

# **THE VALUE OF INDIGENOUS KNOWLEDGE FOR DISASTER RISK REDUCTION:**

A Unique Assessment Tool for  
Reducing Community Vulnerability to Natural Disasters

by  
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Submitted to Webster University, Vienna in partial  
fulfillment of the  
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## ABSTRACT

# **THE VALUE OF INDIGENOUS KNOWLEDGE FOR DISASTER RISK REDUCTION: A Unique Assessment Tool for Reducing Community Vulnerability to Natural Disasters**

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The risk posed by natural disasters is escalating. As a result, the amount of work in the field of disaster management has been increasing, particularly in disaster risk reduction (DRR). DRR focuses on pre-disaster activities including prevention, mitigation and preparedness. Local, national, regional and international organizations have shifted their approach to DRR in recent years, away from technology-focused activities (such as advanced surveillance systems, technical warning systems, and stronger infrastructure) and toward an emphasis on reducing vulnerability which involves affected communities in the process. These shifts have recently led DRR experts and practitioners to consider indigenous knowledge in DRR policy and practice. Indigenous knowledge refers to approaches and practices of a culture which develop from an advanced understanding of its specific environment which has formed over numerous generations of habitation. Research has concluded that indigenous knowledge is valuable to DRR in both a narrow sense (specific DRR strategies which translate to similar communities), and in a general sense (empowering the community, improving project implementation, and successfully using non-formal methods of information dissemination). This suggests the existence of an intermediate value, by which specific categories of indigenous knowledge can be

identified as valuable to DRR and applied to a community, regardless of its unique characteristics.

This research aims to identify these universally applicable categories of knowledge by reviewing literature from the indigenous knowledge discourse. It will extract four primary categories which prove to have the most value for DRR. These four categories all relate to environmental sustainability, strengthening the linkages between sustainable development and DRR. They include ecological knowledge, an environmental ethic, cultural traditions associated with disasters, and a connection to place.

The four categories are examined and supported by examples of communities that have successfully used indigenous knowledge to survive, cope or reduce risk from disasters. The four categories are then organized into an assessment tool which can be used in affected communities to determine and reduce their vulnerability. Finally, the tool is validated by applying it to the case of Simeulue, Indonesia, an island community that successfully reduced negative consequences during the 2004 Indian Ocean tsunami.

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## ACRONYMS

ADRC	Asia Disaster Reduction Center
CBDM	Community Based Disaster Management
CBO	Community Based Organization
CRED	Center for Research on the Epidemiology of Disasters
DFID	United Kingdom Department of International Development
DIPECHO	Disaster Preparedness European Commission Humanitarian Organization
DM	Disaster management
DRH	Disaster Reduction Hyperbase
DRR	Disaster risk reduction
HFA	Hyogo Framework for Action
ICIMOD	International Centre for Integrated Mountain Development
IDNDR	International Decade for Natural Disaster Reduction
IDRC	International Development Research Centre
IFRC	International Federation of Red Cross and Red Crescent Societies
MEXT	Japan Ministry of Education, Culture, Sports, Science and Technology
NGO	Non-governmental organization
NIED	National Research Institute for Earth Science and Disaster Prevention, Japan
SAARC	South Asian Association for Regional Cooperation
TEK	Traditional ecological knowledge
TIK	Transferable Indigenous Knowledge
UN	United Nations
UN/ISDR	United Nations International Strategy for Disaster Reduction
UNDP	United Nations Development Program
UNEP	United Nations Environmental Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization

## INTRODUCTION

At approximately 58 minutes after midnight (UTC) on Sunday December 26, 2004, an earthquake measuring 9.3 on the Richter scale erupted under the Indian Ocean just northwest of Sumatra, Indonesia (fig. 0.1).<sup>1</sup> The earthquake produced one of the most devastating tsunamis in recent history, reaching thirteen surrounding countries and producing overwhelming destruction by killing over 173,000 people and leaving another 108,000 missing (fig. 0.2).<sup>2</sup> Within days of the dramatic event, millions of dollars were donated from foreign countries, the media displayed countless photographs and video footage of destroyed communities, and experts flew in from around the world to study the causes and impacts of the disaster.

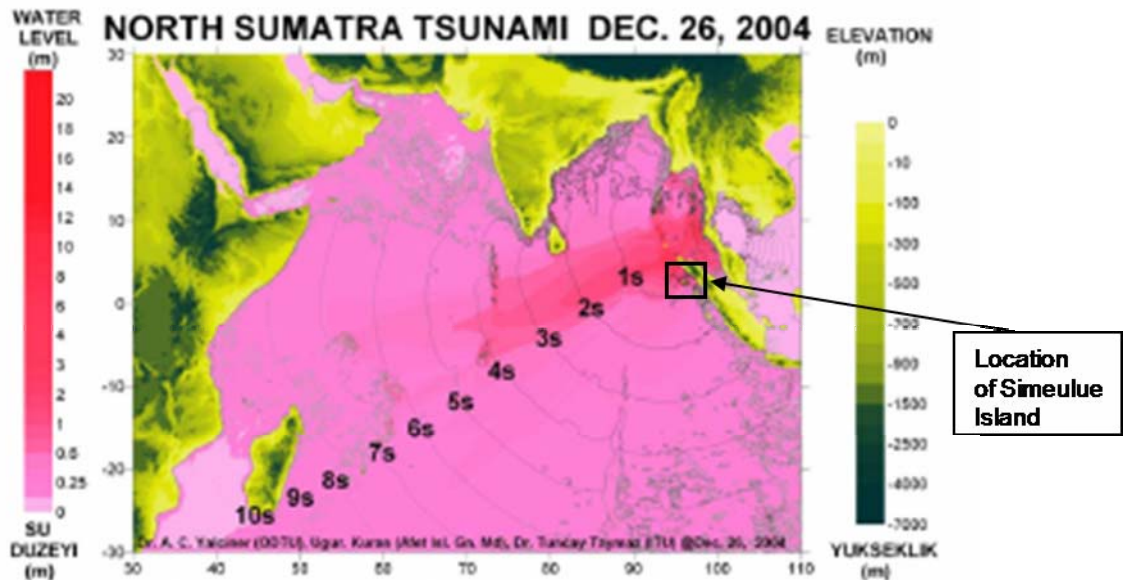
One story of survival emerged from the wreckage of that December day. It centered on a community living on Simeulue Island off the coast of Sumatra, only 40 kilometers southeast of the epicenter of the earthquake. Just ten minutes after the earthquake's tremors ceased, a wave ten meters high struck the northern part of the island. The island inhabitants fully understood the signs of the approaching tsunami because of specific knowledge their ancestors had passed down to them through stories

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<sup>1</sup> UN/ISDR, "Recent and Historical Tsunamis," *UN/ISDR*, <http://www.unisdr.org/ppew/tsunami/what-is-tsunami/backinfor-historical.htm>

<sup>2</sup> Ahmet C. Yalciner, and others, "December 26, 2004 Indian Ocean Tsunami Field Survey (Jan. 21-31, 2005) at North of Sumatra Island," (ITST of UNESCO IOC, 2005), 2-3.

and songs. They responded quickly and successfully. Out of a population of over 78,000 people, only seven people died.<sup>3</sup>

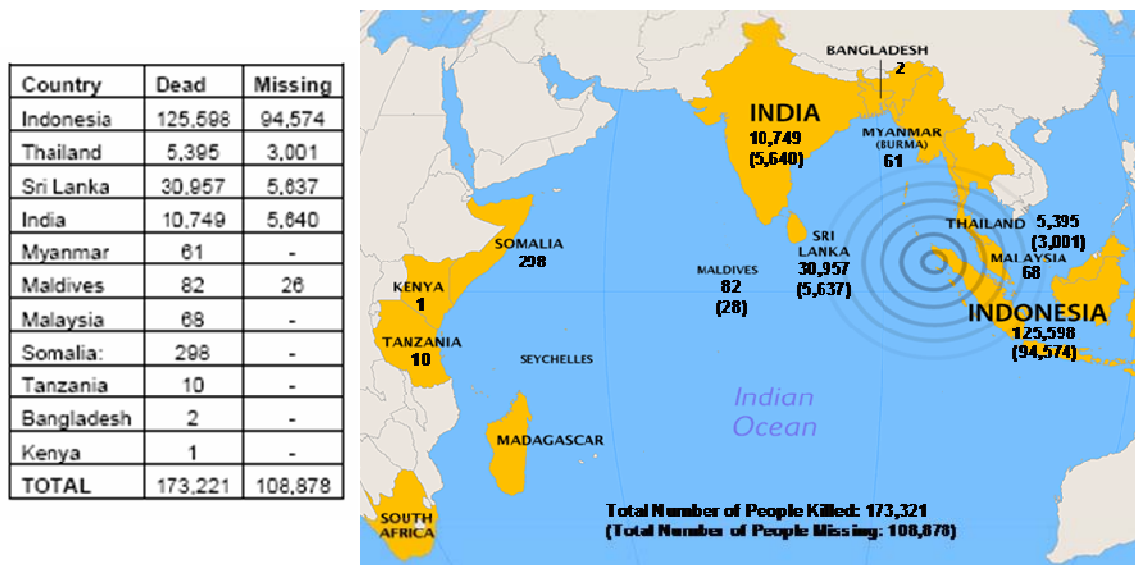


**Figure 0. 1. The location of Simeulue in relation to the minimum water surface elevations at each grid point and travel time curves after the earthquake erupted on December 26, 2004.**

Adapted from Yalciner and others, “December 26, 2004 Indian Ocean Tsunami Field Survey,” fig. 11.

This story is just one out of hundreds of examples of communities that have successfully used indigenous knowledge to survive natural disasters. The aim of this research is to understand what about the knowledge of such communities prove to be so successful in facing disasters. This task has several obstacles to overcome. The first and most important is that indigenous knowledge is often so specific to a locality that it is not always universally applicable. A second challenge is how to integrate indigenous knowledge into mainstream disaster risk reduction (DRR) policy and practice.

<sup>3</sup> Brian G, McAdoo and others. “*Smong*: How an Oral History Saved Thousands on Indonesia’s Simeulue Island during the December 2004 and March 2005 Tsunamis,” *Earthquake Spectra* 22, no. S3 (2006): S661.



**Figure 0. 2. Number of people killed and missing (in parentheses) in each of the countries hit by the Indian Ocean tsunami on December 26, 2004**

Adapted from UK Resilience, Ministry of Justice, “Coroners’ Inquest Incident: Indian Ocean Tsunami, 26 December 2004,” [http://www.ukresilience.info/response/recovery\\_guidance/case\\_studies/g3\\_indian\\_ocean\\_tsunami.aspx](http://www.ukresilience.info/response/recovery_guidance/case_studies/g3_indian_ocean_tsunami.aspx); Data from Ahmet C. Yalciner, and others, “December 26, 2004 Indian Ocean Tsunami Field Survey (Jan. 21-31, 2005) at North of Sumatra Island,” (ITST of UNESCO IOC, 2005), table 1.

This paper addresses these obstacles in two ways. First, it analyzes indigenous knowledge that proved successful in mitigating the effects of disasters in existing case studies. Then, it extracts core categories of knowledge which can have a more universal application. These categories include ecological knowledge, an environmental ethic, cultural traditions associated with disasters, and a connection to place. Second, after analyzing the value of each category for DRR, an assessment tool is proposed designed to both assess the vulnerability of a community and provide guidelines indicating where the community’s resilience can be further increased.

The first chapter provides an overview of the field of disaster management. It defines key concepts and reviews the recent shifts in the approach to DRR, emphasizing the importance of human action in reducing disaster threats. Statistics and recent trends

illustrate that the risk posed by natural disasters is escalating and that there is an urgent need for new strategies which consider indigenous knowledge in protecting vulnerable populations.

The second chapter examines in detail the concept of indigenous knowledge and its complexities. It defines the term and highlights its key characteristics, addressing two issues of terminology to help clarify the definition: who is indigenous, and how does one differentiate between common terms? It also addresses the false assumption that all indigenous people act sustainably, based on a harmonious relationship with the environment.

The third chapter provides an overview of the existing discourse on indigenous knowledge and its value for DRR. Consideration of indigenous knowledge in the field of disaster management has been very slow. The potential value of indigenous knowledge for DRR has only been recognized in the past twenty years. Nonetheless, three factors, including the introduction of the vulnerability approach, the increasing ties between DRR and the international development and sustainable development discourses, and several examples of the success of indigenous knowledge in the face of recent disasters, have all led to a growing interest in the value of indigenous knowledge for DRR. After reviewing the work developing from this interest, the chapter outlines four recognized and established arguments for the importance of indigenous knowledge in reducing disaster risk, which have emerged from this recent work. These arguments can be classified into two groups: narrow values, highlighting specific indigenous practices which can be transferred to other communities, and general values, namely an increase in participation and empowerment of the affected community, improved project implementation, and the

model of non-formal dissemination methods. The chapter concludes by suggesting that there may be a “middle road” which distinguishes specific valuable categories of knowledge while still making the lessons applicable to all communities.<sup>4</sup>

The fourth chapter presents the case study of Simeulue as an example of a community that has successfully reduced the risk of a disaster using indigenous knowledge. It first describes the geographical, economic, cultural, and religious background of the community, followed by a discussion of the story of *Smong*, a cultural legend which provides information on tsunamis. Then, the experience of the Simeulue community during the 2004 Indian Ocean tsunami disaster is described, using both scientific data and first-person accounts to illustrate the incredible events on December 26, and how the community used their knowledge to survive the event. Finally, there is a brief review of the recommendations made in the literature based on the lessons learned from this event. These recommendations stem from the established arguments for the value of indigenous knowledge outlined in chapter three. There is a suggestion that they are either too broad or too narrow to fully develop practical applications for any affected community. These criticisms set the stage for the conclusions of this work, which use the knowledge of the Simeulueans to validate a vulnerability assessment tool based on four core categories of knowledge extracted from the indigenous knowledge literature.

The final chapter begins by defining the four key categories of indigenous knowledge which are chosen based on an analysis of existing indigenous knowledge literature. These four categories (i.e. ecological knowledge, environmental ethic, cultural

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<sup>4</sup> See Julie Dekens, *Local Knowledge Local Knowledge for Disaster Preparedness: A Literature Review*, (Kathmandu, Nepal: International Centre for Integrated Mountain Development (ICIMOD), 2007), where Dekens presents one way to illustrate a “middle road.” She lists the types of indigenous knowledge which relate to disaster preparedness, dividing the information into sixteen sets and grouping these sets into four pillars relating to observation, anticipation, adjustment and communication.

traditions, and a connection to place) all relate to sustainable development and are further examined in the context of DRR. Examples of communities that have successfully used indigenous knowledge to survive, cope or reduce the risk of disasters are used to illustrate that these categories help to reduce the vulnerability of communities to disasters. Following this discussion, the assessment tool is introduced, outlining which specific information must be obtained from a community in order to determine the strength of each of the four categories described. Finally, the assessment tool is applied to the Simeulue community. The Simeulue community has credible knowledge in all four categories which this paper suggests are helpful to reduce vulnerability

While the assessment tool is validated by illustrating four areas of Simeuluean knowledge that helped the community survive the 2004 tsunami, more work must be done to test the tool in other communities. The goal is to make this assessment tool applicable to any community, regardless of its environmental, cultural, economic, social or political context.

## ONE

### **DISASTER RISK REDUCTION:** Definitions, Concepts, and the Impact of Human Actions

The number of global disasters over the past five years has already exceeded the number of disasters that have occurred over the entire decade of the 1990s (fig. 1.1).<sup>5</sup> An upward trend has also become apparent in the number of people affected by disasters globally, with over 200 million people affected each year since 1994 (fig. 1.2).<sup>67</sup> Because of the escalating risk posed by natural disasters, there is an urgent need for new strategies to further improve disaster risk reduction (DRR).

In recent years there has been a shift in the approach to DRR, with an introduction of the vulnerability approach, a focus on pre-disaster activities and an inclusion of the affected community in the process with Community-based Disaster Management (CBDM). These three changes support the inclusion of knowledge held by local affected people in preparedness and mitigation strategies to help reduce the vulnerability of disaster-prone communities. Many indigenous communities understand their local environment and care for it, maintain lessons from past disasters, and are invested in the

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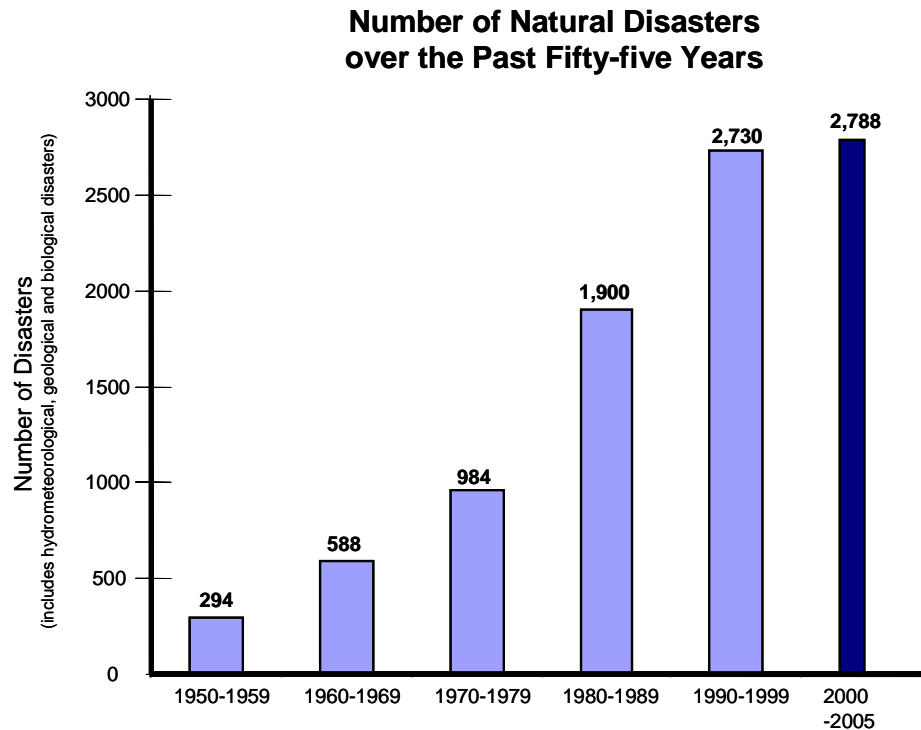
<sup>5</sup> UN/ISDR, "Disaster Statistics," *UN/ISDR* (2007), <http://www.unisdr.org/disaster-statistics/occurrence-trends-century.htm>.

<sup>6</sup> EM-DAT: The OFDA/CRED International Disaster Database, *Natural Disaster Trends: Natural Disasters Reported*, (Brussels, Belgium: Universite Catholique de Louvain, 2007). Graph at <http://www.em-dat.net/disasters/img/Total%20number%20of%20people%20reported%20affected%20by%20disasters%201900-2006.pdf>

<sup>7</sup> Richard Oloruntoba, "A Wave of Destruction and the Waves of Relief: Issues, Challenges and Strategies," *Disaster Prevention and Management* 14, no. 4 (2005): 508.



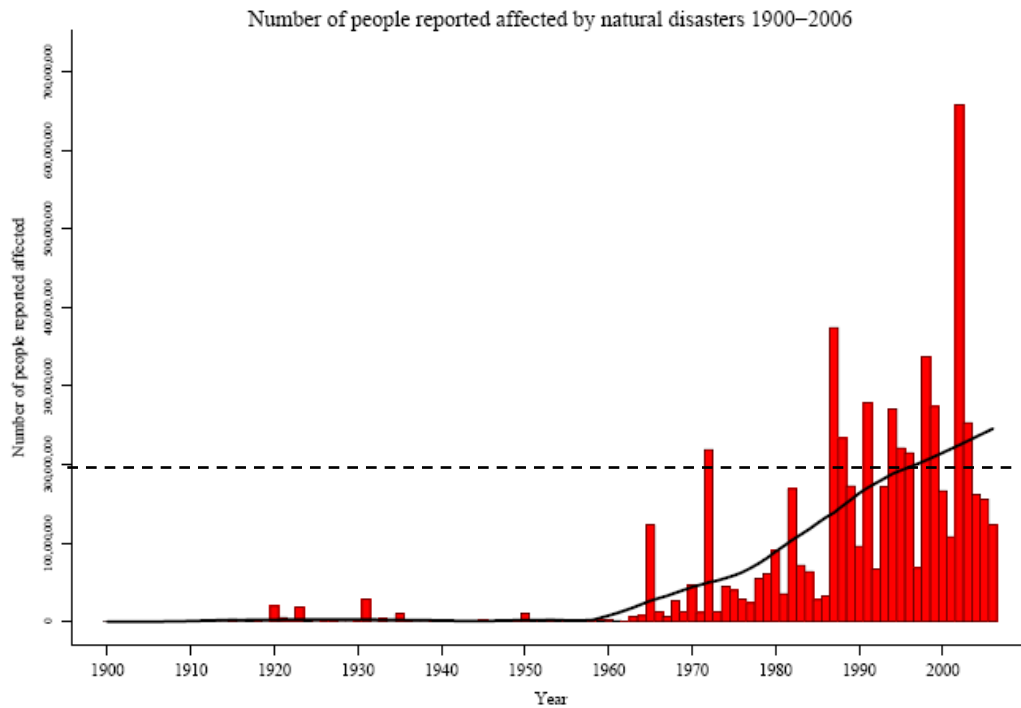
place where they live. The use of indigenous knowledge in the field of DRR is an additional tool that can help vulnerable communities.



**Figure 1. 1. Graph of the increasing number of natural disasters over the past five and a half decades.**

(Data from UN/ISDR, “Disaster Statistics,”  
<http://www.unisdr.org/disaster-statistics/occurrence-trends-century.htm>).

This chapter starts with a definition of key terms associated with disaster management, followed by the use of these definitions to describe the shifting approaches to DRR outlined above. Based on an understanding of core concepts and approaches, an examination of the purpose and motivations behind the work in this field provides the impetus for this research. The emphasis remains on the impact human actions have on the occurrence of disasters, since the added value of indigenous knowledge allows people to adjust their actions in order to further increase their resilience to disasters.



**Figure 1. 2. Graph of the increasing number of people affected by disasters over the past century**

Reprinted from EM-DAT Emergency Events Database, *Natural Disaster Trends: Number of People Reported Affected by Nat. Dis. 1900-2006*,  
[http://www.emdat.be/Database/Trends/GlobalDisasters/globaldis\\_trend\\_03.html](http://www.emdat.be/Database/Trends/GlobalDisasters/globaldis_trend_03.html)

## Definition of Disaster

Defining the concept of disaster is the first step towards understanding the value indigenous knowledge holds for DRR. A disaster consists of the *occurrence of a hazard or event that may cause harm*, and the *inability of a society to manage the consequences of the event*. This can be visually represented as follows:

$$\text{EVENT (HAZARD) + INABILITY TO MANAGE = DISASTER}$$

This two-part definition highlights the difference between a disaster and a hazard and the importance of human action.

According to the United Nations International Strategy for Disaster Reduction (a United Nations organization focused on DRR, abbreviated as UN/ISDR), a hazard is accepted to be “a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.”<sup>8</sup> It is apparent in this definition that hazards only have the “potential” to cause damage.<sup>9</sup> A disaster, therefore, is a hazard that has “overwhelmed the response capability of a community.”<sup>10</sup> The existence of a disaster implies that not only must a hazard occur, but the affected society must also be vulnerable to that hazard, such that the event overwhelms its ability to respond to it.

The second definitional component of disaster, which relates to the inability to manage the event, suggests that the term “natural disaster” is a misnomer. The term “natural” implies that the disaster happens “naturally” on its own and is uncontrollable by humans. Nonetheless, as specified in the definitions above, a disaster is never a pure, untamed event since human ability to manage an event determines whether a disaster results from a hazard or not.

Based on current disaster-related trends (outlined in the next section) and the definitions discussed here, there are two ways that humans can impact disasters:

- *Event (Hazard)*: Some types of human actions can influence the frequency and intensity of hazard events. Such actions include urbanization, unsafe

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<sup>8</sup> UN/ISDR, *Living with Risk*, (Geneva: United Nations, 2004), 16.

<sup>9</sup> Damon Coppola, *Introduction to International Disaster Management*, (Burlington, MA: Elsevier, 2007), 25.

<sup>10</sup> *Ibid.*, 25.

settling and building patterns, and activities that lead to global climate change and environmental degradation.<sup>11</sup>

- *Inability to manage event (vulnerability)*: The occurrence of a disaster depends on how vulnerable a society is to a given hazard.<sup>12</sup> If the hazard is easily manageable and does not overwhelm or disrupt the “functioning of a community or society,” then by definition it is not considered a disaster.

Since disasters are not only a result of natural processes, but are also influenced by social and economic factors of a society,<sup>13</sup> another term such as “environmental disaster” might be used to replace the ambiguous and conflict-laden term “natural.” For the purpose of simplicity and coherence (in relation to sources within the disaster management discourse), the terms disaster, natural disaster and environmental disaster will all be used interchangeably in this text. Nonetheless, it is important to keep in mind the impact of human action on disasters, since reducing this impact, with the help of indigenous knowledge or other strategies, can reduce the risk posed by natural disasters.

For clarification purposes, the term disaster (or natural disaster or environmental disaster) includes four types of hazards: tectonic hazards, such as earthquakes, tsunamis, or volcanoes; mass-movement hazards, including debris movements (landslides, rockfalls and mudslides), land subsistence, and expansive soils; hydrologic hazards, including floods, drought, and desertification; and meteorological hazards, such as cyclones,

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<sup>11</sup> The impact of environmental degradation on the frequency of hazards is expanded on below.

<sup>12</sup> The definition of vulnerability is discussed further below.

<sup>13</sup> Piers Blaikie, Terry Cannon, Ian Davis and Ben Wisner, *At Risk: Natural Hazards, People's Vulnerability, and Disasters*. (New York: Routledge, 1994), 7.

hurricanes, or extreme climate temperatures.<sup>14</sup> The next section defines additional key terms and concepts which are found throughout the DRR discourse.

### **Other Key Definitions**

A few significant terms are used frequently throughout the disaster management discourse. Most of the following definitions take their foundation from international documents on DRR from UN//ISDR, and on development from the United Nations Development Program (UNDP).

#### *Disaster Management*

Disaster management is a general term that incorporates all actions related to disasters. The United Nations (UN) defines the term as “the body of policy and administrative decisions and operational activities which pertain to the various stages of a disaster at all levels.”<sup>15</sup> Within disaster management, there are four different stages that relate to either pre- or post- disaster activities. The duration of each stage can vary, and two or more stages can occur at once.<sup>16</sup> The four stages include:

- *mitigation*, which reduces the likelihood of a disaster occurring in the first place and, thus, its impact on a society;
- *preparedness*, which provides people with the information and tools necessary to respond to disasters in a way which minimizes loss and maximizes chance of survival;

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<sup>14</sup> This organization is taken from Coppola, *Introduction to International Disaster Management*, 39-80.

<sup>15</sup> UN, *Internationally Agreed Glossary of Basic Terms Related to Disaster Management* (Geneva: UN Department of Humanitarian Affairs, 1992).

<sup>16</sup> Coppola, *Introduction to International Disaster Management*, 8.

- *response*, including relief, which works to reduce the impact of past or current disasters in order to prevent further suffering or loss; and
- *recovery*, which returns societies back to how they were before the event occurred.<sup>17</sup>

### *Disaster Risk Reduction (DRR)*

*DRR* is a term often used interchangeably with *disaster reduction*. It refers to steps taken before a disaster occurs, or pre-disaster activities, in order to reduce the impacts the disaster may have. This is more specific than the term disaster management, since it only refers to mitigation and preparedness. The UN/ISDR defines DRR as “the conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.”<sup>18</sup>

### *Risk*

Risk is traditionally defined as a ‘possibility for harm.’ In the context of disasters, risk is the probability of harmful consequences from a hazard event, such as deaths, economic losses, injuries, physical and environmental damage, or destruction of livelihoods.<sup>19</sup> Risk relates to the relationship between an event and the vulnerability of the affected community. Specifically, the following conceptual formula is used:

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<sup>17</sup> Ibid.

<sup>18</sup> UN/ISDR, *Living with Risk*, 17.

<sup>19</sup> Ibid.

$$\text{RISK} = \text{HAZARD (LIKELIHOOD OF EVENT)} \times \text{VULNERABILITY (CONSEQUENCE)}.^{20}$$

In this calculation, hazard is the measurement of the frequency of disasters, whereas vulnerability is the effect a hazard will have on the people and property it strikes.

It, therefore, follows that by reducing either the frequency of a hazard or its effect on the population, disaster risk will be reduced. There are a myriad of approaches to DRR that focus on the different components of risk. Incorporating indigenous knowledge into DRR policies, specifically in education, is another way to reduce a community's vulnerability to natural hazards, thus leading to a reduction in disaster risk.

### *Vulnerability*

Taking a step back, it is necessary to understand vulnerability in order to fully comprehend the concept of both disaster and risk. Vulnerability is a term that describes the susceptibility of a group to the impact of hazards.<sup>21</sup> The concept entered the disaster discourse in the 1970s and 1980s with a new approach to disasters entitled the “vulnerability approach.”<sup>22</sup> This approach dismisses the idea that disasters are solely caused by natural, environmental forces. It argues that disasters are “normal” and based on the vulnerability of a given society as a main cause of disasters.<sup>23</sup> Vulnerability is deeply rooted within the framework of societies, since it is determined by social systems and power at a local, national and international level, not by the natural environment.<sup>24</sup>

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<sup>20</sup> This formula takes into account two different definitions: UN/ISDR, *Living with Risk*, 17; Coppola, *Introduction to International Disaster Management*, 24.

<sup>21</sup> UN/ISDR, *Living with Risk*, 17.

<sup>22</sup> Blaikie, *At Risk*, 10.

<sup>23</sup> *Ibid.*

<sup>24</sup> *Ibid.*, 7.

There are several types of vulnerability that can be targeted. The UN/ISDR definition of vulnerability emphasizes four factors of vulnerability: physical, economic, environmental and social vulnerability. Each of these can be pursued separately or in unison when working to reduce disaster risk.

First, physical vulnerability refers to the physical characteristics of a country, which can be classified according to three components: *geography*, that is, “the natural makeup of the area” such as climate, land cover, topography, water resources; *infrastructure*, which is “the interaction between the people and the land,” including land use, zoning and building codes; and *population*, “how people move throughout time,” such as distribution, location and concentration of populations.<sup>25</sup> For example, a high density population (especially in urban areas), building in hazard-prone areas, and poorly constructed infrastructure all increase a society’s physical vulnerability.

A second factor of vulnerability is economic. Economic vulnerability is related to the number of economic resources in the country, the ability of the country to support itself in the face of a disaster and the susceptibility of a country’s economy to disasters.<sup>26</sup> A society’s gross domestic product (GDP), its economic stability, and the amount of money allocated to disaster management, all help determine economic vulnerability.<sup>27</sup> Several studies have concluded that poorer countries are overall more vulnerable to disasters than richer ones.<sup>28</sup>

A third type of vulnerability is environmental vulnerability. This refers to the natural environment in which a society is located and the impact of environmental

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<sup>25</sup> Coppola, *Introduction to International Disaster Management*, 146-151.

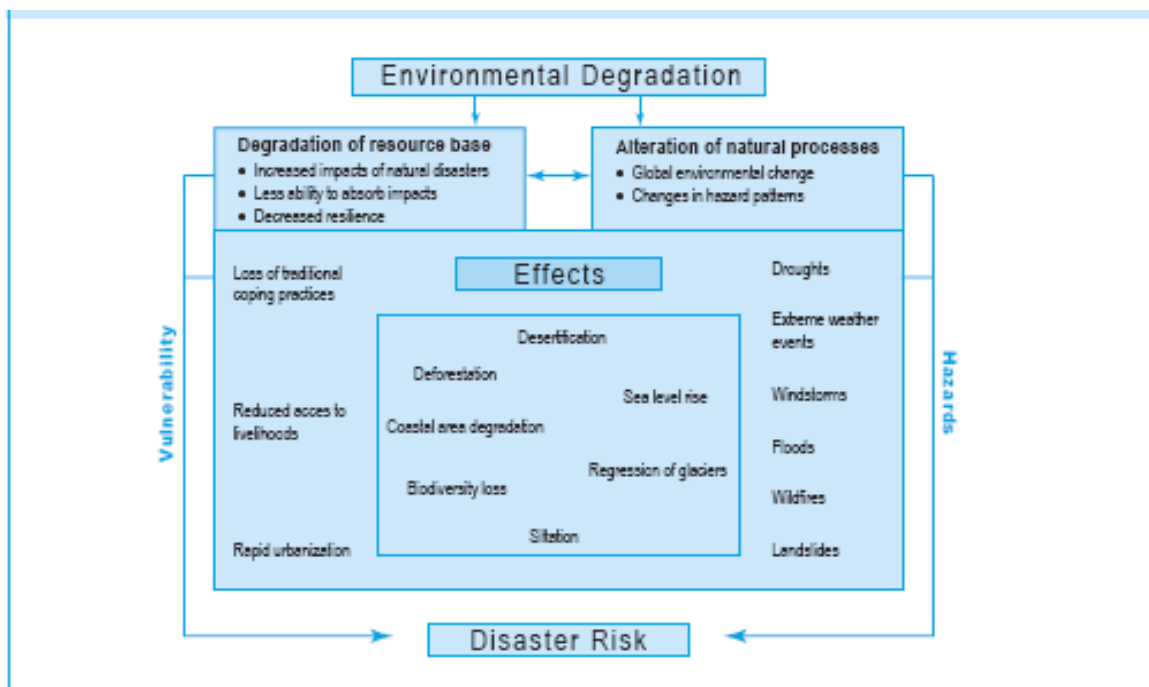
<sup>26</sup> *Ibid.*, 149.

<sup>27</sup> *Ibid.*

<sup>28</sup> The relationship between disaster risk and poverty will be explored in more detail in the following section.



degradation. Figure 1.3 shows a chart which describes the impact environmental degradation has on risk.<sup>29</sup> It explains that degradation of a resource base or the alteration of natural processes can increase vulnerability and hazards, respectively, which both lead to a higher risk of disaster. One specific example is the strength of several natural buffers against tsunamis. It has been proven that mangroves and coral reefs can reduce the impact of tsunamis and coastal flooding (resulting from storms).<sup>30</sup> Reducing environmental degradation can often reduce the environmental vulnerability of communities to disasters.



**Figure 1.3. Link between environmental degradation, natural disasters and vulnerability**

Reprinted from UN/ISDR, *Living with Risk*, Figure 2.8.

<sup>29</sup> UN/ISDR, *Living with Risk*, 57, Figure 2.8.

<sup>30</sup> UN/ISDR, *Living with Risk*, 301.

Finally, social vulnerability is the impact of disasters on the social structure of a society and vice versa. The social profile of a community is diverse, comprised of “education, culture, government, social interaction, values, laws, [and] beliefs” among other things.<sup>31</sup> The way a society interacts, its organization and its cultural practices and traditions, all impact its vulnerability to different hazards. The UN/ISDR, in a publication entitled *On Better Terms*, defines social factors of vulnerability as “levels of literacy and education, health infrastructure, the existence of peace and security, access to basic human rights, systems of good governance, social equity, traditional values, customs and ideological beliefs and overall collective organizational systems.”<sup>32</sup> For example, the distribution of assets, income, and other resources such as knowledge and information among different social groups can impact a certain social group’s vulnerability to disasters.<sup>33</sup> Similarly, social discrimination can dictate allocation of welfare and social protection, including disaster relief and resources for recovery.<sup>34</sup>

### *Resilience*

Resilience is defined as: “the intrinsic capacity of a system, community or society predisposed to a shock or stress to adapt and survive by changing its non-essential attributes and rebuilding itself.”<sup>35</sup> This is relatively new to the field of disaster management. It originated in psychology and psychiatry in the 1940s, and was not used to describe communities and their relationship to future disasters until very recently. The

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<sup>31</sup> Coppola, *Introduction to International Disaster Management*, 151.

<sup>32</sup> UN/ISDR, *On Better Terms: A Glance at Key Climate Change and Disaster Risk Reduction Concepts* (Geneva: United Nations, 2006), 11.

<sup>33</sup> Blaikie, *At Risk*, 5.

<sup>34</sup> *Ibid.*

<sup>35</sup> *Ibid.*, 446.

concept received significant support in UN/ISDR’s *Hyogo Framework for Action 2005-2015* (HFA).<sup>36</sup> Resilience can be seen as a new perspective on the formula Risk = (Hazard) x (Vulnerability), since it further emphasizes that humans can take control of the future impacts of disasters.<sup>37</sup> In comparison to vulnerability and risk, resilience emphasizes the act of building something up as opposed to reducing something; it goes beyond vulnerability reduction which implies “coping with disasters,” and moves toward adaptation and creating something stronger.<sup>38</sup> For a further comparison between vulnerability and resilience see figure 1.4. Developing the ability to adapt to future threats reduces underlying risk and vulnerability. UN/ISDR definition of resilience emphasizes the concept of adaptation as well as the need to build off of the existing capabilities of a given society in order to allow it to better react and control future hazards.<sup>39</sup>

Vulnerability	Resilience
Resistance	Recovery
Force-bound	Time-bound
Safety	Bounce back
Mitigation	Adaptation
Institutional	Community-based
System	Network
Engineering	Culture
Risk Assessment	Vulnerability and capacity analysis
Outcome	Process
Standards	Institutionalize

**Figure 1. 4. The differences between vulnerability and resilience.**

Reprinted from Siambabala Bernard Manyena, “The Concept of Resilience Revisited,” *Disasters* 30, no. 4 (2006), Box 4.

<sup>36</sup> Siambabala Bernard Manyena, “The Concept of Resilience Revisited,” *Disasters* 30, no. 4 (2006): 434.

<sup>37</sup> Manyena, “The Concept of Resilience Revisited,” 433-450.

<sup>38</sup> *Ibid.*, 445-446.

<sup>39</sup> UN/ISDR, *Living with Risk*, 17.

For these reasons, in some academic circles, scholars believe that resilience should replace vulnerability and be mainstreamed into DRR.<sup>40</sup> With regard to indigenous knowledge, strengthening and maintaining specific knowledge within a community can help improve resilience to disasters by building on existing capacity within the community.

### *Capacity*

Capacity, when applied to DRR, is a combination of all the strengths and resources available to reduce the level of risk or the effects of a disaster.<sup>41</sup> There are several factors which contribute to the capacity of a group. These include physical resources, political institutions, social organization, and economic means. Capacity also includes the ability of a community to learn, lead or manage efforts towards reducing disasters. Another term that is often used in conjunction with capacity is *capability*. The capability of a community to minimize disasters is its capacity. Again, considering indigenous knowledge allows DRR strategies and mechanisms to build on the existing capacity of the community in facing future disasters.

### *Sustainable Development*

The concept of sustainable development is important to disaster management because of its long-term perspective. The most general and standard definition for sustainable development is: “development that meets the needs of the present without

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<sup>40</sup> Mayena, “The Concept of Resilience Revisited,” 446.

<sup>41</sup> UN/ISDR, *Living with Risk*, 17.

compromising the ability of future generations to meet their own needs.”<sup>42</sup> The goals of disaster management are therefore necessary for sustainable development, and vice versa.

From the beginning of the twenty-first century the UN has shown how disaster management is necessary for sustainable development. A resolution adopted by the General Assembly in 1989 states that natural disasters hamper the sustainable development of developing countries.<sup>43</sup> In addition, in 2002 the General Assembly made a direct appeal to consider disaster reduction work a significant component of sustainable development, and vice versa:

*Recognizing* that disaster reduction is an important element that contributes to the achievement of sustainable development and that it should be taken into account in the preparatory process for the World Summit on Sustainable Development, to be held at Johannesburg, South Africa, from 26 August to 4 September 2002...<sup>44</sup>

More recently, UN/ISDR made a commitment, followed by an official statement in the HFA, which specifically aims at integrating the *Johannesburg Plan of Implementation of the World Summit on Sustainable Development* with current DRR activities. The document argues that the relationship between the two disciplines is necessary for successful initiatives in both fields. This can be seen in the strategic goals mapped out for the world conference on DRR, which aims for more effective integration of disaster risk considerations into sustainable development policy and programming at all levels.<sup>45</sup>

In addition, consideration of indigenous knowledge in the sustainable development discourse has led to a substantial amount of literature on the values indigenous knowledge holds for successful sustainable practices relating to resource

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<sup>42</sup> United Nations Development Programme (UNDP), *Reducing Disaster Risk: A Challenge for Development, A Global Report*, (UNDP: New York, 2004), 136.

<sup>43</sup> UN General Assembly, Fifty-fourth Session, Official Records, *International Decade for Disaster Management: Successor Arrangements*, Resolution 54/219, Agenda item 100 (b), A/RES/54/219 (2000).

<sup>44</sup> UN General Assembly, Fifty-sixth Session, Official Records, *International Strategy for Disaster Reduction*, Resolution 56/195, Agenda item 98 (b), A/RES/56/195 (2002).

<sup>45</sup> UN/ISDR, *Hyogo Framework for Action 2005-2015: Building the resilience of Nations and Communities to Disasters* (Geneva: United Nations, 2005).

management and conservation. The core reason found by most scholars is that indigenous knowledge takes the environment into consideration when dealing with other issues (whether social, political or economic). Several parallels exist between the value of indigenous knowledge for sustainable development and its value for DRR, stemming from a consideration of the environment. While sustainable development refers to all aspects of a society, economic, political, social, and environmental (and particularly the balancing of all of them), environmental sustainability which focuses on the maintenance of the local environment, is considered often in the indigenous knowledge discourse and will be a core focus of this research due to its importance for DRR

The next section further explores the development of the disaster management field, focusing on the emerging trends and the increased interest in DRR.

### **The Field of Disaster Management: Development and Motivations**

Disaster management has evolved into a popular field in recent decades. According to David Alexander, an established academic and professor of Disaster Management,<sup>46</sup> “...interest in the field [of disasters] has never been greater than it is at present, and, to judge by the explosion of available literature, more than half of existing disaster research has been conducted over the last two decades, so there has been considerable evolution in theories and techniques of mitigation and management.”<sup>47</sup> Along with an increase in academic interest there has been an increase in action focused on DRR, especially at the international level. First and foremost, the UN’s establishment

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<sup>46</sup> Alexander is also the previous editor of the journal *Environmental Management* and currently the coeditor of the journal *Disasters*.

<sup>47</sup> David Alexander, “The Study of Natural Disasters, 1977-1997: Some Reflections on a Changing Field of Knowledge,” *Disasters* 27, no. 4 (1997): 284-285.

of the International Decade for Disaster Reduction (IDNDR) in the 1990's, followed by the *Yokohama Strategy and Plan of Action for a Safer World*, both acknowledged DRR as an important international commitment, and encouraged nations to invest in the field. By 2000, the UN had created the UN/ISDR which further emphasized the importance of DRR.<sup>48</sup> These initiatives also introduced new ways of approaching disasters, including integrating DRR into development policy and planning, and supporting community involvement and capacity building.

Existing international organizations such as the International Red Cross and Red Crescent Societies (IFRC) and several UN agencies have begun to develop new methods for reducing risk, such as community-based disaster management (CBDM), and mainstreaming DRR into development and education. Guided by these international initiatives, many governments have installed disaster management offices, either as new entities or as part of existing ones, and begun working on National Platforms for DRR, a nationally owned and led forum or committee of multi-stakeholders which advocates for DRR at different levels and provides coordination, analysis and advice on areas of priority action.<sup>49</sup> Multitudes of NGOs at the national and local level have also sprung up around the world to combat disasters, especially in developing nations.

Several natural disasters trends over the past few decades have motivated this increased interest in DRR. Three specific trends are explained here, including: (1) the increase in number of disasters; (2) the increase in number of people affected by disasters; (3) the disproportionate impact of disasters on poor countries.

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<sup>48</sup> These international agreements and initiatives will be further discussed in the following section.

<sup>49</sup> UN/ISDR, *Guidelines: National Platforms for Disaster Risk Reduction* (Geneva: UN/ISDR, 2007), 4

### *Recent Trends in Natural Disasters*

Understanding disaster trends is important to realize the challenge that disasters pose and the growing need to find additional ways to reduce disaster risk. The first trend apparent in the last few decades is an increasing frequency of disasters. According to EM-DAT data, a worldwide database on disaster related information maintained since 1988 and documented by the Centre for Research on the Epidemiology of Disasters (CRED) in Belgium,<sup>50</sup> between 1950 and 1959 there were a total of 294 natural disasters; from 1970-1979 there were 964; and from 1990-1999 there were 2,720. From 2000-2005, there were 2,788 reported natural disasters, more than the entire decade of the 1990s (fig. 1.1).<sup>51</sup> In addition, between 2004 and 2005 figures show there was an 18 percent increase in the number of natural disasters worldwide.<sup>52</sup>

This increase can be attributed to two factors, both related to human activity. First, environmental degradation and climate change have several significant consequences, including the loss of natural buffer zones such as dunes, mangroves and wetlands, the destabilization of slopes, and unnatural variation in the average global temperatures.<sup>53</sup> Scientists claim that these changes impact the tendencies of natural disasters. Specifically, climate change has produced both short-term and long-term climate variability which both affect disasters.<sup>54</sup> In the short-term, variability and extreme temperatures lead to a greater range and higher frequency of shocks on a society;

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<sup>50</sup> IFRC, *World Report 2004 Focuses on Community Action* (Geneva: IFRC, 2004), 27.

<sup>51</sup> UN/ISDR, "Disaster Statistics: Disaster Occurrence," *UN/ISDR* (2007), <http://www.unisdr.org/disaster-statistics/occurrence-trends-century.htm>.

<sup>52</sup> Liz Tschoegl, with Regina Below and Debarati Guha-Sapir, "An Analytical Review of Selected Data Sets on Natural Disasters and Impacts," prepared for UNDP/CRED Workshop on Improving Compilation of Reliable Data on Disaster Occurrence and Impact, (Bangkok, 2-4 April 2006): 5.

<sup>53</sup> Coppola, *Introduction to International Disaster Management*, 22.

<sup>54</sup> Lisa Schipper and Mark Pelling, "Disaster Risk, Climate Change and International Development: Scope for, and Challenges to Integration," *Disasters* 30, no. 1 (2006): 29.



long-term variability impacts the productive base of a society, specifically in economies dependent on natural resources, such as agriculture.<sup>55</sup> Further, the International Panel on Climate Change (IPCC) has produced data illustrating that certain characteristics of climate change can cause specific types of disasters. For example, rising temperatures can lead to heat waves, droughts, forest fires and famine. Climate change also causes more intense precipitation, leading to soil erosion, flooding, landslide, avalanche, mudslide damage, and an increased intensity of mid-latitude storms.<sup>56</sup> Overall, it is apparent that climate change and environmental degradation both impact the increase in number of natural disasters.

A second factor contributing to the increasing number of natural disasters is the pattern of settlement in vulnerable areas.<sup>57</sup> According to quoted statistics, “in 1950, less than 30 percent of the world’s 2.5 billion people lived in an urban setting. By 1998, the number of people on Earth had grown to 5.7 billion, and 45 percent of them lived in cities. The UN estimates that by 2025, there will be 8.3 billion people on earth, and over 60 percent of them will live in cities” (fig. 1.5).<sup>58</sup>

What does this increased urbanization have to do with the number of disasters? A greater population density in cities forces many of the poorer groups to reside in more dangerous and hazard-prone areas, such as unstable hillsides or floodplains. This means that hazard events will more likely become disasters, since a greater population in

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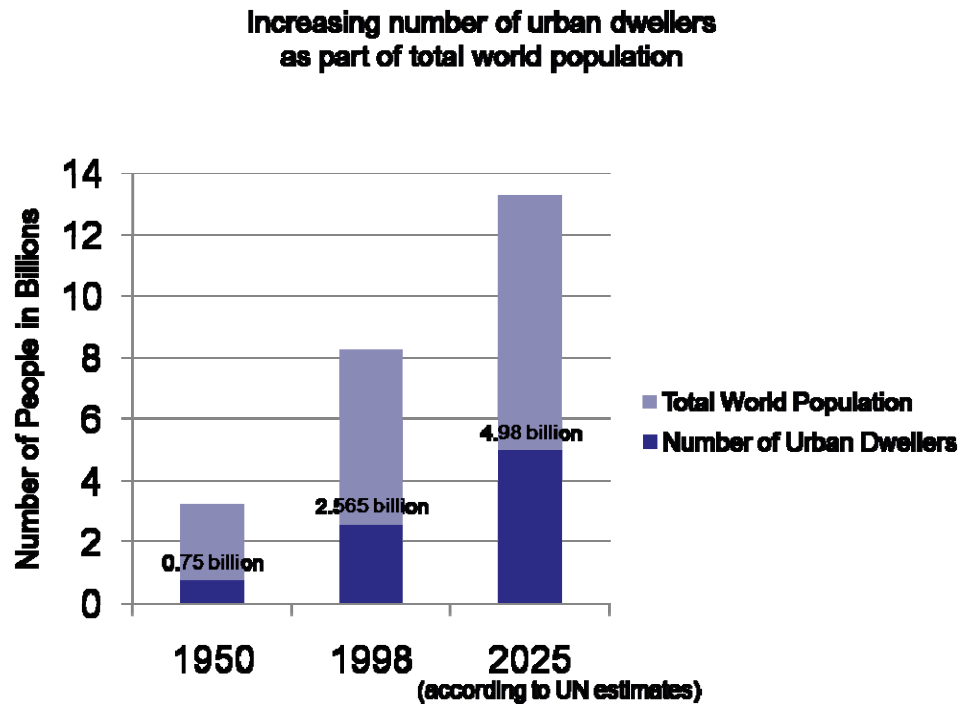
<sup>55</sup> Ibid., 29.

<sup>56</sup> Maarten K. van Aalst, “The Impacts of Climate Change on the Risk of Natural Disasters,” *Disasters* 30, no. 1 (2006): 8-9.

<sup>57</sup> Coppola, *Introduction to International Disaster Management*, 22.

<sup>58</sup> Ibid., 15.

dangerous areas will be more difficult to protect.<sup>59</sup> Overall, both human and natural activities relating to environmental, economic and social elements of societies contribute to the rising number of disasters throughout the world.



**Figure 1. 5. Increasing world urbanization over the past five decades**  
(Based on Data from Coppola, *Introduction to International Disaster Management*, 15)

A second disaster trend highlighted by Coppola is the recent increase in the number of people affected by disasters. The number of people affected by environmental disasters across the globe is staggering. According to EM-DAT data, a general upward trend is visible in the number of people affected globally from 1900-2006 (fig. 1.2).<sup>60</sup> Similar to the increased frequency of disasters, urbanization (which largely began in the

<sup>59</sup> Ibid., 22; This is examined more thoroughly when discussing the difference between disasters and hazards. However, according to Coppola, a disaster is a hazard that has “overwhelmed the response capability of a community.” (25)

<sup>60</sup> EM-DAT: The OFDA/CRED International Disaster Database, “Natural Disaster Trends: Number of People Reported Affected by Nat. Dis. 1900-2006,” *EM-DAT Emergency Events Database*, [www.emdat.be/Database/Trends/NaturalDisasters/natdis\\_trend1\\_03.html](http://www.emdat.be/Database/Trends/NaturalDisasters/natdis_trend1_03.html).

1950s) and the rise of settlement in hazard-prone areas also increases the number of individuals affected by a given hazard.<sup>61</sup>

In addition, the world population increase also contributes to the number of people affected by disasters. According to the United States Census Bureau, the world's population has increased from approximately 2.5 billion in 1950, to 4.45 billion in 1980, to over 6 billion in 2000, with an estimation of 9.4 billion by 2050.<sup>62</sup> The United Nations Development Programme (UNDP) also claims that “at least 75 percent of the world's population lives in areas affected at least once between 1980 and 2000 by earthquake, tropical cyclones, flood or drought.”<sup>63</sup>

A third trend in natural disasters is that poor countries are disproportionately affected by disaster consequences.<sup>64</sup> According to a UNDP 2004 report, fifty-three percent of deaths attributed to disasters between 1980 and 2000 were from countries with low human development ratings, and these same countries accounted for only eleven percent of the world's at-risk population.<sup>65</sup> The UNDP concludes in its report that “development status and disaster risk are clearly closely linked (see fig. 1.6).”<sup>66</sup>

Further, the number of victims from disasters occurring between 1974 and 2003 are disproportionately from low income classes (fig. 1.7).<sup>67</sup>

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<sup>61</sup> Coppola, *Introduction to International Disaster Management*, 15.

<sup>62</sup> US Census Bureau, Population Division, “World Population Information,” <http://www.census.gov/ipc/www/idb/worldpopinfo.html>, (updated July 16, 2007).

<sup>63</sup> UNDP, *Reducing Disaster Risk*, 10.

<sup>64</sup> Coppola, *Introduction to International Disaster Management*, 18.

<sup>65</sup> UNDP, *Reducing Disaster Risk*, 10.

<sup>66</sup> *Ibid.*, 10.

<sup>67</sup> Guha-Sapir, Hargitt, and Hoyois, *Thirty Years of Natural Disasters*, 35.

Country	GDP (US\$) per capita 2002	Annual average victims / 100,000 population 1974 – 2003	Country	GDP (US\$) per capita 2002	Annual average victims/100,000 population 1974-2003
Luxembourg	44,000	0	Somalia	550	2,701
United States	37,600	59	Sierra Leone	580	155
Norway	31,800	5	Burundi	600	674
Switzerland	31,700	2	Congo, RD	610	114
Ireland	30,500	4	Tanzania	630	1,531
Canada	29,400	72	Malawi	670	8,748
Belgium	29,000	2	Afghanistan	700	1,120
Denmark	29,000	0	Eritrea	740	6,402
Japan	28,000	182	Ethiopia	750	5,259
Austria	27,700	29	Madagascar	760	2,090

Figure 1. 6. Table comparing the human impact of natural disasters between the ten richest and ten poorest countries

Reprinted from Guha-Sapir, Hargitt, and Hoyois. *Thirty years of Natural Disasters 1974-2003: The Numbers*, Table 5.

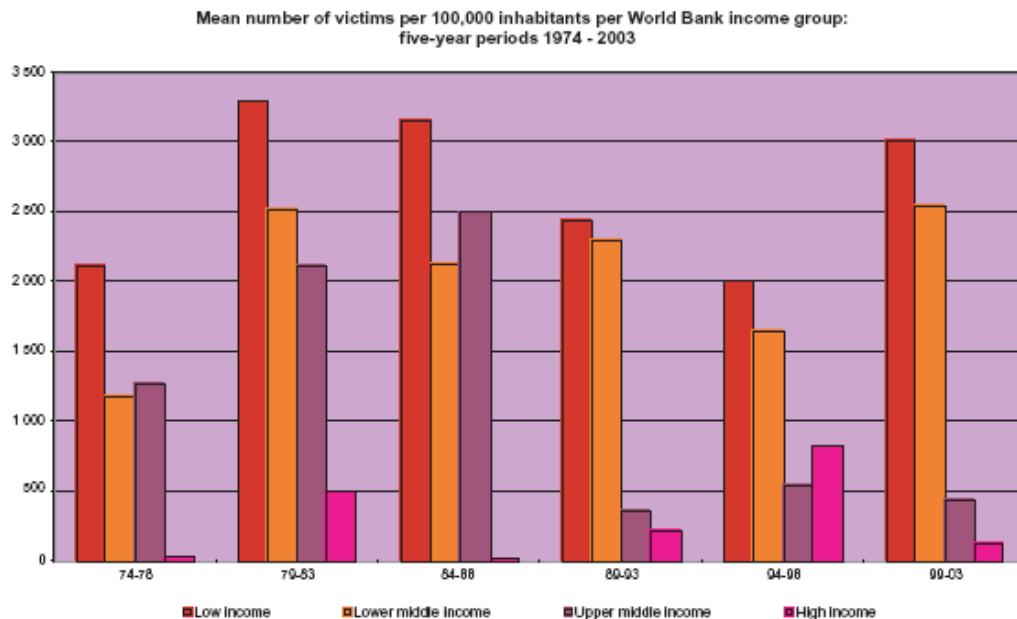


Figure 1. 7. Graph showing the disproportionate impact of disasters on the low income population.

Reprinted from Guha-Sapir, Hargitt, and Hoyois. *Thirty years of Natural*

*Disasters 1974-2003: The Numbers*, Fig. 6.

Further, the United Nations Environmental Program (UNEP) reports that sixty-five percent of disaster-related injuries and deaths occur in countries where per-capita income levels are below \$760 a year.<sup>68</sup> In addition, "...the most important disasters in terms of numbers killed or affected over the last 30 years have occurred in all three continents of the developing world...[In particular,] Asia and Africa bear a disproportional burden of losses due to disasters. Over the last 30 years, approximately 88 percent of the total people reported killed and 96 percent of the people reported affected lived in these two regions."<sup>69</sup> The World Bank reported in 2001 that "an estimated 97 percent of natural disaster-related deaths each year occur in developing countries."<sup>70</sup>

The UN/ISDR explains this trend by attributing disaster vulnerability to certain characteristics of developing nations, such as poverty and poor living conditions, urbanization and density of population, the settling on land most at risk, and the overall greater population of poor throughout the world than rich.<sup>71</sup> Eric Noji indicates additional reasons why the poor are most at risk from environmental disasters:

1. They are least able to afford housing that can withstand seismic activity.
2. They often live along coasts where hurricanes, storm surges, or earthquake-generated tsunamis strike or live in floodplains subject to inundation.
3. They are forced by economic circumstances to live in substandard housing built on unstable slopes that are susceptible to land-slides or are built next to hazardous industrial site.<sup>72</sup>

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<sup>68</sup> Coppola, *Introduction to International Disaster Management*, 18.

<sup>69</sup> D. Guha-Sapir, D. Hargitt, and P. Hoyois, *Thirty years of Natural Disasters 1974-2003: The Numbers* (Louvain-la Neuve, Belgium: Presses Universitaires de Louvain, 2004), 27, 29

<sup>70</sup> UN/ISDR, *Living with Risk*, 59-61.

<sup>71</sup> UN/ISDR, *Living with Risk*, 61.

<sup>72</sup> Coppola, *Introduction to International Disaster Management*, 18.

In addition, there are several “secondary reasons” the poor are affected disproportionately. For instance, injuries caused by disaster impacts often lead to death due to the inability to control disease, environmental conditions, and a lack of sufficient health care. There is also often a lack of enforcement when it comes to safety standards, building codes, and zoning regulations which can protect individuals before they are affected.<sup>73</sup> Finally, developing countries often do not financially prioritize disaster reduction since they have limited resources to distribute overall.<sup>74</sup>

Specifically, it is also noted that many developing populations are not educated on how to respond and survive when a disaster occurs.<sup>75</sup> This is one way that indigenous knowledge can help to reduce risk, being a means by which people become informed on how to recognize incoming disasters and reduce their impact.

#### *Motivations for Disaster Management*

Given these trends, it seems clear that something must be done to reduce the increasing destruction posed by natural disasters. The incentives for DRR are multi-faceted. Motivations for DRR work can be moral, reducing the extreme loss of life; economic, reducing the value of damage and loss which could impact the development of many countries; social, keeping societies and communities intact in the face of disaster; and political, both providing security for political institutions and reflecting the overall relationships between governments and the political goals of individuals, nations, regions and organizations.

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<sup>73</sup> Ibid., 19.

<sup>74</sup> Ibid.

<sup>75</sup> Ibid., 18.

The UN/ISDR defines its motivation for investing in disaster management. “It is about improving standards of safety and living conditions with an eye on protection from hazards to increase resilience of communities. A safer society to withstand disasters may be argued as a case of ethics, social justice and equity. It is also motivated by economic gains.”<sup>76</sup> The UNDP illuminates the connection between disasters and development, arguing that disaster risk is an issue of development and livelihood and successful development needs to incorporate disaster risk management. In addition, it shows that disaster management can contribute to the achievement of the Millennium Development Goals (MDGs).<sup>77</sup> According to these motivations, disaster management is important for the same reasons that development has been promoted and endorsed for decades.

\* \* \*

New approaches have developed over recent years to combat the growing risk posed by natural disasters. While disasters have traditionally been seen as something to survive or with which to cope, new approaches which introduce the concepts of vulnerability, resilience, capacity and sustainable development emphasize how human action and existing social, economic and political systems have a large impact on risk. The next section discusses three different shifts within the disaster management field towards a focus on vulnerability, pre-disaster activities, and an inclusion of the affected community in the DRR process. A consideration of indigenous knowledge in disaster reduction has been introduced by these new approaches, since its value depends on

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<sup>76</sup> UN/ISDR, *Living with Risk*, 19.

<sup>77</sup> UNDP, *Reducing Disaster Risk*, 10. The Millennium Development Goals (MDGs) are eight concrete targets set by the United Nations as a way to coordinate global efforts on issues relating to poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women. These goals are time-bound, with a goal of achieving them by 2015, and have been adopted by all countries as part of the UN Millennium Summit in 2000. For more information, see the United Nations site dedicated to the MDGs: UN, <http://www.un.org/millenniumgoals/>.

decreasing the vulnerability of communities to disasters, educating and preparing communities before a disaster occurs, and involving the holders of this knowledge into the DRR process.

### **Changing Approaches to Disaster Management**

Throughout history, and more rapidly in recent decades, changes have been made in the field of disaster management. Three important approaches help discuss these changes, each dependent on the key concepts defined above: one based on risk and vulnerability, one based on stages of disaster management, and one based on the involvement of the community.

#### *Shift One: Vulnerability Approach*

Referring back to the discussion on the definition of risk, there are two ways of reducing disaster risk: reduce frequency or reduce vulnerability. In the first, to reduce frequency one must decrease the number of hazards that occur. This involves controlling nature which is often quite difficult; however, there are some areas where human action does impact the frequency of disasters. For example, inland deforestation and unsustainable agricultural practices have proven to lead to increased likelihood of disasters, since the stability of the soil and its ability to retain water are decreased, making it more likely to result in flashfloods, landslides and in some cases droughts.<sup>78</sup>

The second way to approach disaster management is to make sure hazards do not become disasters. This can be done by reducing the vulnerability of societies to

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<sup>78</sup> Maarten van Aalst and Ian Burton, *The Last Straw: Integrating Natural Disaster Mitigation and Environmental Management*, Disaster Risk Management Working Paper Series No. 5 (Washington D.C.: World Bank, 2002).



environmental hazards or increasing their resilience, since hazards will only become disasters if they overwhelm societal response capabilities. As discussed above, certain factors of vulnerability, such as settlement patterns or lack of education and awareness, can increase the risk of a disaster.

For many years, it was assumed that the way to reduce the consequence of disasters was to reduce the frequency of the events. This was based on the belief that disasters were solely the responsibility of nature, and did not take into account the human factors impacting disasters. This view is now changing.

People perceive disasters in different ways. First, a “naturalist,” or “physicalist” puts all the blame on nature.<sup>79</sup> This is the classic approach to disasters described above. Second, a “man and nature” perspective claims that humans do not understand nature and often interact in a harmful manner, changing the environment for their own benefit, which can cause consequences in the form of disasters.<sup>80</sup> These consequences, sometimes referred to as “environmental determinism,” is what causes people to rebuild in hazard-prone areas or attempt to control nature, denying that it could cause them harm.<sup>81</sup> A third perspective, “political ecology,” was introduced in the 1970s alongside political economy theory. It emphasizes the impact social and political processes have on the environment, introducing the idea that human action can have environmental consequences.<sup>82</sup> Finally, a new perspective has developed over the past thirty years which takes into account vulnerability when determining the cause of disasters. It considers vulnerability as the “trigger factor” for a disaster, not the environmental hazard

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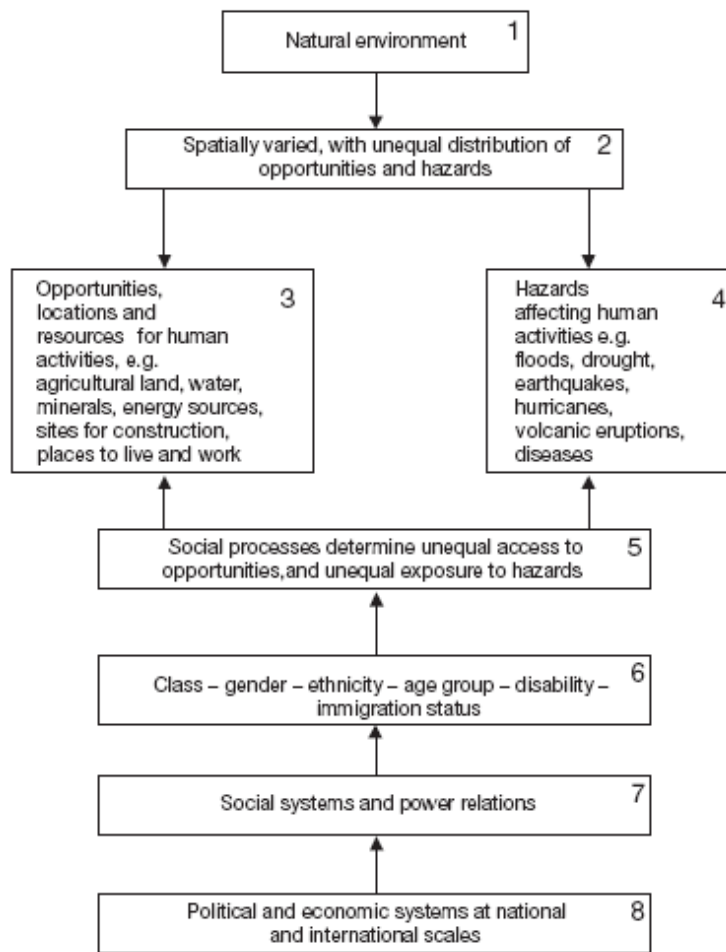
<sup>79</sup> Blaikie, *At Risk*, 10.

<sup>80</sup> Ibid.

<sup>81</sup> Ibid.

<sup>82</sup> Blaikie, *At Risk*, 11.

itself.<sup>83</sup> The diagram seen in figure 1.8 illustrates the different social pressures that lead to disasters, showing that vulnerability to disasters comes from the distribution of both hazards and elements such as race, gender, class, and ethnicity.<sup>84</sup> Today, vulnerability is the focus of many local, national and international disaster management organizations which acknowledge that societal structures and systems influence the consequences of disasters.



**Figure 1. 8. Social pressures which lead to disasters.**

Reprinted from Blaikie, *At Risk*, Figure 1.1.

<sup>83</sup> Ibid., 10-11.

<sup>84</sup> Ibid., 8.

### *Shift Two: Focus on Pre-disaster Activities*

For most of history, disaster management has been focused on preparing for the response and recovery stages, that is, the post-disaster activities. Many organizations and governments emphasize emergency response, relief and aid with short-term considerations. A main reason for this focus is that historically disaster management has been conceptualized as part of civil defense systems, developing with advances in warfare technology, and included elements such as “detection systems, early warning alarms, hardened shelters, search and rescue teams, and local and regional coordinators.”<sup>85</sup> With defense systems came legislation which laid the foundation for present day disaster management organizations. This illustration is a generalization, and naturally the specific arrangement of disaster management in each country differs; yet this history highlights the response-focus of the foundation of mainstream disaster management.

The change that occurred in the latter part of the twentieth century was due in part to the severity and frequency of disasters.<sup>86</sup> Governments, societies and disaster management organizations all hoped to reduce the impact of increasing disasters and looked for a better method. On December 11, 1987, the United Nations’ General Assembly decided that the 1990s should be named the “International Decade for Natural Disaster Reduction” (IDNDR) with the aim to encourage nations to focus on their national disaster reduction efforts and create a means of coordinating these efforts internationally.

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<sup>85</sup> Coppola, *Introduction to International Disaster Management*, 4-5.

<sup>86</sup> UN/ISDR, *Living with Risk*, 7.

As part of the IDNDR, in 1995 the UN adopted a strategy known as the *Yokohama Strategy and Plan of Action for a Safer World*. The Yokohama Strategy became a general set of guidelines for disaster prevention, preparedness and mitigation.<sup>87</sup> In the document, the UN asserted the need for a comprehensive approach to DRR, agreeing that disaster response alone will not fulfill the goals of the IDNDR. They further stated that “we have followed this limited approach for too long.”<sup>88</sup>

Before the end of the IDNDR, the UN decided its work could not be completed during the decade and proposed a new agency of the UN called the International Strategy for Disaster Reduction (UN/ISDR) based in Geneva. This organization, established in 2000, continued the work of the IDNDR and further encouraged the importance of pre-disaster activities, or DRR. Its four objectives each reflect important mitigation and preparedness activities, in contrast to the historic focus of response and reconstruction. They were to:

1. Increase public awareness to understand risk, vulnerability and disaster reduction
2. Promote the commitment of public authorities to disaster risk reduction
3. Stimulate multidisciplinary and inter-sectoral partnerships; expand risk reduction networks
4. Improve scientific knowledge about disaster causes and effects on societies<sup>89</sup>

Finally, in 2005, 168 governments signed and adopted the *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters* (HFA). This document also emphasized pre-disaster activities and encouraged nations to focus on

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<sup>87</sup> UN, *Yokohama Strategy and Plan of Action for a Safer World*, (Geneva: United Nations, 1994).

<sup>88</sup> Ibid.

<sup>89</sup> UN/ISDR, “Mission and Objectives,” [http://www.unisdr.org/eng/about\\_isdr/isdr-mission-objectives-eng.htm](http://www.unisdr.org/eng/about_isdr/isdr-mission-objectives-eng.htm).

risk reduction as an important element of disaster management, something many countries had dismissed in the past.

Another part of the impetus for this shift from post-disaster to pre-disaster activities is the newly accepted preventative, long-term perspective on the issue. This has developed in part because of the linkage between disaster management and sustainable development. Experts have found that developing countries are more susceptible to the impacts of disasters, and disasters have devastating consequences on development.

### *Shift Three: Towards Community-Based Disaster Management (CBDM)*

Community-based disaster management (CBDM) is a new approach to DRR. Allen, a DRR researcher and practitioner working in the Philippines, explains the evolution of CBDM and the shifting emphases:

Historically, top-down, interventionist approaches have dominated the disaster management field. Initiatives have been characteristically technology-centered and driven by outside ‘experts’. However, over the past two decades, increasing emphasis has been placed on, on the one hand, community-based approach, and on the other, pre-emptive approaches that focus on the root causes of vulnerability rather than isolated disaster events.<sup>90</sup>

The concept of CBDM was pioneered as early as the 1980s by the Peruvian NGO Centro de Estudios y Prevención de Desastres (or Disaster Prevention and Study Center, known as PREDES) and the Network for Social Studies on Disaster Prevention in Latin America (La Red).<sup>91</sup> Andrew Maskrey, disaster management specialist working in Latin America at the time, offered a critique of conventional mitigation programs in the

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<sup>90</sup> Katrina M. Allen, “Community-based preparedness and climate adaptation: local capacity-building in the Philippines.” *Disasters* 30, no. 1 (2006): 82-83.

<sup>91</sup> Lorna P. Victoria, “Community Based Approaches to Disaster Mitigation,” in *Proceedings of the Regional Workshop on Best Practices in Disaster Mitigation: Lessons Learned from the Asian Urban Disaster Mitigation Program and other Initiatives*, (Bali, Indonesia: ADPC, 2002): 270.

1980s.<sup>92</sup> He described them, as Allen does, consisting of a top-down approach with “large centralized agencies without participation in decision-making by stakeholders.”<sup>93</sup> He outlines three specific critiques of this approach: First, it reduces the risk but not vulnerability, that is, it attacks the symptoms but not the underlying causes; Second, it does not take into account the needs or demands of the stakeholders, specifically the community members; Third, it favors the rich and powerful and is a very political model.<sup>94</sup> In response, after comparing the effectiveness of the two methods for mitigation programs, he encourages the creation of community based organizations (CBOs) and concludes that community based programs offer a vehicle for development, effectively reduce vulnerability, and build self-confidence within the community so that people are more likely to take control of the situation.<sup>95</sup>

Throughout the 1990s and into the twenty-first century, countless other NGOs and international organizations have done further work using the CBDM model. It has been accepted by the UN as a valuable approach to DRR, shown in a new publication which compiles good practices in Community-Based Disaster Risk Reduction.<sup>96</sup>

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After understanding the current trends, motivations and shifts in the field of disaster management, the importance of improving the mechanisms for reducing disaster consequences is even more apparent. Research continues to be done to determine how to improve existing approaches to DRR. Nonetheless, rarely in the past have DRR

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<sup>92</sup> Andrew Maskrey, *Disaster Mitigation: A Community Based Approach*, (Oxford: Oxfam, 1989).

<sup>93</sup> *Ibid.*, 39.

<sup>94</sup> *Ibid.*

<sup>95</sup> *Ibid.*, 90.

<sup>96</sup> UN/ISDR, *Building Disaster Resilient Communities: Good Practices and Lessons Learned*, (Geneva: United Nations, 2007).

practitioners recognized the value of indigenous knowledge for reducing vulnerability to disasters. The focus of this paper is to identify how four particular categories of indigenous knowledge can help to reduce a society's vulnerability to disasters. These categories include ecological knowledge, an environmental ethic, cultural traditions associated with disasters and a connection to place. The next chapter further explores the concept of indigenous knowledge and its complexities. It sets the foundation for understanding these four core categories of knowledge.

## Two

### **INDIGENOUS KNOWLEDGE:** Defining Key Characteristics and Controversies of the Discourse

Indigenous knowledge refers to the multi-dimensional understandings developed by a culture based on its local environment and its long history of inhabiting that environment. A deeper understanding of indigenous knowledge, its characteristics and controversial elements is essential if this knowledge is to be used to improve disaster risk reduction (DRR).

This chapter focuses on defining indigenous knowledge and understanding its core characteristics and controversies. It begins by proposing a working definition for indigenous knowledge. Since there is no universally accepted definition, several interpretations are reviewed in order to understand its importance within the community. Then, to further clarify the concept of indigenous knowledge, two controversies relating to terminology are discussed: who is indigenous, and how do you distinguish between indigenous knowledge and other related terms? Finally, one main assumption about indigenous knowledge is addressed, dismissing the belief that *all* indigenous communities live environmentally sustainable lives using strategies embedded in their indigenous knowledge.



## Defining Indigenous Knowledge

Since there are numerous definitions of indigenous knowledge found throughout the literature, it is important to agree on one definition. A single definition is not as simple as it seems. Defining indigenous knowledge in and of itself is considered controversial by some.<sup>97</sup> Nevertheless, by defining indigenous knowledge we can better understand its value for DRR and link these conclusions to other academic work on the subject.

*Indigenous knowledge* refers to approaches and practices of a culture which develop from an advanced understanding of its specific environment which has formed over numerous generations of habitation.<sup>98</sup> The relationship between the local community and its specific natural environment is crucial when discussing natural disasters. Furthermore, the extended period of time a community has existed in a given environment expands the knowledge that comes from experience and practice. These two characteristics—the local environment and the element of time—are common to many definitions of indigenous knowledge found throughout the literature.

For example, in regards to the first characteristic of the local environment, Louise Grenier, in a publication by the International Development Research Centre (IDRC), provides a much cited definition of indigenous knowledge that emphasizes the geographical context of the knowledge. She defines indigenous knowledge as “the unique, traditional, local knowledge existing within and developed around the specific

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<sup>97</sup> For a discussion on the issues with defining the term indigenous knowledge, see Deborah McGregor, “Coming Full Circle: Indigenous Knowledge, Environment, and Our Future,” *American Indian Quarterly* 28, nos. 3 & 4 (2004): 385-410.

<sup>98</sup> This definition of indigenous knowledge is inspired by several definitions, including literature on anthropology, development and ethno-science, as well as by organizations focused on indigenous knowledge preservation (such as UNESCO, UNDP, IDRC, and several development organizations).

conditions of women and men indigenous to a particular geographic area.”<sup>99</sup> Not only does this definition claim that the knowledge is specific to the locality, but it also emphasizes the unique relationship between the holders of the knowledge and the geographical location they inhabit.

Similarly, in a working document for an experts meeting on *Safeguarding the Transmission of Local and Indigenous Knowledge of Nature*, the United Nations Educational, Scientific and Cultural Organization (UNESCO) claims that local and indigenous knowledge connect directly to the natural world and the specific environmental context.<sup>100</sup> D. M. Warren, a leading academic in indigenous knowledge and development, defines indigenous knowledge as “unique to a given culture or society.”<sup>101</sup> A society’s uniqueness stems in part from the uniqueness of the local environment and the conditions it presents. Therefore, indigenous knowledge is founded on the relationship between humans and their unique natural environment.

The dependence of indigenous knowledge on the local environment is elegantly described by Batiste and Henderson, two scholars born into indigenous communities, who provide a conceptualization of what indigenous knowledge is:

...[K]nowledge is the expression of the vibrant relationships between people, their ecosystems, and other living beings and spirits that share their lands...All aspects of knowledge are interrelated and cannot be separated from the traditional territories of the people concerned...To the indigenous ways of knowledge, the self exists within a world that is subject to flux. The purpose of these ways of knowing is to reunify the

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<sup>99</sup> Louise Grenier, *Working with Indigenous Knowledge: A guide for researchers*. (Ottawa, Canada: IDRC, 1998), 1.

<sup>100</sup> UNESCO, “Safeguarding the Transmission of Local and Indigenous Knowledge of Nature,” working document for experts meeting, (Nagoya, Japan, 14-15 April 2005). The definition found in this text is as follows: “the knowledge about the natural world that is possessed and developed by peoples with continuing close ties to their natural milieu.”

<sup>101</sup> D. M Warren, “The Role of Indigenous Knowledge in Facilitating the Agricultural Extension Process,” paper presented at *International Workshop on Agricultural Knowledge Systems and the Role of Extension*, (Bad Boll, Germany, May 21-24, 1991).

world or at least to reconcile the world to itself. Indigenous knowledge is *the way of living* within contexts of flux, paradox, and tension, respecting the pull of dualism and reconciling opposing forces...Developing these ways of knowledge leads to freedom of consciousness and to solidarity with the natural world.<sup>102</sup>

Batiste and Henderson provide a theoretical view which explains that indigenous knowledge is more than expertise in a specific field; it encompasses an integral relationship with the environment and the “way of living” in a changing world.

The second important characteristic of indigenous knowledge is its relation to time. The term *indigenous* implies a historic continuity in a specific location. Unlike other types of knowledge, indigenous knowledge stems from experience and understanding of life processes. The time factor, or “generations of habitation,” shows that indigenous knowledge evolves and adapts to the conditions of its existing environment. Another often cited definition of indigenous knowledge emphasizes this dynamic character, claiming that this knowledge is influenced by “internal creativity,” “experimentation,” and “contact with external systems.”<sup>103</sup>

The elements of adaptation and change are found in other working definitions as well. UNESCO defines indigenous knowledge as “dynamic and evolving – reconstituted, re-created and revised by each succeeding generation of knowledge-holders.”<sup>104</sup> Others see indigenous knowledge as “cumulative, representing generations of experiences, careful observations, and trial-and-error experiments.”<sup>105</sup>

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<sup>102</sup> McGregor, “Coming Full Circle,” 390.

<sup>103</sup> J.M. Flavier, et al., “The regional program for the promotion of indigenous knowledge in Asia,” in *The cultural dimension of development: Indigenous knowledge systems*, eds. D.M. Warren, L.J. Slikkerveer and D. Brokensha, (London: Intermediate Technology Publications, 1995): 479.

<sup>104</sup> UNESCO, “Safeguarding the Transmission of Local and Indigenous Knowledge of Nature.”

<sup>105</sup> Rama Devi Tella, “Towards Promotion and Dissemination of Indigenous Knowledge: A Case of NIRD,” *The International Information and Library Review* 39 (2007): 185.

The dynamic view of indigenous knowledge is contrary to a traditional view, which is that of a static, historic entity that has not yet adapted to modernity. Research has shown, however, that the older view is not an accurate reflection of the true nature of indigenous knowledge.

### *Other Characteristics of Indigenous Knowledge*

In addition to the relationship with the natural environment and association with time and adaptation, four additional characteristics of indigenous knowledge have been identified. These include an internal origin, a non-formal method of dissemination, a collective ownership, and a practical type of knowledge.

First, the origin of indigenous knowledge lies within the communities, though it is often influenced by outside sources over time. Exchanges of information between different cultures, notably between Asia and the Americas, have taken place since as early as the fifteenth century.<sup>106</sup> Nonetheless, the process of developing indigenous knowledge, whether incorporating outside knowledge or not, is accomplished solely by the community. A community holds a unique relationship with and an understanding of its environment and knows how to adapt any knowledge or experience to its specific context.

Second, indigenous knowledge is orally transmitted and not often recorded in other media.<sup>107</sup> This is a stark difference from scientific knowledge, which is founded on the categories of documentation and dissemination. In fact, the lack of documentation is

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<sup>106</sup> Arun Agrawal, "Dismantling the Divide Between Indigenous and Scientific Knowledge," *Development and Change* 26 (1995): 422.

<sup>107</sup> This is not to imply that no indigenous knowledge has ever been documented. There are many examples of indigenous knowledge which have been written down. However, it is important to note that most indigenous knowledge is and never will be documented.

consistent with the unique nature of indigenous knowledge.<sup>108</sup> This difficulty with documentations occurs in part because the knowledge is itself a process associated with an active society, which is difficult to capture.<sup>109</sup>

Nonetheless, many scholars and organizations are currently attempting to record indigenous knowledge in a systematic way. For example, UNESCO and the World Bank have both created databases in recent years which contain collections of indigenous knowledge.<sup>110</sup> While this is a valuable exercise, and many specific indigenous practices are shared using this method, it is important to realize that the entire nature of indigenous knowledge cannot be captured through documentation. Indigenous knowledge, and an understanding of the environment, is integrated into peoples' lives, their culture, their values and belief systems and so is difficult to fully describe.<sup>111</sup>

The multi-dimensional nature of indigenous knowledge is the focus of Fikret Berkes' well-known book *Sacred Ecology* which focuses on the worldview of indigenous knowledge holders. Berkes discusses the belief systems attached to indigenous systems of knowledge. He illustrates the moral and ethical context and the integration of nature and culture in this knowledge.<sup>112</sup> The complex relationship between knowledge, culture and beliefs is important in the context of DRR, since the belief system often incorporates an environmental ethic which helps reduce the risk of disasters. Chapter five explores

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<sup>108</sup> Arun Agrawal, "Indigenous and Scientific Knowledge: Some Critical Comments," *Indigenous Knowledge and Development Monitor* 3, no. 3 (1995): 3-6.

<sup>109</sup> Douglas Nakashima, Lyndel Prott, and Peter Bridgewater, "Tapping into the Worlds Wisdom," *Sources* no. 125 (2000): 12.

<sup>110</sup> Management of Social Transformations Program and the Centre for International Research and Advisory Networks (MOST). *Best Practices on Indigenous Knowledge*, [www.unesco.org/most/bpikpub.html](http://www.unesco.org/most/bpikpub.html).

<sup>111</sup> UNESCO, "Safeguarding the Transmission of Local and Indigenous Knowledge of Nature."

<sup>112</sup> Fikret Berkes, *Sacred Ecology* (Philidelphia, PA: Taylor and Francis, 1999), 9.

this concept in more detail when examining the category of knowledge relating to an environmental ethic.

A third characteristic of indigenous knowledge is its collective nature, meaning that the entire community owns the knowledge instead of specific individuals. Many belief systems and worldviews emphasize the importance of community, reinforcing this means of ownership. In fact, the knowledge also often takes into account a communal perspective on survival and decision-making. It must be noted that some knowledge is held by specific groups or members of a community, restricted to one gender, or to certain religious and spiritual leaders, midwives, or healers.<sup>113</sup> Yet on the whole, most indigenous knowledge relates an entire people's way of life, which often includes the community and emphasizes the value of collective ownership.

The final characteristic relates to the type of knowledge embedded in indigenous knowledge. Indigenous knowledge is the basis for survival strategies and decision-making.<sup>114</sup> It is used in several different areas, including agriculture, health, food preparation, education, and natural-resource management, among others.<sup>115</sup> These knowledge systems include all areas of life because they are developed by the people as a matter of survival.<sup>116</sup>

Based on these characteristics of indigenous knowledge, some differences between this knowledge and scientific (or Western) knowledge emerge, suggesting an added value indigenous knowledge holds due to its alternative strategies and different

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<sup>113</sup> UNESCO, "Safeguarding the Transmission of Local and Indigenous Knowledge of Nature."

<sup>114</sup> MOST, *Best Practices on Indigenous Knowledge*.

<sup>115</sup> Warren, "The Role of Indigenous Knowledge in Facilitating the Agricultural Extension Process;" and World Bank, Africa Region: Knowledge and Learning Center, *Indigenous Knowledge for Development: A Framework for Action*, (World Bank: 1998).

<sup>116</sup> Tella, "Towards Promotion and Dissemination of Indigenous Knowledge," 185.

worldview. Indigenous knowledge develops through extended experiences in a specific environment, resulting in concrete information which relies on evidence directly from these experiences.<sup>117</sup> In contrast, scientific knowledge breaks down and rearranges collected data often far removed from the specific experience.<sup>118</sup> Second, indigenous knowledge originates within the community, which contrasts with scientific knowledge which is often influenced by many outside sources unrelated to the local culture or environment. Thus, indigenous knowledge is locally-focused, based in the reality of the specific community and its cultural, moral, political, and cosmological implications. Scientific knowledge prides itself on its universal validity, divorcing itself from the local context.<sup>119</sup> Third, scientific knowledge is documented as a means of maintenance, dissemination and validation; however, indigenous knowledge is most often orally disseminated which better suits its dynamic and local character.<sup>120</sup> Fourth, the collective ownership of indigenous knowledge means it is highly dispersed throughout the community, whereas scientific knowledge is often held by “experts,” or centralized within a given group or state.<sup>121</sup> Finally, in regards to the type of knowledge, on the one hand indigenous knowledge usually contains highly detailed, intimate information relating to livelihoods, in areas such as agriculture, agro-forestry, soil fertilization, health

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<sup>117</sup> M, Howes and R. Chambers, “Indigenous Technical Knowledge: Analysis, Implications and Issues,” in *Indigenous Knowledge Systems and Development*, eds. D. Broeknscha, D. Warrne and O. Werner (Lanham, MD: University Press of America, 1980): 330, quoted in Agrawal, “Dismantling the Divide Between Indigenous and Scientific Knowledge,” 417.

<sup>118</sup> Agrawal, “Dismantling the Divide Between Indigenous and Scientific Knowledge,” 417.

<sup>119</sup> T. Banuri and F. Apfell-Marglin, eds., *Who Will Save the Forests? Knowledge, Power and Environmental Destruction*, (London: Zed, 1993):11, 13, quoted in Agrawal, “Dismantling the Divide Between Indigenous and Scientific Knowledge,” 425,

<sup>120</sup> Agrawal, “Indigenous and Scientific Knowledge: Some Critical Comments,” 4.

<sup>121</sup> Agrawal, “Dismantling the Divide Between Indigenous and Scientific Knowledge,” 417.

care, and so forth. On the other hand, scientific knowledge often focuses on abstract ideas and philosophies, one step removed from concrete realities.<sup>122</sup>

All of the assertions listed above are controversial, and many strong arguments have been made as to why there should not be such a distinct division between scientific and indigenous knowledge. In fact, some argue strongly that the dichotomy between the two types of knowledge is not only false, but also has negative consequences.<sup>123</sup>

As seen in the above discussion, examining the difference between the two types of knowledge highlights several important characteristics of indigenous knowledge.<sup>124</sup> These characteristics can provide added value to many disciplines, including DRR. Some advocates argue that indigenous knowledge is a way to introduce a “cost-effective, participatory, and sustainable development process,” which moves away from the centralized, technically-oriented development solutions of the past which failed to take into consideration the well-being of local people.<sup>125</sup> Taken together, indigenous knowledge and scientific knowledge provide a more “rounded understanding of natural and cultural environments and sustainable development potentials.”<sup>126</sup> The four categories which this paper extracts from this concept and examines in chapter five,

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<sup>122</sup> Ibid., 422.

<sup>123</sup> See Agrawal, *Indigenous and Scientific Knowledge: Some Critical Comments*, and “Dismantling the Divide Between Indigenous Knowledge and Scientific Knowledge.” For an introduction to the debate following this discussion, see “Comments on article by Arun Agrawal,” *Indigenous Knowledge Monitor* 4, no. 1 (1995).

<sup>124</sup> For example, Banuri and Apffel Marlin provide a systems-of-knowledge analysis to compare indigenous and Western scientific knowledge. Their work concludes by providing five distinguishing characteristics of indigenous knowledge: “embeddedness of knowledge in the local cultural milieu; boundedness of local knowledge in space and time; the importance of community; lack of separation between nature and culture, and between subject and object; commitment or attachment to the local environment as a unique and irreplaceable place; and a noninstrumental approach to nature.” As Berkes concludes, “these features contrast, respectively, with Western scientific knowledge systems, which are characterized by disembodiedness; universalism; individualism; nature: culture and subject: object dichotomy; mobility; and an instrumental attitude (nature as commodity) toward nature.” See Berkes, *Sacred Ecology*, 10.

<sup>125</sup> Agrawal, “Dismantling the Divide Between Indigenous and Scientific Knowledge,” 414.

<sup>126</sup> Paul Sillitoe, “The Development of Indigenous Knowledge: A New Applied Anthropology,” *Current Anthropology* 39, no. 2 (1998): 226.



illustrate which characteristics of indigenous knowledge provide this added value to the field of DRR.

### **Further Clarifications in Defining Indigenous Knowledge**

It is important to further clarify a few other issues which may cloud the understanding of indigenous knowledge in the context of DRR. First, the term *indigenous* must be defined. Second, several other terms are found throughout the indigenous knowledge literature and are used interchangeably with *indigenous knowledge*. Such terms include local knowledge, traditional knowledge, folk knowledge, and farmer's knowledge. These must be differentiated in order to clearly reference relevant literature.

#### *Who is indigenous?*

One of the main criticisms of using the term *indigenous knowledge* is that it excludes knowledge that is held by any population that is not considered *indigenous*. Who, then, is indigenous? There is no common definition for the term indigenous, though many experts and policymakers have attempted this task. In fact, even the United Nations (UN), after thirty years of work on the topic and having just recently adopted a declaration on the rights of indigenous peoples, has yet to come up with a definition.<sup>127</sup>

One of the most internationally cited definitions for the term is written by Jose R. Martinez Cobo, the Special Rapporteur of the UN Sub-Commission on the Prevention of Discrimination and Protection of Minorities. The definition is as follows:

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<sup>127</sup> United Nations, "The Concept of Indigenous Peoples," background paper prepared for Workshop on Data Collection and Dissagregation for Indigenous Peoples (New York, 19 – 21 January 2004), <http://www.un.org/esa/socdev/unpfii/documents/PFII%202004%20WS.1%203%20Definition.doc>.

Indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of society now prevailing in territories or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop, and transmit to future generations of their ancestral territories, and their ethnic identity, the basis of their continued existence as peoples, in accordance with their cultural patterns, social institutions and legal systems.<sup>128</sup>

In the conclusions of the document, J.M. Cobo also emphasizes the importance of two distinct elements of the term: objective (including the ancestry, culture, and language of the people labeled as indigenous.), and subjective (including the self-identification and acceptance of these people). He also highlights the need to include the indigenous community in the process of defining the term.<sup>129</sup>

The international definition quoted above differs from the popular definition of the term *indigenous* which implies “nativeness,” and correctly illustrates the complexity of the term indigenous and its related concepts.<sup>130</sup> It emphasizes four elements which should be taken into account when considering indigenous knowledge for DRR:

1. The *historic continuity* of indigenous peoples, which specifically refers to their existence on the territory before the colonial settlers and invaders appeared;<sup>131</sup>

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<sup>128</sup> J.M. Cobo, “Study of the Problem against Indigenous Populations,” vol. v, *Conclusions, Proposals and Recommendations*, UN Doc E/CN.4/Sub.2/1986/7, Add. 4 para 379, (1986/7).

<sup>129</sup> J. M. Cobo, “Study of the Problem against Indigenous Populations,” vol. v, *Conclusions, Proposals and Recommendations*, UN Doc E/CN.4/Sub.2/198321/Add. 4 para 21, (1986).

<sup>130</sup> Michael Dove, “Indigenous People and Environmental Politics,” *Annual Review of Anthropology* 35, (2006): 192.

<sup>131</sup> In regards to historic continuity in relation to colonizers, some argue that this distinction is not valid in many parts of the world, such as Asia and Africa where all people are native since colonizers in these continents did not follow any pattern or wave of occupation, as they did in America and Australia. This produces further confusion as to which populations are indigenous and which are not. In addition, in many places, the term indigenous holds negative connotations due to its past use by colonial oppressors. See: Douglas Nakashima and Marie Roué, “Indigenous Knowledge, Peoples and Sustainable Practice,” in *Encyclopedia of Global Environmental Change*, ed. Peter Timmerman (Chichester: John Wiley & Sons: 2002): 314. In regards to the question of genealogy and the differences between a linear and relational model (where indigenous knowledge follows the non-linear relational model) see Tim Ingold, *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill* (London: Routledge, 2000): 132-150.

2. Indigenous people consider themselves part of the *non-dominant sector* of the society;
3. The desire of the people to *maintain, develop and pass on important elements of their society*;
4. The element of *ancestral territory and ethnic identity* which is common among indigenous peoples and separates them from the rest of society.

Indigenous knowledge holders, therefore, have more in common than simply ancestry. They hold common experiences and relationships which represent a shared worldview and which are all reflected in specific categories of their knowledge. Chapter five discusses four of these categories and how they can help reduce community vulnerability to natural disasters.

#### *Differentiating common terms*

Several different terms appear frequently throughout the literature. These include local knowledge, traditional knowledge, traditional ecological knowledge (TEK), folk knowledge, ethnobotany, ethnoecology, farmer's knowledge, native knowledge and fisher's knowledge. The differences between the terms must be considered in order to understand the literature on indigenous knowledge.

The three most frequently used terms relating to DRR are: traditional knowledge or TEK, local knowledge, and indigenous knowledge. Each of these three terms holds very similar definitions and all are often used interchangeably or as subsets of one another.

TEK is sometimes considered the set of indigenous knowledge that focuses on environmental and ecological aspects. It is the knowledge indigenous people hold about

their environment.<sup>132</sup> TEK is a term widely used in the field of resource management and conservation. Local knowledge is often used in conjunction with TEK or indigenous knowledge, but emphasizes the specificity of the knowledge to a place or region (in contrast to traditional knowledge which focuses on the component of time).<sup>133</sup> Indigenous knowledge is sometimes considered a subset of local knowledge, since it refers to “local knowledge that is held by indigenous populations, or local knowledge unique to a given society.”<sup>134</sup>

The connotations and ambiguities of certain words can lead to a lack of universal agreement. For example, the word “traditional” is often criticized for its static implication, based on the distinction between tradition and change. Since traditional knowledge and TEK are both considered adaptive and dynamic, some argue that they cannot be considered *traditional*.<sup>135</sup> Using the term *local knowledge*, on the other hand, poses its own problems. Due to the generality of the term *local*, local knowledge could include any knowledge that is specific to a location, no matter where the knowledge originated, what it relates to or who holds the knowledge.<sup>136</sup> This lack of specificity makes it difficult to use the term local knowledge.

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<sup>132</sup> McGregor, “Coming Full Circle,” 393.

<sup>133</sup> Julie Dekens, *Local Knowledge for Disaster Preparedness: A Literature Review*, (Katmandu, Nepal: International Centre for Integrated Mountain Development (ICIMOD), 2007), 5.

<sup>134</sup> Berkes, *Sacred Ecology*, 8.

<sup>135</sup> The dynamic nature of indigenous knowledge is discussed earlier in this chapter, when examining the time factor inherent in indigenous knowledge. See “Draft Working Document for Experts Meeting on Safeguarding the Transmission of Local and Indigenous Knowledge of Nature,” (Auditorium, Aichi Prefectural University, Nagoya, Japan, 14-15 April 2005); In his own attempt to remedy the problem with the term traditional, Berkes argues that *traditional* does not mean “an inflexible adherence to the past; it simply means time-tested and wise,” citing Eskimo conference participants who agreed with this clarification, See: Berkes, *Sacred Ecology*, 5.

<sup>136</sup> Dekens has attempted to solve this problem by further classifying local knowledge, separating it into four different subgroups: technical knowledge, environmental and agricultural knowledge, sociocultural and historical knowledge and knowledge about development projects. See Dekens, *Local Knowledge for Disaster Preparedness*, 22.

A further disagreement lies in the varying perspectives of different parties who are defining the term. For example, there are two main differences between the definitions created by non-indigenous versus indigenous people.<sup>137</sup> The first difference is that indigenous people see TEK as action oriented, i.e. one can perform TEK, whereas many non-indigenous academics see TEK as something which can be owned or disseminated as a concrete body of knowledge.<sup>138</sup> Second, indigenous people consider “the people, the knowledge and the land as a *single, integrated whole*,” whereas non-indigenous academics see knowledge as separated from these other elements.<sup>139</sup> Most people are not aware that indigenous perspectives of TEK differ so drastically from their own. Since TEK is a modern term, introduced in the 1980’s by non-indigenous academics, most experts on TEK are not the ones who hold the knowledge, and consequently the holders do not control the discourse.<sup>140</sup>

Given the complexities of the different terms outlined above, it remains true that in most cases indigenous knowledge, traditional knowledge, TEK and local knowledge all refer to the same concept. The differences lie in the specific words used and their connotations. The term indigenous knowledge is used in this paper because of its connection to both historical habitation and relationship with the environment. However, much of the literature cited in this research uses some of the other terms interchangeably, since there is no universally accepted term for the DRR discourse.

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<sup>137</sup> McGregor, “Coming Full Circle,” 393.

<sup>138</sup> McGregor, “Coming Full Circle,” 394.

<sup>139</sup> McGregor, “Coming Full Circle,” 394-395.

<sup>140</sup> McGregor, “Coming Full Circle,” 395.

An examination of the concept of indigenous knowledge illustrates that one key characteristic of indigenous knowledge is its consideration of the natural environment in human action (including development). Nonetheless, it should not be assumed that all indigenous communities have developed environmentally sustainable lifestyles. The following section discusses this controversy, explaining that the focus of this research is on specific categories of indigenous knowledge and does not intend to make any broad assumptions about all communities or the inherent environmental sustainability of all indigenous knowledge.

### **Responding to Assumptions about Indigenous Societies**

An assumption has been implied throughout this paper that indigenous peoples possess insight on environmental stewardship and management which leads to an environmentally sustainable lifestyle, one which includes a respect and understanding of the environment; however, it must be clarified that this may not true in all cases. Many indigenous communities have not always been harmonious with nature and do not provide an idyllic model for modern society.<sup>141</sup> For many years, indigenous peoples were charged with overexploiting natural resources and employing environmentally destructive land use practices.<sup>142</sup> Recent research has been done to prove this point, and some academics cite examples of ancient and pre-industrial societies which have caused

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141 See Dekens, *Local Knowledge for Disaster Preparedness*, 23. Dekens cites three books which discuss the alternative view that indigenous societies have not always had an “idyllic and well informed” relationship with nature. These books include: C.C. Mann, *1491: New Revelations of the Americas before Columbus* (New York: Vintage Press, 2006); Michael Williams, *Deforesting the Earth: From Prehistory to Global Crisis* (Chicago: University of Chicago Press, 2002); Jared Diamond, *Collapse: How Societies Choose to Fail or Survive* (London: Penguin, 2005).

<sup>142</sup> Kate B. Showers and Bertus Haverkort, “Comments on Article by Arun Agrawal,” *Indigenous Knowledge Monitor* 4, no. 1 (1996): 5, 16.

environmental degradation and have had significant impact on environmental changes.<sup>143</sup> For example, estimates of CO<sub>2</sub> and CH<sub>4</sub> emissions in 1500 AD reach 20 percent and 50 percent of current levels, respectively.<sup>144</sup>

Nevertheless, to assume that all indigenous peoples are detrimental to the environment is as extreme as assuming all indigenous communities are model societies. The bottom line is that no one has yet found the ideal society.<sup>145</sup> The challenge, then, is to recognize the positive elements of different societies, which is the purpose of examining indigenous communities. The mere fact that these communities have survived for so many generations means they have done something right which should be examined. The conclusion assumed in this research is that indigenous communities have survived due to their consideration of the environment in their daily life. In most cases this consideration is out of necessity, since many of these communities depend on the environment for survival; in some cases this is also part of a belief or value system which has been passed down through generations, perhaps also originating from the need to survive. This conclusion has been defended in much of the indigenous knowledge literature, yet it does not assume that all indigenous communities are ideal or are all the same.

The four categories which this paper extracts from the literature on indigenous knowledge in the final chapter (i.e. ecological knowledge, environmental ethic, cultural traditions and connection to place) are being examined for their potential value for DRR.

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<sup>143</sup> D. M. Kammen, K. R. Smith, K. T. Rambo and M.A.K. Khalil, "Prehistorical Human Environmental Impacts: Are There Lessons for Global Change Science and Policy?" *Chemosphere* 29, no. 5 (1994): 827-832.

<sup>144</sup> *Ibid.*, 829.

<sup>145</sup> Bertus Haverkort, "Comments on Article by Arun Agrawal," *Indigenous Knowledge Monitor* 4, no. 1 (1996): 16.

Every society has the option of introducing or strengthening these four categories in their society as one means of reducing vulnerability. It is important to note that many indigenous societies have distinct economic, social, political and dimensional differences with modern societies. The categories examined here have the potential to be applied to all communities, regardless of these differences. The challenge, therefore, is to figure out *how* ecological knowledge, an environmental ethic, cultural traditions and a sense of place can each adapt to the specific context of other communities in order to provide added value for assessing vulnerability, mitigating disaster impacts and preparing for hazard events. The simple awareness of these categories and the integration of them into education and policy can have added value for most societies, regardless of their unique characteristics.

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The following chapter explores further the discourse relating to indigenous knowledge, including the relationship between indigenous knowledge and DRR. The aim is to highlight recognized and established tenets which support the argument that indigenous knowledge is valuable for DRR.



### THREE

## **APPLYING INDIGENOUS KNOWLEDGE TO DISASTER RISK REDUCTION:** A Review of Current Literature on the Joining of Two Disciplines

Over the past fifty years, there has been an increasing interest in the added benefit indigenous knowledge can bring to scientific disciplines such as botany, ecology, marine biology, biodiversity science, environmental conservation, medicine and international development. It was not until this interest had already taken shape, however, that disaster risk reduction (DRR) experts finally considered using indigenous knowledge to help reduce the risk of disasters. DRR experts, practitioners and the international aid community as a whole have slowly come to the realization that the standard approaches to DRR, which focus on technological solutions (e.g. better surveillance techniques, high tech warning systems, and stronger infrastructure), could be improved by taking indigenous knowledge into account. Several studies have emerged which examine the value of indigenous knowledge for DRR in different situations. Some of these studies examine the specific knowledge of the community, extracting particular strategies to be used in other communities. Other studies make general arguments for the importance of indigenous knowledge as a whole, citing the benefits all indigenous knowledge has for the community and DRR projects working in that community.

The first objective of this chapter is to give an overview of the indigenous knowledge discourse, showing the development of the field and the reasons for the growing interest in its relationship with DRR. An historic outline of the value of

indigenous knowledge in several disciplines, including anthropology, environmental sciences and development, shows how far the literature had come before it began to enter the field of disaster management. This history sets the stage for a review of existing DRR literature and projects relating to indigenous knowledge.

Following this chronology, a discussion highlights reasons why DRR now considers the value indigenous knowledge provides for the field. First, a shift in thinking about DRR introduced the vulnerability approach to reducing risk, taking into account specific elements of the affected community. Second, DRR has increased its ties with the international development and sustainable development discourses, which have already recognized the value of indigenous knowledge (as early as the 1970s). Finally, several cases have emerged from large disasters (such as the Indian Ocean Tsunami in 2004) which show the success indigenous knowledge has had for reducing community vulnerability to disasters.

The next section reviews the main arguments for the value of indigenous knowledge for DRR. Each argument is illustrated through a review of academic literature, international agreements and existing projects in the field which take a specific position in regards to indigenous knowledge. Four arguments on the value of indigenous knowledge for DRR are examined: First, the specific practices and strategies for DRR which indigenous knowledge provides can help other communities in similar situations; Second, indigenous knowledge encourages the participation of the affected community and empowers its members to take the leading role in DRR; Third, the information contained in indigenous knowledge can help improve DRR project implementation by informing project implementers about the community's context; Finally, how indigenous

knowledge is disseminated, through non-formal educational means, provides a successful model for other education on DRR.

These four arguments can be categorized into two types: narrow and broad. A narrow approach identifies the value of specific strategies in specific communities, but can not be applied to all communities. A broad approach examines the general value of indigenous knowledge as a concept but does not refer to any type of knowledge in particular. This suggests that there may be a “middle road,” one which considers the specific categories of indigenous knowledge that have value for DRR and which can be applied to all communities regardless of their context.<sup>146</sup>

### **Development of Interest in Indigenous Knowledge as a Discipline**

Interest in indigenous knowledge has entered various fields in recent decades, touching on science, politics, development, environmental studies, and education. The modern roots of the study of indigenous knowledge date back to the 1950s when Harold Conklin introduced the field of ethnoscience.<sup>147</sup> Ethnoscience initiated a new approach to the study of science by examining the knowledge that local people themselves held of nature in order to understand their worldview.<sup>148</sup> Conklin, as well as several scholars that followed him, focused on indigenous taxonomies of plant species. After examining over 2000 species held by the Hanunoo in the Philippines, Conklin concluded that “plants,

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<sup>146</sup> Again, see Julie Dekens, *Local Knowledge for Disaster Preparedness: A Literature Review*, (Kathmandu, Nepal: International Centre for Integrated Mountain Development (ICIMOD), 2007) for one interpretation of this middle road.

<sup>147</sup> Harold Conklin is considered the pioneer of ethno-science with his work on plant culture in the Hanunoo Agriculture in the Philippines. See International Council for Science (ICSU), *ICSU Series on Science for Sustainable Development No. 4: Science, Traditional Knowledge and Sustainable Development*, eds. D. Nakashima and D. Elias (ICSU: 2002); and Douglas Nakashima and Marie Roué, “Indigenous Knowledge, Peoples and Sustainable Practices,” in P. Timmerman. ed. *Encyclopedia of Global Environmental Change* (Chichester: Wiley & Sons, 2002).

<sup>148</sup> Nakashima and Roué, “Indigenous Knowledge, Peoples and Sustainable Practices,” 3.

especially cultivated varieties, were the focus of a majority of exchanges. Combining the expertise and interests of systematic and economic botanists, Hanunoo conversations centered upon the hundreds of characteristics which differentiate plant types and often indicate significant features of medicinal or nutritional value...This knowledge is acquired very young and expanded throughout an entire lifetime.”<sup>149</sup> He was able not only to explore the methods of taxonomy held by the Hanunoo people, but also to show how this process reflected their culture and worldview. The work of Conklin inspired other scientists to study what indigenous knowledge can provide to the scientific understanding of ecology. The study of indigenous knowledge grew to cover such fields as marine knowledge, soil and agricultural science, environmental conservation, biodiversity science, and medicine.<sup>150</sup>

Meanwhile, in the early 1960s, Claude Levi-Strauss published a groundbreaking work entitled *The Savage Mind*. The purpose of this book was to examine the relationship between mind and nature.<sup>151</sup> In his first chapter, Levi-Strauss focused on the nature and character of indigenous knowledge, concluding that the development of this knowledge is not solely based on practical utility.<sup>152</sup> Instead, it is driven by curiosity and the desire for knowledge for interest’s sake.<sup>153</sup> What was revolutionary about Levi-Strauss’ work was his acceptance of indigenous people as valid information-holders, dismissing the long-standing prejudice against non-Western cultures.<sup>154</sup>

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<sup>149</sup> Nakashima and Roué, “Indigenous Knowledge, Peoples and Sustainable Practices,” 3.

<sup>150</sup> ICSU, *Science, Traditional Knowledge and Sustainable Development*, 13-15.

<sup>151</sup> Ingold, *The Perception of the environment*, 17-18.

<sup>152</sup> Nakashima and Roué, “Indigenous Knowledge, Peoples and Sustainable Practices,” 3.

<sup>153</sup> Berkes, *Sacred Ecology*, 9.

<sup>154</sup> Berkes, *Sacred Ecology*, 9.

By the 1960s a new study was also being developed which introduced a new view of indigenous peoples: cultural ecology.<sup>155</sup> Instead of considering indigenous people to be “savage” and “uncivilized,” the new discipline reflected an appreciation and admiration for these communities. The view came out of a Western counter-culture movement which spread in the mid-1960s.<sup>156</sup> Many people questioned whether science could solve all problems, reacting against the “remoteness of science and its perceived arrogance and negative technological outcomes.”<sup>157</sup> As a result, indigenous people and their knowledge were held up as models of “idyllic harmony with nature which Western civilization had lost.”<sup>158</sup>

Starting in the 1980s, the interest in indigenous knowledge entered the development discourse.<sup>159</sup> A backlash from “top-down” approaches to development inspired people to look elsewhere for different methods. A new interest in indigenous knowledge provided a way to empower the community and involve members of the community and their knowledge in the decision-making processes. This was a turning point, since participatory processes emphasized, for the first time, the “capacities of the underprivileged, the local, and the under-represented.”<sup>160</sup>

In the 1990s experts continued to explore the alternative approach to development and its consideration of indigenous knowledge. In fact, it was during this decade that the international community began to catch on and introduce indigenous knowledge into the

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<sup>155</sup> Nakashima and Roué, “Indigenous Knowledge, Peoples and Sustainable Practices,” 4.

<sup>156</sup> Dekens, *Local Knowledge for Disaster Preparedness*, 23.

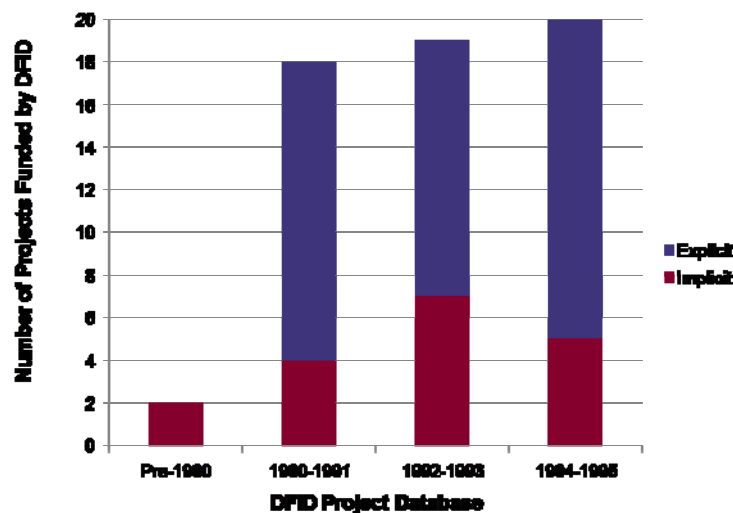
<sup>157</sup> Dekens, *Local Knowledge for Disaster Preparedness*, 23.

<sup>158</sup> Dekens, *Local Knowledge for Disaster Preparedness*, 23.

<sup>159</sup> Important works in the 1980s include: R. Chambers, *Rural Development: Putting the Last First*, (Harlow: Longman, 1983) and P. Richards, *Indigenous Agricultural Revolution: Ecology and Food Production in West Africa* (London: Hutchinson, 1985); Also see discussion in John Briggs & Joanne Sharp, “Indigenous Knowledges and Development: A Postcolonial Caution,” *Third World Quarterly* 25, no. 4 (2004).

<sup>160</sup> Agrawal, “Dismantling the Divide Between Indigenous and Scientific Knowledge,” 414.

debate. The graph presented in figure 3.1 shows the growth of interest in indigenous knowledge during the 1990s, represented in the number of projects funded by UK's Department of International Development (DFID) which consider indigenous knowledge both implicitly and explicitly. Further, in the 1992 United Nations Conference on Environment and Development, the Rio Declaration and Agenda 21 both made clear reference to indigenous knowledge. Further, the Convention of Biodiversity designated an entire article to the "knowledge innovations and practices of indigenous and local communities" as it relates to the conservation and sustainable use of biological diversity.<sup>161</sup> In 1999, the World Conference on Science, organized by UNESCO and the International Council for Science (ICSU) held a session on "Science and Other Systems of Knowledge," and eventually the two organizations produced a joint publication on "Science, Traditional Knowledge and Sustainable Development" published in 2002.<sup>162</sup>



**Figure 3. 1. The increasing number of projects funded by the UK's Department of International Development (DFID) which consider indigenous knowledge (both implicitly and explicitly)**

Adapted from Paul Sillitoe, "The Development of Indigenous Knowledge, Fig. 1.

<sup>161</sup> United Nations, *Convention of Biodiversity*, Treaty Series No. 30619, <http://www.cbd.int/doc/legal/cbd-un-en.pdf> (Rio de Janeiro, 1992), Article 8 (j), quoted in Nakashima, Prott and Bridgewater, "Taping into the World's Wisdom," 12.

<sup>162</sup> ICSU, *Science, Traditional Knowledge and Sustainable Development*.

The issue of indigenous rights was simultaneously coming into international focus. The UN declared that the International Decade for the World's Indigenous Peoples would take place from 1994-2004. The work of this decade included several UN specialized agencies established to design and implement projects with indigenous people on health, education, housing, employment, development and the environment that promoted the protection of indigenous peoples and their customs, values and practices.<sup>163</sup> The UN launched a second Decade in 1995 to strengthen international cooperation and commitment needed to find solutions to the issues faced by indigenous peoples. The work of these decades eventually led to a Permanent Forum on Indigenous Issues, initiated in 2002.<sup>164</sup>

In addition, the field of sustainable development also began to recognize the importance of indigenous knowledge. The World Summit on Sustainable Development (2002) made several references to indigenous knowledge and its importance for sustainability. It recognized the importance of political rights of indigenous people for sustainable development (Paragraph 25), and also the relationship between indigenous knowledge for sustainable development and other fields, including poverty eradication, natural disaster mitigation, climate change, agriculture, mountain ecosystems, biodiversity, forests, health, Africa, and science and technology.<sup>165</sup> In fact, nineteen different paragraphs reference “traditional/indigenous knowledge” or “indigenous and local resource management.”<sup>166</sup>

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<sup>163</sup> United Nations Permanent Forum on Indigenous Issues (UNPFII), “ABOUT UNPFII and a Brief History of Indigenous Peoples and the International System,” <http://www.un.org/esa/socdev/unpfii/en/history.html>.

<sup>164</sup> UNPFII, “ABOUT UNPFII.”

<sup>165</sup> UNESCO-LINKS, “World Summit on Sustainable Development: Official Outcomes relating to ‘Local and Indigenous Knowledge,’” (2003), [http://portal.unesco.org/science/en/ev.php-URL\\_ID=3884&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/science/en/ev.php-URL_ID=3884&URL_DO=DO_TOPIC&URL_SECTION=201.html).

<sup>166</sup> Ibid.

The interest in the importance of indigenous knowledge over these decades has been attributed to a number of “trigger factors” which include the recognition of the value of indigenous knowledge for biodiversity conservation and sustainable resource use, growing innovations in pharmaceuticals and agriculture, and an increased pressure from indigenous peoples to have more say in resource management and against biopiracy.<sup>167</sup> In recent decades a core group of academics has done extensive research on indigenous knowledge, providing literature and feeding information into policy circles.<sup>168</sup> Meanwhile, there has been a general dissatisfaction with existing solutions for resource conservation and management.<sup>169</sup> The mix of these factors, a “critical mass” of knowledge and a desire for alternative solutions, has led to a recognition of indigenous knowledge as providing valuable, alternative answers.<sup>170</sup>

### **The Introduction of Indigenous Knowledge in the DRR Discourse**

Work on indigenous knowledge began to permeate the disaster reduction discourse in the 1970s; however it was very slow to develop in comparison to the fields outlined above. An article appearing in 1975, written by Daniel Vayda of the department of human ecology and social sciences at Cook College, recognized for the first time the relevance of local environmental knowledge in responding to natural hazards.<sup>171</sup> Through a criticism of ecological anthropology, Vayda called for an investigation of the relationships between characteristics of hazards and people’s responses, as well as how

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<sup>167</sup> “Safeguarding the Transmission of Local and Indigenous Knowledge,” (Nagoya, Japan, 14-15 April 2005).

<sup>168</sup> Berkes, *Sacred Ecology*, 17.

<sup>169</sup> *Ibid.*

<sup>170</sup> *Ibid.*

<sup>171</sup> Roy Ellen, ed., *Modern Crises and Traditional Strategies: Local Ecological Knowledge in Island Southeast Asia* (New York: Berghahn Books, 2007), 15.



hazards are responded to by both groups and individuals.<sup>172</sup> In addition, several other publications emerged in the late 1970s which examined specific case studies on human responses to earthquakes, droughts and frosts, in areas such as Peru, Sahel and East Africa (including Nigeria and Kenya) New Guinea, South Africa and India.<sup>173</sup>

For the most part, however, the link between indigenous knowledge and DRR remained vague and indirect. By the 1980s, indigenous knowledge was still being ignored within the established disaster management discourse even as more attention was given to the role and value of this knowledge in other fields.

It was not until the beginning of the twenty-first century that the values highlighted in the limited academic literature on indigenous knowledge became reflected in policies and practices of DRR organizations. Several projects have been initiated by international organizations over the past few years which focus on compiling and disseminating indigenous practices as a means of spreading valuable knowledge and strategies to different communities. There are a few examples from the Asia-Pacific region. In South Asia, a fifteen-month project initiated by ICIMOD, supported by the European Commission through its Humanitarian Aid Department (DIPECHO) was entitled *Living With Risk – Sharing Knowledge on Disaster Preparedness in the Himalayan Region*. This study led to a collection of publications by Julie Dekens (two of which focus on specific cases in the region) analyzing the value of indigenous knowledge for DRR.<sup>174</sup>

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<sup>172</sup> Andrew P. Vayda and Bonnie J. McCay, “New Directions in Ecology and Ecological Anthropology,” *Annual Reviews of Anthropology* 4, (1975): 293-306.

<sup>173</sup> For literature review and further citations see Dekens, *Local Knowledge for Disaster Preparedness*, 3.

<sup>174</sup> Dekens, *Local Knowledge for Disaster Preparedness*; Julie Dekens, *The Snake and the River Don't Run Straight: Local Knowledge on Disaster Preparedness in the Eastern Terai of Nepal* (Kathmandu, Nepal: International Centre for Integrated Mountain Development (ICIMOD), 2007); Julie Dekens, *Herdors of*

Another joint program by South Asian Association for Regional Cooperation (SAARC) and the Asia Disaster Reduction Center (ADRC), a regional disaster reduction organization, will begin in 2008, aiming to compile and disseminate cases from three focus countries in the SAARC region which illustrate the value of indigenous knowledge for communities facing risk.<sup>175</sup> In addition, the Japanese government has funded an initiative (under the framework of MEXT Special Coordination Fund for Promotion of Science and Technology) with the help of the National Research Institute for Earth Science and Disaster Prevention (NIED) which will develop a Disaster Reduction Hyperbase (DRH) focused on the Asian region.<sup>176</sup> The DRH is a database which contains three types of technologies (or strategies) and knowledge used to aid DRR policy in Asian countries. One of the three types is “Transferable Indigenous Knowledge,” (TIK) where specific indigenous technologies are collected from throughout the Asian region.<sup>177</sup> In addition, UN/ISDR and Kyoto University, funded by the EuropeAid, is preparing a publication on *Indigenous Practices and Lessons Learned* for DRR in the Asia-Pacific region to be published in 2008.<sup>178</sup> UNESCO is also currently working on two projects which examine traditional construction methods which

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*Chitral The Lost Messengers? Local Knowledge on Disaster Preparedness in Chitral District, Pakistan* (Kathmandu, Nepal: International Centre for Integrated Mountain Development (ICIMOD), 2007).

<sup>175</sup> E-mail correspondence with Dr. Chakrabarti, Director of SAARC Disaster Management Centre, Delhi. For further information, visit SAARC’s website at [www.saarc-sec.org](http://www.saarc-sec.org).

<sup>176</sup> MEXT-NIED, “Disaster Reduction Hyperbase – Asian Application,” Project Document v 14, available at <http://www.edm.bosai.go.jp/old/v14.pdf>.

<sup>177</sup> For more information, see “Project Documents” at: <http://www.edm.bosai.go.jp/old/m-n.html>.

<sup>178</sup> UN/ISDR and Kyoto University eds., *Indigenous Practices and Lessons Learned*, Bangkok, forthcoming.

have withstood earthquakes in both Kashmir in South Asia and Nias, an island off the west coast of Sumatra, Indonesia.<sup>179</sup>

### **Reasons for a Growing Interest in Indigenous Knowledge for DRR**

As noted, interest in indigenous knowledge has been extremely slow in entering the field of DRR. Experts agree that the links between DRR and indigenous knowledge have seldom been made in either literature or practice.<sup>180</sup> One reason for this delay is that until recently, disasters have been focused primarily on technological solutions including better surveillance techniques, high tech warning systems, and stronger infrastructure. The consideration of social science perspectives, i.e. knowledge originating within the communities, conflicts with the accepted position that “advanced geophysical knowledge and technical systems are the most effective disaster response mechanisms.”<sup>181</sup> While this perspective also existed in the development discourse, by the 1980s the field of development began to shift its thinking and consider indigenous knowledge. DRR is slowly mirroring this shift towards more social science perspectives in recent years, illustrated by the new vulnerability approach. While historically, emphasis in disaster management has been placed on response and recovery plans, focusing a majority of the effort on improving international aid programs and public support systems,<sup>182</sup> this is beginning to change. As discussed in chapter one, the 1970s and 1980s brought a new perspective to disaster management, considering disasters to be

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<sup>179</sup> Randolph Langenbach, *Guidelines for Preserving the Earthquake-Resistant Traditional Construction of Kashmir* (New Delhi: UNESCO, 2007). Available at <http://www.traditional-is-modern.net/KASHMIR.html>; For more information on Nias, contact UNESCO Jakarta,

<sup>180</sup> Dekens, *Local Knowledge for Disaster Preparedness*, viii; Ellen, *Modern Crises and Traditional Strategies*, 1.

<sup>181</sup> Dekens, *Local Knowledge for Disaster Preparedness*, 3.

<sup>182</sup> *Ibid.*, 7-8.

a product of human vulnerability in addition to exposure to the hazards.<sup>183</sup> Once the new vulnerability approach was mainstreamed into DRR at an international level, through the introduction of the International Decade for Natural Disaster Reduction (IDNDR), UN/ISDR and the Hyogo Framework for Action (HFA), the link between indigenous knowledge and DRR could be developed more fully.

A second reason for an increasing interest in indigenous knowledge for DRR is the growing relationship between DRR and development, specifically the sustainable development discourse.<sup>184</sup> Over the past decade, the direct connections between DRR and sustainable development have received more attention and support.<sup>185</sup> In fact, the Yokohama Strategy (1994) was the first international agreement on DRR to highlight the symbiotic relationship between disaster management and sustainable development. This concept was further perpetuated in the HFA which integrated conclusions from recent conferences and publications relating to development into the Yokohama Strategy, (specifically including the 2002 World Summit on Sustainable Development and a recent publication by UNDP entitled “Reducing Disaster Risk: A Challenge for Development”).<sup>186</sup> Further, a statement made by Kofi Annan, former Secretary-General of the UN, in a publication by UN/ISDR in 2004 explicitly states that “disaster risk reduction should be an integral part of all sustainable development projects and

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<sup>183</sup> Ibid., 10.

<sup>184</sup> For references to the value of indigenous knowledge for sustainable development, see Berkes discussion of the value of indigenous knowledge for resource management, conservation of protected areas, biodiversity conservation, environmental assessment, social development, and environmental ethics, and his example of the Cree population: Berkes, *Sacred Ecology*, 28-35, 87-90.

<sup>185</sup> The relationship between disaster consequences and development, as well as the impact of disasters on developing countries is discussed in Chapter One.

<sup>186</sup> UN/ISDR, “Objectives” and “Strategic Goals,” *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters* (Geneva: United Nations, 2005), 3-4; UNDP, “Reducing Disaster Risk.”

policies.”<sup>187</sup> Given the linkages evolving between DRR and sustainable development, it followed that since indigenous knowledge has proven to have value for development, it might also have relevance in the DRR discourse.

A final reason for the increased consideration of indigenous knowledge for DRR is that several examples from large environmental disasters brought the issue to the attention of academics, practitioners and the general public. Specifically, two stories became popular after the 2004 Indian Ocean Tsunami. The Simeulean’s success in using indigenous knowledge to survive one of the most devastating disasters in history forced people to recognize this knowledge as an important way to reduce community vulnerability. Similarly, the Moken community living in the Surin Islands, located off the coast of Thailand and Myanmar, also recognized the warning signs of the tsunami and knew how to respond based on legends passed down from previous generations. Though the whole seaside village was swept away by the tsunami, the entire population survived the event.<sup>188</sup>

These two stories were disseminated widely following the tsunami event. Newspaper articles were written about them in well-known papers including the *New York Times* and the *New Scientist*.<sup>189</sup> A popular CBS show *60 Minutes* televised a special episode focused on the experiences of the Moken, and BBC broadcast a radio show relaying the story of the Simeuleans.<sup>190</sup> In addition, the UN specified these examples in

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<sup>187</sup> UN/ISDR, *Living with Risk*, Foreword, vii.

<sup>188</sup> Narumon Arunotai, “Moken Traditional Knowledge: An Unrecognized Form of Natural Resources Management and Conservation,” *International Social Science Journal* 187, (2006): 143.

<sup>189</sup> See: Abby Goodnough, “Survivors of Tsunami Live on Close Terms with Sea,” *The New York Times*, January 23, 2005, A6; Rachel Nowak, “How a Lullaby Can Warn of an Approaching Tsunami,” *New Scientist*, July 29, 2006, 14; Rungrawee C. Pinyorat, “Sea Gypsies Tsunami Rebuild Curse,” *CBS News*, January 14, 2005; Kamol Sukin. “Thailand’s Sea Nomads,” *Sources* 125, July-August 2000, 13-14.

<sup>190</sup> Jeff Fager, (executive producer), “Sea Gypsies Saw Signs in the Waves,” *60 Minutes* [Television broadcast] (Washington D.C.: CBS News, March 20, 2005); Andrea Protheroe (executive producer) *Saved*

their official publication on lessons learned from the 2004 Indian Ocean Tsunami, making a general statement about the importance of indigenous knowledge for DRR: “Traditional knowledge is valuable and can inform and protect communities.”<sup>191</sup> The recognition of these examples brought the importance of indigenous knowledge to the forefront of the DRR discourse.

Nevertheless, the topic of indigenous knowledge for DRR remains underdeveloped. The next section reviews the existing work done to identify the value of indigenous knowledge for DRR. Four existing arguments are explained, supporting the assertion that there is still a need for additional research and analysis, as well as more emphasis by practitioners and institutions, on the value of this knowledge for DRR.

### **The Value of Indigenous Knowledge for DRR: Arguments in the Literature**

Given the developing literature and initiatives summarized above, several common arguments have emerged on the value of indigenous knowledge for DRR. Four arguments are examined here: first, specific practices and strategies which indigenous knowledge teaches can have added value to existing strategies; second, indigenous knowledge increases the participation of the affected community and empowers them to take the leading role in DRR; third, the knowledge contained in indigenous knowledge can help improve DRR project implementation; finally, indigenous knowledge is disseminated by non-formal educational means which provides a successful model for other education on DRR.

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*by Tsunami Folklore, Our Own Correspondent* [radio broadcast] (United Kingdom: BBC News, 10 March, 2007), [http://news.bbc.co.uk/2/hi/programmes/from\\_our\\_own\\_correspondent/6435979.stm](http://news.bbc.co.uk/2/hi/programmes/from_our_own_correspondent/6435979.stm).

<sup>191</sup> UN/ISDR, *Lessons for a Safer Future: Drawing on the experience of the Indian Ocean tsunami disaster* (Geneva: United Nations, 2006), 6.

The first argument asserts that many communities hold knowledge in the form of strategies or know-how which provides methods for reducing disaster risk. This knowledge may be shared with other communities and adapted to their local context, helping them to reduce their vulnerability. Several experts have examined, documented and disseminated the strategies and practices of specific communities. In many cases, experts aim to find a way to better integrate indigenous practices with scientific ones in areas such as early warning systems or coping mechanisms. For example, in the 1980s, many researchers studied flood management in Bangladesh. Given the failure of large scale technological solutions in this country, several academics analyzed existing local knowledge and argued that all new strategies should build on this knowledge of flood management.<sup>192</sup> In addition, several current initiatives in the Asia-Pacific region aim to collect experiences and technologies of affected communities with the goal of wider dissemination. (For initiatives in the Asia-Pacific region, see above referenced projects by ADRC/SAARC, MEXT-NIED, UN/ISDR, Kyoto University and UNESCO).

The second argument for the value of indigenous knowledge in DRR is part of a long debate on the value of participation in development which can empower the community. Parallel to the development discourse, participation has slowly become a focus of many DRR projects, with a shift towards more community-centered projects. Examples include the introduction of community based disaster management (CBDM) and community participation in early warning research and implementation.<sup>193</sup> Recently, the term empowerment has replaced participation as a main objective, giving

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<sup>192</sup> For further citations, see Dekens, *Local Knowledge for Disaster Preparedness*, 10.

<sup>193</sup> Dekens, *Local Knowledge for Disaster Preparedness*, 13.

the community the power to initiate DRR strategies themselves and the ability to maintain them on their own.

The role of indigenous knowledge in the participatory approach has two main values. First, using indigenous knowledge employs information the community already possesses which is valuable to DRR. In most disaster-prone areas, the community has a history of experience with disasters, leading to an accumulation of information regarding how to predict, react to or recover from their impacts.<sup>194</sup> Further, recognizing indigenous knowledge is part of a shift from “emergency management done *for* (and sometimes *to*) indigenous communities, to emergency management done in partnership *with* indigenous communities.”<sup>195</sup>

Second, the recognition and use of indigenous knowledge can provide improved self-confidence for the community and allow it to deal with disasters on its own.<sup>196</sup> Recognizing and sharing indigenous knowledge will confirm that its knowledge is valuable and will give its members authority over the process of risk reduction. This, in turn, will provide the enhanced security needed to respond immediately to incoming threats from disasters, since local community members are the first-responders.

The use of indigenous knowledge to encourage a participatory and empowering process for the affected community is the main perspective of the international arena. This can be seen in the Yokohama Strategy, which mentions indigenous and traditional

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<sup>194</sup> F. Battista and S. Baas, “The Role of Local Institutions in Reducing Vulnerability to Recurrent Natural Disasters and in Sustainable Livelihoods Development,” in *Consolidated Report on Case Studies and Workshop Findings and Recommendations* (Rome: Rural Institutions and Participation Service, Food and Agriculture Organization (FAO), 2004), 10.

<sup>195</sup> Heidi Ellemor, “Reconsidering Emergency Management and Indigenous Communities in Australia,” *Environmental Hazards* 6, (2005), 6.

<sup>196</sup> Dekens, *Local Knowledge for Disaster Preparedness*, 13.



knowledge twice in the text, both in reference to empowerment and participation in the process of DM.

There is a strong need to strengthen the **resilience and self-confidence** of local communities to cope with natural disasters through recognition and propagation of their traditional knowledge, practices and values as part of development activities;<sup>197</sup>

All countries are called upon to...aim application of traditional knowledge, practices and values of local communities for disaster reduction, thereby recognizing these traditional coping mechanisms as a valuable contribution to the **empowerment of local communities** and the enabling of their spontaneous **cooperation** in all disaster reduction programs.<sup>198</sup>

A third argument for the value of indigenous knowledge for DRR is its help in improving project planning and implementation.<sup>199</sup> Respecting and accounting for indigenous knowledge provides an understanding of local practices and context. A project will be more effective if it takes into account the local peoples' economic, political, social and cultural understanding, to know what is acceptable and what is needed.<sup>200</sup> One example can be seen in a case study of a project in Nambae Island, Vanuatu.<sup>201</sup> The community on the island distrusted the outside experts who were using awareness programs to reduce volcano risks within the society. Research uncovered that this distrust was due to the conflict between the beliefs and practices of the local community and the information and methods imposed by the outsiders. For example, local people could not understand the volcanic risk maps presented by experts since they

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<sup>197</sup> UN, *Yokohama Strategy*, 8. Bold added for emphasis.

<sup>198</sup> UN, *Yokohama Strategy*, 12. Bold added for emphasis.

<sup>199</sup> Julie Dekens, "Local Knowledge on Disaster Preparedness: A Framework for Data Collection and Analysis," *Sustainable Mountain Development* 52 (2007), 21.

<sup>200</sup> Dekens, *Local Knowledge for Disaster Preparedness*, 14.

<sup>201</sup> Shane J. Cronin, David R. Gaylord, Douglas Charley, Brent V. Alloway, Sandrine Wallez and Job W. Esau, "Participatory Methods of Incorporating Scientific with Traditional Knowledge for Volcanic Hazard Management on Ambae Island, Vanuatu," *Bulletin of Volcanology* 66, no. 7 (2004): 652 – 668.

represented a different perception of their local environment than that to which they were accustomed. When the scientists used a Participatory Rural Appraisal (PRA) method to understand the views of the local people and their specific community organization (including communication systems, traditional belief systems, gender roles and social hierarchies), the test communities were more willing to accept what the outsiders had to offer.<sup>202</sup> Thus, in order to successfully educate and communicate with an affected community, local beliefs, perceptions, knowledge and understandings must be considered through an examination of their indigenous knowledge and views of disasters.<sup>203</sup>

The international community has embraced the importance of indigenous knowledge for project implementation. The Yokohama Strategy acknowledges that understanding both the cultural and organizational characteristics of the society, as well as its behavior and interactions with the environment, is vital for effective and efficient means of reducing the impact of disasters.<sup>204</sup> Further, the HFA asserts that indigenous knowledge is important in the context of information management and exchange. The one reference to indigenous or traditional knowledge in the text encourages nations to include indigenous knowledge in any information used in DRR education material.<sup>205</sup> This statement, endorsed by 168 governments, declares that the value of indigenous knowledge lies in its ability to facilitate information sharing and help adapt all information to the specific community.

A final argument for the value of indigenous knowledge is the strength of its dissemination process. Indigenous knowledge is often passed down orally through

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<sup>202</sup> Cronin et. al., "Participatory methods of incorporating scientific with traditional knowledge."

<sup>203</sup> Ellemor, "Reconsidering emergency management," 5.

<sup>204</sup> UN, *Yokohama Strategy*, 2.

<sup>205</sup> UN/ISDR. *Hyogo Framework for Action*, 9.

stories and songs. This method of dissemination has proven to be very successful and emphasizes the importance of non-formal education, the dissemination of information through alternative methods outside of formal schooling, such as songs, stories, art and theater.

Education has become a major focus for international cooperation on DRR. Priority three of the HFA is designated to “[use] knowledge, innovation and education to build a culture of safety and resilience at all levels.”<sup>206</sup> DRR education, however, is often done by integrating information on disasters, vulnerability, and response strategies into formal education via school curricula. In recent years, DRR information has been increasingly disseminated in non-formal ways as well, including the use of stories, songs, folk art and performances as well as utilizing community leaders, religious organizations, community organizations and extra-curricular clubs. Several international organizations and NGOs are involved in promoting the inclusion of DRR into the non-formal education sector. Examples from the Asia Pacific region include UNDP’s work in India,<sup>207</sup> Red Cross programs in Indonesia and Vietnam,<sup>208</sup> and projects by Action Aid Thailand.<sup>209</sup> CDBM is also a method of non-formal education, since it educates the community about DRR policies and strategies outside of the formal education sector

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<sup>206</sup> Ibid., 18.

<sup>207</sup> UNDP India has worked to mainstream DRR into the National Institute of Open Schooling (NIOS), the Sharva Shiksha Abhiyan Program (Education for all), a national volunteers program (National Service Scheme (NSS)) and through health workers outside of the school curriculum.

<sup>208</sup> Indonesian Red Cross has done extensive work on a Vulnerability and Capacity Assessment (VCA) which incorporates the community in the process. In Vietnam the Red Cross is engaged in a program to educate Red Cross staff, primary school teachers and pupils on disaster risk reduction, all outside of the classroom.

<sup>209</sup> Action Aid, Thailand has organized many volunteers who are working on community mapping and vulnerability to prepare for future disasters.

The four arguments outlined above can be categorized into two types: narrow and broad in relation to their relevance to outside communities. The first argument, using specific indigenous strategies and mechanisms, is very narrow in its applicability. In most cases, the strategies can only be applied to communities facing the same types of hazards. More importantly, the strategies will only be successful in places with similar environmental, cultural, economic, social and political factors as the knowledge holders.

In contrast, the other three arguments present broad conclusions about the value of indigenous knowledge for communities affected by disasters, claiming it has a general value due to its encouragement of participation and empowerment, the information it holds about the community, and the way it is disseminated. The arguments do not, however, identify a specific type of indigenous knowledge which is valuable, but focus instead on the knowledge as a general concept.

Each of these arguments illustrates an important value of indigenous knowledge for DRR and more work is still needed to determine how to better integrate them into existing policies and practice. Nonetheless, the arguments do not provide a specific way to use the knowledge to help *all* communities affected by disasters. A proposed intermediate perspective is developed more fully in chapter five. First, however, the next chapter presents the case of Simeulue Island and the inhabitants' successful survival during the 2004 Indian Ocean Tsunami. The chapter concludes by recounting several lessons learned from the Simeulue experience which are cited in the literature. The established lessons are based on the four arguments presented in this chapter. Further lessons are learned after applying the proposed assessment tool to the Simeulue experience in chapter five.

## FOUR

### **THE CASE OF SIMEULUE: Successful Disaster Risk Reduction in the Face of the 2004 Indian Ocean Tsunami**

In 2004, when a devastating tsunami struck thirteen countries surrounding the Indian Ocean, an overwhelming percentage of the population living on the small island of Simeulue in Indonesia successfully survived. Only seven people died during the tsunami out of the population of over 78,000.<sup>210</sup> This was considered a dramatic success, especially in comparison to its mainland neighbor Banda Aceh, a city only 150 kilometers away. The objective of this chapter is to present the case of Simeulue, where a community successfully used indigenous knowledge to reduce the risk of disaster, setting the stage for further analysis as to why this population was so successful (which will follow in the succeeding chapter).

I had the good fortune to visit Simeulue in February, 2008 as a UN/ISDR representative. At that time I was able to observe the existing post-tsunami environment and interview citizens who had experienced first-hand the tsunami in 2004. Many of the conclusions presented in this chapter and the next chapter reflect information gathered during that visit.

The account of Simeulue is divided into three sections. The first part will provide a brief background of Simeulue, describing its geography, population, economy, culture and religion. The second part includes a specific examination of the knowledge the

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<sup>210</sup> McAdoo et. al., “*Smong: How an Oral History Saved Thousands.*”

community holds about tsunamis, manifest in a legend called *Smong*. Finally, the last part gives an account of the events on 26 December, 2004. Scientific data as well as first person narratives on the experiences of several Simeulue Islanders will paint a picture of what happened on that day and provide clues to how the Simeulueans used indigenous knowledge to survive such a devastating event. The chapter concludes with a review of the current discourse on lessons learned from this event. Chapter five presents a further analysis, based on an application of the assessment tool proposed in this paper.

## **Background**

### *Geography and Population*

Indonesia is a country plagued by natural disasters. An archipelago of 17,500 islands, the country runs along the border of the “Ring of Fire,” a zone aptly named for its frequent volcanoes and earthquakes and marked by colliding tectonic plates looping for more than 25,000 miles through the Pacific Ocean (fig. 4.1).<sup>211</sup> One chain of islands about 150 kilometers off the west coast of Sumatra (the western-most part of Indonesia’s mainland) lies amid three hyperactive fault lines: the Sunda trench, the Great Sumatra Fault and the Mentawai Fault (fig. 4.2).<sup>212</sup> The fate of Simeulue Island, northernmost in this chain of islands, is dictated by the movement of these tectonic plates and by the volcanoes, earthquakes and tsunamis erupting from these fault lines. Nonetheless, the people inhabiting Simeulue are aware of the threats posed by disasters and have developed a culture which considers these threats and adapts to them.

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<sup>211</sup> Andrew Marshall, “The Gods Must be Restless: Living in the Shadow of Indonesia’s Volcanoes,” *National Geographic*, January, 2008, 38.

<sup>212</sup> Emmanuel Baroux, Jean-Philippe Avouac, Olivier Bellier and Michel Sebrier, “Slip-partitioning and Fore-arc Deformation at the Sunda Trench, Indonesia,” *Terra Nova* 10, no. 3 (1998): 139.

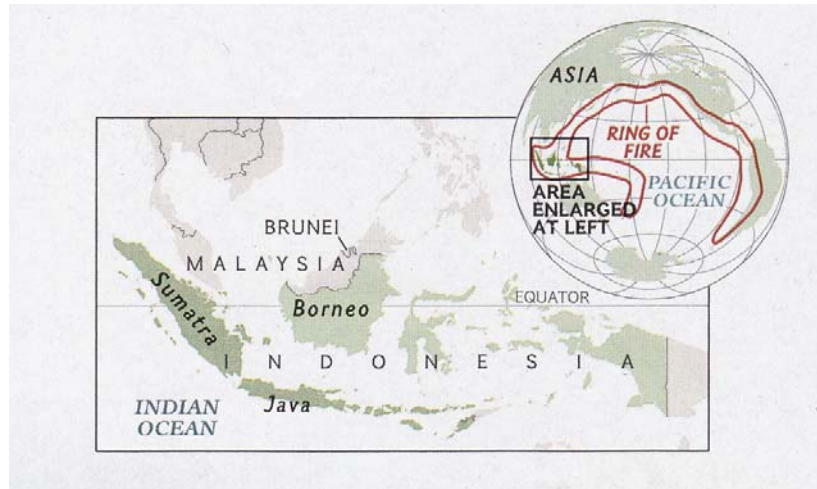


Figure 4. 1. Indonesia's place in the "Ring of Fire."

Reprinted from Andrew Marshall, "The Gods Must be Restless: Living in the Shadow of Indonesia's Volcanoes," *National Geographic*, January 2008.

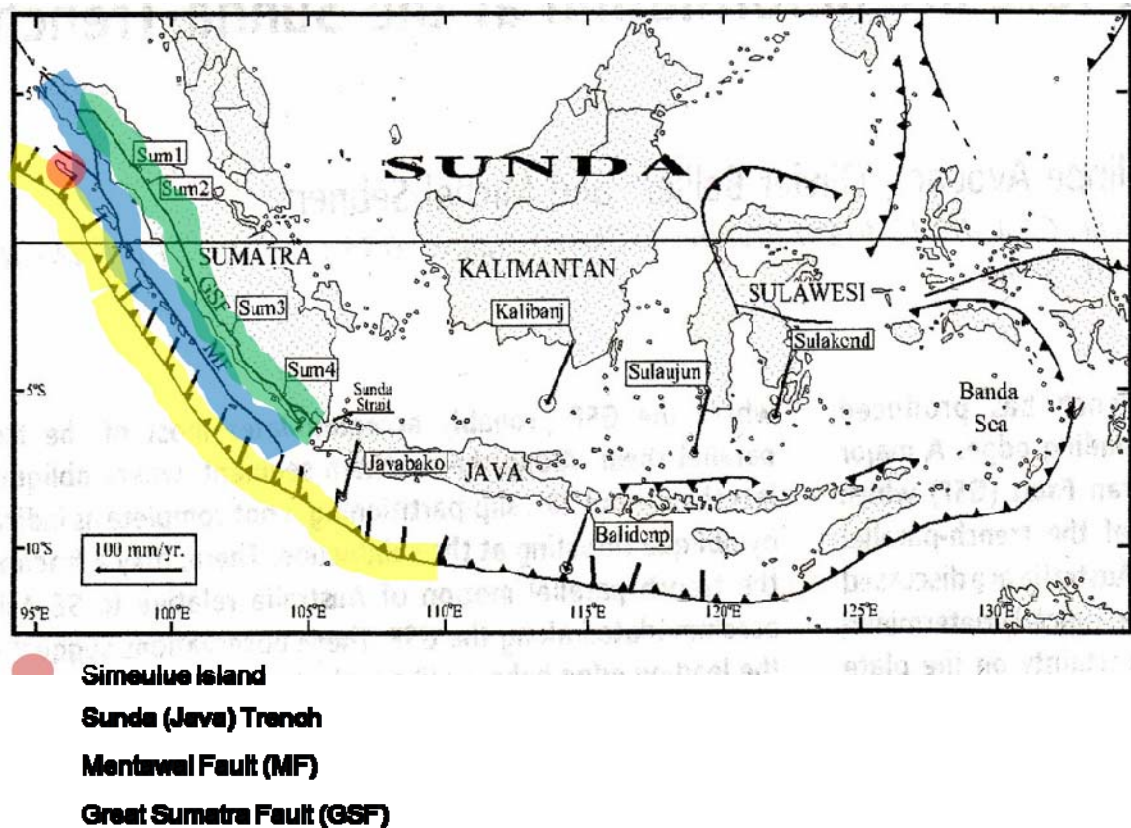
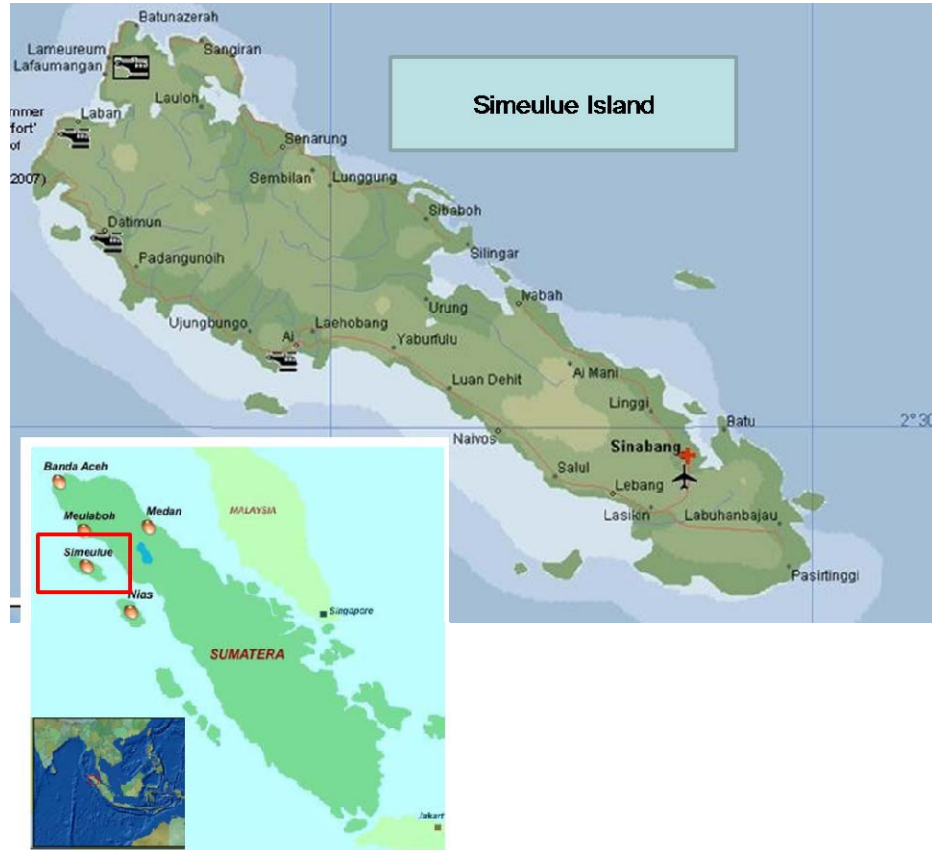


Figure 4. 2. Location of Simeulue in relation to the local tectonic scheme.

Adapted from Baroux, Avouac, Bellier and Sebrier, "Slip-partitioning and Fore-arc Deformation at the Sunda Trench, Indonesia," fig. 2.



**Figure 4. 3. Map of Simeulue Island**

Adapted from Yalciner and others, “December 26, 2004 Indian Ocean Tsunami Field Survey,” fig. 11; Map of Simeulue Island adapted from Comment on “Simeulue Banyak,” Uplifting Indo Blog, comment posted April 4, 2005, <http://upliftindo.blogspot.com/>.

Simeulue Island provides a perfect example of a community which has developed an understanding of the threats posed by earthquakes and tsunamis. Simeulue district is located less than 100 kilometers off the shore of Sumatra (fig. 4.3).<sup>213</sup> It is part of the Aceh district, and consists of one large island, Simeulue Island, and approximately forty

<sup>213</sup> McAdoo et. al., “*Smong*: How an Oral History Saved Thousands,” S661.



small islands, covering a total area of 205,150 ha.<sup>214</sup> The main island of Simeulue has a population of 78,128, according to 2005 statistics.<sup>215</sup> Of this population, most inhabitants can trace their origin back to various parts of Sumatra, including Aceh, Minangkabau and Tapanuli, while others are presumed to be from the land of Bugis in South Sulawesi and from Java.<sup>216</sup> The people consider themselves Simeuluean, even though ethnic groups have been assimilating on the island over the last hundred years.<sup>217</sup> This gives the region a multi-ethnic character.<sup>218</sup>

### *Economy*

With regard to livelihood, most economic sources for Simeulueans come from farming. According to 2003 statistics, 62.8 percent of the population consists of farmers, 13 percent are laborers, 5 percent are traders, 4.7 percent fishermen, 2.5 percent are civil servants, and 1.7 percent craftsmen.<sup>219</sup> Surprisingly, even though 106 out of 135 villages are coastal villages, a very small percentage of the population obtains its income from fishing.<sup>220</sup> Nonetheless, statistics also say that 84 percent of the population lives on the coast and on small islands surrounding the main island, and most of these people are

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<sup>214</sup> Koen Meyers, "Simeulue, Nias and Siberut: Indigenous Practices and Lessons Learned," in *Indigenous Practices and Lessons Learned for Disaster Risk Reduction*, eds. UN/ISDR and Kyoto University, (Bangkok, forthcoming).

<sup>215</sup> McAdoo et. al., "*Smong*: How an Oral History Saved Thousands," S661. Population statistics cited are from United Nations Information Management Systems (2005) found at [www.humanitarianinfo.org/sumatra/](http://www.humanitarianinfo.org/sumatra/)

<sup>216</sup> Teuku Abdullah Sanny, *The Smong Wave from Simeulue: Awakening and Changing, Post Tsunami Strategic Development of Regency of Simeulue* (Simeulue, Indonesia: Local Government of Simeulue Regency, 2007), 41.

<sup>217</sup> Meyers, "Simeulue, Nias and Siberut."

<sup>218</sup> Herry Yogaswara and Eko Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness in Simeulue Island, Nangroe Aceh Darusallam*, (Jakarta: UNESCO and LIPI, 2005).

<sup>219</sup> *Ibid.*, 10.

<sup>220</sup> *Ibid.*

fishermen.<sup>221</sup> Overall, the population is fairly poor compared to the rest of Indonesia, considered one of the 199 “backward regencies of Indonesia.”<sup>222</sup>

### *Religion and Culture*

Simeulue is a strong Islamic community, with one hundred percent of the population reported as Muslim.<sup>223</sup> The religion originated from the mainland, arriving through Aceh, Minang and Nias.<sup>224</sup> It is said that in the period of the Aceh Darussalam Kingdom, established in the sixteenth century, a champlain named “Halilullah” (renamed Tengku Di Ujung) was ordered by the Sultan of Aceh to go to Simeulue and convert all its inhabitants to Islam.<sup>225</sup> Islam continues influences many aspects of Simeuluean culture, specifically artistic pursuits including songs, dances and music, as well as folklore based on Islamic values and holy verses from the Al Qur’an.<sup>226</sup> Other influences on Simeuluean culture come from the mainland, where many of the ceremonies and traditions originate. One example is the Nandong, a tradition of storytelling through song, which focuses on life struggle and emotional events. Different themes are emphasized using Nandong, such as love, divorce or separation, and foreign adventures.<sup>227</sup> Though Nandong came from the mainland, several adaptations have been made over the years on Simeulue Island.<sup>228</sup>

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<sup>221</sup> Sanny, *The Smong Wave from Simeulue*, 53.

<sup>222</sup> Ibid.

<sup>223</sup> Ibid.

<sup>224</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 11.

<sup>225</sup> Sanny, *The Smong Wave from Simeulue*, 27.

<sup>226</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 13.

<sup>227</sup> Interview with Education officers and school Inspectors, Simeulue, February 2008.

<sup>228</sup> Sanny, *The Smong Wave from Simeulue*, 139.

## **Indigenous Knowledge: The Story of *Smong***

Stories have been passed down through several generations which describe a tsunami which devastated Simeulue on January 4, 1907. The tsunami is said to have extended over 950 kilometers along the coast of the island.<sup>229</sup> While the death toll in 1907 is unknown, these same legends say that up to seventy percent of the population was killed, many of whom were found on top of coconut trees up to ten meters tall or in the hills several kilometers inland.<sup>230</sup>

A Simeuluean word *Smong* has been assigned to this type of event, roughly translated as “the ocean coming onto the land,”<sup>231</sup> or simply “tsunami.” The word is said to come from *ni semongan* or splashing (of water) in one of the three local languages.<sup>232</sup> According to local residents today, the word *Smong* is associated with a three-staged event: 1) a strong earthquake; 2) receding sea; 3) large wave and flooding.<sup>233</sup> This was even confirmed by children, many of whom described these three stages when asked if they knew what *Smong* was.

The existence of a local name for the event implies that the people possess a certain amount of knowledge associated with tsunamis on the island.<sup>234</sup> In addition, the three-stage description of the event shows the extent of knowledge the residents have about tsunamis, describing the hazard in terms of its warning signs (the earthquake and receding sea).

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<sup>229</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 17.

<sup>230</sup> McAdoo et. al., “Smong: How an Oral History Saved Thousands,” S665.

<sup>231</sup> Ibid.

<sup>232</sup> Meyers, “Simeulue, Nias and Siberut.”

<sup>233</sup> Ibid. Also confirmed in interviews performed February 2008.

<sup>234</sup> Meyers, “Simeulue, Nias and Siberut.”

The exact origin of the word *Smong* is unknown, though many believe that it originated before the 1907 event. An excerpt from the final examination of a master of education who studied the structure of Devayan language, states the following:

...*Smong* is a word with 5 letters, without any syllable. We may believe assumptions which say *kemong* is tsunami or similar natural event. But due to influences from Acehnese language, it became *Smong*. But I still believe the first tsunami in Simeulue occurred in 1907...And I believe the word had existed before that, because it is a conversational language learnt from their ancestors. And this word came again when such event occurred.<sup>235</sup>

Today, referring to the term *Smong* with almost every resident of Simeulue will not only result in a confirming nod, but will also be attached to a lesson about how to recognize the warning signs of the *Smong* and what to do when it strikes. The story of the 1907 tsunami has been told over and over and spread throughout the island of Simeulue. Most people say they were told the story by their parents and families. This was confirmed by a retired fisherman estimated to be in his seventies and living near the coast in the Teupah Barat region, who said that he learned the story of *Smong* from his parents. He and his daughter, a teacher at a local school, explained that the stories were in the form of lessons describing what to do in case the hazard strikes again, as opposed to legends and songs (figs. 4.4 and 4.5).<sup>236</sup> Storytelling has a strong cultural tradition in Simeulue and is used as an activity to pass the time in many family residences (which include a core family and grandparents).<sup>237</sup>

Families may also tell different types of stories relating to *Smong* at particular times for particular reasons. One type of story tells about specific family members that

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<sup>235</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 24.

<sup>236</sup> Interview with retired fisherman and his daughter, a local school teacher, in Teupah Barat, February 5, 2008.

<sup>237</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 35.

died during the 1907 tsunami. These stories emphasize the strength of the hazard and describe the right actions to take when a tsunami approaches.<sup>238</sup> They also personalize the story, telling how a direct family member was harmed by the event (Two examples of these stories can be found in Appendix 1).



**Figure 4. 4. Retired fisherman in Teupah Barat**    **Figure 4. 5. Local school teacher in Teupah Barat**

Photos taken by author.

Stories of *Smong* are also told when a different disaster occurs, such as a fire or an earthquake, even if the disaster does not result in a tsunami. Another disaster provides a time to instruct others on the existence and threats of tsunamis. For example, in 2002 a strong earthquake hit Simeulue and many people were prepared to go to the hills; however, they did not see the sea water recede so they remained in their homes.<sup>239</sup> The

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<sup>238</sup> Ibid., 36.

<sup>239</sup> Ibid., 37.

event gave educated Simeulueans a chance to inform others about the threats of tsunamis and about the story of *Smong*. In addition, outsiders could also be educated, as happened with a sub-district chief of South Teupah, coming from Aceh, who learned about the 1907 *Smong* after people spoke of it in the aftermath of the 2002 earthquake.<sup>240</sup>

Another way *Smong* stories are incorporated into the lives of Simeulue Islanders is by using the word in other contexts. Sometimes, *Smong* is used to describe an emotional situation. For example, one interviewee explains: “when a parent is angry, it is called *Smong*. When he is really angry, then it overflows.”<sup>241</sup> This analogy introduces the word into everyday language and familiarizes the Simeulueans with the concept. It also educates the population by implying the power *Smong* has, similar to that of a father’s anger. *Smong* is sometimes used as a time reference when speaking about someone’s age or when something occurred.<sup>242</sup> For example, if one is wondering about the age of a specific person, they could ask how old the person was when the *Smong* took place?<sup>243</sup>

In regards to folklore, or verbal traditions existent in certain communities,<sup>244</sup> there are differing opinions on whether *Smong* is included in any traditional story telling or art form. According to one study, folklore has not been found that refers to the 1907 tsunami.<sup>245</sup> Nonetheless, the Linon traditional poetry, also used in Nandong, does include a passage which refers to an earthquake event. There are two versions of this writing. The first is from a working paper prepared for the Regent of Simeulue speech in Japan and Thailand, in a reflection on the 2004 Indian Ocean Tsunami. It is referred to as

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<sup>240</sup> Ibid.

<sup>241</sup> Ibid.

<sup>242</sup> Ibid., 41.

<sup>243</sup> Ibid.

<sup>244</sup> Ibid., 39.

<sup>245</sup> Ibid., 40.

“Earthquake/Linon traditional poetry” and is supposedly known widely in Simeulue, especially by the generation over sixty years old.<sup>246</sup> The passage is as follows:

*Kedang-Kedang Mo laek, uwak-uwak mo Linon*  
Drums you are lightning, our swing is an earthquake<sup>247</sup>

A similar passage comes from the Regent’s speech, which combines various writings and adds a reference to *Smong*.

*Smong dumek-dumek mo, linon uwak-uwak mo, ek laik kedang-kedang mo, kilek suluh-suluh mo”*  
Your bath is tsunami, your swing is earthquake, your drums are lightning and your illumination is lightning.<sup>248</sup>

It is not clear whether the original earthquake traditional poetry would have included this reference; however in the tradition of Nandong the poem is supposed to develop and change based on the imagination of the one reciting it.<sup>249</sup> A five-stanza rhyme or lyric about *Smong* is quoted in one research project as a way in which the *Smong* story has been transmitted over generations.<sup>250</sup> This rhyme is performed on several public occasions and sung as a children’s lullaby song.<sup>251</sup> (For original version and translation into Bahasa Indonesian see Appendix 2). After interviewing many residents, it seems that no one is aware of any Nandong which tells the story of the 1907 tsunami.<sup>252</sup>

In addition, one field note from a visit to Simeulue in 2005 states: “The news about Tsunami is never ending. No inhabitant is unfamiliar with the term *Smong* because

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<sup>246</sup> Ibid.

<sup>247</sup> Ibid.

<sup>248</sup> Ibid.

<sup>249</sup> Ibid.

<sup>250</sup> Sanny, *The Smong Wave from Simeulue*, 70.

<sup>251</sup> Ibid.

<sup>252</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 41. This comment is confirmed after several more interviews performed by the author in February 2008.

it has been a lullaby.”<sup>253</sup> Nonetheless, after a limited study was conducted to determine whether Simeuluean lullabies, also called *buai-buai*, actually do tell the story of *Smong*, it was discovered that there was no lullaby related to the 1907 tsunami. The study concludes:

However, *buai-buai* is a form of spontaneous and personal mumbling without any rhyme/poem. Therefore there may be one person mumbling about the tsunami but it is not intended to directly tell a story about the incident. It may have expectations related to the child’s character for the future.<sup>254</sup>

According to many Simeulue Islanders who were interviewed about *Smong*, the reason for the story’s success in staying with people (and eventually saving the population during the 2004 tsunami) is that it provides lessons from an actual event. Many people explained the same general concept: knowledge is power, and experience provides knowledge. They explain that in Aceh, the people did not have the same prior experience with tsunamis, and, therefore, did not know how to read the warning signs or react to the hazard.

#### **Event: the Tsunami 26 December 2004**

The devastating Indian Ocean Tsunami, occurring on December 26, 2004, was the result of an earthquake whose epicenter was approximately forty kilometers north of Simeulue. This means that on average the population had about twenty minutes to react after the earthquake occurred and before the tsunami hit the island.<sup>255</sup> In fact, some residents in Langi, the northernmost coast closest to the epicenter of the earthquake, had

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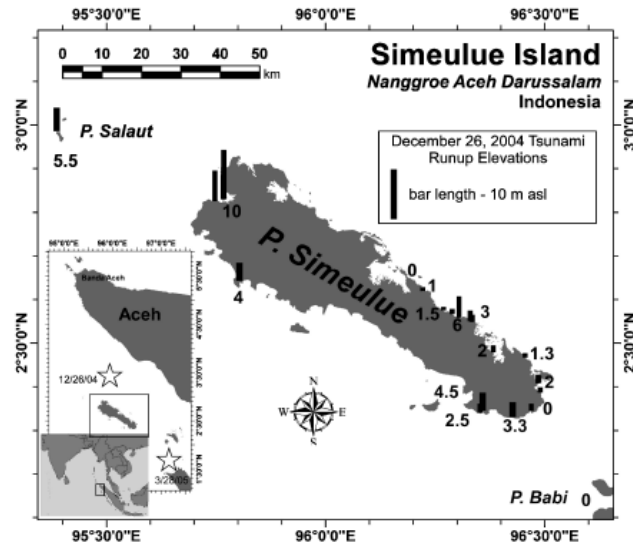
<sup>253</sup> Ibid.

<sup>254</sup> Ibid.

<sup>255</sup> McAdoo et. al., “Smong: How an Oral History Saved Thousands,” S665.



only 8 minutes to react after the earthquake shaking stopped.<sup>256</sup> Wave heights varied across the island, reaching over ten meters on the northernmost point, and subsiding towards the south (fig. 4.6).<sup>257</sup> Even with very little time to react, and the tsunami wiping out entire villages in some areas of the island, only seven people out of the total population of 78,128 died as a result of the tsunami.<sup>258</sup>



**Figure 4. 6. Various wave heights and runup elevations from the 26 December 2004 tsunami on Simeulue Island.**

Reprinted from McAdoo et. al., “*Smong*: How an Oral History Saved Thousands,” Fig. 1.

Several accounts of the Simeulue Islander’s experiences on that day help to understand the event. One man living in Teupah Barat (south east coast of Simeulue), estimated to be about 50 years old, was interviewed about his experience with the 2004 tsunami (fig. 4.7).<sup>259</sup> He recounted how he was sitting outside of his home, from which it is possible to see the coast line (approximately one hundred meters away), when an

<sup>256</sup> Ibid.

<sup>257</sup> Ibid.

<sup>258</sup> Ibid., S661.

<sup>259</sup> Interview performed February 5, 2008.

earthquake struck and the ground shook, splitting the road in front of him. When water began to shoot out of the ground, the man knew what was happening based on *Smong* stories. He quickly gathered his family and ran to the hills, located very close to his home. He said he stayed in the hills for 3 months before returning to his home, which had been destroyed by the tsunami.



**Figure 4. 7. Simeuluean man who survived the 2004 Indian Ocean Tsunami, now living in Teupah Barat.**

Photo taken by author

Another story is told by the head of a hamlet in the Langi Village, in an interview conducted in April 2006.<sup>260</sup> The village, which is home to 800 people and is located on the north of the island, was completely destroyed by the tsunami; however no one was killed.<sup>261</sup>

During the incident, the hamlet head was in Sibigo, the sub-district of West Simeulue. In the morning he could feel the earthquake in Sibigo. After feeling the presence of quake, he thought that he had to return home

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<sup>260</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 45.

<sup>261</sup> McAdoo et. al., "Smong: How an Oral History Saved Thousands," S665.

immediately to his family who was in the Langi village. He knows about the 1907 *Smong* story, but because the waters around Sibigo did not indicate a low tide, he went home quickly to his family. Using a boat and a “Robin” motor, he hurried towards Langi that was around two hours away. When he approached Langi, he felt the huge sea waves but he could not do anything against such huge waves. Giving up, he just let the waves take him all the way to the village of Lok Pauh, which is situated across the Langi village. He let his boat be carried away by the waves until it was hurled upon a hill in Lok Pauh village. He survived but it took him 2 days to return to the Langi village.<sup>262</sup>

Another story is told by Amir Hamzah, a 45 year old male villager from Slur.

On 26 December 2004, since it was a Sunday he woke up rather late. Suddenly a very strong earthquake occurred preventing him from being able to walk. Because the house was near the sea, and to prevent the possibility of electric shock and panic he ran in the direction of the sea. However, he saw that the water near the coast had receded. He remembered stories from his parents of the tsunami of 1907. He ran back to his house to get his sarong. At that time the water had begun to rise to his ankles. He heard the roar of water and he ran to the mountains. According to him there were three signs before a large wave came, namely (1) a powerful earthquake, (2) water on the coast receding quite far and (3) water buffalos gathering by the side of the mountain.<sup>263</sup>

All three of these stories indicate that the people living in Simeulue knew the story of the 1907 tsunami when the disaster struck in 2004. Not only could they recognize the warning signs, but they knew what to do to survive the incoming threat. This knowledge is credited with saving the lives of almost all inhabitants on the island, even though many of the villages where they resided were destroyed.

### **Lessons Learned in Established Discourse**

The story of the Simeulue community during the 2004 Indian Ocean tsunami is a dramatic and positive one; yet important questions still remain. How can this story help

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<sup>262</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 45.

<sup>263</sup> *Ibid.*, 47.

other communities facing tsunamis and other types of disasters similarly reduce risk? What lessons can be learned from Simeulue that are applicable to communities in different environmental and cultural contexts? Can this story help add value to the field of disaster risk reduction (DRR)?

Several studies following the tsunami event attempted to answer these questions. The success of Simeulue Islanders is mainly credited to their knowledge of tsunamis, manifest in the story of *Smong*. From there, some have called for the general inclusion of indigenous knowledge in DRR policy justified by the Simeulueans' success.<sup>264</sup> Nonetheless, more work has been done in recent years to try to determine what specific lessons can be learned from this experience. All of the published results are based on the arguments outlined in the previous chapter. Most rely on the argument that the method of dissemination used in Simeulue could be used elsewhere, and encourage the use of the same successful low-tech, grassroots approach to disseminate DRR knowledge in other communities.<sup>265</sup> Others use the story as a means of defending the involvement of affected communities in future DRR projects, planning and regulations, since the Simeulueans proved that they have valuable information to improve DRR on their island and that their specific context should be taken into account.<sup>266</sup> These arguments are broad approaches to the value of indigenous knowledge, but do not specify key categories of knowledge the Simeulueans held which helped reduce their vulnerability.

Alternatively, others take a different approach and look narrowly at the knowledge of the Simeulueans. They point to the specific message passed on by the

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<sup>264</sup> UN, *Lessons for a Safer Future*, 6.

<sup>265</sup> Ibid.; McAdoo, et. al., “*Smong: How an Oral History Saved Thousands*,” S661-S669; Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 49.

<sup>266</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 50. This study specifically recommends that government regulations should be “socialized to the community.” (50).

community: *when an earthquake occurs, if the water recedes, immediately run to the hills because a tsunami is coming.* They claim that this information is the lesson learned from this event, and ask for the message to be included in future education and awareness-raising in tsunami-prone areas to reduce risk.<sup>267</sup> This approach, however, is too specific since it only provides lessons for communities who also face tsunamis and also live in similar terrain (for instance with the existence of hills to which the community can run).

The goal of this research is to uncover lessons from the Simeulue experience which specify the type of knowledge which was successful during the tsunami, but do not limit these lessons to apply only to communities with similar environmental or cultural contexts. To achieve this objective requires a new approach to gathering lessons from this story; one which extracts core categories of indigenous knowledge in order to find elements which dictate the vulnerability of a community in any context. The following chapter will do this using a newly proposed assessment tool.

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<sup>267</sup> UN, *Lessons for a Safer Future*, 6.

## FIVE

### **A NEW ASSESSMENT TOOL: Four Categories of Indigenous Knowledge Used to Assess Vulnerability**

To achieve the goal of determining a practical way to apply the value of indigenous knowledge to disaster risk reduction (DRR), a four step process has been performed and is outlined in this chapter. First, four key categories of indigenous knowledge have been extracted from the discourse which each relate to environmentally sustainable development. These categories, which include ecological knowledge, an environmental ethic, cultural traditions associated with disasters and a connection to place, have been chosen for their value in reducing vulnerability to disasters. Each category is explained and defined in the context of the indigenous knowledge discourse. Second, the value of each category for DRR is confirmed by citing various cases of communities that have used indigenous knowledge to survive, cope with, or reduce the risk of disasters. Third, an assessment tool is presented, which uses clues about a community's knowledge to determine the strength of each category of knowledge. If some or all of the categories are strong, the community is less vulnerable to future disasters. Weaker categories can be strengthened through education, environmental policy and cultural reinforcement to further reduce the community's vulnerability to disasters. Finally, this tool is validated by applying it to Simeulue Island. Since Simeulueans have successfully reduced their vulnerability to the 2004 Indian Ocean tsunami, the strength of Simeulue knowledge in each of these four areas helps to prove

that these categories of indigenous knowledge reduce vulnerability to disasters. The new assessment tool could potentially provide a concrete, streamlined method of further reducing vulnerability of communities threatened by disasters.

#### **Four Extracted Categories of Indigenous Knowledge**

Based on the indigenous knowledge discourse, four categories of indigenous knowledge can be derived which are shown to have a value for DRR. The four categories relate to the environmental perspective of the knowledge holder, dictating how well one knows the local environment, how well one cares for this environment, how environmental events from the past are still acknowledged and how much one wishes to invest in the local environment. Each of these categories of knowledge is defined below, drawn from definitions and characteristics of indigenous knowledge.

##### *1. Ecological Knowledge*

Since indigenous knowledge is time-tested and has developed over generations of habitation in one specific location, it often incorporates an intimate understanding of the local environment.<sup>268</sup> In indigenous communities, ecological knowledge is learned through experience and trial-and-error, not via the standard academic practice of formal education. This allows for an intimate understanding of the interactions between humans and the environment.

Indigenous knowledge not only includes biological and ecological information, such as naming of plant species or animal classifications. Many communities also

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<sup>268</sup> For specific examples and citations relating to the ecological knowledge in the context of sustainable development, see Berkes, *Sacred Ecology*, 29-30.

maintain an understanding of their environment's behavior, its relationships, and how it has changed over time.<sup>269</sup> Older members of the society who are respected by their community, often referred to as elders, are considered key knowledge carriers since many have extended experience in a location and have observed changes that have occurred throughout their lifetimes.<sup>270</sup> Along with memory of past events, elders provide the wisdom to interpret rare events.<sup>271</sup> Their knowledge does not simply reflect the existing environment, but also grasps its historic development and its interaction with social and cultural changes within the community. For example, communities in the Arctic have shown their ability to observe the changing conditions of nature. A study performed on Banks Island in the Arctic explains that the Inuvialuit community has identified minor changes in environmental processes including unpredictable weather conditions, the ability to catch certain species of salmon previously unattainable, and the early births of umingmak (muskox), which have all proved to be the result of climate change.<sup>272</sup> The knowledge of the Inuvialuit is rooted in historic longevity and the ability to recognize changes in the environment over time, especially those too minor for outsiders to notice.

The existence of the ecological knowledge described here stems from many communities' dependence on a direct interaction with the natural environment for survival and livelihood. The only way a community will survive is if it can recognize and use its resources. Strategies must also be developed to maintain these resources. Thus, ecological knowledge develops out of necessity. In many industrialized countries

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<sup>269</sup> Nancy J. Turner, *The Earth's Blanket: Traditional Teachings for Sustainable Living* (Seattle, WA: University of Washington Press, 2005), 138.

<sup>270</sup> Turner, *The Earth's Blanket*, 230.f

<sup>271</sup> Berkes, *Sacred Ecology*, 95.

<sup>272</sup> Dyanna Riedlinger, "Climate Change and the Inuvialuit of Banks Island, NWT: Using Traditional Environmental Knowledge to Complement Western Science," *Arctic* 52, no. 4 (1999): 430-432.



which no longer depend on the citizen's direct interaction with the local environment, much of this knowledge is lost.

In several cases, ecological knowledge has led to the creation of sustainable conservation and resource management systems.<sup>273</sup> For example, Fijian indigenous communities have developed traditional marine resource management strategies which are based on knowledge accumulated over generations about the sea, its creatures, and the people's system of interaction with each.<sup>274</sup> Practices include holding excess catch in enclosures until it is needed and restricting fishing in certain areas (like inland lagoons or easily accessible species) until times of poor fishing conditions.<sup>275</sup> These require an understanding of fish behavior over time, the social circumstances of the community, and how these two factors interact. Further, practices incorporated into conservation and resource management systems help to both maintain and pass on ecological knowledge by allowing community members to further their own knowledge while informing others.

## 2. *Environmental Ethic*

An environmental or stewardship ethic refers to a moral responsibility and attitude towards nature which encourages the preservation and protection of resources. "At the very least, a stewardship ethic urges humans to see ourselves not as conquerors of other creatures but ordinary members and stewards of the ecological community."<sup>276</sup>

Specifically, the difference between using and exploiting the environment is crucial,

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<sup>273</sup>For examples, see: Joeli Veitayaki, "Traditional Marine Resource Management Practices Use in the Pacific Islands: An Agenda for Change," *Ocean and Coastal Management* 37, no. 1 (1997): 127; Madhav Gadgil, Fikret Berkes and Carl Folke, "Indigenous Knowledge for Biodiversity Conservation," *Ambio* 22, no. 2-3 (1993): 152; Turner, *The Earth's Blanket*, 152, 166, 230; Berkes, *Sacred Ecology*, 95.

<sup>274</sup> Veitayaki, "Traditional marine resource management practices," 127.

<sup>275</sup> *Ibid.*, 125.

<sup>276</sup> Seth Appiah-Opoku, "Indigenous Beliefs and Environmental Stewardship: A Rural Ghana Experience," *Journal of Cultural Geography* 24, no. 2 (2007): 80-81.

especially in the context of disasters. Humans are undoubtedly dependent on nature and its resources and must use the environment in order to survive. Exploiting the environment refers to over-use of nature to the point where the environment cannot recuperate to be used to meet future needs; it cannot develop sustainably (see definition of sustainable development in chapter one).

Oftentimes, exploiting the environment leads to environmental degradation and eventually disasters. In the diagram presented in figure 1.3, the link between environmental degradation, vulnerability and disaster risk is clear. Environmental degradation has two effects; it can degrade the community's resource base, leading it to be more vulnerable to disasters, and it can alter natural processes, leading to an increase in hazards. According to the definition of disaster risk, an increase in vulnerability and/or an increase in frequency of hazards lead to an increase in risk.

Environmental ethic is closely tied to indigenous belief systems, an essential part of indigenous knowledge.<sup>277</sup> A belief system is an entity which allows a society to interpret the outside world based on a specific worldview. The worldview is often associated with a certain set of values which dictate the society's behavior with nature.

One accepted analytical model shown in figure 5.1 further explains the belief system of traditional knowledge and management systems as a *knowledge-practice-belief complex*.<sup>278</sup> The model shows that a belief system, or worldview, encompasses three other elements of a society: ecological knowledge, resource management practices and social institutions.<sup>279</sup> Ecological knowledge is necessary for survival, and as discussed earlier, it includes specific knowledge about species identifications and taxonomies, life

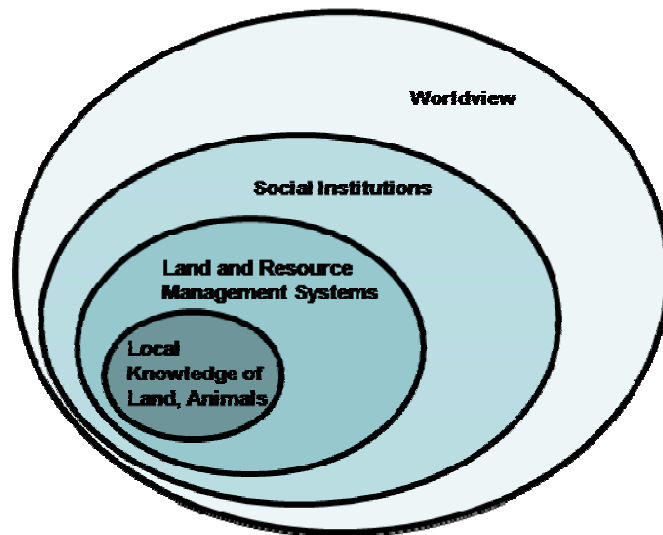
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<sup>277</sup> Appiah-Opoku, "Indigenous Beliefs and Environmental Stewardship."

<sup>278</sup> Berkes, *Sacred Ecology*, 13-14.

<sup>279</sup> Berkes, *Sacred Ecology*, 13-14.

histories, distributions and behavior; yet this knowledge does not automatically lead to sustainable resource management. Therefore, the next level, resource management systems, refers to the set of practices which lead to management systems which maintain the resources sustainably for future generations. Next, in order to control and maintain these systems, social institutions must be put in place to establish rules, to coordinate activities and to promote cooperation. All three of these elements are encompassed by a worldview which shapes the environmental perception of the society which supports the existence and maintenance of the other activities. A belief system gives meaning to the observations the community has of the environment and allows its members to interpret the world around them in a particular way.



**Figure 5. 1. Knowledge-Practice-Belief Complex**

Adapted from Berkes, *Sacred Ecology*, Fig. 1.1.

The worldview held by many indigenous peoples incorporates an environmental ethic which derives from the community's dependence on nature for survival. Since the society needs the environment and its resources, its worldview must encourage an

awareness of the environment and a symbiotic relationship where individual actions do not harm the potential for future resources. Many societies develop teachings, traditions and institutions which are founded on this environmental ethic.<sup>280</sup>

An environmental ethic, in terms of control and exploitation, is one of the key contradictions between most scientific approaches and the approaches of indigenous societies. It has been generalized that the scientific approach to the environment considers nature as an “external” entity and was introduced during the enlightenment period; some attribute the origin to Cartesian’s dualism of mind versus matter or man versus nature.<sup>281</sup> Others say that Francis Bacon is to be credited for the change in perspective of European societies.<sup>282</sup> In fact, Francis Bacon claims that his Utopia, labeled *New Atlantis* in his 1624 treatise, is a “society dedicated to the mastery of nature through rigorous application of the categories of rational science.”<sup>283</sup> Before the enlightenment period in history, all societies held beliefs parallel to many indigenous communities do today, where humans follow what has been defined as an environmental ethic.<sup>284</sup>

### 3. Cultural Traditions

Many indigenous communities have a strong oral tradition, representing a primary way its knowledge is passed down through generations. One way this oral tradition manifests itself is in the form of these cultural traditions which often contain lessons and

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<sup>280</sup> Turner, *The Earth’s Blanket*, 235.

<sup>281</sup> Berkes, *Sacred Ecology*, 34.

<sup>282</sup> Thomas Heyd, review of *Sacred Ecology: Traditional Knowledge and Resource Management*, by Fikret Berkes, *Environmental Ethics* 22, no. 4 (2000): 419-421.

<sup>283</sup> Ingold, *Perceptions of the Environment*, 77.

<sup>284</sup> Berkes, *Sacred Ecology*, 34.

teachings. Cultural traditions can include stories, legends, songs, proverbs, ceremonies or rituals which both represent and are encouraged by the culture of a society. For example, many indigenous communities have Creation and Re-creation stories which relay the legend of how everything began.<sup>285</sup> These stories often contain lessons about human behavior or explanations of why certain things are the way they are.

Oftentimes cultural traditions take on a religious significance. For example, many communities still perform ceremonies which honor the spirits of the plants, animals and supernatural creatures which hold a religious significance to a community.<sup>286</sup> Such rituals become embedded in the culture and are passed on to future generations.

#### *4. Connection to Place*

While “place” is often considered simply a location or physical site, many indigenous people perceive “place” as having an inherent connection with the community, spirituality, livelihood and identity. For example, Aboriginal people living in the Daly River, Northern Territory, Australia, have one word for the environment: “country;” however this word conveys “the holistic, multi-dimensional notion where people, animals, plants, dreaming, underground, the earth, minerals, and waters are all encompassed by the term ‘country.’ It can include attachments, feelings, and people’s spiritual relationship to the land. Aboriginal people say, ‘The country needs its people.’ They say, ‘Healthy country means healthy people.’”<sup>287</sup> Perceiving place in a holistic way creates a deep kinship with the land, since it does not simply represent a physical location, but there is also a spiritual and cultural connection to it.

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<sup>285</sup> Turner, *Earth’s Blanket*, 45.

<sup>286</sup> *Ibid.*, 125.

<sup>287</sup> Gillian Kendall, “A Burgeoning Role for Aboriginal Knowledge,” *ECOS* 125 (2005): 10.

The connection to place is manifest in several ways. Economic systems of many communities, as well as livelihoods, are dependent on specific land, its resources and its ownership.<sup>288</sup> In addition, oftentimes place will dictate a person's identity by linking them to a specific spirit or clan.<sup>289</sup> Further, place can also represent family history, connecting past and future generations. For example, aboriginal groups in Australia develop a familial relationship with their local environment.

For Aboriginal groups kin and country are indivisible: it is literally impossible to talk about one without referring to the other and in this way land represents the emotional, affective aspects of people's lives, embodying their kin relationships and tying their personal lives into other forms of knowledge. This conflation leads to an intensity of affective attachment that is difficult for non-Aboriginal people to appreciate. ... the country holds not only relatives who have died, but also all of those who are alive, and those yet to come. The loss of country is thus also the loss of familial connections...<sup>290</sup>

Further, when comparing one specific Australian Aboriginal community, known as Kowanyama, with Euro-Australian pastoral communities in the same location that base their livelihood on raising livestock living in the same place, the aboriginal connection to place is even more vivid.<sup>291</sup> Both communities depend on a similar knowledge of their environment; however, pastoralists interpret the environment according to global perceptions, via quantitative, temporal and linear conceptions. For example, pastoralists classify their land based on universal categories relating to type of timber or grass, or a

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<sup>288</sup> Veronica Strang, "Close Encounters of the Third World Kind: Indigenous Knowledge and Relationship to Land," in *Development and Local Knowledge: New Approaches to Issues in Natural Resources Management, Conservation and Agriculture*, ASA 2000, vol. 2, Studies in Environmental Anthropology Series, eds. A. Bicker, J. Pottier and P. Sillitoe, (London: Routledge, 2004), 99.

<sup>289</sup> For example, in the aboriginal society of Kowanyama in Cape York, North Queensland, every individual has a specific place from whence his/her spirit has emerged. The location of one's spirit dictates which clan he or she belongs to, thus the network of clans among the Australian Aboriginals is defined by geography. Strang, "Close Encounters of the Third World Kind," 97, 99.

<sup>290</sup> Strang, "Close Encounters of the Third World Kind," 99.

<sup>291</sup> Ibid.

flora and fauna defined by a global genus.<sup>292</sup> Indigenous peoples, on the other hand, consider their environment qualitatively, spatially and cyclically relating elements to the specific local environment.<sup>293</sup> Aboriginals do not have any words for numbers over three, referring to groups as, “a lot”, so instead of counting members of the environment they name them, distinguishing them individually.<sup>294</sup> Therefore, as Strang argues, indigenous knowledge systems often provide a sense of belonging to a location, an identity which involves the place, and an ability to relate specifically to that place.<sup>295</sup> These characteristics allow for a more integrated approach to the environment, in that social and environmental relationships are interlinked and there is a deep kinship between the people and their local environment.

### **Value of the Four Core Categories of Indigenous Knowledge for DRR**

Now that each category has been defined in the context of the indigenous knowledge discourse, the following section examines each category again in relation to its value for disaster risk reduction. Other DRR research has made note of the different categories of indigenous knowledge which relate to DRR. Specifically, Dekens presents a framework by which indigenous knowledge is organized into sixteen sub-groups, which are further divided into “four pillars of local knowledge on disaster preparedness.”<sup>296</sup> In this research, four categories of indigenous knowledge are emphasized as those most

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<sup>292</sup> Ibid., 108.

<sup>293</sup> Ibid., 103.

<sup>294</sup> Ibid., 102.

<sup>295</sup> Ibid.

<sup>296</sup> Dekens, *Local Knowledge for Disaster Preparedness*.

important in reducing the vulnerability. These four categories are then placed into a streamlined assessment tool for easy use in future DRR policy and practice.<sup>297</sup>

The four categories were chosen because of their relationship to environmental sustainability, an important component of DRR. The specific value of each category of knowledge for DRR is supported below by specific experiences of communities, mostly from the Asia-Pacific region, which have successfully used this specific category of knowledge to survive or cope with a natural disaster.

### *1. Ecological Knowledge*

Ecological knowledge holds particular value for DRR because it provides an ability to recognize and interpret warning signs, which can help to predict incoming disasters. Through identifying impending disasters, people can adapt to the changing circumstances and respond to disasters before it is too late.

Several cases from the Asia-Pacific region show that communities can recognize and predict specific recurring hazards. For example, in Papa New Guinea, a flood-prone community living in Singas observes the rainfall in the hills in order to predict future flooding in the lowlands.<sup>298</sup> Other communities are able to recognize unusual animal behavior as a sign of impending disasters. For example, in Pakistan, three observations have been made relating to the behavior of animals before an earthquake:

1. Immediately before the earthquake strikes birds come out of their nests and start flying and make noise in an unusual restless manner.

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<sup>297</sup> The four categories were selected due to their relevance to environmental sustainability and are drawn from literature on the value of indigenous knowledge for sustainable development (including specifically resource management and conservation). Two out of the four categories overlap groups represented in Dekens framework which provides further support for their relevance for DRR.

<sup>298</sup> Jessica Mercer and Ian Kelman, "Living with Floods in Singas, Papa New Guinea," in *Indigenous Practices and Lessons Learned for Disaster Risk Reduction*, eds. UN/ISDR and Kyoto University (Bangkok, forthcoming).



2. The animals tied to pegs or confined in rooms/enclosures show restlessness and try to run away.
3. Even the ants come out of their houses (Holes) in the earth.<sup>299</sup>

In the Chitral district in northwestern Pakistan, community members are able to predict floods based on the color, smell and behavior of mountain streams.<sup>300</sup> In particular, in 2006 a glacial lake outburst flood destroyed 106 houses in Brep village; however, no lives were lost, since the community had the ecological understandings to interpret the stream behavior and evacuated the village in time.<sup>301</sup>

In addition to recognizing warning signs, an understanding of the environment and how its elements act can assist communities in creating mechanisms to cope with disasters. For example, in Nandeswar, Assam, India, bamboo is planted near canals to reduce soil erosion and risk from flood.<sup>302</sup> The value of bamboo as a material to reduce soil erosion near river embankments lies in the fact that when it is planted in a certain way (known as the bamboo root pressure technique) its roots exert pressure in all directions of the main shoot allowing newer shoots to grow both near the surface and as deep as five feet into the soil.<sup>303</sup> The community's knowledge of the properties of bamboo and its understanding of how to foster specific behavior helps them to reduce river erosion and flood.

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<sup>299</sup> E-mail correspondence with Vickram Chhetri, in reference to observations by Dr. Irshad Hussain Tirmazi, Consultant TEVT, UNESCO, Islamabad (Pakistan), January 21, 2008.

<sup>300</sup> Dekens, *Herders of Chitral*, 29-30.

<sup>301</sup> Julie Dekens, "Eastern Terai of Nepal and Chitral District of Pakistan: Local Knowledge on Flood Preparedness: Examples from Nepal and Pakistan," in *Indigenous Practices and Lessons Learned for Disaster Risk Reduction*, eds. UN/ISDR and Kyoto University (Bangkok, forthcoming).

<sup>302</sup> Irene Stephen, Rajiv Dutta Chowdhury and Debashish Nath, "Soil and Water Conservation through Bamboo Plantation: A Disaster Management Technique adopted by the people of Nandeswar, Assam," in *Indigenous Practices and Lessons Learned for Disaster Risk Reduction*, eds. UN/ISDR and Kyoto University (Bangkok, forthcoming).

<sup>303</sup> Stephen, Chowdhury and Nath, "Soil and Water Conservation through Bamboo Plantation."

## 2. *Environmental Ethic*<sup>304</sup>

In the context of disasters, respecting and preserving the environment allows communities to reduce potentially harmful actions leading to disasters. Disasters represent an extreme relationship between humans and the environment, since the definition of disaster depends on both a hazard (the environment) and an inability to control it (human action). Therefore, certain vulnerabilities of communities result from a mismanagement of the environment. By maintaining an awareness of the environment and not exploiting it or causing degradation, the potential for disasters to occur is much lower.

An environmental ethic helps DRR by maintaining a healthy and productive environment as well as specifically encouraging the conservation of natural buffers, both of which can help protect a population from disasters. For example, healthy wetlands provide flood protection, healthy forests are less susceptible to wildfires and reduce landslide risks, and dunes on the coastline can reduce the impact of storm surges.<sup>305</sup> Deforestation can exacerbate both floods and droughts. By removing trees, soil systems and other vegetation which either absorb water or store water, humans can make land more prone to drought or flooding respectively.<sup>306</sup> Some indigenous communities have recognized the value of natural elements and compensated for their loss. For example, in Nepal, one of the most common practices performed by local people to mitigate

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<sup>304</sup> Again, this is not to assume that all indigenous people have an environmental ethic, which has been proven to be false. See discussion in chapter two.

<sup>305</sup> Coppola, *Introduction to International Disaster Management*, 153.

<sup>306</sup> Anders Wijkman and Lloyd Timberlake, *Natural Disasters: Acts of God or acts of Man?* (Washington D.C.: Earthscan, 1988), 29-30.

landslides and floods has been to plant trees in uncultivated lands, along river banks, and on the road side.<sup>307</sup>

Mangroves, dunes, coral reefs and wetlands, such as salt marshes, are considered the *Big Four Ecosystems* which help protect coastal regions from more frequent and regular storms.<sup>308</sup> A study done in Sri Lanka after the 2004 Indian Ocean tsunami illustrates the possible benefits of coral reefs for tsunami protection. American researchers studied the coral reefs in Sri Lanka after the event and concluded that the presence of coral and rock reefs off shore reduced the wave height and the impact of the tsunami.<sup>309</sup> Nonetheless, further work must be done to determine the true impact of natural buffers on large scale tsunamis such as the 2004 Indian Ocean tsunami, since this fact remains controversial.<sup>310</sup>

### 3. Cultural Traditions

Two categories of cultural traditions have value for reducing disaster risk. The first category relates to the strong oral tradition of indigenous communities, manifesting itself in the form of stories, proverbs, legends and songs. These traditions reduce

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<sup>307</sup> Man B. Thapa, "Indigenous Knowledge on Disaster Mitigation: Towards Creating Complementarity Between People's and Scientists' Expertise," in *Indigenous Practices and Lessons Learned for Disaster Risk Reduction*, eds. UN/ISDR and Kyoto University (Bangkok, forthcoming).

<sup>308</sup> E-mail correspondence with Brian McAdoo, Vassar College, March 5, 2008.

<sup>309</sup> H. J. S. Fernando, J. L. McCulley, S. G. Mendis, and K. Perera, "Coral Poaching Worsens Tsunami Destruction in Sri Lanka," *Eos* 86, no. 33 (2005): 301, 304.

<sup>310</sup> Andrew H. Baird claims that healthy ecosystems can not reduce impacts from tsunamis, presenting several arguments. See Andrew H. Baird, "Myth of Green Belts," *Sumadra*, Report No. 44 (July 2006): 14-19; and Andrew H. Baird, et. al., "Acehnese Reefs in the Wake of the Asian Tsunami," *Current Biology* 15 (2005): 1926-1930. Other scientists have attempted to prove the value of natural systems. See Fernando et. al, "Coral Poaching Worsens Tsunami Destruction in Sri Lanka;" Finn Danielsen and others, "The Asian Tsunami: A Protective Role for Coastal Vegetation," *Science* 310 (2005): 643; Hamzah Latief and Safwan Hadi, "The Role of Forests and Trees in Protecting Coastal Areas against Tsunamis," *FAO Publication*, in press, (2006); Kandasamy Kathiresan, and Narayanasamy Rajendran, "Coastal Mangrove Forests Mitigated Tsunami," *Estuarine, Coastal and Shelf Science* 65 (2005): 601-606.

community vulnerability by educating the people on local risks, how to recognize warning signs, the impact of disasters and how to respond to impending disasters.

One prime example involves the Moken people of the Surin Islands, one of three sub-groups of Chao Lay (or sea people) living on islands and in coastal areas near Thailand (fig. 5.2). Of the three groups (which also include the Moklen and Urak Lawoi), the Moken have remained the most traditional society and are for the most part isolated from modern society. Moken ancestors, having experienced a tsunami on Yann Chiak Island in Myanmar, warned their future descendants of the threats of tsunamis by creating a legend.<sup>311</sup> The *legend of the seven rollers*, as it was called, warned that the *laboon*, or giant wave, comes in as a series of waves (hence seven rollers).<sup>312</sup> Not only did the story tell of the hazard's existence, but it also taught that if the water along the shore suddenly receded, it meant *laboon* was approaching and everyone should run to higher ground.<sup>313</sup> Speaking of the *laboon* was forbidden in the Moken community, out of fear that it would produce the terrifying event, yet the story and its warnings were well known.<sup>314</sup> In 2004, during the Indian Ocean Tsunami, the community recognized these warning signs and all ran to the hills. The entire population of over 200 members of the community survived the event, in spite of the islands' dangerous location.<sup>315</sup>

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<sup>311</sup> Arunotai, "Moken Traditional Knowledge," 143.

<sup>312</sup> Narumon Arunotai, "Saved by an old legend and a keen observation—the case of Moken sea nomads in Thailand," in *Indigenous Practices and Lessons Learned for Disaster Risk Reduction*, eds. UN/ISDR and Kyoto University (Bangkok, forthcoming).

<sup>313</sup> Arunotai, "Saved by an Old Legend and a Keen Observation."

<sup>314</sup> Arunotai, "Moken Traditional Knowledge."

<sup>315</sup> One source noted that a crippled man left behind in the confusion of the event did die, resulting in one casualty. However, this death can only be found in two sources: (Raffy Tima, Jr., "Lessons from History," Southeast Asian Press Alliance (SEAPA), (2003), [www.seapabkk.org/newdesign/fellowshipsdetail.php?No=441](http://www.seapabkk.org/newdesign/fellowshipsdetail.php?No=441); and UN, *Lessons for a Safer Future*, 6). A significant number of other sources claim there were no casualties at all, including Arunotai, "Moken Traditional Knowledge," 143.



**Figure 5. 2. Map of Surin Islands**

Reprinted from UNESCO. *Indigenous People and Parks: The Surin Islands Project*. Coastal Region and Small Island Papers 8 (Paris: UNECO, 2001).

A similar example, also from Southeast Asia, can be seen in the Philippines, with the indigenous tribal group called Aeta, living near the volcano Mt. Pinatubo in central

Luzon (about one hundred kilometers north of Manila).<sup>316</sup> In the 1980s the Philippine National Oil Company began a geothermal power plant project in the area, which resulted in drilling at three sites around the mountain. The project went on in spite of the vehement warnings of the Aeta, whose elders claimed that disturbing the volcano, which had remained inactive for over one hundred years, would produce “a great disaster never before witnessed in our lifetime [to] descend upon us.”<sup>317</sup> The Aeta recalled a story which was passed down from their ancestors, who warned of the danger the volcano presented when the mountain was disturbed. The project was declared unviable in the late 1980s and abandoned, even though much of the drilling had already been performed. In the summer of 1991, three geothermic explosions rocked Mt. Pinatubo, leading to several eruptions which killed 700 people, displaced tens of thousands of families and caused millions of dollars worth of damage.<sup>318</sup> The cultural stories of the Aeta, which warned against disturbing the mountain, proved true in the face of the volcano.

Other examples exist where cultural stories are produced in the form of proverbs or songs and disseminated regularly throughout the community. For example, in Nepal a proverb which states “the snake and the river don’t run straight,” warns the people in the Eastern Terai that the nature of the river is unstable and they should act cautiously.<sup>319</sup> The same community has a traditional song which recounts a flood in the 1960s, warning of the impact such an event could have on the community.

The flood of 1966 did unexpected things.  
When floods came to Lakhandehi (river), they went to Sundarpur.  
When diarrhea affected water, people consumed the same water.  
Then people became intoxicated and resorted to fighting.

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<sup>316</sup> Tima, “Lessons from History.”

<sup>317</sup> Ibid.

<sup>318</sup> Ibid.

<sup>319</sup> Dekens, *The Snake and the River Don’t Run Straight*.

Some broke their jaws and some broke their heads.  
Salt, blood, and law, all became cheaper.  
When in 1966, floods came to Bheem River.  
Son and father were harvesting seeds.  
Daughter and mother were fetching water.  
Bheem River's floods drowned both of them.  
From the other shore, Kheru could only beat his chest.  
The flood of 1966 did unexpected things.

Song narrated by Ram Ekbal Sah,  
Piparyia VDC, Sarlahi District<sup>320</sup>

A second category of cultural traditions which can help reduce vulnerability to disasters include ceremonies and rituals. Ceremonies and rituals educate people about local environmental threats, can further foster an environmental ethic and help create social resilience within a community.

In many cases, performing rituals help the community to understand and keep past events alive in the mind of its members. Several communities in Pakistan, specifically noted in the Mansehra and Battagram Districts, perform prayers and rituals after a disaster event to honor and remember it.<sup>321</sup> Specifically, the Kalash community in Chitral District of Pakistan has a collective ceremony called “lavak natek” which recreates different components of floods through symbolic actions, such as running down from the hills and shouting.<sup>322</sup>

Similarly, on the island of Siberut, located in an earthquake prone area off the western coast of Sumatra, Indonesia, the community has several traditions associated with earthquakes. Whenever a new house is built, offerings are put near certain pillars of

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<sup>320</sup> Ibid., 59.

<sup>321</sup> Takeshi Komino, “Indigenous Coping Mechanisms for Disaster Management in Mansehra And Battagram Districts, North West Frontier Province (NWFP), Pakistan,” in *Indigenous Practices and Lessons Learned for Disaster Risk Reduction*, eds. UN/ISDR and Kyoto University (Bangkok, forthcoming).

<sup>322</sup> Dekens, “Eastern Terai of Nepal and Chitral District of Pakistan.”

the house to appease the spirits of the earth (Taikabaga) so that tetu (grandfather) will not become upset and angry, resulting in an earthquake.<sup>323</sup> Such ceremonial traditions help to reinforce the community's collective awareness of the risk of earthquakes.<sup>324</sup> The education proved valuable in reducing vulnerability when, on September 12, 2007, an earthquake erupted near Siberut which measured 7.9 on the Richter scale.<sup>325</sup> On the entire island, only one person died.<sup>326</sup> The success was due to the community's strong architectural figures and their awareness of earthquakes and what to do when they strike, many taking refuge in open spaces close by.<sup>327</sup> Cultural traditions are important ways to share information about disasters because they receive more emphasis, more authority within the everyday lives of most people, and there is a stronger commitment to continue disseminating this knowledge.

Ceremonies and rituals can also help encourage an environmental ethic. Many indigenous communities perform ceremonies which honor the spirits of the plants, animals and supernatural creatures, such as the offerings the Siberut people give to the earth spirits to calm the earthquake. Such acts help to encourage an awareness and respect for the elements of the environment. Other ceremonies and rituals exist to respect land use, harvests, feasts, and sacred plants.<sup>328</sup> As explored earlier, an active recognition and respect for the environment further reduces threats from disasters that are caused by human actions.

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<sup>323</sup> Meyers, "Simeulue, Nias and Siberut."

<sup>324</sup> Ibid.

<sup>325</sup> Ibid.

<sup>326</sup> Ibid.

<sup>327</sup> Ibid.

<sup>328</sup> Turner, *The Earth's Blanket*, 125.



Finally, ceremonies and rituals can also strengthen the social resilience of a community, maintaining close ties between community members who can depend on one another when a disaster strikes. Examples like the “lavak natek” ceremony of the Kalash people can be therapeutic for a community and build social strength by sharing the experience together. Similarly, the Siberut rituals bring the community together every time a new house is built, which can further strengthen social cohesiveness.

#### *4. Connection with Place*

A strong connection to place can have two main benefits for DRR. First, similar to the environmental ethic, a strong association and connection to a place can provide a deep concern for the local environment and the motivation to maintain and preserve it. If a community’s identity is closely linked to place, there is more incentive to care for this place.<sup>329</sup> This can in turn reduce the risk of disaster, as explained with an environmental ethic.

A second benefit for disaster reduction comes from a strong commitment to remain in that place. A commitment fosters a desire to dedicate time and energy to finding solutions to the problems posed by disasters. Communities may be more willing to invest in strategies to reduce risk, or may even develop their own innovative ways given the long-term commitment. If there is no feeling of a connection to place, the community may move somewhere else where the disaster threat might not exist. In many cases today, communities do not have the choice to move away from their disaster-prone home, due to economic or social obstacles. Therefore, the lessons from these

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<sup>329</sup> Ibid., 229

communities that choose to remain in their location due to this connection to place are even more valuable.

Several examples exist where communities have developed locally adapted strategies which protect them from the threat of disasters. For example, in Nepal people have developed housing construction techniques that utilize local materials, including bamboo, dry branches and thatch roofing, to help reduce risks from earthquakes, landslides or floods.<sup>330</sup> The uses of certain materials, which are relatively cheap and very accessible, provide a lighter house which allows residents to escape from disaster casualties more easily.<sup>331</sup> Similarly, a building construction technique used in Kashmir, called Dhajji-Dewari, has proven resistant to earthquakes. This technique uses a strong wooden frame with small subdivisions which are filled with local masonry material, such as small stones and mud mixed with pine needles or straw.<sup>332</sup> It is successful because of its light weight. These strategies developed out of a necessity for protection from reoccurring hazards, since the community is committed to remaining in a specific location.

### **How to Use the Proposed Assessment Tool**

Given the value of the four categories of indigenous knowledge examined here for reducing vulnerability, elements of a community's knowledge can be examined to determine the strength of each category in order to assess the society's vulnerability. If certain categories appear weaker, education, environmental policy and cultural

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<sup>330</sup> Thapa, "Indigenous Knowledge on Disaster Mitigation."

<sup>331</sup> Ibid.

<sup>332</sup> UN Habitat, Pakistan, "Housing Reconstruction after the Kashmir Earthquake. Dhajji Timber Frame Construction," in *Indigenous Practices and Lessons Learned for Disaster Risk Reduction*, eds. UN/ISDR and Kyoto University (Bangkok, forthcoming).

reinforcement can help further strengthen them, thus increasing resilience to disasters. This assertion is organized into an assessment tool proposed here (fig. 5.3). To determine the strength of each category, certain concrete information must be gathered from the given community mainly through interviews and observations.

To measure the level of ecological knowledge in a community, interviewing is the most efficient method of data collection. The goal would be to determine if the community is aware of the natural changes and specific behavior occurring in their local environment. The knowledge of certain processes can be tested, such as weather patterns, tides, animal behavior, or seasonal trends. If community members possess this knowledge they will be able to recognize unusual patterns, providing a warning of a possible disaster. If they do not hold this information, however, the knowledge can be strengthened through education by fellow community members or outside experts. It is important, however, to keep the community's worldview in mind when both testing and teaching ecological knowledge. The community's interpretation, perception or identification of specific environmental elements may not match those of an outsider.

Determining the level of environmental ethic embedded within a community may be difficult simply by asking people through interviews. Nevertheless, this ethic may be observed in the amount of environmental degradation existing in a society. Specifically, the health level of environmental elements that have the potential to buffer natural hazards, such as dunes, forests, mangroves, coral reefs are very important.

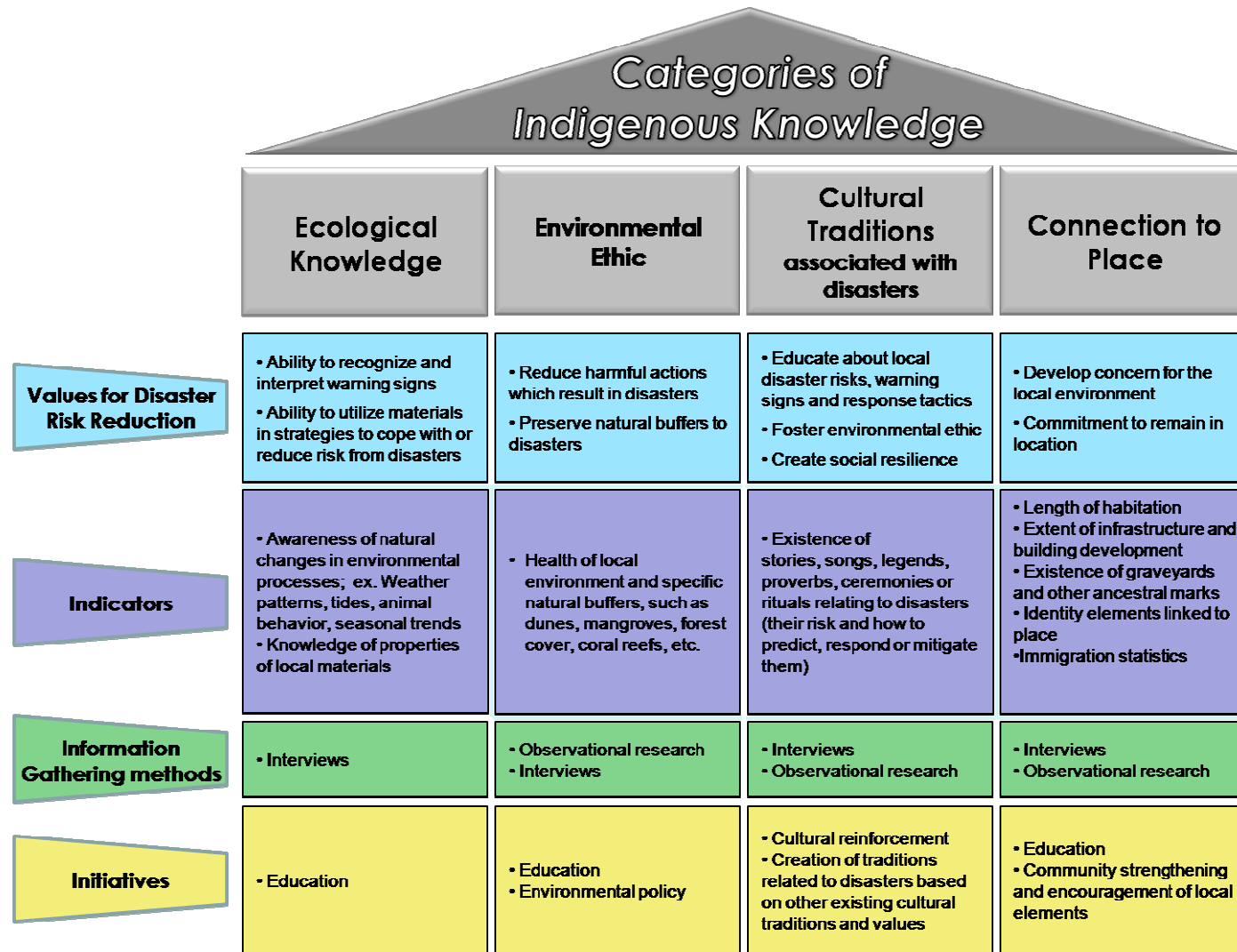


Figure 5. 3. Illustration of proposed assessment tool

If there is a large amount of environmental degradation present, an ethic can be encouraged through both environmental policy (initiated by governments and local leaders) and education. Educating about environmental ethics can also be a means of advancing ecological knowledge. Again, cultural beliefs and practices must be taken into account when an outsider begins to discuss environmental ethics with any member of a different community.

Uncovering the existence of specific cultural traditions associated with disasters is a fairly straightforward process, through either interviews or anthropological observation of everyday life. If stories, ceremonies or rituals which relate to disasters already do exist but are not widely known within the community, these can be encouraged and spread with education and cultural reinforcement through community activities or performances. If such traditions do not already exist, in some instances they can be created (in the form of songs, stories or proverbs) building off other existing cultural traditions, perhaps relating to different environmental processes. Lessons may be better absorbed if they are associated with existing cultural values and traditions which are already respected by the community. In addition, the information spread using cultural traditions could relate to other categories, such as ecological knowledge and environmental ethics.

Finally, a connection to place may also be difficult to discern from interviews. The goal is to find out how rooted the people are in their present location. Questions relating to the length of past and planned inhabitation in the location can provide insight into a person's individual connectedness. Elements of a person's identity which are associated with the place, such as clan or livelihood, can also indicate connectedness and be drawn from interviews. Certain census statistics relating to migration numbers can

also reveal patterns which lead to general conclusions about the community's connection to their home place.

Further, specific observations of the built environment can provide additional clues. If there is evidence that significant time or energy has been put into the buildings or infrastructure, perhaps having developed over a long period of time, then the people are more likely to feel rooted. Also, specific ancestral marks, such as graveyards or elaborate religious or cultural objects can show that a community is connected to the specific location. If there is a lack of connectedness, this can be encouraged through education and community strengthening, highlighting the positive elements which already exist in the community.

When considering communities with a drastically different composition from indigenous communities, such as industrialized societies or cities with millions of inhabitants, this tool can still be applied to reduce the society's vulnerability to disasters. The categories, however, must be adapted to the contexts of these different societies. For example, in large industrialized civilizations, the focus for education may not only be individuals at risk, but also government officials who make many decisions for the people which dictate resource management and disaster planning strategies. How to better adapt these categories to different societies must be further explored, and more research should be done on how these societies relate to the four categories.

Applying the proposed assessment tool to the Simeulue community, which has proven resilient during disasters, helps to validate the tool. Simeulue proves to have strength in all four areas presented. Nonetheless, this does not mean they cannot further improve their resilience to disasters.

## Assessing Simeulue: Applying the Assessment Tool to the Community of Simeulue

### 1. Ecological Knowledge

The existence of ecological knowledge about processes relating to tsunamis, including ocean behavior, weather changes and animal behavior, are seen in the way Simeulueans responded to the 2004 tsunami. In order to benefit from the story of *Smong*, one must be able to recognize and interpret the warning signs. The accounts of several Simeuluean residents, described in chapter four, show that many islanders were able to see the changing conditions in the environment and understand their meaning. One man, Amir Hamzah, even explains how he identified three different ecological processes which told him a tsunami was approaching: “(1) a powerful earthquake, (2) water on the coast receding quite far and (3) water buffalos gathering by the side of the mountain.”<sup>333</sup>

Another man who was interviewed and who works as a fisherman and farmer in Teulah Barat, explained how there are specific warning signs before *Smong* strikes (fig. 5.4). One of these warning signs, he explained, is the existence of a specific type of earthquake.<sup>334</sup> This statement implies an inherent knowledge of the environmental processes, since it takes sophisticated ecological understanding to recognize this type of earthquake.<sup>335</sup>

Further, it is said that in Aceh, when the sea receded, many Acehnese went to the water's edge to gather fish, since the animals were exposed and easy to collect. In interviews on Simeulue, residents told how fellow Simeulueans in Aceh were aware of the story of *Smong*, and even on the mainland they ran for the hills and were saved, while

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<sup>333</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 47.

<sup>334</sup> Interview performed February 5, 2008.

<sup>335</sup> The interviewee referred to “seven earthquakes” when he described the type of earthquake. While he was unable to elaborate, his specification of this type implies that his knowledge allows him to differentiate the type of earthquake.

many Aceh residents called them crazy and continued to gather fish by the water's edge.<sup>336</sup>



**Figure 5. 4. A farmer/fisherman (right) being interviewed in Teupah Barat by a member of Cordaid (left), a Dutch NGO working on Simeulue Island**

Photo taken by author

In addition to interpreting warning signs, specific ecological knowledge can be seen in how several people responded to the tsunami and survived after the tsunami struck. One woman store owner who was interviewed explained how she ran to the hills after she felt the earthquake and saw the sea recede (fig. 5.5).<sup>337</sup> When asked where she ran and how she knew where to run, she pointed behind her house and explained that her family owns land there where they plant some crops, and she knew the area well when she

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<sup>336</sup> Interview performed February 5, 2008.

<sup>337</sup> Interview performed February 5, 2008.



ran that way. Similarly, when children were asked if they know where to go when a tsunami strikes, they said that they know where the path is up into the hills.<sup>338</sup> Finally, one man (whose experience is explained in chapter four, fig. 4.7), lived in the hills for three months and had to depend on ecological knowledge for survival, knowing what to eat and how to live in the forests before returning home.<sup>339</sup>



**Figure 5. 5. Siimeuluean woman store owner living in Teupah Barat**

Photo taken by author

From these interviews, it seems that Simeulueans had specific ecological knowledge which allowed them to recognize and interpret warning signs, respond to the disaster correctly and efficiently, and survive after the tsunami struck.

## *2. Environmental Ethic*

It was difficult to discern from interviews with individuals whether they held an environmental ethic or not, since this seemed difficult to articulate for many islanders.

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<sup>338</sup> Interview performed February 5, 2008.

<sup>339</sup> Interview performed February 5, 2008.

One group of teenage students from Teupah Barat (fig. 5.6) explained that perhaps their parents might feel a stronger respect towards the environment, but they thought it was okay to take anything they might need from the environment without there being any major consequences. Similarly, a group of secondary school students in Sinabang (seen in fig. 5.7), the capital of Simeulue and a larger urban area, explained that they would only stop doing something to the environment if they were able to see the direct, negative consequences. In contrast, a retired fisherman interviewed in a remote village in Teupah Barat (fig. 4.4) expressed a belief that the people on Simeulue had more respect for the environment than those living on the mainland because of their dependence on the land for survival.<sup>340</sup>



**Figure 5. 6. Group of teenage Simeulue students from the rural area of Teupah Barat**

Photo taken by author.

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<sup>340</sup> Interview performed February 5, 2008.



**Figure 5. 7. Group of students from city of Sinabang**

Photo taken by author

The seeming lack of respect for the environment seen in Simeulue may be the result of a difficulty to express it. It seems from the interviews referenced here that the younger generation feels that they are less knowledgeable about the environment than their parents and do not have the same respectful relationship with nature as older generations. This may be because they are exposed to more modern technologies and ways of life, which do not depend so heavily on the environment and begin to distance the relationship between society and nature. In addition, the older man interviewed, who lives in a rural area, expressed a stronger feeling of respect towards the environment than both the younger generation of rural students and urban students.

In addition, Islamic teachings, encourage a harmonious relationship with the environment, where misusing nature is considered a sin.<sup>341</sup> Therefore, the strong Islamic

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<sup>341</sup> Mohsen Ghafory-Ashtiany, "Islamic View of Earthquakes, Human Vitality and Disaster," (IIES, 2008): 11.

following on Simeulue may imply that there is indeed an underlying culture encouraging an environmental ethic which may be difficult to articulate.

With regard to observations about the environmental degradation on the island, the development is relatively low, with only one main road connecting many of the villages. Many of the beaches and fields are still very well intact. The vegetation in the hills surrounding rural villages is fairly dense, providing a safe place for residents to run to in the face of a tsunami. In terms of natural buffers, Simeulue lacks the appropriate environmental conditions for healthy mangroves on the seaward-facing (southwest) coastline, as well as sand dunes and salt marshes, but well-established coral reef colonies are present all along the southwest coast. Coral reefs are threatened world wide by global warming, inland deforestation (increased erosion leads to more turbid water, which corals cannot survive in), and damaging fishing practices such as bombing and cyanide poisoning. While deforestation exists on Simeulue, it is not yet extensive enough to have a negative effect on the reefs. Perhaps because of the existing environmental ethic that exists on Simeulue, fishermen do not participate in the types of fishing practices that damage the reef.<sup>342</sup> More extensive scientific research must be done to further recognize the status of natural buffers on Simeulue, as observations and existing literature is limiting.

### *3. Cultural Traditions Associated with Disasters*

The story of *Smong* has become a strong part of the Simeulue culture. Almost every person living in Simeulue today knows about the 1907 tsunami, even though they did not experience it themselves. From the story many people know the warning signs of

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<sup>342</sup> Correspondence with Brian McAdoo, Vassar College, February 2008.

a tsunami and how to respond to the hazard. Several people acknowledged that though they had heard the stories before, they did not believe it was true until the tsunami came in 2004; yet, these people had still internalized the story and knew what to do when it turned out to be real.<sup>343</sup> Since the story was not believed until it occurred, it shows that it is not always seen as a report of a past event, but has become a cultural legend within the community. This may have been why the story spread as successfully as it did and helped to save so many Simeulueans.

Several cultural traditions also exist in relation to the *Smong* story. The Nandong, whether it incorporates the story of *Smong* or not, provides a forum by which stories of disasters and loss can be expressed to the community. In addition, other traditional performances and songs provide valuable media to relay messages about disasters to the community. These can be further utilized to educate the community and further reduce their resilience to disasters.

In addition to the stories of *Smong*, a legend exists about the first mosque in Simeulue, which was built in Salur, West Teupah sub-district. The mosque is said to have contained eight stone structures representing eight tribal representatives; however, only seven remain today.<sup>344</sup> Local legends say that the eighth structure disappeared after the 1907 tsunami.<sup>345</sup> The story reminds the community of the power of the tsunami and keeps residents aware of the threat.

In addition, Islam has an enormous impact on the culture of Simeulueans. Simeulue Island is reportedly one hundred percent Muslim, with 99 mosques and 143

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<sup>343</sup> Yogaswara and Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness*, 39.

<sup>344</sup> *Ibid.*, 21.

<sup>345</sup> *Ibid.*

prayer houses recorded in 2001 before the 2004 Tsunami.<sup>346</sup> Several Islamic ceremonies and rituals, as well as the Islamic prayer community, may help to strengthen the social resilience of the community, creating communal bonds which individuals can depend on in times of disaster.

The Islamic religion also contains a strong environmental ethic, as discussed above. The religious and cultural support of an environmental ethic can be capitalized on, since the Islamic religion has so much authority and respect within the community. This, in turn, can help to conserve the local environment which helps to reduce the community's vulnerability to incoming tsunamis.

It should be noted, however, that one cultural tradition relating to the tsunami, based on Islamic teachings, is that Allah is responsible for the tsunami. Based on this reasoning, many people believe there is nothing they can do to change the fate of disasters.<sup>347</sup> While it is true that human action cannot reduce the frequency of tsunamis and earthquakes, humans can still significantly reduce their vulnerability to these disasters, which can help them survive. The experience during the 2004 tsunami has in some instances counteracted the belief that Allah controls all aspects of disasters, since many people were able to survive by utilizing their own indigenous knowledge .

#### *4. Connection to Place*

The final category to be examined in the context of Simeulue is a connection to place. Simeulueans do not have as long a history of habitation on the island of Simeulue as other indigenous populations, since many came from the mainland relatively recently.

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<sup>346</sup> Sanny, *The Smong Wave from Simeulue*, 53.

<sup>347</sup> Interview conducted February 5, 2008.

Still, there is a strong relationship felt with their home and their local environment. Several informants proudly explained how their family has lived in a particular place for over three generations. When one retired fisherman was asked if he would ever want to move, he asked why? “You can make money here, you can make money anywhere” he said (fig. 4.4).<sup>348</sup> The man expressed a sentiment felt by many Islanders, which is that he knows how to survive in the place where his home is and there is no desire to move, not even to avoid disasters. This stems directly from Simeulueans’ dependence on the local land for farming and fishing (apparent in the retired fisherman’s statement cited above). There is no desire to “learn” a new place which presents new variables when they are focused on working for their livelihood.

The younger generation, again, did not reflect the same connection to Simeulue as the older generation. Two groups of students, one from a rural school and one from an urban school (figs. 5.6 and 5.7) said they did not feel any specific connection to Simeulue, and would consider moving somewhere else, “more modern,” when they grow up.

Further, the knowledge embedded in the stories of *Smong* contains lessons relating to the specific local environment. For example, they refer to the hills which are present in the local landscape. These hills are a necessary component in survival, acting as a safe escape from the coastline during a tsunami.<sup>349</sup>

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It is apparent through this analysis that all four categories are present on Simeulue to a relatively strong degree. There is no doubt that the islanders have ecological knowledge to interpret tsunami warning signs and perform survival response measures, an

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<sup>348</sup> Interview February 5, 2008.

<sup>349</sup> Meyers, “Simeulue, Nias and Siberut.”

ethic to preserve natural elements on the island, stories and traditions that relay information about the 1907 tsunami and how to recognize and respond to future disasters, and a connection to Simeulue through their livelihood, traditions and culture. Further research can be done through more in-depth interviews which cover a wider audience. Scientific research can also be done to more accurately determine the physical condition of the environment, specifically the natural buffers which exist on the island. The strength of Simeulue in these four areas, along with its successful experience in facing the 2004 Indian Ocean tsunami, suggests that this tool provides the capability to assess the vulnerability of a community to future disasters.



## CONCLUSION

Recent global trends have shown that the threats posed by disasters are increasing. The approach of those looking to reduce these risks is shifting. Instead of relying solely on post-disaster and technology-based approaches, including emergency response mechanisms, stronger infrastructure and advanced surveillance systems, in recent years there has been a growing focus on mitigation and preparedness activities which concentrate on reducing community vulnerability. With the introduction of more social scientific perspectives, the international community has begun to recognize the importance of indigenous knowledge for disaster risk reduction (DRR).

Existing arguments for the value of indigenous knowledge consider either indigenous knowledge in a general sense or in a specific sense. There is, however, an intermediate value, neither general nor specific, which highlights different categories of indigenous knowledge that can be applied to many types of communities, regardless of their unique characteristics.

In particular, four categories of indigenous knowledge are identified as most important in helping to reduce vulnerability to natural disasters. These categories, which include ecological knowledge, an environmental ethic, cultural traditions associated with disasters, and a connection to place, can be used in DRR practice by employing the assessment tool proposed in this paper. In order to assess the strength of knowledge

existing in each category, specific information can be gathered through interviews and observational research. If these four categories are accepted as markers of vulnerability in disaster-prone communities, then the strength of each category of knowledge can be used to dictate the level of vulnerability in the community. Further, through education, environmental policy, and cultural reinforcement, knowledge deficiencies in each category can be strengthened as a means of further increasing resilience.

This assessment tool is validated by applying it to the Simeulue community, a group of people who successfully reduced their own disaster vulnerability to the 2004 Indian Ocean tsunami by using indigenous knowledge. Further work must be done to test this tool in communities who face other types of disasters and whose society consists of distinct economic, social, political, cultural and environmental factors. The purpose of this tool is to highlight key categories of knowledge that exist (or have the potential to exist) in all communities and can help reduce risk from future disasters.

Further, the existence of these four categories of knowledge in a given community implies that there is a general consideration of the environment in the actions and behavior of the society. Since the categories are markers of disaster vulnerability, this paper strengthens the ties between DRR and sustainable development. More work must be done with this connection in mind, to continue to strengthen and increase the linkages between these two areas.

Those most at risk to future disasters are the poor. Therefore, cost-effective strategies to reduce risk, such as the one proposed here, which utilize and build upon existing knowledge embedded in a community may be a valuable way to further help the vulnerable communities who need it most.

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## APPENDICES

### Appendix I.

The following reflect the retelling of the 1907 Tsunami Story based on the deaths of family members. These cases are taken from a working paper entitled “Cerita Linon dan Smong Tiga Generasi” (2005) written by an anonymous writer to prepare for a speech given by the Regent of Simeulue when he received a Sasakawa Award for Disaster Reduction in 2005. This award is presented by UN/ISDR in “appreciation for its encouraging efforts to contribute to a global culture of prevention, thereby furthering the goals of the ISDR.”<sup>350</sup>

During one day grandmother told that “my uncle, the oldest son of my grandparents is not Abdul Thalib whom we often refer to as *Mamakwo*; the oldest uncle or *sia'a (Wo)* is actually Aminullah, but he passed away during the *Smong*.” That’s how grandmother started her sad story with wet eyes. She was working at a coconut plantation at Ulu (Hulu estate) when suddenly a powerful quake occurred. After the quake we hurried back home where uncles *Tua* and my grandmother’s younger sibling were. However, two hundred meters from our seaside home and they could not go any further. They witnessed how the sea water had reached as high as coconut trees. When the water subsided they approached the home anxiously. The sight which they beheld. There was no rubble. They searched left and right and eventually they came upon uncle’s corpse. To date, my grandmother’s younger sibling remains missing; not even a corpse was found. Wiping her tears grandmother said, “When a strong quake occurs (she was not familiar with the Richter scale) do not hesitate. Run for the mountains!”

\* \* \*

During one day I asked my father, “Has grandfather no other siblings?” He then told the story of my grandfather 70 years ago. “Your grandfather had two brothers and one sister. He was number two (*si ngah*). The other three died in 1907 *smong*. Allah saved grandfather, whom got caught in a breadfruit tree. In the tree he managed to survive by eating yong breadfruit. It was only the fifth day that he could come down and he proceeded to walk to the hills until he came upon a shelter with a displaced family. He sought refuge with this family, whom eventually adopted him. So we have our origins at Salur village. Father ends the story saying, “Son, *smong* is very powerful! After the quake the waterline recedes to come back in the form of a tidal wave. A *smong*!”

Source: Herry Yogaswara and Eko Yulianto, *Smong: Local Knowledge and Strategies on Tsunami Preparedness in Simeulue Island, Nangroe Aceh Darusallam*, (Jakarta: UNESCO and LIPI, 2005), 36

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<sup>350</sup> The quote is taken from the certificate of merit for the Sasakawa Award presented to Simeulue in 2005.

## Appendix II.

Lyric referring to *smong* which is said to have been performed as a means of disseminating the story of the tsunami. (Translation into Bahasa Indonesia found in parentheses)

Enggel mon sao surito (dengarlah suatu kisah)  
Inang maso semonan (pada zaman dahulu kala)  
Manoknop sao fano (tenggelam suatu desa)  
Uwilah da sesewan (begitulah diturkan)

Unen ne alek linon (Gempa yang mengawali)  
Fesang bakat ne mali (disusul ombak raksasa)  
Manoknop sao hampong (tenggelam seluruh negeri)  
Tibo-tibo maawi (secara tiba-tiba)

Angalinon ne mali (Jika gempanya kuat)  
Oek suruk sauli (disusul air yang surut)  
Maheya mihawali (segeralah cari tempat)  
Fano me senga tenggi (dataran tinggi agar selamat)

Ede smong kahanne (Itulah smong namanya)  
Turiang da nenekta (sejarah nenek moyang kita)  
Miredem teher ere (Ingatlah ini semua)  
Pesan navi-navi da (pesan dan nasihatnya)

Smong dumek-dumek mo (tsunami air mandimu)  
Linon uwak-uwakmo (gempa ayunanmu)  
Elaik keudang-keudangmo (petir kendang-kendangmu)  
Kilek suluh-suluhmo (halilintar lampu-lampumu)

(This lyric was re-performed by DRs. Darmili,  
Simeulue Regency Leader period of 2001-2006)

Source: Teuku Abdullah Sanny, *The Smong Wave from Simeulue: Awakening and Changing, Post Tsunami Strategic Development of Regency of Simeulue*, (Simeulue, Indonesia: Local Government of Simeulue Regency, 2007), 79-81.

## ABOUT THE AUTHOR

Jennifer Baumwoll is originally from Newton, MA. In 2006 she graduated Phi Beta Kappa with honors from Vassar College, in Poughkeepsie New York, with a Bachelor of Arts in Urban Studies, focusing in studio art and computer aided design and planning. She has recently completed her Master of Arts in International Relations from Webster University in Vienna. As part of this degree, she spent six months at the end of 2007 working as an intern with the United Nations International Strategies for Disaster Risk Reduction (UN/ISDR) Asia/Pacific regional office, in Bangkok. While interning with UN/ISDR, she initiated a program which worked to raise awareness about the value of indigenous knowledge for disaster risk reduction. She also worked to network with partners in the region to facilitate information sharing and collaborative projects on the topic. She is currently living in Boston while continuing this work with UN/ISDR as a consultant. She will be editing and compiling a publication, in partnership with Kyoto University and funded by EuropeAid, entitled *Indigenous Practices and Lessons Learned* that will gather cases from throughout the Asia/Pacific region where communities have successfully used indigenous knowledge to survive, cope with and reduce risk from natural disasters.



