and traditions are often referred to in Tetum as *fiar-malu* (trusting/believing/having faith in one another) (Palmer & Carvalho 2008). *Tara bandu* is a form of customary law which regulates the use of natural resources, within an area collectively owned by a community, through imposing ritual prohibition under threat of spiritual sanctions (McWilliam 2002, Haburas Foundation 2007, Palmer & Carvalho 2008). Even though many of these traditional cultural practices have been weakened by a long history of colonization and occupation (McWilliam 2002; Haburas Foundation 2007b), the national NGO Haburas Foundation and local NGO's, such as Roman Luan, have recently been working closely with coastal communities in Timor Leste to revive local knowledge and traditional customs and laws to protect natural resources (Palmer & Carvalho 2008, Haburas Foundation 2007b, Weaver 2008).

Significantly, within the Nino Konis Santana National Park, communities in the Lautem District (Com-Tutuala-Lore region) maintain strong traditional culture (Fataluku), lifestyle and practices, probably more vigorously maintained in the area than in other parts of Timor Leste (MAFF 2006, McWilliam 2007, Palmer & Carvalho 2008). As such, local lifestyles, including social and economic activities, are imbued with ongoing cultural significance. Distinct locations along the coast are identified as the ancestral homes of the *ratu* or noble families of the area, and a number of locations, particularly along the Paitxau Range and the south eastern coast, were formerly occupied by families relocated to current villages *sucos* during Indonesian times (MAFF 2006, McWilliam 2007). Sacred places, such as *lulik* forests and Ili Kerekere, are of major importance to the ceremonial life of communities, and continued access to (and protection of) these sites within the park is a priority. There is high priority need to fully document and assess the rich cultural and Indigenous Fataluku heritage (and extant customary practices) of the National Park and also, adjacent Marine Park.

Within the coastal section of the Nino Konis Santana National Park, the following Fataluku cultural values, customary marine management practices and culturally significant sites, have been identified to-date by McWilliam (2002, 2007), Carvalho *et al.* (2007), Palmer and Carvalho (2008) and Edyvane *et al.* (2009):

- **Mythic Landscapes** - For coastal and rural communities of long standing, histories of settlement and occupation are mapped onto the surrounding landscape and recorded in community narratives and mythic histories of ancestral events and practice. Topographic features across the landscape and the fringing coastal waters and reefs are often accorded cultural significance and meaning among resident clans or house communities. Within the Nino Konis Santana National Park (and Lautem District), there is a strong narrative tradition that relates the origins of settled communities to the exploits of sea-faring ancestors who settled the coast of far eastern Timor and left traces of their presence in topographic forms across the landscape (Pannell 2004). Prominent limestone outcrops for example, are said to be the fossilised stone boats (*loiasu mataru*) of ancestors who beached themselves on Timor and sought refuge in fortified settlements on prominent hilltops. The proliferation of local placenames mark sites of ancestral events and the settlement trajectories of the clan over time and space. The memory of their histories is both a record of the past and a basis for many of the customary claims that local communities assert over land and local resources (see McWilliam 2007).
- **Spiritually Significant Sites** - Along the coastal zone are found numerous places and built structures that form part of the narrative landscapes of myth, and which are considered spiritually charged (*lulik*) and for that reason, accorded respect and cautious regard. The coastal zone is an area, local communities know intimately, constituted by the named *ratu* estates and '*valu ia mari*' (F: 'ancestor footfall/footprint') sites (McWilliam, 2006), located at different points along the coast, creating inseparable connections between themselves, the environment and preceding generations of *rai/tasinain* (land/sea owners). These sites can only be visited in the company of appropriate *ratu* members. All local settlements have a range of sites that fall within this category and often represent places of sacrificial invocation and blessing (see Plate 7, Edyvane *et al.* 2009). Places or objects regarded as *lulik* are treated with caution and respect by local communities because of their potential for causing illness or misfortune to those who transgress the customary proscriptions attached to these sites (Pannell & O'Connor 2004). Within the coastal sections of the National Park, a range of sites of spiritual significance have been documented to-date (see Edyvane *et al.* 2009, Plate 7) (Appendix 1). Examples of these places include:
  - Massive dry stone graves which represent pre-Christian burials.

- Altar posts and other sites of sacrificial veneration.
  - Certain springs or water sources may be accorded sacred (*lulik*) status
  - Some caves, stones, trees and other topographic features that have mythic or ancestral association. The large fig trees in some settlements, which hold the drying remnants of newborn babies umbilical and afterbirth are cases in point.
- **Protected & Restricted Sites** - Under *tara bandu*, protection and restrictions apply to sacred places where no fishing, swimming, diving or going ashore is allowed under customary law, without permission from traditional custodians. Below are some of protected and restricted areas identified to-date (Sandlund *et al.* 2001, Carvalho *et al.* 2007, Palmer & Carvalho 2008), that fall within the National Park and Marine Park:
    - **Jaco Island** (*Totina* in Fataluku) – The small low-lying island of Jaco has no permanent human population and is sacred to the mainland coastal inhabitants in the Tutuala area. The site is significant for a number of reasons, perhaps most importantly it is the place where the *tasi mane* (the aggressive male south coast sea) and *tasi feto* (the calm female north coast sea) come together as one, mixing together the essences of what is otherwise one of Timor’s most culturally and ecologically salient dualisms (Palmer & Carvalho 2008). Under *tara bandu*, no fishing, swimming, diving or going ashore is allowed under customary law (Sandlund *et al.* 2001, Carvalho *et al.* 2007). However, these prohibitions are frequently violated by domestic as well as international tourists that either disrespect, or are not aware of those restrictions, and by local fishermen that offer transport to the island in pursuit of economic profit. As such, if not managed appropriately, tourism development can have significant impacts and contribute towards erosion of cultural values (Sandlund *et al.* 2001). The island has a permanent population of rusa deer (*bibi rusa*), which is managed by MAFF under the beginnings of a wildlife protection program. Due to the absence of a fresh water supply on the island, the deer have long become accustomed to drinking salt or saline water (Palmer & Carvalho 2008).
    - **Jon Beach** (*Jon Sere*) – people from Chailoro or Chailoro Ratu clan use the flat rock on the beach (known as ‘tal’) for a ritual ‘fish calling’ ceremony by traditional priests or shamans. The ceremony is performed when the seas are not suitable or safe for fishing and all fish caught this way must be only for local consumption and not for sale. At all other times, people who want to go fishing in the sea off Jon Beach, must first ask permission from Chailoro Ratu clan fishermen or suffer the spiritual consequences.
    - **Veru Beach** (*Veru Sere*) – located 14km from Tutuala, accessible on foot (3 hours), beach is close to Jaco Island and Macha beach, used for traditional sacred ceremonies.
    - **Hilapuna Beach** (*Hilapuna Sere*) – located 4km from Tutuala, accessible on foot (3 hours), beautiful white sand beach and the place where the local Jenlai Ratu carry out the ceremonial rites of their ancestors and where they have a totem pole.
  - **Ceremonial Activities** - One of the striking and seasonal features of coastal Timor Leste is the occurrence of various ceremonial harvesting of the bounty of the land and sea, with traditional rituals and prayers for good harvest and safe return from the sea still practiced by a majority of communities (McWilliam 2002, Carvalho *et al.* 2007). Importantly, these ritual harvests and associated ceremonies are also important in affirming relationships and bonds between people, the environment and each other. Under *tara bandu*, estuaries and lagoons can be closed seasonally for fishing and only re-opened after a ceremony (Sandlund *et al.* 2001; McWilliam 2002). Very often these ritual harvests are based on naturally occurring events and are accompanied by ritual sacrifices at designated sites, authorized by traditional authorities. There are many examples of these ritual marine and estuarine harvests documented along the

north coast of Timor Leste (McWilliam 2002, see Plate 8, Edyvane *et al.* 2009). Within the Marine Park, the following customary marine harvests have been documented to-date:

- **Mechi Harvest** - the major cultural harvest event in the Marine Park is the annual *mechi*, (or *mechi boot* in the local language of Fataluku), so-called, seaworm (*Eunice virides*) ceremony. The seaworms are gathered twice a year in the last quarters of the moon in February (a smaller harvest known as *mechi kiik*) and also, in March at the time of the new moon (a mass harvest known as *mechi boot*). The harvested seaworms are combined raw with chili and lime to make a marinated salad delicacy. The *mechi boot* harvest takes place each year in the pristine coastal shallows of mainland Valu Beach and the adjacent island of Jaco, where local communities gather at the coast, to conduct ritual invocations and songs to mark the beginning of a new agricultural calendar (McWilliam 2002). As the *mechi* worm is photosensitive the harvest takes place at night, with fire sticks used to scan the shallows and attract the *mechi* that spawn in great numbers in the shallows (Palmer & Carvalho 2008). Significantly, the actual practice of ritual public harvesting, feasting, singing and dancing and associated ceremonies is not only an exciting celebration of the harvest (and culinary occasion), but is also important in strengthening, renewing and creating bonds and alliances between those present (Palmer & Carvalho 2008). This includes renewing and maintaining bonds between the participating *ratu* and the local sea and spiritscapes and also, is an important public statement about the effective unity of two spheres of authority – the ritual and the political. While the ritual leaders lead the ceremony and renew their various *ratu* connections to the land/sea and ancestors, the role of the *liurai/chefe de suco* is to forge, build and renew political alliances with all of those present (Palmer & Carvalho 2008).
- **Sardine Harvest** - the spawning of small sardine-like fish in Com each August during an event known in Fataluku as *Api moko lere* (McWilliam, pers.comm. 2006).

**MPA Management Issue 11: Indigenous Cultural Values, Rights and Aspirations** – Within the Nino Konis Santana National Park and Marine Park, planning needs to recognise the strong cultural coastal connections, interests, significance and management aspirations of the indigenous, Fataluku. Within the coastal zone, this includes, sites of spiritual significance and also, customary laws, practices and harvest ceremonies. To this end, there is a high priority need for a full documentation, mapping and assessment of the indigenous cultural values and sites within the Marine Park. This should be done in close consultation with (and approval by) local communities and, in partnership with the Haburas Foundation, which has been working closely with the Fataluku within the park to document and revive local knowledge, traditional customs and '*tara bandu*' laws.

## 4.2 Socio-Economic Setting

Timor-Leste is considered among the 20 poorest countries in the world (Government RD/TL 2005) and faces major human development challenges – with some of the highest levels of population growth, infant mortality, malnutrition, unemployment, illiteracy and food insecurity in the South East Asia (Drysdale 2007, UNDP 2006, RD/TL 2005, World Bank & Asia Development Bank 2007). Approximately 75% of the population lives in rural areas (Drysdale 2007), with high levels of rural poverty (46%) and a large portion of the population (64%) considered food insecure (UNDP 2006). The population is highly dependent on natural resources to sustain their livelihoods, with agriculture including fisheries, the main source of income (in 2001) for 94% of villages (Drysdale 2007). Firewood is the primary source of energy for 98% of the population (WB & ADB 2007). Similarly, most of the coastline in Timor-Leste is inhabited by rural communities

whose livelihoods are highly dependent on semi-subsistence fishing and farming - with most fishing activities limited to low-technology inshore fishing. Importantly, the high dependency of coastal communities on environmental goods and services (ie. fertility of land, productivity of coastal waters) also means rural (versus urban) populations are more vulnerable to food shortages (Talaue-McManus 2006; Barnett *et al.* 2007). As such, ongoing degradation of coastal resources (through uncontrolled development and population growth) has the real potential to put many of these livelihoods further at risk.

The Nino Konis Santana National Park is located entirely within the Lautem District (population 57,453 in 2004) and is home to approximately 10,000 people and includes the six villages *suco* of Tutuala, Mehara, Muapiting, Lore, Bauro, and Com, and their associated hamlets. The Marine Park includes the coastal margins of three main villages or population centres: Com, Tutuala and Lore. Within the National Park there is a diverse mix of rural settlements and agricultural activity, and with many of the villages and hamlets lining roads, also taking advantage of passing traffic to sell local produce from roadside stands (ie. textiles in Com and Tutuala). There is a significant lack of information on the socio-economic demographics, status and livelihoods of the villages and hamlets within the National Park (including participation in subsistence activities, including fishing, and the level of food insecurity).

While there are no major coastal roads within the boundaries of the adjacent National Park, the coast road to Com and the Nino Konis Santana National Park is highly scenic (particularly from Dili to Manatuto). However, accessibility to the coastal regions of the Nino Konis Santana Marine Park (and particularly Tutuala, Jaco Island and Lore) is limited by the poor condition of the roads (Com to Tutuala, Tutuala to Valu Beach, Lospalos to Lore) and also, the lack of access to the Jaco Island. Similarly, the poor state of the roads and the lack of infrastructure; particularly electricity, and are also significant impediments to economic development in the region.

**MPA Planning Issue 7: Socio-Economics and Coastal Livelihoods** – Within the Nino Konis Santana National Park and Marine Park, There is a significant lack of information on the socio-economic demographics, status and livelihoods of the villages and hamlets within the National Park (including participation in subsistence activities, including fishing, and the level of food insecurity). This information is vital to inform Marine Park planning and zoning – and also, to assist with complementary livelihood and community development activities.

### 4.3 Fisheries Values

Despite its long coastline, fisheries resources within the waters of Timor Leste are currently considered under-developed (RDTL 2007b). Fishing activities along the coast are primarily confined to an artisanal or low-technology, inshore reef fishery, conducted at subsistence and semi-subsistence levels. Many coastal communities supplement agricultural livelihoods with artisanal fishing, principally from dug-out canoes and opportunistic reef gleaning at low tide on shallow rock platforms (Deutsch 2003, Carvalho *et al.* 2007b, Lloyd *et al.* 2009). As such, fishing is an important component of the domestic economy of small coastal settlements with most produce being consumed or sold locally. The principal gear type used in the fishery include nets (with currently no regulation of net mesh size) and hand-lines, with spear fishing undertaken to a lesser degree. During the Indonesian occupation, destructive fishing practices, such as the use of dynamite and cyanide were common. These days, such practices are still practiced in some places, but to a limited extent (Deutsch 2003, Carvalho *et al.*, 2007).

Within the Marine Park, artisanal fishing and subsistence farming provide the main source of income for the majority of the communities (Lloyd *et al.* 2009). This income is supplemented to a limited extent in some areas by the sale of traditional *tais* (traditional weaving) as well as basket weaving and other crafts. There is also a small amount of tourism focused around Com, Jaco Island and Valu beach (see Section 4.4). Fishing is undertaken from small canoes; some with outboard engines, with handlines used to fish for reef fish and rocks used as sinkers. Spear fishing is undertaken with handmade spears and wooden handmade goggles. Boat-based fishing is largely undertaken by men, while mainly women and children collect fishes, crabs and molluscs in the intertidal zone at low tide (Sandlund *et al.*, 2001). Targeted species in the inshore fishery include demersal species such as snapper, croaker and bream, pelagics like tuna, mackerel, scad and sardines, and a variety of prawns, crabs, lobsters, bivalves and cephalopods (McWilliam 2002).

Within the region of the Marine Park (ie. Lautem District), a total of 460 fishers and 88 boats are estimated – or approximately 9.3% of the national total of fishers (4,967) and 3.2% of national total of boats (2,740). However, only 36 of the 88 boats (40.9%) are motorized (see Table 5):

District	No. Fishers	No. Boats	No. Motorised	Other	Size of Boats (m)				% of Total Number of Boats			
					<3m	3-5m	5-7m	>7m	<3m	3-5m	5-7m	>7m
Lautem	460	88	36	52	0	30	36	22	0	34	41	25
<b>Total in TL</b>	<b>4967</b>	<b>2740</b>	<b>448</b>	<b>2292</b>	<b>21</b>	<b>1743</b>	<b>755</b>	<b>221</b>	<b>1</b>	<b>64</b>	<b>28</b>	<b>8</b>

**Table 5.** Estimated fishermen and boats in the Lautem District of Timor Leste (de Carvalho *et al.* 2007b, NDFA 2005).

Commercial-scale fishing operations in the Marine Park are currently confined to the Chinese fishing company “Parkway”, whose operations are primarily focused on the Sahul Banks. Fish are unloaded in Com, and the catch is transferred directly to a mother ship and transported to Asian markets (Lloyd *et al.* 2009). Due to the current limited resources and capacity for commercial fishing operations, the NDFA is currently giving fishing licenses to foreign fishing companies for joint venture operations in offshore waters. The fishing operations are closely monitored by two local observers permanently installed on each fishing vessel (NDFA 2005).

Due to the destruction of most of the fisheries infrastructure, fishing boats and equipment in 1999, there are currently no large-scale, commercial fishing activities in Timor Leste (Fonseca 2001; McWilliam 2002, Weaver 2008). However, the government aims to develop a commercial-scale industry targeting potential deep water, offshore resources, where catches are expected to be higher (Mounsey 2001), including tuna, deep sea snapper and deep sea shrimp (RDTL 2007b; 2007f, WB and ADB 2007). The proposed development of offshore commercial fisheries in Timor Leste is focussed on the north coast where the infrastructure is better and where the strong demand in Dili needs to be catered for (Guterres 2003). As such, the development of any commercial-scale industry needs to carefully consider and be closely integrated with the objectives, planning and management of the Nino Konis Santana Marine Park. However, there also remains major limitations to the development of the industry, including lack of infrastructure and public transport which limits access to markets, lack of storage and cooling facilities, and limited equipment as well as knowledge to handle modern and more efficient equipment (McWilliam 2002, Carvalho *et al.* 2007b). The sector is also in urgent need of reliable baseline data on size and status of fish stocks, critical habitat types (nursery and spawning areas) and on socio-economic conditions of fishing communities (NDFA 2005; WB and ADB 2007).

In identifying the fisheries values within the Marine Park, there is also a need to consider opportunities for community-based, recreational fishing and charter-based, fishing operations.

While current fishing charters to the Marine Park are limited, a recent study by Lloyd *et al.* (2009) (ie. Project 5: Fisheries Development in the Com-Tutuala-Jaco Island Area), has identified significant opportunities for the development of recreational fishing and also, community-based fishing (and cultural) tourism in the Marine Park:

- **Recreational fishing** - The findings of Lloyd *et al.* (2009) indicate that recreational fishing potential within the Marine Park is very good, particularly for spear fishing. Dog-tooth tuna (one of the most highly prized fish for spearfishermen due to its strength and speed) was observed in large numbers around Jaco Island, and significantly, relatively close to shore (this species is often found a considerable distance offshore). [Note: A recent article on successful spearfishing within the park, has led to serious interest in the spear fishing fraternity both within Australia and overseas (see Lloyd *et al.* 2009).] Jaco Island also offers the recreational fisher the opportunity to fish for both reef fish and pelagic species (marlin, sailfish, tuna) all in the same area, and close to shore – and significantly, shelter and all-weather fishing conditions. Pelagic species (particularly sharks), and associated bait schools and seabirds, were notably low or absent in the region. The reef fishing habitat around Jaco Island are extensive, and extend from the shore to approximately 200 m offshore, after which there is a drop to the abyss of the Wetar Strait.

The development of a recreational fishing industry is not expected to have any significant adverse affects on the local community (Lloyd *et al.* 2009). The local fishermen concentrate on the protected inshore waters, whereas the recreational fishers would focus on the deeper waters, for species such as marlin, sailfish, and tuna, which are prized for their strength and speed. In inshore waters, recreational fishers target the delicate tasting species such as coronation trout, coral trout and snappers, whereas the local community prefers the stronger tasting species such as trevally, mackerel, wahoo (Lloyd *et al.* 2009).

- **Development of ecotourism fishing lodges & cultural ecotourism** - Several aboriginal communities in Arnhem Land (Northern Territory, Australia) have successfully engaged in ecotourism fishing lodges and it is felt that similar enterprises could be undertaken within the Com-Tutuala-Jaco region. There are strong parallels with this eastern region of Timor-Leste and Arnhem Land in terms of landscapes, remoteness, lack of resources (water, electricity), the desire of the local communities to preserve their culture and traditional life style, and a recognition of the need for local income and employment opportunities. In recent years, many recreational fishers in the Northern Territory have been seeking a “wilderness experience” in more remote (and pristine environments). This has lead to several local recreational fishing companies joining in partnership ventures with local aboriginal clans (see Box 3). These joint ventures provide income and employment (ie. tourist guides, dancers, other cultural activities) for local communities, and also, limited (usually less than 12 people) and controlled development of tourism within the community (minimizing cultural impacts).

The key to the success of fishing lodges in Arnhem Land has been to keep visitor numbers low, to target the exclusive high priced end of the market. While tourist operations are expensive to run (due to the remoteness of the areas), Arnhem Land tourist operators have realised that dedicated recreational fishermen are willing to pay high prices for a ‘unique’ fishing experience in a remote pristine environment with good quantities of sports fish. However, Lloyd *et al.* (2009) recommends that in developing any industry, that recreation fishing numbers are kept low. This would minimise the impact on the community culturally and the demand for resources (such as water), which are in limited supply. Lloyd *et al.* (2009) recommends that representatives from the Tutuala community and Haburas Foundation undertake a study tour of Arnhem Land communities which are successfully engaged in fishing ecotourism, to observe how they run and market their business.



### **Box 3 – Case Study: Ecotourism & Recreational Fishing Lodges – Arnhem Land Barramundi Lodge (Northern Territory, Australia)**

The Arnhem Land Barramundi Lodge is an example of a successful, joint venture between recreational fishers and local indigenous communities. The fishing lodge has been set up in partnership with the Bawinunga Aboriginal Corporation (BAC) in Maningrida; a distance of approximately 400 km from Darwin by road. The BAC comprises the 16 clans of this region and has been set up to coordinate economic development and employment opportunities for the clans in this region. This Lodge offers a complete fishing and cultural experience, with activities such as bird watching, nature tours and aboriginal cultural tours to complement the fishing experience. The cultural tours are interactive and guests spend time visiting the different clan estates, visiting ancient rock art sites and experiencing the natural beauty of the region from rocky uplands, woodland and floodplains to beaches and mangroves. As this area has no electricity, generators are used to provide electricity. The accommodation is comfortable, but not luxurious and is designed to blend into the environment.

**Full details can be found on <http://www.barralodge.com.au/>.**

Lloyd *et al.* (2009) have also identified the following additional opportunities for fishing-related development within the Marine Park area:

- **Capacity-building of the artisanal fishery** - The artisanal fishing capacity of the Com-Tutuala-Jaco region could be improved with assistance from organizations such as Secretariat of the Pacific Community (SPC) or Food and Agriculture Organisation (FAO). This should also include training in fish handling techniques, business skills, fishing co-operatives and marketing, all of which would assist in increasing the value of fish that are caught.
- **Development of community-based, Indigenous Marine Ranger programs & Indigenous fisheries management** – Current Indigenous marine ranger programs in the Northern Territory (NT) undertake a range of marine monitoring activities (ie. surveillance, marine debris, fish kills and fishing infringements). These training and community-based ranger management programs (developed and coordinated by the NT Department of Fisheries, Indigenous Liaison Group), could be used as a model to develop similar co-operative management programs with Indigenous communities in Timor Leste, including the Fatuluku. These ranger programs and also, approaches to Indigenous fisheries management, should be considered for their potential applicability in Timor-Leste (Lloyd *et al.* 2009).
- **Increasing Timor-Leste women’s role in fishing** - The role of women in fishing in the Com-Tutuala-Jaco region should be encouraged and promoted by developing links with women in fisheries operations within Australia, particularly the NTAquarium fishery, which has similar species to Timor-Leste and also, a high level of participation by women.

**MPA Management Issue 12: Fisheries Management** – Community-based fisheries management needs to be encouraged, including: (a) development of recreational fishing opportunities (charter operations, fishing lodges); (b) further capacity-building of the artisanal fishery (ie. fish handling, business skills, fishing cooperatives, marketing); (c) training and development of community-based, Indigenous marine rangers; and (d) identification of opportunities for greater participation of women in fisheries (potentially an aquarium fishery).

## 4.4 Tourism Values

The Nino Konis Santana National Park and Marine Park, established in August 2007 (RD'TL 2007b), represents the largest area of coastal and marine habitat and biodiversity currently protected in Timor Leste – and has the potential to become a major national focal point and icon for ecotourism (Edyvane *et al.* 2009). Previous tourism development projects have also identified the NKS National Park (and Marine Park) as a major focal point for nature-based and cultural tourism (GERTiL 2006, Basiuk 2006, Edyvane *et al.* 2009). Several studies have specifically highlighted the potential tourism value of the coastal and marine environments of Timor Leste, particularly the north coast's suitability for developing the '3-S' (Sun, Sand, Sea) beach tourism, due to its better infrastructure and accessibility, and more suitable climate (shorter wet season) (Ximenes & Carter 2000, GERTiL 2001, Bock 2006, Edyvane *et al.* 2009). These studies also highlight the countries accessible, relatively 'intact' coral reefs (and hence, diving and snorkelling opportunities) and white sandy beaches (particularly along the north coast), underwater caves, offshore surf, and also, cetacean watching (particularly in the Savu Sea) (Ximenes & Carter 2000, GERTiL, 2001, Bock 2006, Edyvane *et al.* 2009). To this end, the Government of Timor Leste has identified sustainable ecotourism and the development of a niche market for nature-based tourism, as central to the development of a responsible tourism industry (RD'TL 2007a).

Coastal-marine ecotourism, as a labour-intensive industry, has significant potential to generate local incomes and long-term employment for coastal communities in Timor Leste, particularly if the tourism sector adopts community-based, 'pro-poor' approaches to development and the industry is developed in an ecologically sustainable manner (Sandlund *et al.* 2001, Weaver 2008). The development of ecotourism provides opportunities for local communities to benefit directly through accompanying income streams and work opportunities such as tour guides, guest house management, cultural performances and sales of local handicrafts and produce. Cash flow derived from participation in natural and cultural-based ecotourism also has indirect flow-on effects which can benefit the wider community. In this regard, existing community-based eco-lodges at Valu Beach (Tutuala) represent good models of 'pro-poor' tourism development from which local coastal communities can profit. However, expansion of the coastal tourism sector in Timor Leste requires careful planning and management to reduce potential environmental and cultural impacts. Increased tourism not only results in increased needs for infrastructure, food provision and public services, but also increased amounts of waste, and potential impacts on coastal landscapes and ecosystems, including loss and degradation of coastal-marine habitats (ie. mangroves, coral reefs), loss of scenic amenity, marine pollution, and over-harvesting of marine resources.

Current coastal tourism development within the park is large confined to Com (Com Resort, guesthouses, fishing/snorkelling activities, local crafts) and Tutuala (eco-village, fishing/snorkelling activities) (see Edyvane *et al.* 2009). These small-scale tourism enterprises generate income for the local communities through the selling of handicrafts (ie. *tai's*), turtle shell and other ornamental shells and corals, renting fisher boats to recreational fishers, island day trippers and dive groups, and low-budget 'guest-house' accommodation. At the community-level, the national NGO, the Haburas Foundation, is actively engaged in facilitating community-based, ecotourism development (including the community-based, eco-village at Valu Beach, Tutuala), and also, involved in a range of projects including mangrove replanting, ecotourism development, catchment rehabilitation and reforestation, environmental education and the strengthening of traditional natural resource management regimes (Haburas Foundation 2007, Weaver 2008). Significantly, the Haburas Foundation has also facilitated the development of ecotourism and ethical tourism guidelines with local communities in the Tutuala region (Carvalho 2007).

While the coast road to Com and the Nino Konis Santana National Park is highly scenic (particularly from Dili to Manatuto), accessibility to the coastal regions east of Com (and the Nino

Konis Santana Marine Park) and Jaco Island is limited by the poor condition of the roads (Com to Tutuala, Tutuala to Valu Beach) and the lack of access to the island. Coastal communities within the park, particularly on the southern coast (ie. Lore) are unable to access potential road-side tourism traffic and are poorly connected to urban centers - and therefore have limited capacity to attract tourists as well as sell products to urban markets. Ecotourism development within the park is further limited by the lack of accommodation and local tourism infrastructure and amenities (see Edyvane *et al.* 2009).

Given the potential opportunity for ecotourism to generate incomes and provide alternative sustainable livelihoods within the Com-Tutuala-Lore region – there is a high priority need for tourism development to be integrated and coordinated with the management planning for the NKS National Park. This could be achieved through representation of the National Directorate of Tourism on the planning team for the NKS National Park.

The following coastal and marine ecotourism values have been identified for the Nino Konis Santana Marine Park (see Edyvane *et al.* 2009):

- **Coastal Aesthetic Values** – The following major coastal aesthetic values for the park have been identified:
  - **Nino Konis Santana National Park** – the coastline of the Nino Konis Santana National Park and Marine Park contains natural viewsapes or vistas, relatively undisturbed by recent human settlements or developments (ie. roads, buildings). The coastal landscapes also include dramatic ‘wilderness’ coastlines, mountains-sea viewsapes (ie. including the rugged limestone Paitxau Range), densely forested landscapes and extensive karst landforms (sinkholes, freshwater springs, caves). The wide range of wilderness views within the National Park also has the opportunity to attract professional and amateur wilderness photographers.
  - **Jaco Island** – Jaco Island, at the easternmost tip of Timor Leste is a small, flat, vegetated islet (in the Nino Konis Santana National Park) surrounded by coral reefs and on its north side, by a spectacular white beach. Photographs of the island (and beach) are highly popular with tourists and are usually taken from the elevated headland of Tutuala. As an iconic beach (in a National Park) – Jaco Island has significant opportunity to promote both beach and wilderness tourism (similar to the Wineglass Bay, in Freycinet National Park in Tasmania).
- **Dive Tourism** - The nearshore coral reefs within the Marine Park (and the north coast of Timor Leste) are highly accessible for shore-based, snorkelling and diving activities due to the accessibility to steep, reef drop-offs, and have significantly potential for ongoing dive tourism development within the park (see Tibirica 2007, Edyvane *et al.* 2009). The coral reefs off Jaco Island however, are only accessible via vessel and hence, are more suitable for diving charters. The Com-Jaco Island region has significant potential for regional, coral-based dive tourism, particularly longer-term, dive safari’s – particularly if combined with other coastal tourism activities (eg. fishing, recreation, cultural tourism). As such, several well-known diving sites within the park, are currently regularly used by local diving companies. Dive tourism (snorkelling, SCUBA) however, is relatively small-scale in Timor-Leste. There are only 3 established diving companies (Dive Timor Lorosae, The Free Flow, Dili Dive) which run scuba safaris to sites in Tutuala and Jaku Island. There is only one established tourism boat charter operation (Island Charters, which operates from Dili to Atauro Island). In developing coral reef dive tourism in Timor Leste, Ximenes and Carter (1999) identified the following needs, issues and priorities: identification and characterization of dive sites; evaluation of coral reefs and identification of priority areas; creation and adjustment of a protected area system; implementation of poverty alleviation strategies; identification of diving markets and creation

of new markets (eg. in association with research volunteer programs, such as 'Reef Check'); professional training; and the creation of a monitoring system (Tibirica 2007).

- **Dolphin & Whale-Watching** - Cetacean tourism is a global industry with whale watching trips now available in more than 87 countries around the world (Hoyt 2001). While whale watching and dolphin watching activities are currently not well-established, the abundance and diversity of cetaceans in nearshore waters suggest there is considerable potential to develop community-based cetacean tourism in Timor Leste (Dethmers *et al.* 2009, Edyvane *et al.* 2009). While cetaceans occur throughout Timor Leste's waters, the accessible, deep waters within the Nino Konis Santana Marine Park, offer significant potential for development of cetacean tourism.
- **Turtle Tourism** - Illegal turtle harvesting remains a major issue in the Nino Konis Santana National Park and Marine Park (and also, Timor Leste). Community-based, turtle tourism, particularly the establishment of community-based monitoring programs and turtle hatcheries, have great potential to create alternative livelihoods and shift local villages from illegally harvesting turtles to generating income from turtle ecotourism. Within the park, the coastal villages of Tutuala, Com and Lore, have significant potential to develop community-based, turtle tourism.
- **Underwater Photography & Coral Reef Tourism** – In addition to dolphin and whale-watching, there are also considerable opportunities for dive tourism focussing on iconic larger fish species (eg. manta rays, eagle rays), small 'iconic' fish and invertebrates species (eg. sea horses, nudibranchs, sea whips, etc.) and also, commercial charter and community-based, targeted, recreational fishing-related tourism (ie. spear-fishing, game fishing) (see Lloyd *et al.* 2009). Ideally, these activities should be integrated with the broader scope and development of dive-based tourism and village-based tourism and eco-lodges within the park (ie. Com, Tutuala).
- **Indigenous culture (Com-Tutuala-Lore region)** – The rich diversity of local Fataluku traditions, customs and practices along the Lautem coast (Com-Tutuala-Lore region) represents a vital and enduring cultural heritage with significant potential for cultural tourism development. In particular, communities in the Lautem district maintain strong traditional culture (Fataluku), lifestyle and practices, perhaps more vigorously maintained in the area than in other parts of East Timor (MAFF 2006). Distinct locations along the coast are identified as the ancestral homes of the Ratu or noble families of the area, and sacred places such as *lulik* forests and Ili Kerekere (e.g. Kwavatxa Nian, Tutuala Nian) are of major importance to the ceremonial life of communities, and continued access to (and protection of) these sites is a priority. Further, seasonal ceremonial harvest festivals in the region (ie. *Metchi*) accompanied by traditional ceremonies and rituals provide a significant opportunity for cultural tourism and local income generation. While indigenous cultural tourism has the potential to provide significant local economic benefits - planning and development requires a considered and precautionary approach and also, close consultation and collaboration and negotiated agreements with local communities to minimise cultural impacts through visitation.

**MPA Management Issue 13: Ecotourism Development** – As a matter of priority, ecotourism development within the Com-Tutuala-Jaco region, needs to be integrated with the development of management plan for the Nino Konis Santana National Park and Marine Park. This could be assisted through formal membership of the National Directorate of Tourism on the planning team for the Nino Konis Santana Protected Area. Ecotourism development priorities within the Marine Park should include identification, assessment and development of pro-poor, community-based natural and cultural ecotourism opportunities, particularly marine wildlife (whales, dolphins, turtles) tourism, recreational fishing (spear-fishing, game fishing, 'fishing lodges') tourism and dive tourism (see Edyvane *et al.* 2009).

## 5 MPA PLANNING & MANAGEMENT

### 5.1 MPA Planning & Management Context

The planning and management of MPAs in Timor Leste (and the Nino Konis Santana Marine Park), needs to consider the following human development, socio-cultural, economic and institutional challenges:

**Human Development & Food Insecurity** – As one of the the poorest countries in the world, and ranking lowest among south-east Asian countries in terms of human development (UNDP 2006), Timor Leste faces major human development, poverty and food security challenges. GDP per capita is US\$370, with 40% of the population currently living below the poverty line of US\$0.55 per day (Drysdale 2007, UNDP 2006, RDTL 2005, WB and ADB 2007). Timor Leste's population is currently food insecure, with a significant importation of rice still unable to meet the national calorific requirements (CTI-ADB 2009). As a consequence, infant mortality and maternal mortality rates are high and an estimated 46% of children under 5 years old are underweight. A large portion of the population also regularly suffers from food shortages. Rural poverty is a major issue, with the majority of the country's population (75%) living in rural areas; 46% living below the poverty line. These significant challenges are compounded by one of the highest population growth rates in the world (between 3-4%), an extremely low median age of the population (with >50% of the population under 15 years) and an estimated adult literacy rate of 50% (UNDP 2006; WB and ADB 2007, Drysdale 2007). As a result, the population of Timor Leste, estimated to be around 1 million (CIA 2007) is highly dependent on natural resources, for survival and to sustain livelihoods.

**High Dependency on Coastal Resources** - The coastal zone (and habitats) of Timor Leste are particularly subject to a high degree of human dependency and resource use. To-date, almost 560,000 people (approximately two-thirds of the total population) in Timor Leste live in coastal and lowland areas with an elevation up to 500 m ASL (NSD, 2006). Approximately 64% of the rural population is food insecure, relying heavily on natural resources, with agriculture and (semi-) subsistence fisheries being the major sources of income (~94%) for the population. According to a household survey conducted in 2001, agriculture including fisheries is the main source of income for 94% of villages (Drysdale 2007). Further, increased demands on coastal resources will be significant, with a 150% increase in demand for fish resources expected by 2030 (CTI-ADB 2009).

**Lack of Knowledge** - With many coastal communities highly dependent on coastal resources - knowledge of the distribution, nature and ecological condition of coastal and marine biodiversity and resources is essential to underpin conservation, ecosystem-based planning and sustainable use and also, regional economic development (particularly fisheries, aquaculture and coastal-marine ecotourism). Given the strong (and increasing) demand on coastal fisheries resources, there is also an urgent need of reliable baseline data on size and status of fish stocks, critical habitat types (nursery and spawning areas) and on socio-economic conditions of fishing communities

**Current Status of Coastal & Marine Resources** - While the coastal environment of Timor-Leste was previously considered to be in a relatively pristine and healthy condition (Sandlund *et al.* 2001, Stockwell 2002), recent studies indicate that coastal and marine environments are being significantly impacted by a high level of illegal, unregulated and unsustainable use. This includes ongoing and significant loss of coastal habitats, particularly mangrove forests (Boggs *et al.* 2009); the loss of large predatory and pelagic fish species and invertebrates (Ayling *et al.* unpubl. data,

Lloyd *et al.* 2009); and the ongoing harvest of threatened and protected marine wildlife, particularly turtles (Dethmers *et al.* 2009) (see Plate 3).

**Lack of Capacity & Resources** – Coastal and marine management in Timor Leste is currently limited by a significant lack of human, financial and technical capacity and resources (including equipment and infrastructure). These challenges are exacerbated by the lack of regional infrastructure, capacity and resources within the Districts. Existing capacity for Marine Protected Area management (and integrated, spatial marine planning and management) is particularly low. Long-term support (financial, organisational and technical) to the NDFA and NDES is urgently required to assist with the building of the capacity to manage protected areas and coastal and marine resources (CTI-ADB 2009).

**Poor Institutional & Legal framework** - The current institutional and legal framework does not yet provide sufficient mechanisms for implementing spatial planning, particularly Marine Protected Area development or sustainable, integrated coastal management (ICM). However, a number of recent research studies and government reports have identified and highlighted the need for a community-based and integrated approach to coastal management, and also, the development of policies and regulations and institutional arrangements to support implementation (Sandlund *et al.* 2001; Planning Commission 2002; NDFA 2005; RDTL 2007a, Weaver 2008, CTI-ADB 2009).

**Lack of Inter-agency Coordination** – Complicated bureaucratic structures and the lack of effective inter-agency coordination and cooperation remains a major impediment to integrated ecosystem-based coastal and marine resource management in Timor Leste. In particular, the planning of Marine Protected Areas requires effective participation and engagement with other agencies and sectors with coastal interests (ie. environment, tourism, heritage, shipping, mining, etc.). For the NDFA, this requires the establishment of effective coordinating mechanisms and administrative structures, to facilitate inter-agency coordination in the planning (and management) of MPAs.

**Lack of Donor Coordination** – A major issue in Timor Leste is the need for donor organisations and non-government aid agencies to coordinate their activities. Within the NDES and NDFA, there is a high priority need for donors to coordinate their support for coastal and marine management projects, particularly with respect to provision of technical support and training (for eg. Marine Protected Areas, coral reef monitoring, fisheries management). This lack of coordination often results in duplication of efforts and resources and also, results in considerable confusion among agency staff within NDES and NDFA.

## 5.2 Planning History

In progressing the establishment of the Nino Konis Santana National Park (NKSNP), MAFF engaged consultants (ie. New South Wales Parks and Wildlife Commission) to produce a policy and planning document to guide the park's development. The policy and planning paper (and English language summary) was publicly released in June 2007, following a series of community and national level consultations (TDPANP 2007). The document identifies the interim land (and sea) boundaries for the NKSNP and also, outlines the proposed planning process for the developing and establishing park, includes the development of a community participation framework via a NKSNP Advisory Committee, NKSNP Suco Consultation meetings and the establishment of higher-level, inter-agency government structures such as a National Steering Committee and National Working Group. Further it proposed that the Plan of Management be developed over the next three years.





**Plate 3:** Marine management issues within the Nino Konis Santana Marine Park; (a) subsistence fishing of reef fish; (b) reef gleaning; (c) harvesting and selling of corals, clams and shells; (d)-(f) illegal harvesting and selling of protected turtle species – shells, eggs; (g) monitoring and management of 'problem' estuarine crocodiles; and (h) community-owned, eco-village at Valu Beach, Tutuala.

The policy and planning document further proposed ‘extensive consultation’, ‘active ownership and support’ of local communities, to enable local communities to participate effectively in the area’s management.

To date, a working group for the National Park has been established at the National Directorate (MAFF) level which has: established and mapped the boundaries of the terrestrial park; identified the planning principles (see Text Box 3) and management priorities (20) for the park; conducted multiple stakeholder surveys and community consultation; and drafted a legal and regulatory framework for management and enforcement (Carvalho *et al.* 2007a). An Interim Committee including representatives from government as well as from villages within the designated area is yet to be set up.

### 5.3 MPA Planning Workshop

A 2-day, Marine Park – National Park planning workshop was held in Dili on 7-8 April 2009, to identify key MPA planning, implementation and consultation activities, processes and priorities (see Appendix 4). The workshop was attended by key MAF-Fisheries and MAF-Protected Areas staff, technical advisors (Northern Territory Government) and also, key NGO partners (The Nature Conservancy and Conservation International). This forum was essential in engaging with relevant government stakeholders and NGO partners in identifying key steps in planning and implementing the Marine Park – prior to the completion of a final report.

The workshop identified the following issues in relation to establishing the Marine Park:

- The 2 management plans for the NKS Protected Area must include regulations, zones, objectives and activities, and detailed costs.
- A protected areas planning team (encompassing both the National Park and Marine Park) is needed to guide the coordinated and integrated development of the 2 management plans and ensure coordination and input between MAFF and other agencies.
- While the majority of biological information for management planning and zoning at NKS and nationally has been collected, there is a need for habitat mapping of the south coast sections of the park
- For the Marine Park, there is need for data analysis, synthesis and integration (particularly fisheries and cultural information) and the establishment of a single spatial database, to inform the development of a zoning plan.
- Key socio-economic information, at the village-level, is still needed (particularly on livelihoods and food security) and is essential to guide the development of zoning plan.
- Barriers to developing the management plans include time and human resources, the need for improved dialogue between agencies, capacity, and guidance
- Actions needed include forming a planning team, spatial data analysis and integration, undertaking socio-economic surveys, getting expert guidance or skills building from supporters and partners.

The workshop also confirmed and endorsed the following

1. **MPA Boundary** - The boundary of proposed MPA will be 3 nautical miles from the coastal baselines – and include all the maritime estate adjacent to the proposed Nino Conis Santana National Park.
2. **Type of Marine Protected Area** - Marine Park, Category VI (multiple-use MPA), to provide for a range of sustainable uses, consistent with the primary goal of biodiversity conservation.



3. **Community-based Marine Protected Areas** - While the planning and consultation will be undertaken by government, a community-based approach to planning will be adopted, ie. Locally Managed Marine Area (LMMA) model.
4. **Development of Alternative Livelihoods** - The assessment and development of sustainable livelihoods (ie. ecotourism, fisheries, aquaculture) within the Marine Park (and National Park) area needs to be initiated as a matter of priority – prior to the development of the zoning plan for the Marine Park.
5. **Stakeholder Participation and Input** - Marine Park planning will require participation and input from all relevant government agencies and civil society (including local representatives of customary custodial communities).
6. **Integrated Coastal (Marine-Terrestrial) Planning** - Planning of the proposed Marine Protected Area (MPA) should be integrated with the planning of the adjacent Nino Konis Santana National Park.
7. **Joint Planning Committee** - To facilitate this integration, a joint planning committee will be established with membership (among others) from MAF-Protected Areas (responsible for the planning of Nino Konis Santana National Park) and MAF-Fisheries (responsible for the planning of the Nino Konis Santana Marine Park).
8. **Governance and Management of MPAs** – There is a need for a strategic policy, planning and technical framework for identifying and establishing MPAs (ie. TL MPA Strategy), and particularly to clarify administrative, legal and institutional arrangements for managing MPAs.

#### 5.4 Proposed Definition of a Marine Protected Area

In Timor Leste, Marine Protected Areas, including the Nino Konis Santana Marine Park, should utilise the internationally accepted ‘protected area’ definition developed by the IUCN (1994) for a Marine Protected Area. As such, the proposed definition of a Marine Protected Area in Timor Leste 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.*  
(IUCN 1994).

#### 5.5 Proposed MPA Goals

##### *Proposed Primary Goal*

To establish and manage the natural, cultural, spiritual values of the Nino Konis Santana Marine Park, protecting the ecosystems, biodiversity and ecological processes and ensuring their long term ecological viability, in cooperation with the traditional laws, customs of the indigenous Fatuluku.

##### *Proposed Secondary Goals*

Consistent with the generally accepted IUCN objectives of MPAs (eg. Kelleher 1999), the Nino Konis Santana Marine Park has the secondary goals to:

##### **Ecological**

- **representative habitats, ecosystems, biodiversity** - to protect and manage substantial examples of marine and estuarine systems to ensure their long-term ecological viability and to maintain biological diversity at all levels by establishing a comprehensive, adequate and

representative system of MPAs, including highly protected areas, across all marine bioregions and biounits and across a range of ecosystems and habitats within bioregions and biounits;

- **rare, endangered threatened species, habitats** - to protect depleted, threatened, rare, endangered or endemic species and ecological communities and in particular to preserve habitats considered critical for the survival of such species;
- **sensitive, vulnerable or species** - provide for special groups of organisms, eg. species with complex habitat requirements or mobile or migratory species, or species vulnerable to disturbance which may depend on reservation for their conservation;
- **ecologically significant areas** - protect areas of high species diversity, natural refugia for flora and fauna and centres of endemism;

### Economic

- **local economic opportunities and sustainable livelihoods** – to assist with poverty alleviation and human development, through the promotion and development of local, community-based, economic opportunities and sustainable livelihoods;
- **economically significant habitats** - to protect and manage habitats of significance to the life-cycles of economically important species;
- **integrated marine management** - to provide a formal management framework for a broad spectrum of human activities, including recreation, tourism and the use or extraction of resources, that are compatible with the primary goal;

### Social

- **geological, archaeological, historical and cultural sites** - to protect and manage significant geological, archaeological, historical and cultural sites for present and future generations;
- **aesthetic values** - to protect the natural aesthetic values of marine and estuarine areas for present and future generations
- **indigenous cultural practices and values** - to cater for the management of marine areas and species by the indigenous Fataluku communities in accordance with traditional cultural practices and affiliations;
- **community support and participation** - to achieve the support and cooperation of the community, particularly the indigenous Fataluku, through input and participation in ongoing management;
- **public education and community awareness** - to facilitate the interpretation of marine and estuarine systems for the purposes of conservation, recreation and public education;

### Scientific

- **environment impact assessment** - to provide for research and training, and for monitoring the environmental effects of human activities, including the direct and indirect effects of development and adjacent land-use practices;
- **scientific reference sites** - to provide for reference sites for scientific studies, including sites for baseline fisheries monitoring and long term environmental monitoring
- **rehabilitation of degraded ecosystems** - to facilitate the restoration of degraded marine ecosystems; and
- **ongoing review of goals, objectives and performance** - to be capable of evolving in light of new information.

## 5.6 Proposed MPA Principles

The following are proposed MPA principles for managing the Nino Konis Santana Marine Park:

- **Indigenous rights, interests and participation** – The rights, customs, practices, interests and ecological knowledge of the Indigenous Fataluku people should be recognised, respected and incorporated in planning and management of the Marine Park.
- **Comprehensiveness** – The Marine Park will include the full range of ecosystems, habitats and biodiversity, recognised at an appropriate ecological scale.
- **Adequacy** – The Marine Park will have the required level of reservation to ensure the ecological viability and integrity of populations, species and communities.
- **Representativeness** – The marine ecosystems and habitats identified for reservation within the Marine Park should reasonably reflect the biotic diversity of the marine ecosystems from which they derive.
- **Highly protected areas** – The Marine Park will aim to include some highly protected areas (IUCN Categories I and II).
- **Precautionary principle** – The absence of scientific certainty should not be a reason for postponing measures to establish highly protected zones within the Marine Park to protect representative ecosystems.
- **Consultation** – The processes of planning and managing the Marine Park will include effective public consultation with appropriate community and interests groups, to address current and future social, economic and cultural issues.
- **Decision-making** – Decision-making processes should effectively integrate both long term and short term environmental, economic, social and equity considerations.
- **Connectivity** - ecological connectivity needs to be addressed within the Marine Park design to address regional (and local) patterns of connectivity, address system uncertainties and maximise the ecological integrity and viability of the park.
- **Global and regional significance** - where possible, the Marine Park needs to protect conservation features or species of a global or regional significance.
- **Secure optimum benefits** – The Marine Park should reflect the social, cultural and economic values, aspirations of the community, consistent with achieving conservation outcomes - to maximise benefits to all stakeholders. This should be done through providing an equitable, transparent framework for identifying and securing optimum economic, social and cultural benefits (and also, costs).
- **Complementary and regional management** – The Marine Park will integrate, where possible, with existing coastal and marine management arrangements (plans, strategies) in the region, provided they are secure and formalised, and can be verified as supporting the goals and principles.
- **Cooperative management** - Cooperative arrangements for the management of the Marine Park will be pursued, where possible, with parties with a demonstrated interest (legal or otherwise).

- **Performance assessment** – The Marine Park will be designed to provide for regular review of its performance in achieving biodiversity conservation at the bioregional and national level, to enable adaptive improvements.

## 5.7 Proposed MPA Management Objectives

The Nino Konis Santana Marine Park will:

- provide for sustainable, integrated, ecosystem-based management for the broad range of human activities (including recreation, tourism, shipping, resource use), the impacts of which are compatible with the primary goal;
- provision of reference sites for scientific research and long-term environmental monitoring;
- provide for special needs of rare, vulnerable, threatened or depleted species and/or ecological communities;
- provide for the needs of special or ecologically significant species, ie. mobile or migratory species, flagship species, umbrella or keystone species;
- protect areas of high conservation value, including areas of high biodiversity, productivity, natural refugia and centres of endemism;
- provide for the recreational, aesthetic and socio-cultural needs of indigenous Fataluku and non-indigenous people; and
- provide for the protection of Fataluku indigenous cultural sites, values, customary practices, traditions and the integrated management of ‘sea country’.
- conserving coastal and marine biodiversity and ecological processes;
- assisting and enhancing fisheries and fish habitat management (eg. fish propagation areas)
- facilitating the restoration of depleted species and degraded marine ecosystems;
- promoting management of marine areas and species by Indigenous communities in accordance with traditional cultural practices and affiliations;
- recognising and providing for the recreational, aesthetic, spiritual and cultural needs of Indigenous Fataluku and non-Indigenous people;
- facilitating community participation and community-based management;
- providing local economic benefits through the development of alternative livelihoods and incomes;
- monitoring the environmental effects of human activities, including the direct and indirect effects of development and adjacent land use practices;
- and educating the community about the environment and benefits of Marine Parks.

## 5.8 Proposed MPA Boundary

The boundary of the Nino Konis Santana Marine Park is currently 3 nautical miles from the coastal baselines – and includes all the maritime estate adjacent to the Nino Conis Santana National Park. Consideration however should be given to extending the Marine Park boundary to 5 or 10nm to ensure that major deepwater habitats (and also, important cetacean habitat) is being represented within the park.

## 5.9 Proposed IUCN Protected Area Category

The Nino Konis Santana National Park and Marine Park has been declared under International Union for the Conservation of Nature (IUCN) Category V criteria as a Protected Landscape/Seascape (Timorese Department of Protected Areas and National Parks, 2007). The IUCN protected area management categories provide a uniform classification which both identifies the principal management objectives of a protected area, as well as acknowledging that other secondary uses and values can be conserved through reservation. In this respect, Marine Protected Areas often achieve a mix of management objectives (see Appendix 4).

Significantly IUCN Category V protected area criteria are broadly inclusive and supportive of the use and ownership rights of relevant local communities, with management objectives clearly local in their focus. They aim to:

*'bring benefits to, and to contribute to the welfare of, the local community through the provision of natural products (such as forest and fisheries products) and services (such as clean water or income derived from sustainable forms of tourism)' (IUCN, 1994, p. 22).*

The decision on the part of MAFF to declare the National Park a Category V protected area follows global trends in best practice protected area management (Phillips 2003). Further, in their own separate planning for the development of ethical tourism in the Tutuala region, the ethical tourism group, local fishermen and other groups from the community have agreed that their aim should be to manage the area as an IUCN Category V protected area (Carvalho 2007, Palmer & Carvalho 2008).

## 5.10 Proposed MPA Legislative, Management Model

The following steps are recommended in strengthening the legislative basis for the Marine Park:

- (a) **Governance and Management of MPAs in Timor Leste** – Develop a strategic policy, planning and technical framework for identifying and establishing MPAs (ie. Timor Leste Marine Protected Areas Strategy), and particularly to clarify administrative, legal and institutional arrangements for managing MPAs.
- (b) **Recognition of Community-Based MPAs** – Within the strategic policy framework for MPAs [see (a), above], formally recognise community-based, MPAs (ie. LMMAs, IPAs), and outline the relevant, technical, planning and consultation objectives and processes to ensure they satisfy the biophysical and socio-cultural objectives of MPAs – and also, contribute to an effective representative network of MPAs in Timor Leste.

## 5.11 Development of the Zoning and Management Plan

The integrated management of uses or activities within the multiple-use, Nino Konis Santana Marine Park should be developed through the preparation of a management plan, and achieved through a process of zoning. Zoning separates a Marine Park into discrete management units or zones and provides levels of protection which reflect the characteristics of natural resources, biodiversity and traditional use. Most importantly, by separating potentially conflicting uses and activities into different areas or zones, zoning minimises conflicts that may arise between the different user groups. Community and industry input on the draft management plan (and management zones) is typically achieved principally through consultation and/or the establishment of a stakeholder advisory committee.

Within the Nino Konis Santana Marine Park, it is proposed that a range of management zones be considered to enable spatial management of the Category V Marine Protected Area. This will enable a spectrum of activities from the highest levels of protection, to provisions for recreational and commercial activities, within a multiple-use planning framework).

Below are some possible marine management zones (and associated management objectives) for consideration for the Marine Park:

- **Sanctuary Zones** – are ‘look but don’t take’ areas managed solely for nature conservation and low-impact recreation and tourism.
- **Recreation Zones** – these areas provide for conservation and recreation including recreational fishing (subject to bag limits and other conservation measures).
- **General Use Zones** – are areas of Marine Parks not included in Sanctuary, Recreation or Special Purpose Zones. Conservation of natural resources in general use zones is the priority but activities such as sustainable commercial fishing, aquaculture, mineral and petroleum exploration and production are permissible provided they do not compromise conservation values.
- **Special Purpose Zones** – are areas managed for a particular priority use or issue. This could be protection of habitat, a seasonal event such as wildlife breeding or whale-watching or a particular type of commercial fishing. Uses compatible with the priority use or seasonal event are allowed in these zones.

Within a multiple-use, zoned Marine Park, conservation legislation generally prevails only in the exclusion zones, which are determined by reference to incompatibility of the proposed use with the objectives for the relevant management zone. In the zones of a Marine Park where use is allowed, the relevant resource sector Act (ie. fisheries, aquaculture, tourism, mining, etc.) generally prevails over conservation legislation. As such, management of the resources normally managed under other Acts continues. However, organisms not subjected to fisheries legislation, generally fall under conservation legislation.

Various international guidelines exist for the zoning, establishment and management of a MPA (Salm & Clark 1984?, Kelleher & Kenchington 1992, Kelleher 1999). Usually, the following sequence or hierarchy of decision-making is followed in establishing an MPA:

Stage 1	Legal establishment of boundaries
Stage 2	Zoning
Stage 3	Enactment of zoning regulations
Stage 4	Specific site planning
Stage 5	Specific site management
Stage 6	Day-to-day management
Stage 7	Review and revision of management

In developing the zoning and management plan for the Nino Konis Santana Marine Park, the following steps are recommended:

- (a) While the planning and consultation of the Marine Protected Area should be undertaken by government, a community-based approach to planning will be adopted, ie. Locally Managed Marine Area (LMMA) model.
- (b) Planning of the proposed Marine Protected Area (MPA) should be integrated with the planning of the adjacent Nino Konis Santana National Park.

- (c) To facilitate this integration, a joint planning committee will be established with membership (among others) from MAF-Protected Areas (responsible for the planning of Nino Konis Santana National Park) and MAF-Fisheries (responsible for the planning of the Nino Konis Santana Marine Park).
- (d) Marine Park planning will require input from all relevant government agencies & civil society (including local representatives of customary custodial communities).
- (e) Use of conservation planning software tools such as Marxan and Marzone should be considered in identifying management zones and highly protected zones. These tools not only facilitate community-based, participatory planning, but also, are a very powerful education tool for raising community awareness of Marine Protected Areas.

## 5.12 5 Key Steps in Planning & Implementing the NKS Marine Park

Based on the above (and also, outcomes from the NKS Protected Areas Planning Workshop), the following is a list of key steps to assist in planning and implementing the NKS Marine Park:

1. **Establish a Nino Konis Santana Protected Area (NKSPA) Management Planning Team** – there is a critical need to establish a new planning team to undertake the integrated planning of both, the Marine Park and National Park. The NKSPA Management Planning Team should include representatives from key government agencies, MAF-Protected Areas and MAF-Fisheries and also, include representatives from other key agencies (ie. tourism, environment). Due the current lack of capacity within MAF, the planning team should be small (4-6 persons) and be supported by an Expert Advisor (Protected Area planning).
2. **Short-Term Work Plan** – The first task of the Planning Team should be the development of a short-term, work and priorities program to identify resources and timelines required to: (a) establish and support an Advisory Committee; (b) appoint an Expert Advisor; (c) develop a Work Plan to implement the NKSPA; (d) identify short and long-term budget needs; and (e) undertake regular audit and financial review of program.
3. **Establish an Indigenous Protected Areas Advisory Committee (IPAAC) to Guide Planning** – The first task of the Planning Team should be to establish an Indigenous Protected Areas Advisory Committee (IPAAC) to provide community, stakeholder and expert input into the planning (and management) of the Nino Konis Santana National Park and Marine Park. The IPAAC should be established with clear Terms of Reference (approved by the relevant Minister's), which reflect the overall management goals, objectives and management principles for the protected area. This committee should include members from:
  - Government agencies (ie. protected areas, fisheries, tourism, environment, culture, agriculture, infra structure, internal affairs, justice)
  - Traditional leaders
  - *Suco*, village leaders (Tutuala, Mehara, Muapiting, Lore, Bauro, and Com)
  - Youth groups
  - Non-government organisations (for eg. Haburas, )
  - Academia
4. **Development of a Work Plan to Guide NKS Management Planning** – a key task of the Planning Team (and Expert Advisor) is the preparation of a Work Plan to guide the planning, preparation and implementation of a zoning and management plan for the NKS Protected Area. The Work Plan should include priorities, timelines and implementing organisations and



should be endorsed and approved by the Advisory Committee, prior to implementation. Elements of the Work Plan, should include:

- (a) **Collection of outstanding baseline data** – collect outstanding baseline data on habitats, biodiversity, resources present and the usage levels within the NKS protected area, prior to, or concurrently with, the development of the zoning and management plan. Priorities should include: (i) fine-scale mapping of the boundaries of the National Park; (ii) broadscale, coastal-marine habitat mapping of the southern coast of the park; (iii) socio-cultural and economic surveys at the village-level, within the park, particularly assessing livelihoods (fisheries, forestry, agriculture) and levels of food security; (iv) survey and mapping of cultural Indigenous values within the park.
- (b) **Data processing, synthesis and integration** – ensure all relevant biophysical and socio-cultural and economic spatial datasets are analysed and integrated into a single GIS spatial database. This should include processing and incorporating existing biodiversity, cultural and fisheries information. This database will be critical in informing the development of the zoning plan.
- (c) **Alternative livelihood assessments** - identify and assess alternative livelihood opportunities within the NKS protected area, including engaging rapid assessment advisors on aquaculture, recreational (game) fishing, marine wildlife tourism and ecotourism (for eg. Alan White, TNC, Charles Darwin University, Northern Territory Government, Australian Government) and study tours to successful community-based, economic developments (ie. fishing lodges and crocodile farming in the NT, turtle hatcheries and dolphin watching in Bali).
- (d) **Identification of training and capacity needs** - undertake a full assessment of training, capacity, and technological needs of park managers (NDES and NDFA) and develop a strategy and plan to fill these needs
- (e) **Marine Park and National Park management training and capacity-building** – identify options for capacity-building and training in protected area planning and management, including study tours of MPAs, IPAs, LMMAs (ie. Northern Territory, Kei, Maluku)) and training workshops.
- (f) **Ranger training** – undertake training of rangers. To-date, 6 people have been hired as rangers for the NKSNP, but have yet to receive training. Investigate options for ranger training in the Northern Territory with the NT Government (which has a successful training program for rangers, including Indigenous rangers) and also, useful tools to support management (ie. cyber tracker).
- (g) **Co-management** – explore options for potential co-management of the NKS protected area, including study tour with Fataluku to an Indigenous Protected Area in the Northern Territory (ie. Dhimurru) to learn about community-based protected area management and Indigenous ranger programs.
- (h) **Community consultation, outreach and extension** – identify requirements and resources for a community consultation and outreach program, including a village-based outreach and education program. Consider options for participation of the Haburas Foundation in developing and undertaking such a program.
- (i) **Illegal fishing** – investigate opportunities (and necessary resources) for collaborative arrangements with key agencies in Australia (AFMA) to address the serious ongoing illegal fishing issues in TL (and the Marine Park) and other key management issues as needed (ie. joint fisheries patrols, training, surveillance).
- (j) **Development of the zoning plan** – identify process for developing management zones and developing the zoning plan, including community workshops and use of the software tools, Marxan and Marzone.
- (k) **Development of the management plan** – develop a management plan for the NKS National Park and Marine Park (see Appendix 5, as an example of a MPA management plan). In particular identify, clear integrated regulations and management strategies;

potential management partners and mechanisms on how the various parties are involved in 'day-to-day' management; options (and mechanisms) for co-management with Fataluku; ongoing monitoring and research needs; effective surveillance and compliance (and opportunities for land-based, marine surveillance) and involvement of Indigenous rangers; and evaluation and monitoring of plan.

- (l) **Implementation of the management plan** – identify the full resources (human, financial) and infrastructure needs for implementing and managing the NKSPA, including options for staged implementation and potential partners/donors.
  - (m) **Expert support and assistance** - Identify potential expert support to assist in undertaking the Work Plan.
5. **Clarify and Strengthen Legal, Regulatory and Administrative MPA and Coastal Management Arrangements** - Develop a marine policy for TL especially with a focus on developing categories for MPAs and other needed management zones, co-management structures, and other key policy initiatives as needed, recognition of community-based MPAs.

## 6 CAPACITY-BUILDING & ENGAGEMENT

### *Capacity-Building and TL Engagement*

- A total of 9 MAFF staff participated in the marine field survey of the Nino Konis Santana Marine Park (November 2008).
- A total of 35 government agency staff (fisheries, protected areas, tourism) attended the Marine Park – National Park planning workshop (7-8 April 2009).
- MAF-Fisheries assisted with the survey of the Marine Park in November 2008 (Anselmo Lopes Amaral).

## 7 EMERGING ISSUES & PRIORITIES

1. The assessment and development of sustainable livelihoods (ie. ecotourism, fisheries, aquaculture) within the Marine Park (and National Park) area needs to be initiated as a matter of priority – prior to the development of the zoning plan for the Marine Park.
2. As much of the compliance and management for the Marine Park will be terrestrial-based, infrastructure assessment and planning, compliance and ranger training needs to be coordinated and initiated as a matter of priority for the Marine and National Park. There are significant opportunities for collaborative and cooperative ranger training and exchange programs with the Parks and Wildlife Service of the Northern Territory.
3. Data analysis and further data processing required to assemble all relevant spatial data-layers for the Marine Park. In addition, all available spatial layers for the Marine Park, natural and social (coastal infrastructure, land tenure, etc.) needs to be managed within a single GIS database, by a dedicated government agency responsible for data management (ALGIS).
4. Additional field work required to map habitats at the fine-scale for the proposed MPA (ie. 3 nautical miles from the coastal baselines – and include all the maritime estate adjacent to the proposed Nino Konis Santana National Park).
5. Customary practices, sea tenure, and 'Tara Bandu', needs to be identified within the Marine Park region to assist with MPA zoning and planning. Existing cultural studies have been undertaken at Tutuala (by Haburas) and need to be extended for the whole Marine Park region.

6. The role and input of key NGO partners (The Nature Conservancy, Conservation International) and MPA technical advisors (Northern Territory Government) needs to be clarified and coordinated in the planning, establishment and management of the Marine Park.
7. Clearer and formal demarcation of planning and consultation responsibilities within the National Park and Marine Park is required.
8. There is a priority need for a strategic policy, planning and technical framework for identifying and establishing MPAs (ie. Timor Leste MPA Strategy), particularly to clarify the governance and management of MPAs in Timor Leste (ie. administrative, legal and institutional arrangements for managing MPAs).
9. Ecotourism planning and development within the Nino Konis National Park and Marine Park needs to be integrated with wider land-use and marine zoning consultation processes and future management arrangements for the National and Marine Park.

## 8 BIBLIOGRAPHY

Audley-Charles, M.G. (2004). Ocean trench blocked and obliterated by Banda forearc collision with Australian proximal continental slope. *Tectonophysics* 389, 65–79.

Anderson, R. & Deutsch, C. (2001). *Sustainable Development and the Environment in East Timor: Proceedings of the Conference on Sustainable Development in East Timor, held from 25-31 January 2001*. Paper presented at the Conference on Sustainable Development in East Timor, Dili, East Timor.

Ashley, C., Boyd, C. & Goodwin, H. (2000). Pro-poor tourism: putting at the heart of the tourism agenda [Electronic Version]. *ODI Briefing Paper*, 51, 1-6. Retrieved 02/10/2006 from [www.odi.org.uk/publications/briefing/bp\\_march06\\_tourism2.pdf](http://www.odi.org.uk/publications/briefing/bp_march06_tourism2.pdf).

Barrkman, J. (2009). *Husi Bei Ala Timor Sira Nia Liman - From the Hands of Our Ancestors - The Art And Craft Of Timor-Leste*. Museum and Art Gallery, Northern Territory.

Basiuk, R. (2006). *Sustainable Tourism Sector Development and Institutional Strengthening, Republic of Timor-Leste. Environmental Planning Inputs*. Dili, UNWTO/UNDP Project for the Government of Timor-Leste: 53.

Bennett, O., Roe, D. & Ashley, C. (1999). *Sustainable tourism and poverty elimination study*. London: Department for International Development.

Bock, A. (2006). Beauty and struggle: mapping tourism in Timor-Leste. *Origins*. **2**: 18-20.

Boggs G, Edyvane K, de Carvalho N, Penny S, Rouwenhorst J, Brocklehurst P, Cowie I, Barreto C, Amaral A, Smit N, Monteiro J, Pinto P, Mau R, Amaral J & Fernandes L. (2009). *Marine & Coastal Habitat Mapping in Timor Leste (North Coast) – Final Report*. Ministry of Agriculture & Fisheries, Government of Timor Leste.

Carter, R. W. (2001, 25-31/01/2001). *Developing sustainable tourism in East Timor: some insights from South East Asia*. Paper presented at the Conference on Sustainable Development in East Timor, Dili, East Timor.

Carter, R. W., Prideaux, B., Ximenes, V. & Chatenay, A. V. P. (2001). Development of tourism policy and strategic planning in East Timor. School of Natural and Rural Systems Management Occasional Paper, 8 (1), 1-101.

Cinner JE, Marnane MJ & TR McClanahan (2005). Implementation and management of marine protected areas: Conservation and community benefits from traditional coral reef management at Ahus Island, Papua New Guinea *Conservation Biology*, 19(6):1714-1723.

Cowie, I. (2006). *A survey of Flora and Vegetation of the Proposed Jaco-Tutuala-Lore National Park, Timor-Leste (East Timor)*. Palmerston, NT: Northern Territory Herbarium.

- de Carvalho, D. d. A., *et al.* (2007). *Monografia Sub-Distrito Tutuala*. Dili, Haburas Foundation.
- Dethmers K, Chatto R, Meekan M, Amaral A, de Cunha C, de Carvalho N & Edyvane K (2009). *Marine megafauna surveys in Timor Leste: identifying opportunities for potential ecotourism – Final Report*. Ministry of Agriculture & Fisheries, Government of Timor Leste.
- Deutsch C. (2003). *Coral Reefs in East Timor: An Investigation of the Impacts of Fishing on Reef Fish Abundance*. EM 531 Project Report, Unpublished report.
- dos Santos Silva, C., *et al.* (2007). *Project Progress Report*. Dili, Food and Agriculture Organisation (FAO) - Trust Fund Programme.
- Dutra LXC & MB Taboada (2006) *Preliminary Survey of the coral reefs from Beloi (Atauro Island, Timor-Leste): alternatives for sustainable use*. Ministry of Agriculture, Forestry and Fisheries - National Directorate of Fisheries and Aquaculture, Dili, 9p.
- Edyvane KS & M Lockwood. (2005). Marine Protected Areas. In *Protected Area Management (Principles and Practice)*, edited by GL Worboys, M Lockwood. Oxford Press.
- Gell FR & CM Roberts. (2003). Benefits beyond boundaries: the fishery effects of marine reserves. *TRENDS in Ecology and Evolution*, 18 (9): 448-455.
- GERTIL (2001). Plano Estratégico de Reconstrução e Desenvolvimento de Timor Leste (PETIL). Lisbon, GERTIL - Grupo de Reconstrução de Timor Lorosae, Universidade Técnica de Lisboa: 119.
- GERTIL. (2006). *Grupo de Estudo de Reconstrução - Timor-Leste*. Retrieved 29/08/2006, 2006, from <http://gertil.fa.utl.pt>.
- Government RDTL (2005). *Timor Leste 2005: Millennium Development Goals*. Dili.
- Graham NAJ, Evans RD, Russ GR. (2003). The effects of marine reserve protection on the trophic relationships of reef fishes on the Great Barrier Reef. *Environmental Conservation*, 30(2): 200-208.
- Haburas Foundation (2007). *Haburas Foundation Overview*. Dili.
- Haburas Foundation (2007). *Tara Bandu*. Dili.
- Halpern, B. S. 2003. The impact of marine reserves: do they work and does size matter? *Ecological Applications*, **13**, S117–S137.
- Hamson, G. (2004). *The tectonic evolution of East Timor and the Banda Arc*. B.Sc.(Hons) Literature Review, University of Melbourne.
- Hoyt, E. (2001). *Whale Watching 2001: Worldwide tourism numbers, expenditures and expanding socioeconomic benefits*. A report for IFAW.
- Hill, R. (2004) *Global Trends in Protected Areas: A Report from the Vth World Parks Congress, Durban 2003*. Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC, Cairns. (60 pp). Unpublished report.
- Instituto Português de Apoio ao Desenvolvimento (IPAD). (2007, 15/02/2006). Timor-Leste GIS Portal. Retrieved 21/01/2007, from <http://websig.civil.ist.utl.pt/timorgis/Home@1@0.aspx>.
- IUCN (World Conservation Union). (2003). Recommendations of the 5<sup>th</sup> IUCN World Parks Congress. IUCN, Gland, Switzerland.

- Jamieson, W., Goodwin, H., & Edmunds, C. (2004). *Contribution of tourism to poverty alleviation. Pro-poor tourism and the challenge of measuring impacts*: Transport Policy and Tourism Section. Transport and Tourism Division UN ESCAP.
- Jasarevic T. (2002). *Reviving fisheries in East Timor – Casting nets for development*. UN Volunteers. Retrieved 29 March 2003 from [http://www.unv.org/infobase/unv\\_news/2002/93/02\\_08\\_93TMP\\_fish.htm](http://www.unv.org/infobase/unv_news/2002/93/02_08_93TMP_fish.htm)
- Kahn, B. (2005). *Indonesia Oceanic Cetacean Program Activity Report: April-June 2005*. The Nature Conservancy.
- Keep, M., Barber, L., & Haig, D. (2009) Deformation of the Cablac Mountain Range, East Timor: An overthrust stack derived from an Australian continental terrace. *Journal of Asian Earth Sciences*, 35:150–166.
- Kelleher G & R Kenchington. (1991). *Guidelines for Establishing Marine Protected Areas*. A Marine Conservation and Development Report. International Union for Conservation of Nature and Natural Resources (IUCN), Gland, Switzerland.
- Kelleher G. (1999). *Guidelines for Marine Protected Areas*. World Commission on Protected Areas, IUCN, Gland.
- Lape, P.V. (2006). Chronology of fortified settlements in East Timor. *Journal of Island & Coastal Archaeology*, 1:285–297, 2006
- Lloyd, J.A. C. Errity, K. Howard, K. Dysart & J. Damaso (2009). *Fisheries Development in the Com-Tutuala-Jaco Island area*. Northern Territory Government, Darwin.
- Lockwood M, Worboys G & A Kothari. (2006). *Managing Protected Areas: a Global Guide*. IUCN, Earthscan Publishing, 802 pages.
- Lubchenco J, Palumbi SR, Gaines SD, Andelman S (eds). (2003). The Science of Marine Reserves. *Ecological Applications* 13(1), Suppl: S3-S228.
- McClanahan T, Marnane M, Cinner J & W. Kiene (2006). A Comparison of Marine Protected Areas and Alternative Approaches to Coral-Reef Management. *Current Biology*, 16(14):1408-1413.
- McWilliam, A.R. (2002). Timorese seascapes: Perspective's on customary marine tenures in East Timor. *The Asia Pacific Journal of Anthropology* 3(2):6-32.
- McWilliam, A.R. (2007). 'Customary Claims and the Public Interest: On Fataluku Resource Entitlements in Lautem', in Damien Kingsbury and Michael Leach (eds), *East Timor: Beyond Independence*. Melbourne: Monash Asia Institute Press. pp. 165-178.
- Ministry of Agriculture Forestry & Fisheries (MAFF). (2007). *The Implementation of the SDS-SEA in Timor Leste: Integrated Coastal Resource Management Project, 2007-2009*. Draft Project Work Plan and Budget, MAFF.
- Ministry of Agriculture Forestry & Fisheries (MAFF), Government of Timor-Leste, New South Wales (NSW) Department for Environment & Conservation (Australia), & BirdLife International (2006). *Preparation of draft proposal for 'Tutuala-Lautem-Jaco' National Park and first draft perimeter (Workshop Report)*. Dili: Ministry of Agriculture, Forestry and Fisheries; Government of Timor-Leste; New South Wales Department for Environment and Conservation (Australia) and BirdLife International.
- Monk K.A, Fretes, Y. & Reksodiharjo-Lilley G. (1997). *The Ecology of Nusa Tenggara, the Ecology of Indonesia Series, Volume 5*. Periplus Editions (HK) Ltd., Hong Kong.
- Murray SN, Ambrose RF, Bohnsack JA, Botsford LW, Carr MH, Davis GE, Dayton PK, Gotshall D, Gunderson DR, Hixon MA, Lubchenco J, Mangel M, MacCall A, McArdle DA, Ogden JC, Roughgarden J, Starr RM, Tegner MJ, Yoklavich MM. (1999). No-take reserve networks: Sustaining fishery populations and marine ecosystems. *Fisheries*, 24 (11): 11-25.

NDFA (2005). *Fish for Sustainability: Our Strategic Plan for Fisheries, 2006-2011*. Working draft 21 December 2005. Dili, National Directorate of Fisheries & Aquaculture: 28.

O'Connor, S. 2003. *Nine New Painted Rock Art Sites from East Timor in the Context of the Western Pacific Region*. *Asian Perspectives*, 42, 1, 96-128.

O'Connor, S & N V. Oliveira. (2007). Inter- and Intra-regional Variation in the Austronesian Painting Tradition: A View from East Timor, *Asian Perspectives*, V46(2) 390-403.

O'Connor, S., Spriggs M. & Veth P. (2002). Excavation at Lene Hara Cave establishes occupation in East Timor at least 30,000-35,000 years ago. *Antiquity* 76:45-50.

O'Connor, S. & P. Veth. (2005). Early Holocene shell fish hooks from Lene Hara Cave, East Timor establish complex fishing technology was in use in Island South East Asia five thousand years before Austronesian settlement. *Antiquity* 79:249–256.

Palmer, L. & Carvalho, DA. (2008). Nation building and resource management: the politics of 'nature' in Timor Leste. *Geoforum* 39 (3), 1321-1332.

Pannell, S. (2004). Welcome to the Hotel Tutuala: Fataluku accounts of going places in an immobile world. Presented at Australian Anthropological Society Conference, University of Melbourne.

Pannell, S & S. O'Connor. (2004). Where the Wild Things Are: An exploration of sacrality, danger and violence in confined spaces. Paper presented at the Society for American Archaeology 69<sup>th</sup> Annual Meeting, Montreal. Pp. 1-19.

Pannell, S. and S. O'Connor. (2005). Toward a cultural topography of cave use in East Timor: A preliminary study. *Asian Perspectives* 44:193–206.

Pedi, D. (2007). *Community-based ecotourism as a pro-poor development option: A case study of Tua Ko'in Eco-village, Atauro Island, Timor-Leste*. School of Global Studies, Social Science and Planning. Melbourne, RMIT University. Master of Social Science: 134.

Phillips, A. (2002). *Management Guidelines for IUCN Category V Protected Areas Protected Landscapes/Seascapes*. Gland, Switzerland, Cambridge, UK, International Union for Conservation of Nature and Natural Resources (IUCN).

RD'TL (2007a). IV Constitutional Government Program. P. o. t. M. s. Office: 79.

RD'TL (2007b). Resolucao do Governo No. 8/2007: Cria o Parque Nacional Nino Konis Santana. *Jornal da Republica* 1(21): 1805-1807.

Salm RV, Clark JR; Siirila E & T Analit. (2000). *Marine and Coastal Protected Areas: a guide for planners and managers*. P. imprenta : Gland, Switzerland, USAID, 370 pages.

Sandlund, O.T., I. Bryceson, D. de Carvalho, N. Rio, J. da Silva & M. Isabel Silva. (2001). *Assessing Environmental Needs and Priorities in East Timor: Issues and Priorities*. Report submitted to UNOPS and NINA-NIKU, East Timor. 45 p.

Stacey, N., Karam, J., Dwyer, D., Speed, C. & Meekan, M. (2008). Assessing traditional ecological knowledge of whale sharks (*Rhincodon typus*) in eastern Indonesia: a pilot study with fishing communities in Nusa Tenggara Timur. (DEWHA: Canberra.)

Stockwell, A. (2001). *Introduction to Co-Management or Community-Based Management of Coastal Resources*. Dili, Second Agricultural Rehabilitation Programme, World Bank.

Stockwell, A. (2002). *Coastal Habitat Assessment and Monitoring Procedures*. Dili, Second Agricultural Rehabilitation Project, World Bank, Department of Fisheries and the Marine Environment: 46.

Tibirica, Y.J.A. (2007). *The Potential for Sustainably Managed SCUBA Diving Tourism to Assist in Both Community Development and Coral Reef Conservation in Developing Countries – With a Focus on a Case Study from Timor Leste (East Timor)*. Unpublished thesis, Masters of Tourism (Ecotourism), School of Business, James Cook University of North Queensland.

Timorese Department of Protected Areas and National Parks. (2007). *Parque Nino Conis Santana*. Ministry of Agriculture, Forests and Fisheries, Timor Leste, 26 June, pp. 1–3.

UNDP and RDTL. (2006). Environment & Natural Resource Management. Dili, Environment and Natural Resource Management Unit, UNDP Timor-Leste: 2.

UNDP and RDTL. (2007). Capacity Building in and Mainstreaming of Sustainable Land Management - SLM Project Factsheet. Dili, United Nations Development Programme, RDTL.

UNTAET (2000). Regulation No. 2000/19 on Protected Places. U. N. T. A. i. E. T. (UNTAET), United Nations Transitional Administration in East Timor (UNTAET).

Veth, P. Spriggs, M. & O'Connor S. (2005). The continuity of cave use in the tropics: examples from East Timor and the Aru Islands, Maluku. G. Barker (ed.). *Asian Perspectives* 44(1): 180-192.

Ward TJ, Heinemann D & Evans N. (2001). *The Role of Marine Reserves as Fisheries Management Tools. A Review of Concepts, Evidence and International Experience*. Bureau of Rural Sciences, Canberra, Australia.

Weaver, L. (2008). *Assessing Management Challenges and Options in the Coastal Zone of Timor-Leste*. Griffith Centre for Coastal Management Research Report No. 86. Griffith University.

Wilkinson, C. (Ed.) (2004). *Status of Coral Reefs of the World: 2004*. Global Coral Reef Monitoring Network, Australian Institute of Marine Science.

Wong, L.S. & L.M Chou. (2004). Status of Coral Reefs on North-east Atauro Island, Timor-Leste, based on surveys conducted in November 2004. *REST Technical Report No. 7, Marine Biology Laboratory, Department of Biological Sciences, National University of Singapore*. 31p.

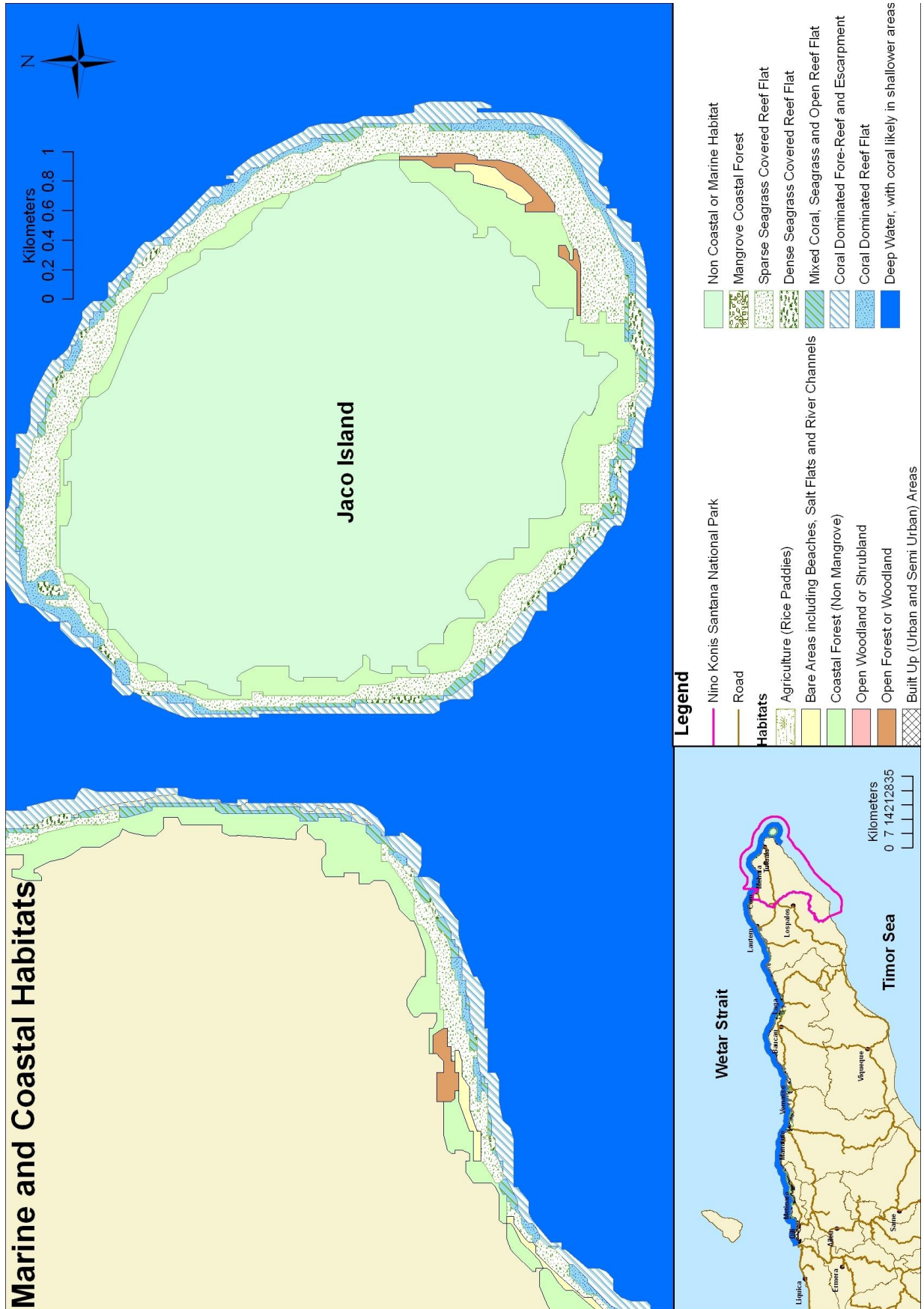
Ximenes, V., & Carter, R.W. (1999, 5-9 April). *Tourism: A strategic focus for sustainable development in East Timor. Working Paper 03*. Paper presented at the Strategic Development Planning for East Timor Conference, Australia.

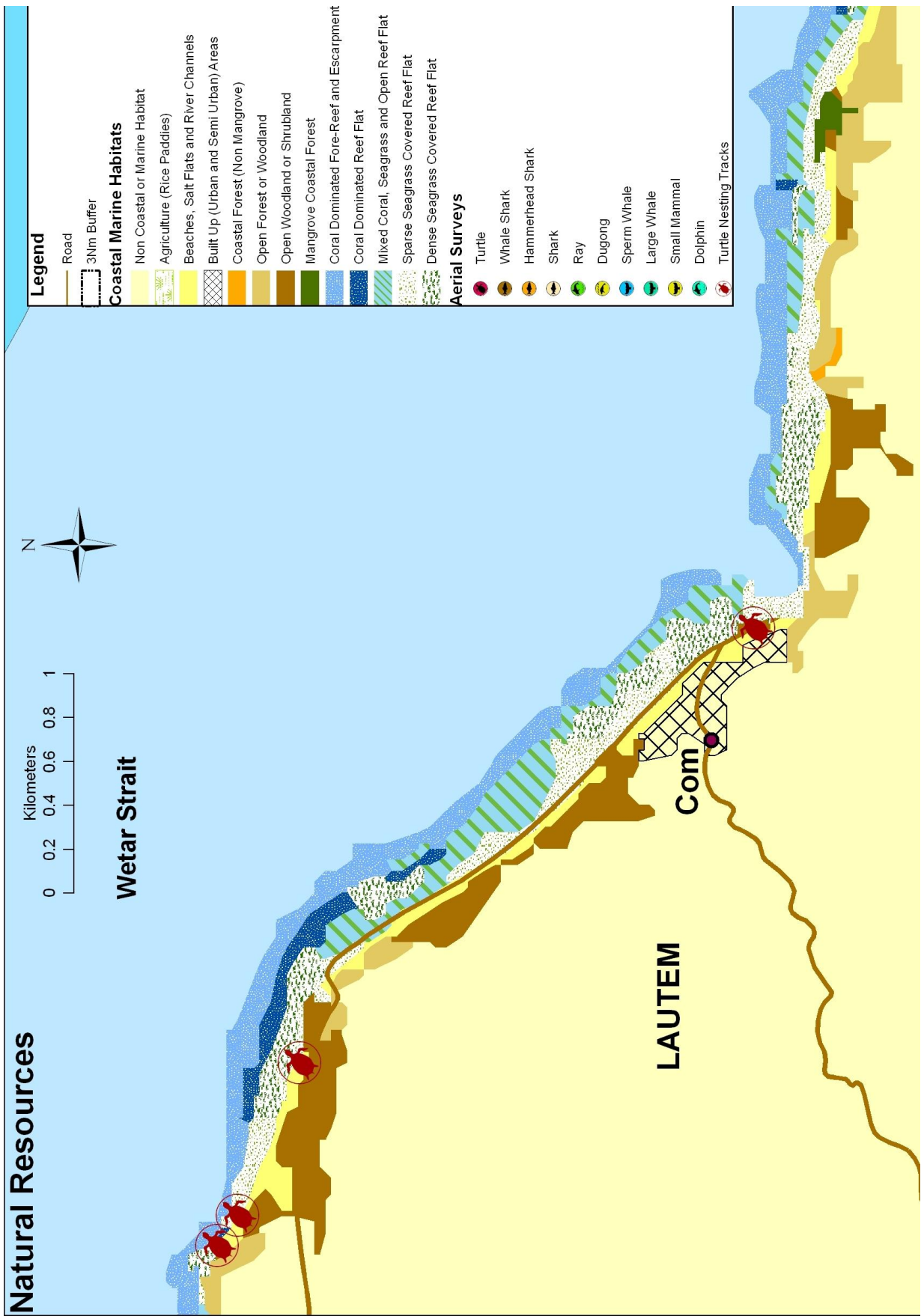
Ximenes, V., & Carter, R.W. (2000, 30/05/2000). *Environmental Protection and Tourism: Issues for East Timor*. Paper presented at the Reconstruction: Review of the Past and Perspective for the Future Conference, Tibar, East Timor.

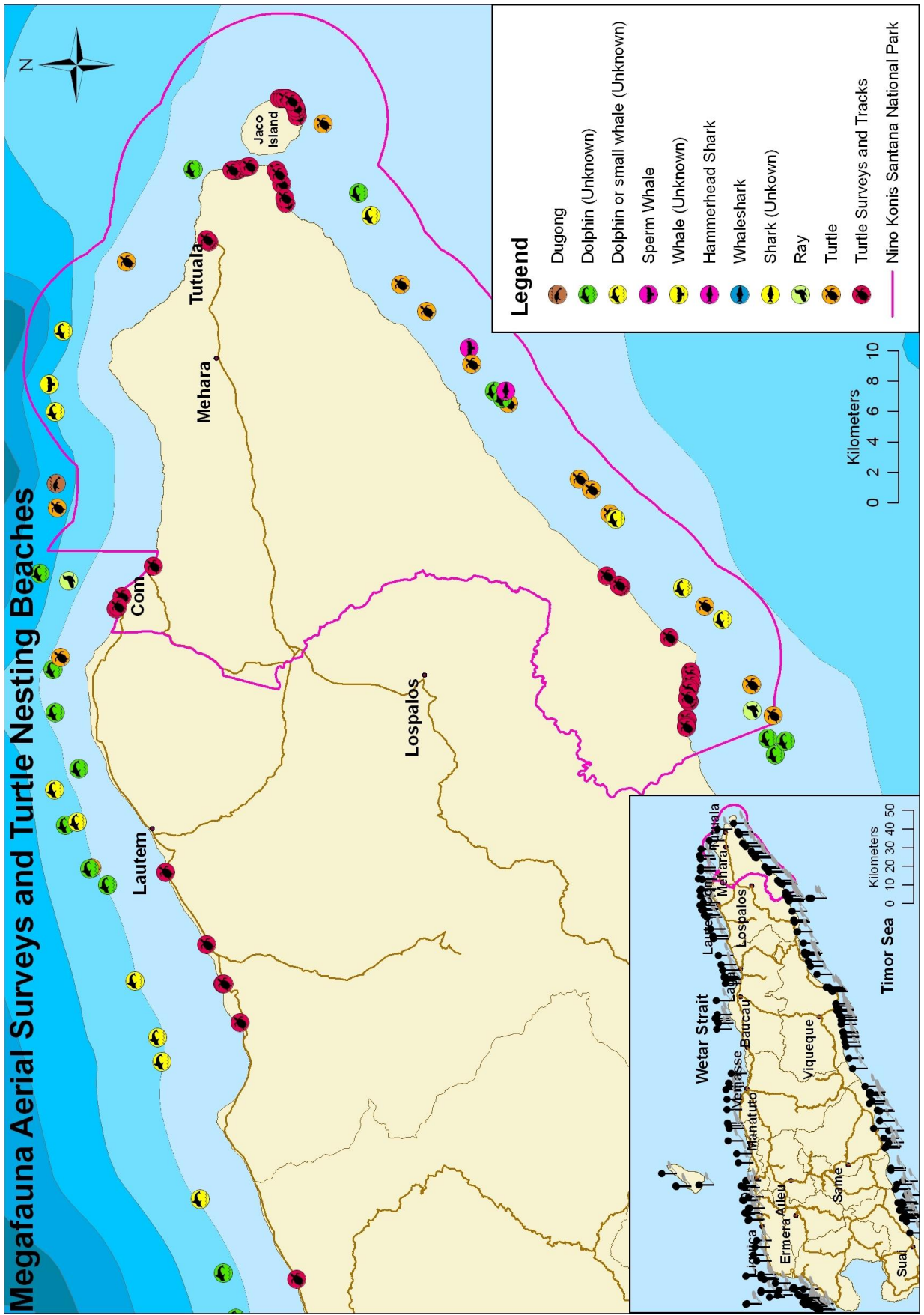


# APPENDICES

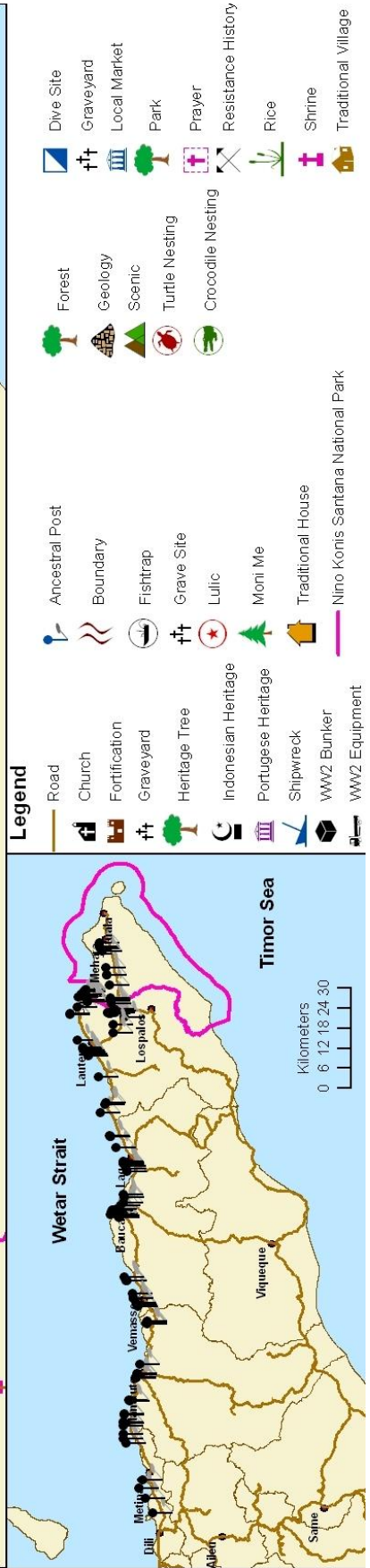
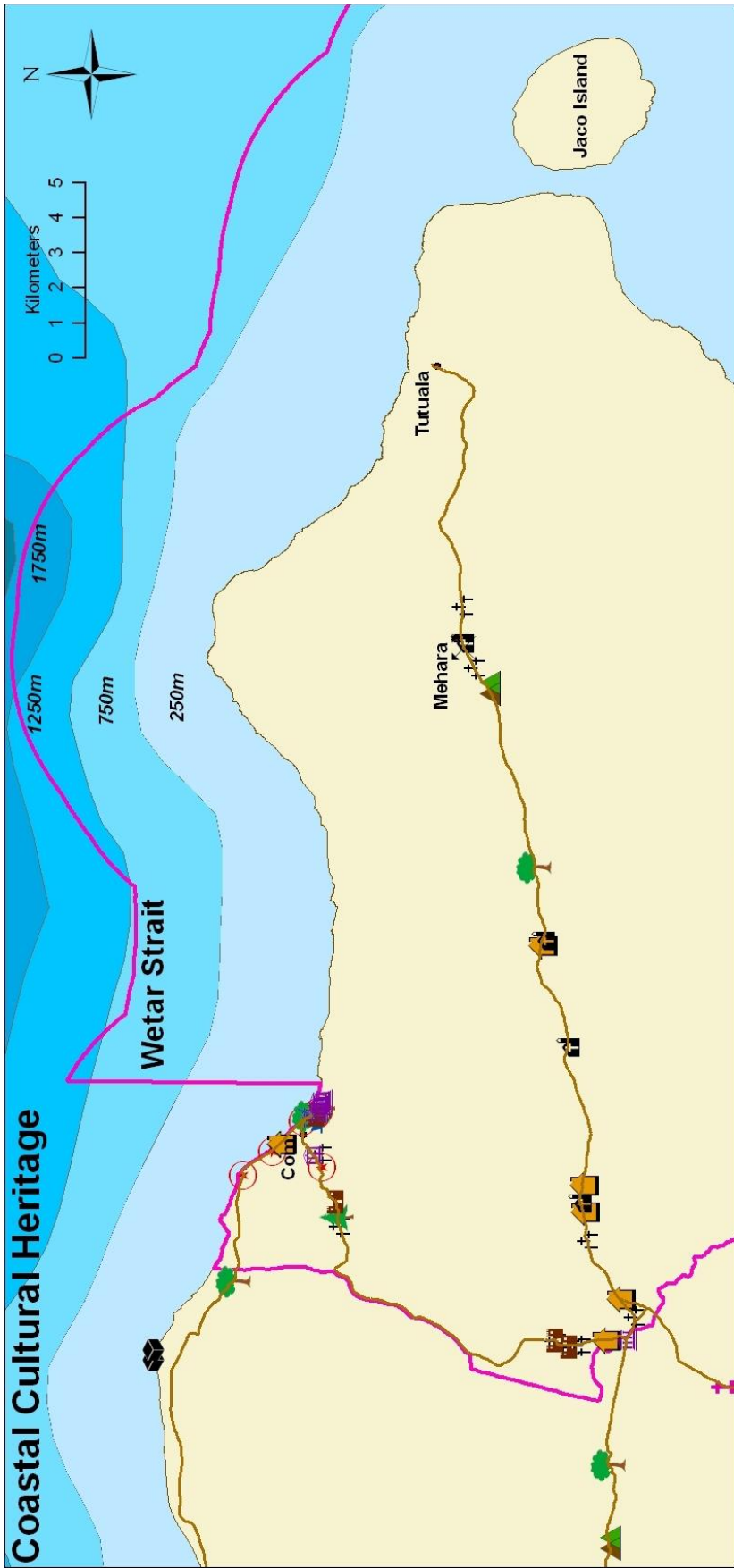
**Appendix 1:** Coastal-marine natural and cultural values of the Nino Konis Santana Marine Park.

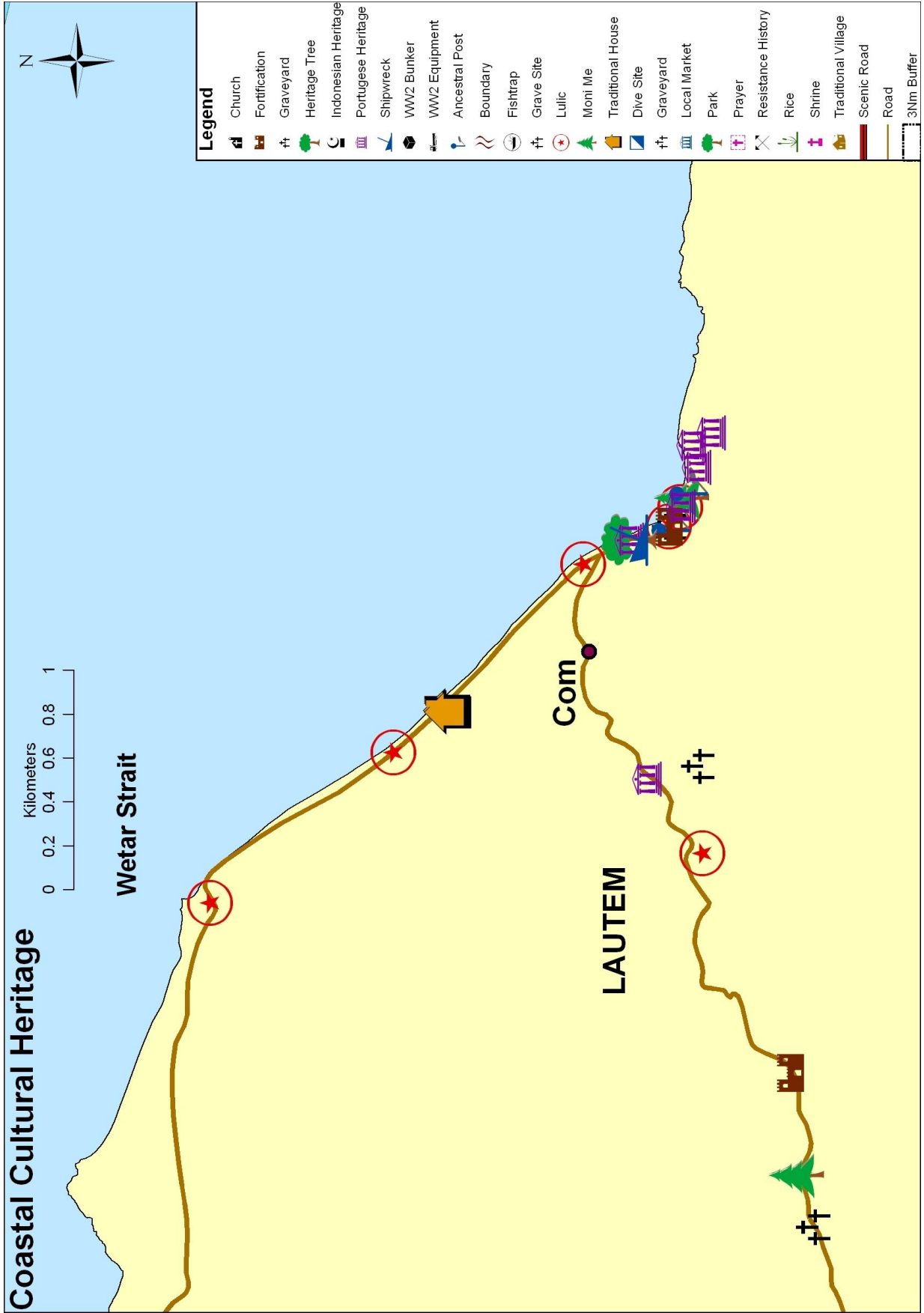












## **Appendix 2:** Preliminary Biological Resource survey of Fringing reefs in the Proposed Nino Konis Santana Marine Park, Timor Leste (from Ayling et al. *in prep.*).

### **Executive Summary**

'Sea Research' was asked to assist with a detailed marine resource survey of the proposed Nino Konis Santana Marine Park on the eastern tip of East Timor. The proposed park includes about 100 km of coastline with its associated steeply sloping fringing reefs. About half of the coast faces south and is exposed to the predominant SE winds and swell and the other half faces north and is more sheltered. Quantitative surveys of fishes, invertebrates and benthic communities were made in the 8-12 m depth strata at 27 sites grouped in nine locations covering about 80% of the proposed marine park coastline. Sharks and large fishes were counted in a single 250 x 20 m transect at each site, medium sized fishes and invertebrates such as holothurians in four 50 x 5 m counts and small fishes in four 50 x 2 m counts at each site. The percentage cover of all benthic species was measured using four 20 m line intersect transects at each site. Fish and invertebrate diversity was assessed during the quantitative counts but also during nine reconnaissance dives that attempted to cover a greater range of the available reef habitats than the single depth strata of the counts. Snorkel swims over the reef flat at each location recorded the presence and species composition of seagrass meadows.

Densities of reef sharks and large predatory fishes such as the Maori wrasse *Cheilinus undulatus* were very low within the proposed park compared with other central Indo-West Pacific localities for which comparable data are available. However, densities of moderate sized predatory fishes, grazing herbivores and small fishes such as pomacentrids, anthiines and small labrids were similar on East Timor reef within the proposed park to those recorded in other reef localities. Estimated diversity of coral reef fishes within the proposed park was 840 species, higher than that recorded at almost all other Indo-Pacific reef localities. Benthic communities within the proposed park had low to moderate hard coral cover and coral cover had apparently been reduced by exposure to large seas on south facing sites and by *Acanthaster planci* coral grazing on north coast sites. Soft corals were common on these reefs and had higher cover than hard corals at many north facing sites. Sponges were also common and dominated on the reef slope below about 15 m especially in areas exposed to strong currents. The blue coral *Heliopora coerulea* and fire corals *Millepora* spp. were locally common on these reefs especially on north facing sites. Commercially valuable holothurians were rare or absent on these reefs and *Trochus* snails were also rare.

The coral grazing sea star *A. planci* was present in outbreak densities on some north coast reefs and had caused significant coral death at some sites. Although reef benthic diversity estimations in this study were not as thorough as those for reef fishes these estimations did suggest that hard coral diversity was not particularly high on these reefs. Seagrasses were absent from all south facing sites but four species were recorded on the reef flat of north facing sites and were most abundant toward the north-western end of the proposed park.

There was a lot of variability at the site level in reef communities but the major differences in species abundance were the result of differences in exposure. Most species and groups showed significant differences in abundance between south facing exposed reefs and more protected north facing reefs. Some species/groups were more common on south facing reefs and others more common on north facing reefs. The east facing sites on the east side of Jaco Island off the eastern tip of East Timor had some unique features but were also in many ways intermediate between north and south facing reefs. It is suggested that these reefs have been subjected to enough fishing pressure to reduce numbers of vulnerable target species and of commercially valuable invertebrates. However, the reefs are generally in good condition and have a number of unusual features. Suggestions of some features of importance and possible management actions are made for these reefs.

## Recommendations for Management

A pivotal point for managers of the proposed park to consider is the presence of two major biological regions within the park area. Fish, benthic and invertebrate communities were significantly different on south facing reefs compared to those facing north. The application of zoning for the new park will have to be split between these major regions to ensure equal protection for both reef community types.

Unusual features of the reef communities at some sites and locations also need to be considered by managers when planning zoning for the proposed park:

- South Coast Location 3 (Sites 7-9) had higher coral cover than the other South Coast locations and had several unusual features including an extensive sand plain in 10-15 m of water with dense populations of several species of garden eels at Site 7, and a very unusual large colony of the agariciid coral *Gardineroseris planulata* 15 x 18 m in size at Site 9.
- The fringing reef in North Coast Location 1 (Sites 1-3) fell very steeply to over 40 m with many vertical walls covered in a sponge, gorgonian and black coral dominated benthic community. Site 3 in this location had many unusual large colonies of the agariciid coral *Pavona clavus*.
- The reef slope in North Coast Location 2 and 3 was often a steep rubble and sand habitat with scattered reef patches and supported unusual fish and invertebrate communities compared to the more coral dominated slopes.
- The reef flat at North Coast Location 3, in the bay to the east of Com, supported the only dense seagrass beds within the area of the proposed park, and also had a shallower, more sandy reef slope with many fish species not recorded in the rest of the survey area. Site 9 in this location had unusually high cover of *Millepora* fire corals.
- The north and east facing locations on Jaco Island had unusual benthic communities with high cover of the blue coral *Heliopora coerulea* and club-shaped colonies of *Acropora palifera*. Fish communities on the Jaco east location were also different in composition to those on all other surveyed reefs.
- The current swept west face of Jaco Island supported an unusual, large sponge dominated benthic community on the reef slope below 10 m.

In combination the fringing reef around Jaco Island has many unusual features and this island should probably be considered in its entirety for total no-take protection. Given its discrete nature as an island it would also be easy to mark and enforce a complete protection zone for this area.

There is some evidence that the area of the proposed new park has been overfished for large predatory fish over the past few decades and that numbers of sharks and large predatory fishes are low to very low within the proposed park. As the proposed park accounts for almost 15% of East Timor's coastline and reef area it could act as an important refuge for these sought after species and allow stocks to increase and supply larvae and migrant adults to other reef areas outside the park (Cole et al. 1990). This assumes that at least parts of the park receive effective protection and stocks are allowed to increase within its borders. Previous experience with true no-take marine reserves has shown that even small totally protected areas can encourage rapid recovery of fished populations and enhance target fish densities and catches outside the protected area itself (Russ and Alcala 1989, Cole et al. 1990, Ayling et al. 1992, Williamson et al 2004). As the reef habitat and associated resources within the Park are relatively limited continuing low level fishing within the park may be enough to prevent stock recovery of these slow growing species (Ayling and Choat 2008).

Effective protection, with good education, enforcement and deterrents for a good portion of the reefs within the proposed park will be essential if the aim is to improve densities of fished reef fish populations and maintain healthy reef systems (Davis et al. 2004, Ayling and Choat 2008, Sweatman 2008). Experience on the GBR Marine Park has shown that pulses of fishing can have huge effects on target fish population densities, reducing numbers by as much as 80% in just a few months (Ayling and Ayling 1998) and that a small amount of illegal fishing in no-take zones can have a marked effect on



fish numbers in supposed no-take reserves (Russ et al 1995, Robbins et al. 2006, Ayling and Choat 2008). As well as using strict no-take zones other forms of fishing control may be usefully applied to the proposed new park. These could include banning certain destructive methods of fishing, restricting some commercial fishing activities and/or using bag limits or some target species. Some fishing activities are particularly destructive to coral reef communities and could usefully be restricted within the entire Park. These activities include: targeted fishing for sharks and selected large predatory fish; explosive and cyanide fishing (already banned?); large scale commercial fishing; commercial harvesting of holothurians and *Trochus* snails. There is anecdotal evidence that explosive fishing is presently taking place within the proposed park and increased effort should be put into liaising with local people to report such activities and determine and prevent the source of the incursions.

It has been found in New Zealand and Australia that effective protection of no-take reserves can lead to substantial increases in population densities of large unafraid fishes that attract large numbers of tourists. With suitable protection, education and logistical support the proposed East Timor marine park could also eventually attract many visitors and help to support local people with jobs and economic benefits.

One important consideration in the zoning of the proposed marine park is to keep the zoning simple and to make sure that obvious shore features are used to mark boundaries between zones. Because the reefs are so close to shore leading marks on the shore could be used to help mark zone boundaries. Lines on maps need to be easily related to features in the field for fishers to be aware of the boundaries. An intense education campaign also needs to be undertaken to educate local people and visitors to the zones and restrictions in the new park. Research on the GBR has shown that negative perceptions of park restrictions amongst fishers encourage illegal use of park zones (Sutton and Li 2008).

There is some debate over whether destructive *Acanthaster planci* outbreaks are a natural part of coral reef ecology or whether they represent an impact resulting from human interference with ecosystem processes (Moran 1986). Given this doubt and the damage that active outbreaks of these sea stars can cause to coral communities (Moran et al. 1987) it might be worthwhile trying to remove *Acanthaster* from the north coast reefs of the proposed park. As the reef area is limited this should be possible without huge expense. Such an action would speed up recovery of already damaged reef areas and prevent ongoing degradation of the reefs.

To determine ongoing reef and fish community status within the PNKSMP and determine the effectiveness of management decisions it is important to set up an on-going monitoring program to measure the effect of protection, or the lack of it, on reef communities within the proposed park. Experience on the GBR suggests that such a program should be based on permanently marked sites to ensure that the high site variability typical of coral reefs does not confound temporal changes (Mapstone et al. 1989, 2004, Sweatman et al. 2008). It is also important to ensure that methods and, if possible, personnel are consistent throughout the monitoring program. Constant changing of methods and/or personnel often confounds the detection of temporal change in marine park and other monitoring programs (Ayling and Ayling 1995b, Ceccarelli et al. 2008, 2009; Kospartov et al. 2006). Monitoring sites should be split between south facing and north facing reefs, with some representation on the east coast of Jaco Island, to ensure that all regions within the proposed park are covered. Ideally surveys should be made annually as this enables the cause of any changes to be assessed more accurately but five year intervals between surveys are the maximum that should be considered if annual surveys are logistically too frequent.

**Appendix 3:** Coral fish diversity index (CFDI) values for restricted Indo-Pacific localities including the Nino Konis Santana Marine Park (from Ayling *et al.* unpublished data). [Number of coral reef fish species as determined by surveys to-date, and estimated numbers using the CFDI regression formula. Table modified from Allen and Werner (2002).]

Locality	CFDI	No. reef fishes recorded	Estim. reef fishes
Maumere Bay, Flores, Indonesia	333	1111	1107
Togean and Banggai Islands, Indonesia	308	819	1023
Komodo Islands, Indonesia	280	722	928
Yap State, Federated States of Micronesia	280	787	928
Madang, Papua New Guinea	257	787	850
<b>Nino Konis-Santana MP, East Timor</b>	<b>254</b>	<b>432</b>	<b>840</b>
Kimbe Bay, Papua New Guinea	254	687	840
Manado, Sulawesi, Indonesia	249	624	823
El Nido-Bacuit Bay, Philippines	243	694	803
Capricorn Group, Great Barrier Reef	232	803	765
Chuuk State, Federated States of Micronesia	230	615	759
Ashmore/Cartier Reefs, Timor Sea	225	669	742
Kashiwa-Jima Island, Japan	224	768	738
Scott/Seringapatam Reefs, Western. Australia	220	593	725
Samoa Islands	211	852	694
Chesterfield Islands, Coral Sea	210	699	691
Pohnpei and nearby atolls, FSM	202	470	664
Layang Layang Atoll, Malaysia	202	458	664
Sangkalakki Island, Kalimantan,	201	461	660
Bodgaya Islands, Sabah, Malaysia	197	516	647
Pulau Weh, Sumatra, Indonesia	196	533	644
Izu Islands	190	464	623
Lihou Reef, Coral Sea	189	343	620
Coringa-Herald Reefs, Coral Sea	187	342	613
Christmas Island, Indian Ocean	185	560	606
Elizabeth-Middleton Reefs, Coral Sea	184	322	603

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Sipadan Island, Sabah, Malaysia	184	492	603
Rowley Shoals, Western Australia	176	505	576
Cocos-Keeling Atoll, Indian Ocean	167	528	545
North-West Cape, Western Australia	164	527	535
Tunku Abdul Rahman Is., Sabah	139	357	450
Lord Howe Island, Australia	139	395	450
Monte Bello Islands, W. Australia	119	447	382
Bintan Island, Indonesia	97	304	308
Kimberley Coast, Western Australia	89	367	281
Cassini Island, Western Australia	78	249	243
Johnston Island, Central Pacific	78	227	243
Midway Atoll	77	250	240
Rapa	77	209	240
Norfolk Island	72	220	223

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#### Appendix 4: IUCN Protected Areas Management Categories.

Around the world there is wide range of nomenclature and definitions for Marine Protected Areas (ie. Marine Parks, Marine National Parks, Aquatic Reserves, Nature Reserves, Marine Reserves, Fish Habitat Reserves, etc.). This causes considerable confusion as different labels can be used for protected areas with identical management objectives. Marine Protected Areas can be categorised or classified on the basis of IUCN's Protected Area

The International Union for the Conservation of Nature (IUCN) Protected Area Management Categories (Table 4.1) provide an international system of protected area categorisation to facilitate understanding and flexibility at national and regional levels. These categories provide a uniform classification which both identifies the principal management objectives of the protected area, as well as acknowledging that other secondary uses and values can be conserved through reservation. In this respect, MPAs may achieve a mix of management objectives. There are 6 IUCN Protected Area Management Categories into which a Marine Protected Area, or parts thereof, can be classified. Categories I and II are highly protected, or 'no take' areas, Category III is a limited use area, and Categories IV–VI are multiple use areas.

The IUCN protected area management categories provide a uniform classification which both identifies the principal management objectives of a protected area, as well as acknowledging that other secondary uses and values can be conserved through reservation. In this respect, Marine Protected Areas often achieve a mix of management objectives.

Management Objective	IUCN Protected Area Management Category						
	IA	IB	II	III	IV	V	VI
Scientific research	1	3	2	2	2	2	3
Wilderness protection	1	2	2	3	3	-	2
Preservation of species and genetic diversity	1	2	1	1	1	2	1
Maintenance of environmental services	2	1	1	-	1	2	1
Protection of specific natural/cultural features	-	-	2	1	3	1	3
Tourism and recreation	-	2	1	1	3	1	3
Education	-	-	2	2	2	2	3
Sustainable use of resources from natural ecosystems	-	3	3	-	2	2	1
Maintenance of cultural/traditional attributes	-	-	-	-	-	1	2
Key 1 Primary objective 2 Secondary objective 3 Potentially applicable objective - Not applicable							

**Table 4.1.** Management objectives of the IUCN Protected Area Management Categories.

**Appendix 5:** Stakeholder workshop (7-8 April 2009) on identifying coastal-marine ecotourism opportunities in Timor Leste.

## **MPA Planning Workshop 7-8 April 2009, Dili, Timor Leste**

08/04/09

Discussion groups on

- 1) Management Planning and Zoning for NKS and
- 2) Integrated Coastal Zoning Plan for Timor Leste.

Standard questions addressed by both groups:

1. What should be in the plan? (is there a national system or regulation already?)
2. Identify Steps to create the plan
3. What been done so far? (what activities, existing policies, regulations etc.)
4. What information do we have – and what do we still need?
5. What barriers to develop the management plan?
6. What are the Actions needed to carry out each of these efforts

### **Results:**

#### **Group 1) Management Planning and Zoning for Nino Konis Santana**

(the focus in this discussion group was on a step-by-step relational process)

#### MPA planning process

A working group for the terrestrial National Park was established at the National Directorate level (i.e. for decision making). This group has:

- established and mapped the broad-scale boundaries of the NKSNP.
- consulted the community consultation about the NP
- proposed list of 20 management priorities

Need to establish a new working group to include the marine part of the National Park (i.e. forestry + fisheries). This group will need to:

- conduct fine-scale mapping of the boundaries of the NP
- do zonation of the NP and GIS mapping
- Extension to community (formally and informally), facilitated by an advisory committee.

Need to identify members and establish an independent advisory committee which provides ideas for implementation of management. This committee should include members from:

- Traditional leaders
- Village leaders
- Youth groups
- Ministry
- NGO
- Academia

The advisory committee advises the Management Team (consisting of members from the various governmental departments).

Problems identified associated with the planning process:

Lack of human resources  
Complicated Bureaucratic System  
Limited financial resources  
Limited equipment (technical resources)  
Difficult Logistics

Next Step in the planning process:

Form the advisory committee for the NKSNP

An integrated team (fisheries, agriculture and forestry) will identify where and why people make gardens (resource use) in the NP and Identify alternative livelihoods.

6 people hired as rangers – but no training yet.

Options for the use of cyber tracker is well received to use for training

**Group 2) Integrated Coastal Zoning for Nino Konis Santana NP**  
(the focus in this discussion group was on answering questions 1-6)

1) What should be in the plan

- Clear integrated regulations / policy
- Zoning and mapping of the district(s)
- Ministries: tourism, environment, culture, agriculture, infra structure, internal affairs, justice
- Conflict in spatial utilization
- Special places (unique)
- A mechanism on how various parties are involved
- Co-management
- A mechanism for access to various information sources
- Evaluation / monitoring
- Audit (e.g. financial resources for ambiguous activities) – we need to know the process of auditing

2) Identify Steps to create the plan

- Dissemination / training / workshop on integrated coastal planning (PW?)
- Map of zones
- Management council (is 1 package with the NP management program – cannot be separated)
- Study tour
- Staged implementation
- Planning must be continuous

3) What been done so far? (what activities, existing policies, regulations etc.)

- fisheries regulations
- special places

- conservation areas (national park)
- dissemination of fisheries regulation in 6 districts
- policy → Governmental Regulation no.8/2007
- Conservation zone – nino knois santana

4) What information do we have – and what do we still need?

- Capacity building / awareness
- Study tour
- Initiative + preliminary concept
- Financial
- Expert support

5) What barriers to develop the management plan?

- Human resources
- Limited Financial means
- Logistic support
- Inter-governmental Coordination (coordination between departmental divisions).

6) What are the Actions needed to carry out each of these efforts

- Short term working program/ agenda
- Priorities program
  - NCC & national facilitator
  - Establishment of thematic group
- Short term budget planning
- Initial work-team including all relevant departments

**Appendix 5:** A proposed outline for a Marine Protected Area management plan (adapted from Kelleher & Kenchington 1992).

## AN EXAMPLE OF A MPA MANAGEMENT PLAN

Executive Summary

Introduction

Management Arrangements (Legal, Administrative)

Objectives for Management

Resource Description

- Name of Area and Location
- Geographic and Habitat Classification
- Conservation Status
- Access and Regional Context
- History and Development
  - Archaeology
  - Historical Relics
  - Written and Oral History
  - Recent Developments
  - Current Human Use and Development
- Physical Features
  - Coastal Landforms
  - Bathymetry
  - Tides
  - Salinity and Turbidity
  - Geology
  - Dominant Currents
  - Freshwater Inputs
- Climate
  - Precipitation
  - Temperature
  - Winds
- Plant Life
- Marine Fauna
- Miscellaneous



## AN EXAMPLE OF A MPA MANAGEMENT PLAN (continued)

### Description of Management Issues

- Historic and Current Conflicts
- Pollution
- Future Demand
- Potential Conflicts

### Management Policies

- Objectives
- Resource Units
  - Natural
  - Development Areas
  - Areas of Impact
- Zoning
- Management Policies for Resource Units

### Surveillance

### Monitoring

### Education and Interpretation

### Enforcement

### Maintenance and Administration

- Budget
- Staffing

### Information Sources

### Appendices

- Boundary and Area Description
- Legislation
- Plant Species
- Animal Species
- Special Features
- Past, Present and Proposed Use
- Maps

### *Box 5.1- IUCN Protected Area Management Categories*

- IA**      *Strict Nature Reserve* – protected area managed mainly for science
- Areas of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.**
- IB**      *Wilderness Area* – protected area managed mainly for wilderness protection
- Large area of unmodified or slightly modified land and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.
- II**      *National Park* – protected area managed mainly for ecosystem protection and tourism
- Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area, and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.
- III**      *Natural Monument* – protected area managed mainly for conservation of specific natural features
- Area containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.
- IV**      *Habitat/Species Management Area* – protected area managed mainly for conservation through management intervention
- Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.
- V**      *Protected Landscape/Seascape* – protected area managed mainly for landscape/seascape conservation and recreation
- Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinctive character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.
- VI**      *Managed Resource Protected Area* – protected area managed mainly for the sustainable use of natural ecosystems
- Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs. The area must also fit the overall definition of a protected area.