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GREEN

GUIDE TO

OPPORTUNITIES FOR GREEN RECOVERY AND RECONSTRUCTION: AN INTRODUCTION

GREEN RECOVERY AND RECONSTRUCTION: TRAINING TOOLKIT FOR HUMANITARIAN AID

The Green Recovery and Reconstruction Toolkit (GRRT) is dedicated to the resilient spirit of people around the world who are recovering from disasters. We hope that the GRRT has successfully drawn upon your experiences in order to ensure a safe and sustainable future for us all.

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Emma Jowett, Consultant

NOTE TO USERS: The Green Recovery and Reconstruction Toolkit (GRRT) is a training program designed to increase knowledge and skills for utilizing environmentally sustainable disaster response approaches. Each GRRT module package consists of: (1) training materials for a workshop; (2) a trainer's guide; (3) slides; and (4) a technical content paper that provides background information for the training. This is the technical content paper that accompanies the one-hour training session that introduces the principles of green recovery and reconstruction.

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MODULE 1: OPPORTUNITIES FOR GREEN RECOVERY AND RECONSTRUCTION: AN INTRODUCTION

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1 INTRODUCTION

1.1 Module Objectives

This module introduces the concept of green recovery and reconstruction. It provides an overview of the key environmental issues associated with post-disaster recovery and reconstruction and introduces strategies for addressing these issues. The module also describes the Green Recovery and Reconstruction Toolkit (GRRT) and its components. The training session for Module 1 is intended to be a one-hour session presented before the other modules (Modules 2 – 10).

Specific learning objectives for this module are as follows:

1. Describe how addressing the environment in a humanitarian response a) is critical to saving lives and livelihoods, b) reduces risk and vulnerability, and c) contributes to successful recovery outcomes
2. Explain the purpose of the Green Recovery and Reconstruction Toolkit and its components.
3. Discuss key opportunities, misconceptions, and challenges for mainstreaming the environment into humanitarian action.

1.2 The Green Recovery and Reconstruction Toolkit

This is Module 1 in a series of ten modules comprising the Green Recovery and Reconstruction Toolkit (GRRT). Collectively, the GRRT modules provide information and guidelines to improve project outcomes for people and communities recovering from disaster by minimizing harm to the environment, and taking advantage of opportunities to improve the environment. Module 1 provides a brief introduction to the concept of green recovery and reconstruction to help make communities stronger and more resilient to future disasters by integrating environmental issues into the recovery process. GRRT Module 2 provides guidance on how project design, monitoring, and evaluation can better incorporate and address environmental issues within the typical project cycle. GRRT Module 3 builds upon Module 2, focusing specifically on assessment tools that can be used to determine the environmental impact of humanitarian projects regardless of the type of project or sector. GRRT Modules 4, 5, and 6 pertain specifically to building construction, with Module 4 focusing on site planning and development, Module 5 on building materials and the supply chain, and Module 6 on building design and construction management. GRRT Modules 7 through 10 provide sector-specific information to complement Modules 2 and 3, including livelihoods, disaster risk reduction, water and sanitation, and greening organizational operations.

1.3 Intended Audience

Module 1 is intended for people working as part of disaster recovery and reconstruction efforts, including staff involved in project design, implementation, and management. Target staff include project planners for shelter, water and sanitation, and livelihoods sectors, as well as the procurement and logistics staff who support them. It also includes staff who monitor and evaluate recovery and reconstruction projects, and who design and implement disaster risk reduction activities. Module 1 is also appropriate for field engineers, program and country directors, disaster management staff, spatial planners, environmental managers, facility managers, and private-sector representatives (e.g., construction contractors, suppliers, and estimators).

1.4 Module Key Concepts

This module builds on the following key concepts:

1. **Environmental sustainability is critical to the achievement of long-lasting disaster recovery results.** Shelter construction, livelihoods recovery, water and sanitation, and disaster risk reduction interventions must actively address environmental sustainability in order to ensure that communities, and the natural resources upon which they depend, are not put at further risk because of the unintended consequences of the disaster recovery process.
2. **Addressing the environment in post-disaster recovery projects has multiple benefits.** By minimizing negative environmental impacts, project planners not only increase the long-term sustainability of their projects but can also achieve other benefits such as cost savings, disaster risk reduction, gender equity, food security, and energy efficiency, among others.
3. The restoration of communities after disasters is a complex process that involves a wide range of actors and activities over many years. Given this complexity, it may appear that the only way to address environmental issues is to assign this responsibility to environmental experts or organizations whose sole function is to ensure that environmental issues are addressed. **While there may be a role for dedicated environmental teams in a disaster recovery effort, in practice, nearly all people involved in disaster recovery and reconstruction have the opportunity and responsibility to incorporate environmental sustainability into their activities.** While it is best to address environmental issues during the recovery planning phase early on after a disaster, **it is never too late to take some action to improve outcomes for people and communities.**
4. Disaster recovery and rebuilding attempts to build back in a few years what often took generations to develop. If not well-planned and executed, this race to recovery can put an enormous strain on natural resources, leaving people more vulnerable to disasters in the long term. With proper planning, however, **the recovery process can be an opportunity to build back safer.** In this context, building back safer means using an approach that minimizes environmental impacts, and building more environmentally sound communities than may have existed before the disaster. The goal is to move beyond pre-disaster conditions to meet the longer-term development needs of disaster-affected people.
5. The differences between disaster types, local communities, environmental conditions, infrastructure types, and available resources for disaster recovery mean that every disaster situation has unique characteristics. Given this fact, it is important for project planners to maximize their use of local knowledge whenever possible in order to **ensure that recovery activities are grounded in local context and are supported by local communities**.
6. In light of the unique nature and complexities of each disaster situation and local context, project planners can face enormous challenges when planning and implementing recovery activities. In order to address these challenges, and go

beyond simply identifying environmental problems, project planners must take a **solution-oriented approach** to creatively solving environmental challenges. The GRRT is designed to be solution-oriented and allows for multiple approaches to problem solving.

1.5 Module Assumptions

The basic assumption of this module is that the GRRT is applicable immediately following the disaster when recovery and reconstruction strategies are first being formed, and then throughout the recovery and reconstruction phase, which may last from six months to several years after a disaster strikes. The GRRT training should ideally occur before a disaster happens in order to equip responders with the knowledge, skills, strategies, and tools necessary to implement the GRRT approach. However, GRRT training can be deployed after immediate, life saving relief activities have taken place and alongside the recovery and reconstruction planning. All of the GRRT modules acknowledge that every situation is specific and that application of the tools and approaches will have to be adapted to the context.

1.6 Key Module Definitions

The following are key terms used in this module. A full list of terms is contained in the Glossary.

Disaster risk. Potential disaster losses (in lives, health status, livelihoods, assets, and services) that could occur to a particular community or a society over some specified future time period. Risk can be expressed as a simple mathematical formula: Risk = Hazard X Vulnerability. This formula illustrates the concept that the greater the potential occurrence of a hazard and the more vulnerable a population, the greater the risk.

Disaster risk reduction. The practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

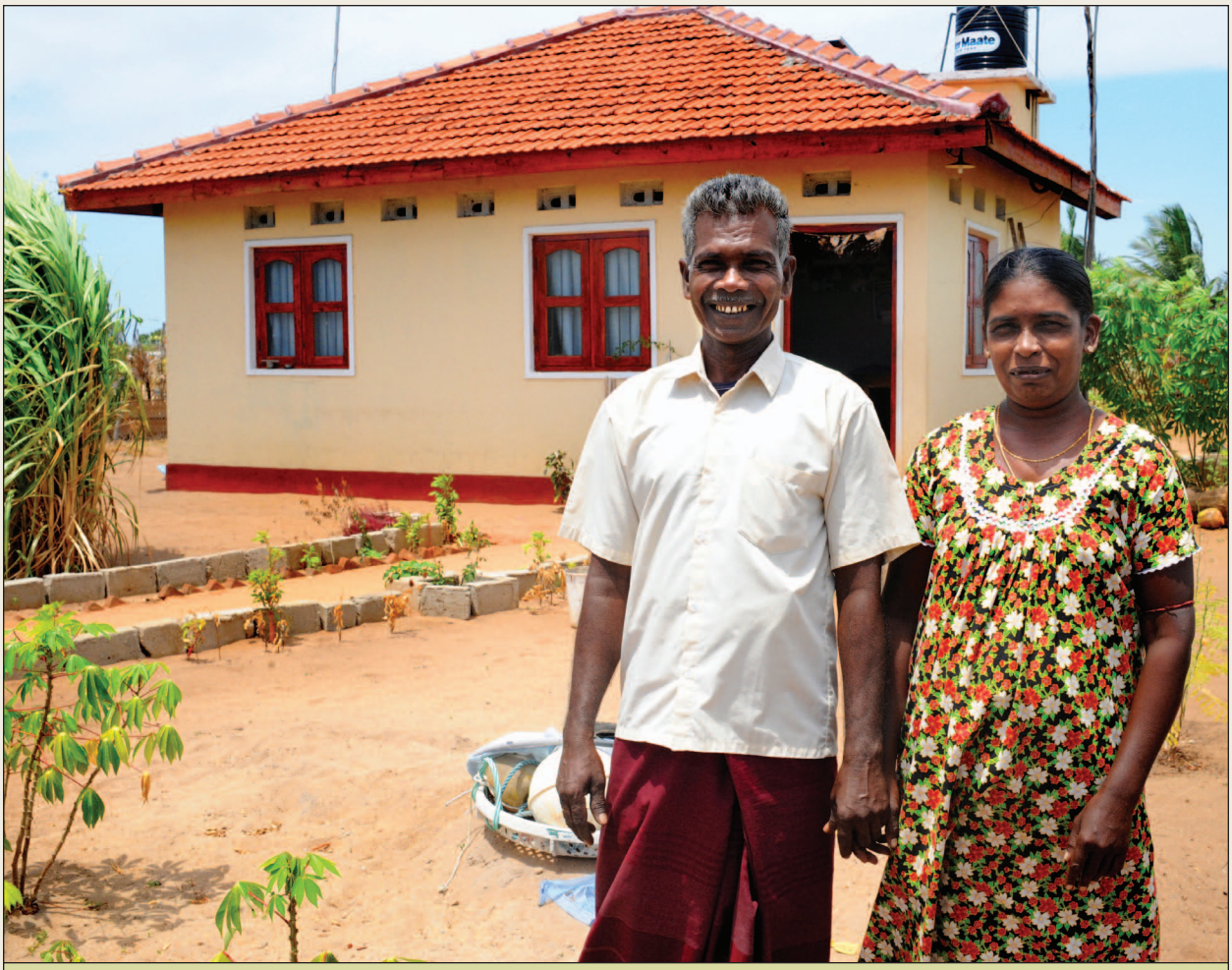
Ecosystem. Dynamic complexes of plants, animals, and other living communities and the nonliving environment interacting as functional units. Humans are an integral part of ecosystems.

Hazard. 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. Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological, and biological) or induced by human processes (environmental degradation and technological hazards).

Resilience. The capacity of a system, community, or society potentially exposed to hazards to adapt, by resisting or changing, in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures.

Vulnerability. *Human* vulnerability is the relative lack of capacity of a person or community to anticipate, cope with, resist, and recover from the impact of a hazard. *Structural or physical* vulnerability is the extent to which a structure or service is likely to be damaged or disrupted by a hazard event. *Community* vulnerability exists

when the elements at risk are in the path or area of the hazard and susceptible to damage by it. The losses caused by a hazard, such as a storm or earthquake, will be proportionally much greater for more vulnerable populations, e.g., those living in poverty, with weak structures, and without adequate coping strategies.



By incorporating environmental concerns into the recovery and reconstruction process, communities and individuals can lower their risk and vulnerability to future disasters. © Daniel Cima/American Red Cross

2 ENVIRONMENTAL SUSTAINABILITY IN DISASTER RECOVERY AND RECONSTRUCTION

2.1 Saving Lives and Reducing Risk

The human and economic losses caused by natural disasters and conflict are devastating. Over the past 35 years, between 1974 and 2009, disasters have killed over 3.5 million people, affected over 5.7 billion, and caused estimated damages of US$1.8 trillion.[1] Disasters are also on the rise: Between 1996 and 2005, over 6,400 natural and man-made disasters occurred globally, representing a 60 percent increase from the previous two decades. While the annual rate of people killed by natural disasters is falling, the number of people vulnerable to and affected by natural disasters is increasing. From 2000 – 2004, a third more people were affected than during the period between 1995 and 1999. According to the Intergovernmental Panel on Climate Change, extreme weather events, such as droughts and cyclones, will become more severe in the future as the climate becomes warmer.[2]

Humanitarian action remains the primary tool available to the international community to support individuals, communities, and governments when disaster strikes and when people's lives are threatened by conflict. In response to disasters over the five-year period from 2005 – 2009, the international humanitarian aid community contributed over $51 billion to rebuild shelters, install water and sanitation systems, provide medical assistance, support livelihoods, and reconstruct schools, among many other activities.[3] Every day humanitarian action helps to save lives and reduce suffering around the world.[4]

A critical component of saving lives and reducing risk after a disaster is ensuring that the natural resources that form the basis for human life and livelihoods are restored and protected for the future. Clean air, water, and soil are all essential for human health (preventing malnutrition and disease) and well-being (providing the raw materials for economic development and healthy living conditions). Sustainable supplies of timber, clay, sand, fish, agricultural crops, and other natural resources are fundamental inputs for the restoration and protection of lives and livelihoods, and scarcity of natural resources can lead to food insecurity and conflict.

Environmental issues have both direct and indirect impacts on human life and livelihoods. For example, if water sources are contaminated with chemicals such as mercury (used in mining) or pesticides (used in agriculture and aquaculture), there can be direct, negative impacts on human health. These may include poisoning, birth defects, or even death. Negative impacts are not only the result of industrialization or globalization; if clay is removed from hillsides to be used as a building material for post-disaster shelters, the risk of landslides and flooding can be increased, endangering human populations. The overexploitation of natural resources, such as fish or timber, may directly benefit the fishermen or logger when he or she sells a product, but indirectly harm future generations who will need these natural resources for their own livelihoods and well-being over the long term.

Humans rely on healthy ecosystems for the goods and services that are essential to human life, and the raw materials that are processed into food products, clothing, and building materials.

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1 Center for Research on the Epidemiology of Disasters. International Disaster Database. www.emdat.be (Accessed on June 14, 2010)

2 Intergovernmental Panel on Climate Change. 2007. *Climate Change Impacts, Adaptation and Vulnerability: Summary for Policymakers*. Working Group II Contribution to the IPCC Fourth Assessment Report: Climate Change.

3 As reported by UN Office for Coordination of Humanitarian Affairs. 2010. *Financial Tracking System*. www.ocha.unog.ch/fts/ (Accessed on April 15, 2010)

4 DFID. 2006. Saving lives, relieving suffering, protecting dignity: DFID's Humanitarian Policy.

Intact ecosystems such as wetlands, floodplains, forested hillsides, mangroves, and undeveloped land all provide critical functions in reducing disaster risk that physical infrastructure cannot duplicate. If natural resources are severely depleted or the environment significantly polluted, then the gains made in saving lives and reducing risk in the immediate humanitarian response may be lost in the ensuing months and years. When humanitarian activities do not address environmental issues, they can increase the disaster risk facing a community. Disaster risk is often expressed as a mathematical formula: **Risk = Hazard x Vulnerability**.[5] The formula illustrates the concept that the greater the potential occurrence of a hazard and the more vulnerable a population, the greater the risk. Human vulnerability is the relative lack of capacity of a person to anticipate, cope with, resist, and recover from its impact. If the natural environment is degraded, then vulnerability is increased.

In some instances, humanitarian activities have the potential to put communities at risk if environmental issues are not adequately identified and addressed during project planning and throughout the life of the project. In general, the environmental consequences of humanitarian activities can be divided into the following categories: **pollution**, **habitat destruction and modification**, **unsustainable resource extraction**, and **human-wildlife conflict**. A set of examples is provided in the following table, which shows different types of environmental and human impacts related to the recovery effort after the 2004 Indian Ocean tsunami. An additional example from the 2010 Haiti earthquake is also provided in Annex 1.

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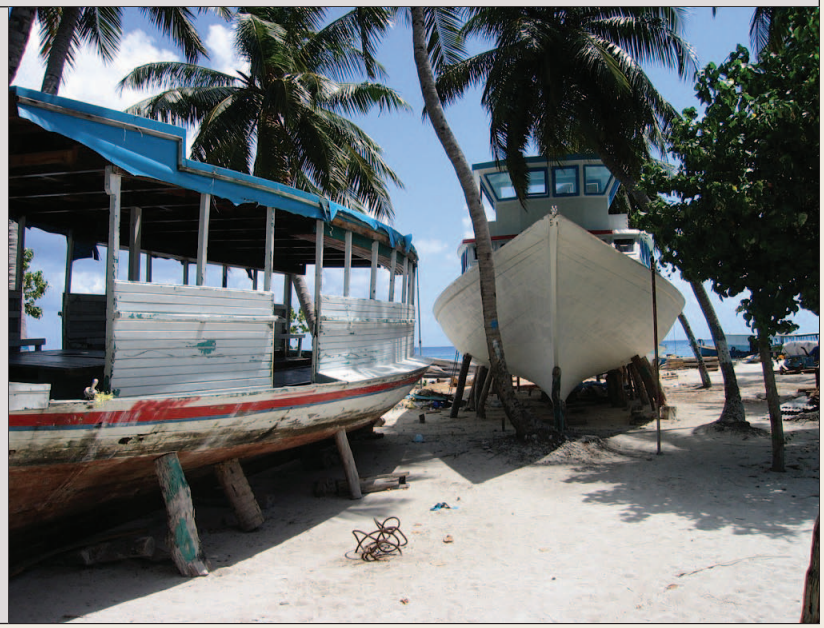
5 U.N. International Strategy for Disaster Reduction. Terminology of disaster reduction. www.unisdr.org/eng/library/lib-terminology-eng%20home.htm (Accessed on April 25, 2010)

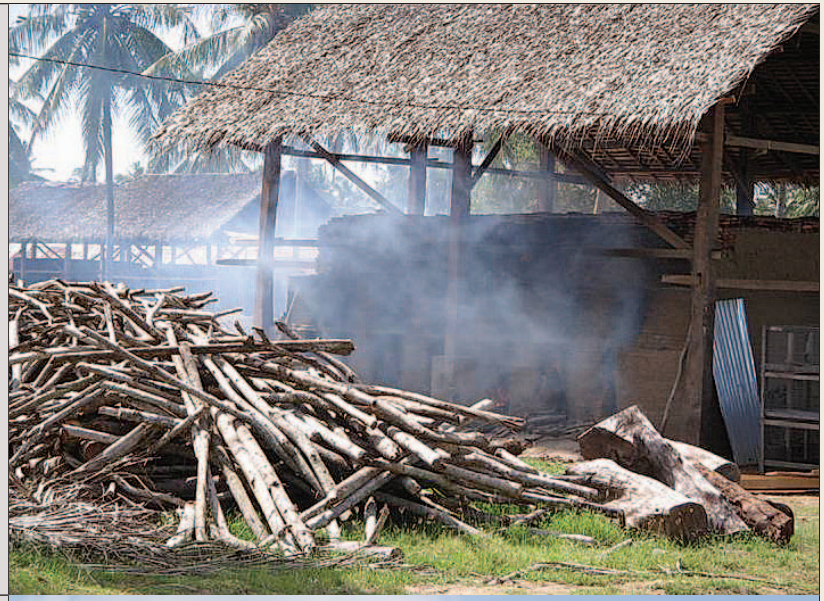
RECOVERY ACTIVITIES: ENVIRONMENTAL AND HUMAN IMPACTS

The following photographs taken in Indonesia, Thailand, Sri Lanka and the Maldives show a few examples of environmental and human impacts associated with post-disaster recovery and reconstruction following the 2004 Indian Ocean tsunami. A detailed report on these issues is contained in: UNEP. 2007. *Environment and Reconstruction in Aceh: Two Years After the Tsunami*. Nairobi: UN Environment Programme.

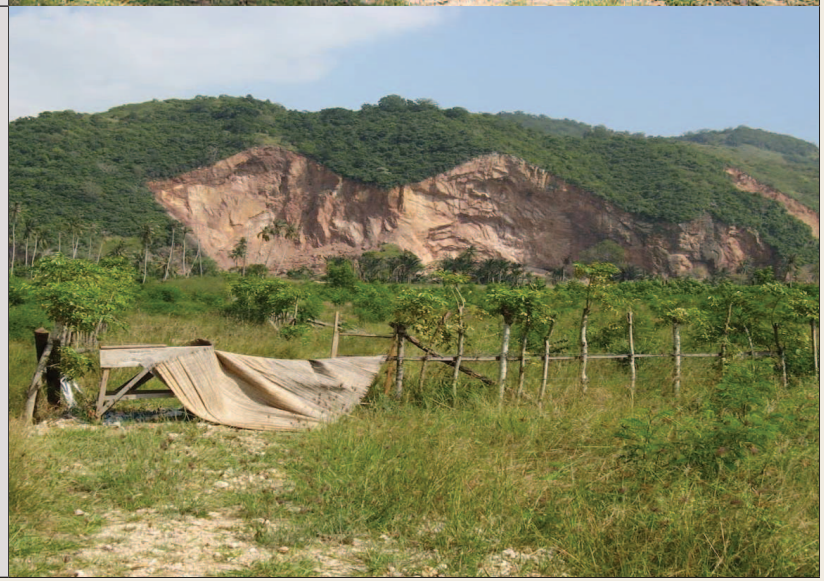
Livelihoods. In the rush to restore fisheries livelihoods in the tsunami-affected countries, many aid agencies provided large numbers of boats and fishing gear without consideration as to whether the natural resource base could support existing let alone an increased fishing effort. Over-harvesting of natural resources at an unsustainable rate can cause or worsen food security and create conflict. In this photograph, a newly constructed boat (right) is larger and able to catch more fish faster than the original boat (left). (Module 8, Green Guide to Livelihoods contains additional information on addressing this issue.)



Building materials. The kilning of clay bricks requires a significant quantity of wood for fuel and results in air pollution as shown in this photograph. This can cause health impacts to workers and neighboring residents. Timber harvesting for fuel can also result in destruction of habitat that can lead to soil loss, water quality degradation, and reduction in wildlife which can lead to increased risk, food insecurity, disease and conflict. According to a report by the Food and Agriculture Organization, a typical brickworks in Sumatra, Indonesia, produces approximately 10,000 bricks per week, enough to build one home. It requires approximately 9 cubic meters of wood to fire this number of bricks. Therefore, roughly twice as much wood is needed to fire the bricks for a brick house than to build a wooden house.[6] (Module 5, Green Guide to Materials and the Supply Chain contains additional information on addressing this issue.)



Building materials. Uncontrolled soil mining can put communities at risk by increasing landslides, as well as causing soil erosion and sedimentation of rivers as shown in this photo. Rivers and other sources of clean water can be contaminated with soil runoff leading to unsafe or unreliable water supplies and impacts to fisheries. (See Module 5, Green Guide to Materials and the Supply Chain for information on addressing this issue.)



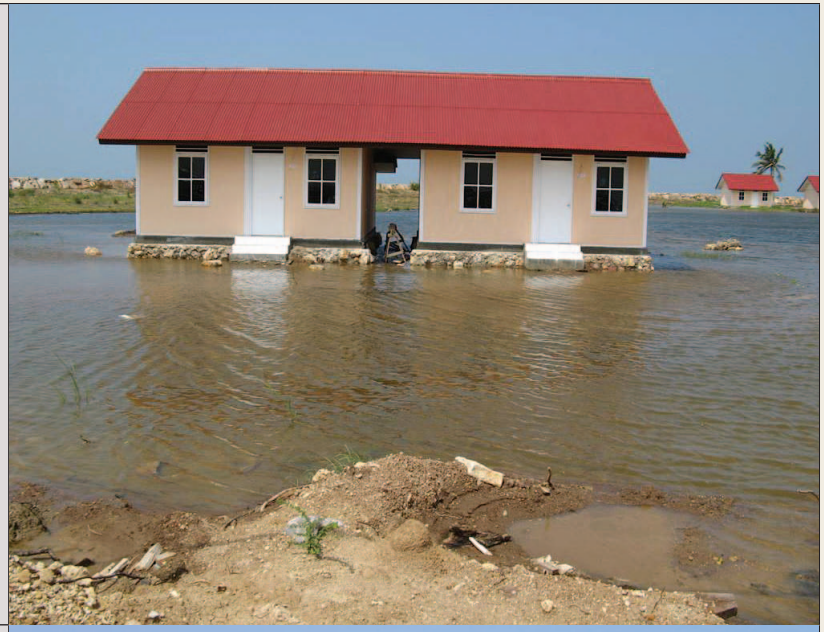
6 Kuru, George. 2005. FAO *Assessment of Timber Demand and Supply for Post-Tsunami Reconstruction in Indonesia*. Report prepared for the Food and Agriculture Organization.

Land conversion. Illegal logging can result in water pollution, erosion, loss of habitat, and human-wildlife conflict.[7] This can lead to lack of clean water, disease, increased disaster risk, and fewer livelihood opportunities over the long-term. (See Module 6, Green Guide to Construction for ways to address this issue)

Solid waste management. The construction of new shelter settlements after disasters also requires proper planning for solid waste management. In this photograph, solid waste is disposed in an un-lined ditch creating water contamination, health concerns, and foul odor for neighboring communities. (See Module 7, Green Guide to Water and Sanitation for ways to address this issue)

7 Jakarta Post. 2007. Aceh to implement logging moratorium. Jakarta Post. *March 17.*

Shelter construction. The rush to construct houses after the tsunami resulted in some new homes being constructed in unsafe areas as shown in in this photo.. Flooded homes can lead to increased risk of water-bourne disease and unsafe living conditions. Note: a newly constructed sea wall in the background aggravates the problem because it prevents rainwater from flowing out to sea. (See Module 4, Green Guide to Strategic Site Selection and Development for ways to address this issue)



Site Selection. The selection of relocated housing sites resulted in the use of undeveloped land that infringed on elephant habitat, resulting in new incidences of human-wildlife conflict. Human-wildlife conflict can lead to increased injuries, loss of livelihood opportunities, and increased risk. (See Module 4, Green Guide to Strategic Site Selection and Development and Module 3, Green Guide to Environmental Impact Assessment Tools and Techniques for ways to address this issue).

2.2 Challenges to Addressing Environmental Issues

In the urgency of a humanitarian response setting, the critical roles that natural resources play in a healthy and secure human life are often overlooked. This might be because project planners:

- are not fully aware of the environmental impacts of their projects
- believe that the environment is of secondary importance to the goals of their project
- believe that addressing the environment is too costly or too time consuming
- feel that they do not have sufficient knowledge or skills to address environmental issues

Other important environmental challenges include:

Data: It can be difficult to find, interpret, and apply environmental data in pre- and post-disaster situations (Note: these challenges are also encountered in data collection and analysis for other sectors, whether related to the environment or not).

Time: Environmental change can be long term and may not always be measured within a project's life span.

Scale: Environmental impacts at times occur outside of the immediate project area.

Cause-effect: It is not always possible to determine definitive "cause and effect" relationships, since factors other than the studied intervention can contribute to the measured changes (attribution).

However, none of these challenges negates the importance of addressing the environment in order to improve outcomes for people and communities recovering from disaster. This module and the others in this GRRT series provide resources that can be used to address challenges by building understanding and ownership of environmental issues and illustrating the multiple benefits of incorporating the environment into disaster recovery.

It is important to acknowledge when the humanitarian imperative to save lives and reduce suffering must take precedence over other considerations. However, the humanitarian imperative does not have to be at the expense of the environment and, ultimately, of the people who depend upon the environment's health. Humanitarian projects can serve as a platform for improving environmental conditions in order to benefit people's needs related to shelter, water, health, and livelihoods.

2.3 An Opportunity to Build Back Safer

Disaster recovery and rebuilding attempts to build back in a few years what often took generations to develop. This recovery process represents an opportunity to *build back safer,* creating more environmentally sound communities than existed before the disaster. The GRRT uses the phrase build back safer instead of the more common "build back better" because build back better is often interpreted as building back infrastructure that is larger, or more modern, which is not always "better" in terms of long-term sustainability. A full discussion of the build back better concept is contained the paper "The Meaning of 'Build Back Better': Evidence From Post-Tsunami Aceh and Sri Lanka."[8]

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8 Kennedy, Jim, Joseph Ashmore, Elizabeth Babister, and Ilan Kelman. 2008. The meaning of 'build back better': Evidence from post-tsunami Aceh and Sri Lanka. *Journal of Contingencies and Crisis Management.* 16(1): 24-36.

Once the immediate, life-saving needs are met in the earliest phases after a disaster, governments, aid agencies, and multilateral organizations have an opportunity and responsibility (as their policies and standards describe) to ensure that recovery and reconstruction activities support and strengthen longer-term development to achieve long-lasting outcomes for disaster-affected communities.

The goal of post-disaster recovery should be to move beyond pre-disaster conditions in order to enable the longer-term development needs of disaster-affected people. In the book *Rising from the Ashes: Development Strategies in Times of Disaster*, the authors point out:

> Too often, disaster responses in the form of relief aid have not contributed to long-term development and, worse, actually subverted or undermined it. *There is no reason why this should continue to be the case.* If the number of times external agencies intervene in disaster responses is actually increasing – and it is – then the necessity for designing relief interventions so that they contribute to long-term development becomes all the more important. Relief efforts directed at "getting things back to normal" will do just that and no more, leaving people as vulnerable to the next crisis as they were to the last.[9]

In recent years, a number of humanitarian agencies have taken steps to ensure that post-disaster recovery and reconstruction actively addresses environmental concerns and thereby supports longer-term development. Some of these activities have included the following:

- Encouraging the use of building materials that are from renewable natural resources
- Locating buildings outside of hazardous and environmentally fragile areas
- Taking advantage of technological innovations that can be successfully adapted to local contexts
- Reintroducing traditional methods that are more environmentally sustainable than modern approaches
- Reusing or recycling disaster debris
- Conserving water and accessing it only from sustainable sources
- Managing waste so it becomes an environmental asset, not a liability
- Building back governance capacity to sustainably manage natural resources

As explained further in Section 3 below, the GRRT contains numerous case studies, tools, and strategies that illustrate these examples of integrating environmental sustainability in disaster recovery.

There are multiple benefits to addressing the environment. By minimizing negative environmental impacts, project planners are not only increasing the long-term sustainability of their projects, but are also working toward other project objectives such as cost savings, disaster risk reduction, gender equity, food security, and energy efficiency, among others. For example, by ensuring that recovery activities do not degrade ecosystems, humanitarian project planners can help to ensure that the disaster risk reduction functions of ecosystems are maintained. Ecosystem functions include flood retention, slope stability, clean and healthy air and water, and food stores. In many cases, by addressing the environmental issues, humanitarian actors can address the underlying causes of the disaster itself. The following examples from Guatemala/Mexico and Somalia show how risk can be reduced through sound environmental management following a natural disaster.

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9 Anderson, Mary and Peter Woodrow. 1998. *Rising from the Ashes: Development Strategies in Times of Disaster.* London: Intermediate Technology Publications.

REDUCING RISK THROUGH ENVIRONMENTAL MANAGEMENT AFTER HURRICANE STAN IN GUATEMALA/MEXICO

In the high-altitude upper watersheds of the Coatán and Suchiate rivers, straddling the borders of Guatemala and Mexico and flowing off the slopes of the Tacaná volcano to the Pacific Ocean, environmental degradation and climate change are increasing the risk of devastating flash floods. These watersheds have been deforested and are badly degraded in many places. Severe erosion of formerly deep soils has reduced their capacity to hold water. Population density is high and degradation of the environment has limited people's livelihood options. Communities are therefore increasingly vulnerable to flooding caused by tropical storms and hurricanes. In 2005 tropical storm Stan dropped torrential rains on the region, causing flooding and mudslides that led to an estimated 2,000 deaths and damage of up to US$40 million. Roads, bridges, water supply systems, crops, and local economies were destroyed. This disaster propelled communities to take action and find ways to reduce the risks of flooding. With the support of IUCN's Water and Nature Initiative and other organizations, local communities organized themselves into "micro-watershed councils" to coordinate watershed management among groups of villages. People have become aware of the effects of unsustainable environmental management. They have identified the different demands on water and defined priorities for managing and restoring watersheds that respond to their development needs. Driven by the need to expand livelihood options to reduce poverty, these community councils have led to the diversification of farming systems, including terracing of degraded slopes and reforestation through the introduction of agroforestry. Communities are investing their labor and capital in restoration of natural infrastructure. As self-organization expands, communities are becoming better equipped to adapt to climate change and are less sensitive to severe storms.

Source: Smith, D.M., and S. Barchiesi. 2009. *Environment as infrastructure – Resilience to climate change impacts on water through investments in nature*. Perspectives on water and climate change adaptation. The Hague, Netherlands: CPWC; Marseilles, France: World Water Council; Gland, Switzerland: IUCN; and London, UK: IWA. Cited in Sudmeier-Rieux, Karen, and Neville Ash. 2009. *Environmental Guidance Note for Disaster Risk Reduction: Healthy Ecosystems for Human Security*. Revised Edition. Gland: IUCN.

Community engagement and self-organization helps to ensure long-term project results and reduce disaster risk. This photograph shows a community center in Maderas del Pueblo Nuevo Paraiso, Chimpalas, Oaxaca, Mexico which acts as a forum for communities to discuss livelihoods, environmental issues, disaster risk, and other concerns facing the community. © Anthony B. Rath/WWF-Canon

CASE STUDY: GREEN RECOVERY IN XAAFUUN, SOMALIA, AFTER THE 2004 TSUNAMI

Reconstruction efforts in Xaafuun, Somalia, following the 2004 tsunami pinpoint the importance of environmentally appropriate site selection for a relocated community. Xaafuun is one of the few permanent fishing settlements on the northeastern Somalia coast, oscillating between 250 and 600 families depending on the season. In the damaged settlement, houses had been built at sea level near the beach, which had destabilized the fragile dune ecosystem of the area. Strong, sand-laden winds would regularly hit the village during the monsoon season, often burying structures and causing health problems, particularly for children, pregnant women, and the elderly.

To find a safe and environmentally sustainable site, a multidisciplinary team of urban planners, an economic development expert, and an environmental specialist collaborated to formulate the reconstruction plan. Key issues of sustainability included the potential for settlement expansion and construction in close proximity to both fishing and market locations. Protection from the elements was another important consideration, since Xaafuun is subject to strong winds and sand from the adjacent sand dune habitat. The team also looked at the suitability of a new site with regard to public infrastructure for water delivery systems, sanitation systems, and roadway access points.

The new location called for a carefully considered, integrated settlement layout with appropriate types of shelter, rather than a simple replication of what existed before. A preparatory sketch-plan discussed with all stakeholders allowed for swift land allocation to different agencies for immediate reconstruction activities. Meanwhile, a more detailed settlement layout was prepared by UN-HABITAT. A new mosque, a Koranic school, a meat market, a women's center, and a health center have been built.

The town plan was based on the following principles:

1. Compact settlement: this mitigates the impact of Xaafuun's strong winds on living spaces and housing units, ensures cost efficiency by reducing the total service area, and reduces infringements on the sensitive dune habitat.
2. Public border: a public zone, comprising public spaces and public buildings, faces the sea, and acts as a buffer between the residential area and the dunes.
3. Main road: this serves as the backbone of the development and is linked with the main public facilities.
4. Economic development: next to the formal market structures and the sites along the sea for a small-scale fishing industry, spaces for spontaneous economic activities and social gatherings are created.

The Xaafuun case illustrates that without compromising humanitarian efforts to save lives, it is vital to introduce a development perspective in the early stages of the post-disaster situation, fully taking advantage of the opportunities that might result from the disaster. The full case study is included as Annex 3 of Module 4, Green Guide to Strategic Site Selection and Development.

Source: Decorte, Filiep. 2008. *Paving the Way for Sustainable Development in a Post Disaster Situation – the Case of the Tsunami-damaged Village of Xaafuun North Eastern Somalia*. Nairobi: UN-HABITAT.

2.4 Environment in Post-Disaster Recovery International, National, and Local Policy

For the past few decades, governments, the UN, and civil society organizations have examined the role of a sustainable environment relative to disaster response and human development policy. Additionally, many national, regional, and local governments have legal mandates that require development activities to incorporate environmental issues and include environmental impact assessment. Project planners and managers involved in post-disaster recovery and reconstruction should address both the international-level policy (described below) and the applicable national, regional, and local laws that pertain to their projects.

2.4.1 Code of Conduct for Disaster Relief

The Code of Conduct for the International Red Cross and Red Crescent Movement and Non-Governmental Organizations (NGOs) in Disaster Relief was developed and agreed upon by eight of the world's largest disaster response agencies in the summer of 1994. Signatories include National Red Cross and Red Crescent Societies, Oxfam, the Save the Children Fund, and CARE, among others. It is currently being used by the International Federation to monitor its own standards of relief delivery and to encourage other agencies to set similar standards.

Principle 8 in the Code of Conduct specifies:

> **Relief aid must strive to reduce future vulnerabilities to disaster as well as meeting basic needs.** All relief actions affect the prospects for long-term development, either in a positive or a negative fashion. Recognizing this, we will strive to implement relief programmes which actively reduce the beneficiaries' vulnerability to future disasters and help create sustainable lifestyles. *We will pay particular attention to environmental concerns in the design and management of relief programmes. We will also endeavour to minimize the negative impact of humanitarian assistance, seeking to avoid long-term beneficiary dependence upon external aid.*

2.4.2 The SPHERE Project

The Sphere Project initiative began in 1997 as a response to a collective recognition within the humanitarian community of the need for quality and accountability mechanisms in humanitarian responses. Sphere is three things: a handbook, a broad process of collaboration, and an expression of commitment to quality and accountability. The Sphere Handbook has become a widely recognized tool for improving humanitarian response, not only by NGOs but also by United Nations agencies, host governments, donor governments, and other actors involved in humanitarian response.

In the Sphere handbook a number of crosscutting issues are identified that have relevance to all sectors in a disaster response, including the environment:

> The environment…provides the natural resources that sustain individuals, and determines the quality of the surroundings in which they live. It needs protection if these essential functions are to be maintained. The Minimum Standards address the need to prevent over-exploitation, pollution and degradation of environmental conditions.[10]

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10 The Sphere Project. 2004. Minimum Standards in Shelter, Settlement and Non-food Items. Sphere Handbook. Geneva: Oxfam Publishing. *Note: a revised version of the handbook will be published in 2011.*

The environment, disaster risk reduction, and climate change are issues that will be further explored in the revision of the handbook, which is planned for publication in 2010.

The Sphere handbook provides practical advice on programming related to the environment through the minimum technical standards, indicators, and guidance notes throughout the handbook. One example of this can be found in **Shelter and settlement standard 6: environmental impact**:

> The adverse impact on the environment is minimized by the settling of the disaster-affected households, the material sourcing, and construction techniques used. Gaps in reaching the standards can be used to advocate for additional resources where appropriate.

2.4.3 Hyogo Framework for Action

The Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters was launched in January 2005 when over 4000 representatives of governments, non-governmental organizations, academic institutes, and the private sector gathered in Kobe, Japan, at the second World Conference on Disaster Reduction. This Framework for Action, adopted by 168 states, sets a clear expected outcome – the substantial reduction of disaster losses, in lives as well as in the social, economic and environmental assets of communities and countries – and lays out a detailed set of priorities to achieve this by 2015. The Framework for Action identifies environmental management as a priority action for reducing the underlying risk factors to natural hazards.

The Hyogo Framework for Action built on the Yokohama Strategy and Plan of Action (1994), which stated that the representing Heads of State "resolve to pursue the following expected outcome for the next 10 years: *The substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries…"*

through the following key activities:

(i) Environmental and natural resource management

> (a) Encourage the sustainable use and management of ecosystems, including, through better land-use planning and development activities, the reduction of risk and vulnerabilities.
>
> (b) Implement integrated environmental and natural resource management approaches that incorporate disaster risk reduction, including structural and non-structural measures, such as integrated flood management and appropriate management of fragile ecosystems.
>
> (c) Promote the integration of risk reduction associated with existing climate variability and future climate change into strategies for the reduction of disaster risk and adaptation to climate change, which would include the clear identification of climate-related disaster risks, the design of specific risk-reduction measures, and an improved and routine use of climate risk information by planners, engineers, and other decision makers.

2.4.4 Millennium Development Goals

In September 2000, world leaders came together at United Nations Headquarters in New York to adopt the United Nations Millennium Declaration, committing their nations to a new global partnership to reduce extreme poverty and setting out a series of time-bound targets – with a deadline of 2015 – that have become known as the **Millennium Development Goals (MDGs).** The MDGs relate to humanitarian response, because the humanitarian sector is part of the developmental process.

The four targets of Goal 7 address environmental sustainability. The targets are as follows:

1. Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources.
2. Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss.
3. Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation.
4. By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers.

2.4.5 United Nations Cluster System

Over the years the international humanitarian community has developed several mechanisms to improve the overall effectiveness of response to disasters. One prime example has been the humanitarian reform proposed by Jan Egeland, the former United Nations Undersecretary-General for Humanitarian Affairs and Emergency Relief Coordinator, and agreed to by the Inter Agency Standing Committee (IASC) in 2005. This reform seeks to improve the effectiveness of humanitarian response by ensuring greater predictability, accountability, and partnership. It is an ambitious effort by the international humanitarian community to reach more beneficiaries with more comprehensive needs-based relief and protection in a more effective and timely manner.

An essential part of the reform is the "cluster approach," a sectoral-based approach to more efficient and effective coordination. The cluster approach consists of groupings of UN agencies, NGOs, and other international organizations around a sector or service provided during a humanitarian crisis. Each of the eleven clusters (Protection, Camp Coordination and Management, Water Sanitation and Hygiene, Health, Emergency Shelter, Nutrition, Emergency Telecommunications, Education, Agriculture, Logistics, and Early Recovery) is led by a designated agency.[11]

The approach has the multiple objectives of developing adequate capacity and predictable leadership in all sectors to ensure that the following takes place:

- Identified gaps in all the main sectors or areas of humanitarian response are addressed, including crosscutting issues such as the environment.
- Responses are more strategic and are based on prioritization of available resources and clarity about who does what.

The Emergency Shelter Cluster has developed an Environment Advisor program to support Emergency Shelter Cluster field operations. The Environment Advisor provides advice and technical support to the Cluster Coordinator and Cluster members on how to identify and minimize the negative impacts of emergency shelter assistance. In 2010, Environment Advisors were deployed to Haiti and Indonesia following earthquake disasters in those countries.

The cluster approach includes the environment as a crosscutting theme that should be considered across all the technical clusters (or sectors). The GRRT training modules 1, 2, and 3 are applicable to all clusters. Sector-

11 Interagency Standing Committee (IASC). 2006. *IASC Guidance Note on Using the Cluster Approach to Strengthen Humanitarian Response*. Geneva: United Nations.

specific GRRT modules relate to the clusters and Table 1, below, shows which GRRT modules relate to which cluster activities. It should be noted that the cluster system is not invoked in all disasters; however, many governments use a similar, sector-by-sector coordination approach.

TABLE 1. **LIST OF CLUSTERS AND THE GRRT MODULES THAT RELATE TO THE CLUSTERS**

CLUSTER	RELATED GRRT SECTOR-SPECIFIC MODULE
TECHNICAL CLUSTERS	
AGRICULTURE	Green Guide to Livelihoods (Module 8)
EDUCATION	No GRRT module relates directly.
EMERGENCY SHELTER	Green Guide to Strategic Site Selection and Development (Module 4) Green Guide to Materials and the Supply Chain (Module 5) Green Guide to Construction (Module 6)
HEALTH	Green Guide to Water and Sanitation (Module 7) Green Guide to Construction (regarding debris management) (Module 6)
NUTRITION	No GRRT module relates directly.
WATER, SANITATION, AND HYGIENE	Green Guide to Water and Sanitation (Module 7)
CROSSCUTTING CLUSTERS	
CAMP COORDINATION AND CAMP MANAGEMENT	Green Guide to Strategic Site Selection and Development (Module 4) Green Guide to Materials and the Supply Chain (Module 5) Green Guide to Construction (Module 6)
EARLY RECOVERY	All the sectoral GRRT modules support the principles and practices of the Early Recovery cluster. Green Guide to Livelihoods (Module 8) is especially relevant.
PROTECTION	No GRRT module relates directly.
COMMON SERVICES	
LOGISTICS	Green Guide to Materials and the Supply Chain (Module 5) Green Guide to Construction (Module 6)
EMERGENCY TELECOMMUNICATIONS	No GRRT module relates directly.

In addition, the UN Environment Programme (UNEP) assists with environmental issues related to disaster response.

3 THE GREEN RECOVERY AND RECONSTRUCTION TOOLKIT

World Wildlife Fund (WWF) has worked with the American Red Cross Tsunami Recovery Program (TRP) and their partners in the areas impacted by the 2004 Indian Ocean tsunami in Sri Lanka, Indonesia, Thailand, and the Maldives. Through this innovative five-year partnership (2005 – 2010), WWF and the American Red Cross have developed considerable knowledge as to what activities, strategies, and training can improve the disaster recovery and reconstruction process by helping to make communities more environmentally sustainable. In order to broaden the learning and experiences, WWF and the American Red Cross worked with over 30 subject-matter experts and humanitarian specialists from over 18 other organizations in order to develop this Green Recovery and Reconstruction Toolkit (GRRT). Participating organizations include the International Federation of the Red Cross Red Crescent Societies, Oxfam, CARE, Save the Children, Mercy Corps, Tearfund, United Nations Environment Programme, ProAct, World Conservation Union (IUCN), World Vision, RedR UK, the U.S. Agency for International Development, the International Strategy for Disaster Reduction, ProAct, the Danish Refugee Council, the Asian Disaster Preparedness Center, Shelter Centre, and Environment Foundation Limited.

The Green Recovery and Reconstruction Toolkit (GRRT) is a series of 10 standalone modules that address a wide range of topics and sectors vital to disaster response. The toolkit for each module consists of the following:

1. A content paper, presenting key information about the topic
2. A trainer's guide for training planners and facilitators on a proposed workshop agenda, participant learning objectives, key points for presentations, interactive learning activities, and PowerPoint slides to support the workshop
3. All the materials necessary to support a one-day workshop on the topic

Each topic presents a range of green recovery and reconstruction principles and practices. In addition, several modules combine to form a series of workshops with a focus on a broader application. Most participants in a GRRT workshop would benefit from a combination of the introductory module, which presents the context of green recovery and reconstruction, with one or more sectoral modules, e.g., Strategic Site Selection and Development (Module 4), Materials and the Supply Chain (Module 5), or Construction (Module 6). See Module A, Toolkit Guide, for complete details on ways to combine and manage GRRT workshops.

3.1 Who Is the Toolkit For?

The core audience for the Toolkit includes humanitarian, environmental, and conservation staff as part of disaster recovery and reconstruction efforts. Staff involved in the design, implementation, and management of recovery and reconstruction would benefit from the training program. Target staff includes shelter specialists, water and sanitation specialists, field engineers, program and country directors, disaster management staff, livelihoods specialists, spatial planners, environmental managers, and procurement staff. Other important stakeholders who may be interested include the local community, local and national government officials, and private-sector representatives (e.g., construction contractors, suppliers, and estimators).

In terms of the audience for workshops, the modules have been designed with exercises and other interactive activities for groups of 15 – 25. As a consequence, if a training planner is expecting a smaller or larger group, he or she will need to modify the exercises or the training plan accordingly.

3.2 What Does the Toolkit Try to Achieve?

The goal of the Toolkit is to equip humanitarian, environmental, and conservation field staff involved in post-disaster recovery and reconstruction with the practical information and strategies necessary to improve project outcomes for the affected population, build back communities that are more environmentally sustainable, and reduce risk and vulnerability to future disasters.

The Toolkit is available for use by organizations that want to train their own and partners' staff in the knowledge and skills of building back with a "green" approach.

3.3 How Is It Organized?

The GRRT consists of 10 modules in addition to this Guide. The titles are listed in the following table along with the modules' learning objectives and the intended audience.

TABLE 2: GRRT MODULE LEARNING OBJECTIVES

TITLE	MODULE LEARNING OBJECTIVES By the end of the training, participants will be able to….	TARGET AUDIENCE
A. TOOLKIT GUIDE	This is not a training module but a brief summary guide of how the GRRT works and recommended training tools and methods.	All trainers
1. OPPORTUNITIES FOR GREEN RECOVERY AND RECONSTRUCTION: AN INTRODUCTION	1. Describe how addressing the environment in a humanitarian response a) is critical to saving lives and livelihoods, b) reduces risk and vulnerability, and c) contributes to successful recovery outcomes 2. Explain the purpose of the Green Recovery and Reconstruction Toolkit and its components. 3. Discuss key opportunities, misconceptions, and challenges for mainstreaming the environment into humanitarian action.	All participants
2. GREEN GUIDE TO PROJECT DESIGN, MONITORING, AND EVALUATION	1. Understand why it is important to incorporate environmental considerations into project design, monitoring, and evaluation in order to improve outcomes for people and communities recovering from disaster. 2. Integrate environmental indicators into the project strategy and the key steps of the project cycle's development and implementation. 3. Select and measure environmental indicators using the same criteria as other indicators (e.g., SMART indicators). 4. Demonstrate that integrating environmental monitoring into a project does not have to be difficult, costly, or time consuming.	M&E Specialists, Program and Country Directors, Delegates Across Sectors, Environmental Managers

TITLE	MODULE LEARNING OBJECTIVES By the end of the training, participants will be able to….	TARGET AUDIENCE
3. GREEN GUIDE TO ENVIRONMENTAL IMPACT ASSESSMENT TOOLS AND TECHNIQUES	1. Describe the value and role of environmental impact assessment tools in post-disaster recovery and reconstruction project planning. 2. List the five elements of the Environmental Impact Assessment (EIA) process. 3. Use the ESR tool with a sample project to identify and assess the adverse environmental impacts and propose mitigation measures to prevent, reduce, and compensate for the impacts. 4. Describe several tools that are used for environmental assessments in post-disaster settings.	Delegates across sectors (Water and Sanitation, Livelihoods, Shelter, Disaster Risk Reduction), Field Engineers, Program and Country Directors, Environmental Managers
4. GREEN GUIDE TO STRATEGIC SITE PLANNING AND DEVELOPMENT	1. Understand the principles of environmentally sustainable site selection and development. 2. Conduct an assessment of post-disaster site selection, design, and adaptation to address environmental conditions in order to protect people and communities. 3. Identify strategic points of entry in the post-disaster recovery and reconstruction cycle to promote environmentally sustainable site selection and development.	Country Office Directors, Government Officials, Senior Program Managers, and Site Planners who make site planning decisions.
5. GREEN GUIDE TO MATERIALS AND THE SUPPLY CHAIN	1. Identify the typical environmental impacts of building material choices in order to minimize impacts to people and communities recovering from disaster. 2. Use environmentally aware approaches in the design of buildings and selection of materials for post-disaster housing reconstruction. 3. Identify the typical environmental impacts of material procurement options. 4. Describe strategies for procuring materials for post-disaster housing reconstruction that have the least negative impact on human welfare and the environment. 5. Explain the benefits and limits of environmentally conscious decision making in the selection and procurement of building materials after disasters.	Procurement Specialists, Shelter Delegates
6. GREEN GUIDE TO CONSTRUCTION	1. Describe the key principles of environmentally sustainable building design and architecture to protect people and communities recovering from disaster. 2. Describe the key principles of environmentally sustainable on-site construction management. 3. Demonstrate how to apply the key principles of sustainable building design and construction management to a community-based project.	Shelter Delegates, Field Engineers, Spatial Planners

TITLE	MODULE LEARNING OBJECTIVES By the end of the training, participants will be able to….	TARGET AUDIENCE
7. GREEN GUIDE TO WATER AND SANITATION	1. Promote and implement water and sanitation systems that improve community well-being by enhancing environmental sustainability. 2. Explain to stakeholders why water supply project infrastructure should include watershed protection to ensure sustainability, and identify examples of ways to achieve sustainability. 3. Demonstrate how water and sanitation projects can be made more sustainable for communities through initial technology choice, project design, and community consultation.	Water and Sanitation Delegates, Field Engineers, Hygiene Specialists.
8. GREEN GUIDE TO LIVELIHOODS	1. Explain how livelihoods, disaster recovery, risk reduction, and ecosystems are linked. 2. Identify the recurring environmental impacts of typical livelihoods interventions. 3. Understand and address solutions for sector-specific livelihoods challenges, and be able to identify sources of expertise to improve livelihoods project outcomes.	Livelihoods Delegates, Environmental Managers
9. GREEN GUIDE TO DISASTER RISK REDUCTION	1. Describe the ways in which disaster risk and environmental conditions are linked. 2. Integrate environmental issues into typical disaster risk reduction assessments. 3. Identify a set of ecosystem-based activities that can reduce risk and enhance disaster risk reduction programs. 4. Describe how disaster risk reduction activities can have negative impacts on the environment and how these impacts can be mitigated.	Disaster Risk Reduction Delegates, Environmental Managers
10. GREEN GUIDE TO ORGANIZATIONAL OPERATIONS	1. Describe the three core strategies of Green Organizational Operations and how they can be used to implement a plan for reaching greening goals and targets. 2. Assess opportunities for improving the environmental performance of the operational aspects of organizations and identify specific areas to address. 3. Describe three examples of "action items" for greening and discuss how they can be instituted within each of the core strategies. 4. Assign responsibility, motivate staff, and develop a green team to participate in greening efforts.	Facility managers, and other headquarters and field offices staff who have decided to apply the principles of sustainability to their own work environment

3.4 Principles of Green Recovery and Reconstruction

Through their work together, WWF and the American Red Cross have found that there are some key principles that guide how environmental issues can best be integrated into humanitarian operations. The GRRT Training Toolkit incorporates the following principles throughout the modules:

a) "Do no harm" to the environment and beneficiaries

The "do no harm" principle, developed by Mary Anderson in the 1990s, aims to get humanitarian practitioners to examine their programs to ensure that no unintentional negative impacts occur as a result of an intervention. This principle is linked to the "build back safer" concept, and, in the environmental context, means that all programs should be examined for unintentional negative impacts on the environment and the beneficiaries.

This theme is developed in a few of the modules. Specifically, Module 2, Green Guide to Environmental Impact Assessment Tools and Techniques, provides some tools for assessing whether planned activities will have a negative impact, and looks at ways of mitigating unintended impacts from programs.

This is further extended in Module 9, Green Guide to Disaster Risk Reduction, in which the idea of doing no harm is linked to the risk of harm from disasters. The module recognizes that activities presumed to reduce risk might themselves have a risk of doing harm. For instance, a risk reduction intervention to build floodwalls in one location may exacerbate flooding in another location. These secondary, "downstream," or unintended impacts are often not incorporated into the planning of disaster risk reduction interventions.

In Module 6, Green Guide to Construction, the first aim of sustainable construction must be to ensure that efforts do not worsen the environment or the quality of life for those whom the activities are intended to assist. In a similar vein, Module 4, Green Guide to Strategic Site Selection and Development, highlights that a failure to consider environmental sustainability in site selection and development runs counter to the "do no harm" concept, as this failure will likely result in additional harm to resettled individuals and their communities.

b) Multiple benefits of addressing the environment

There are many demands placed on people and agencies that respond to disasters, whose priorities include saving lives, reducing suffering, and jump-starting recovery. Staff may be tempted to address the environment as a lower priority, something that can be put off. However, making the environment a priority and addressing it from the beginning has multiple benefits. These benefits include the potential to do the following:

- Address the underlying environmental issues that may have contributed to causing the disaster in the first place.
- Improve the affected population's health and safety through reduction of air and water pollution (management of debris, liquid and solid wastes).
- Protect future livelihoods, shelter, and water-related needs by protecting the natural resources upon which those livelihoods depend.
- Implement mitigation activities that will preserve and protect people and the environment from future hazards.

Further, proactively addressing environmental issues can slow or reverse trends that lead to deforestation, desertification, soil erosion, and salinization, which impact significantly, for example, on food security and economic development in many countries.

c) Environmental issues cannot always be subcontracted; they require action on your part

This theme aims at ensuring that all humanitarian workers recognize their role in ensuring that their activities do not lead to a damaging environmental impact, or, in some cases, contribute to further disasters. Humanitarian workers must recognize that environmental issues are integral to solutions to mitigate the effect of further disasters. This is not an area that can be considered outside the remit of, for example, a water engineer or a health worker. Everyone must take a part in understanding how a program may affect the environment and ensuring that programs build back safer and do no harm.

d) Build back safer

The post-disaster situation allows humanitarian actors an opportunity to undertake projects that have an environmental component in order to build back safer. This may be, for example, in understanding and reducing shelter and settlement risks and vulnerabilities, or promoting better or changed practices in settlement planning and approach to construction and preparedness.

Principle 8 of the 1994 Code of Conduct for the Red Cross/Red Crescent and NGOs in Disaster Relief echoes this theme: Relief aid must strive to reduce future vulnerabilities to disaster as well as meet basic needs.

e) Be solution-oriented

While many of the modules discuss some of the negative examples of humanitarian practice, and the environmental degradation that has occurred, it is important that we look to solutions to ensure that this trend is changed. All the GRRT modules offer suggestions for ways to mitigate environmental impact and build back safer.

f) Emphasize the use of local knowledge in problem solving

This theme is an extension of the growing recognition in the humanitarian community of the necessity of involving communities in program design. This is to ensure that we are meeting the real needs of communities and individuals, and not those perceived by us, as well as to ensure that local capacity is utilized to the fullest extent.

In this photograph, humanitarian and government staff conducts a rapid environmental assessment with a community affected by Cyclone Jokwe in Mozambique in 2008. Community consultations can help project planners develop recovery strategies that incorporate local knowledge of environmental issues and effectively address the needs of the community. © Jonathan Randall/WWF

ANNEX 1

Environmental Concerns Related to the 2010 Haiti Earthquake

The following text is excerpted from a Rapid Environmental Assessment (REA) that was prepared after a major earthquake that struck Haiti in January 2010. The REA highlights many of the typical environmental issues associated with a disaster and the recovery effort.

The earthquake that struck Haiti on January 12, 2010, resulted in an estimated 230,000 deaths, and the damage or destruction of 285,000 housing units. In addition, up to 598,000 persons left the city of Port au Prince soon after the earthquake due to scarcities of shelter, food, and other basic needs.

As it was clear that an earthquake of that scale would have significant and numerous impacts on the environment, various elements of the U.S. government response dedicated specific efforts to identifying and managing environmental impacts to the greatest degree possible. As part of these efforts, U.S. Agency for International Development/Haiti commissioned CHF International and Sun Mountain International to field a team of Haitian and international staff to complete a Rapid Environmental Impact Assessment (REA) of disaster-affected areas and response operations.

The assessment identified a range of major (life-threatening) issues and actions to address these issues. These immediate actions and additional medium-term issues needed to be considered in planning and implementing the shift from immediate relief operations to sustainable recovery.

1. **Coordination, Management and Information**: The need for an environmentally sound response was generally accepted in Haiti, but the scale and scope of earthquake impacts and assistance far exceeded existing coordination and management mechanisms, leading to general inefficiencies, a weak focus on environmental issues and poor sharing of information.
2. **Sanitation and Waste:** Sanitation was very poor in many of the 400+ rural and urban camps occupied by earthquake survivors. Sewage was not properly managed. There were indications that safe-to-drink water was being contaminated due to improper household-level handling. Vector numbers and vector-related disease (e.g., malaria) appeared to be increasing. Liquid and solid waste disposal was [disorganized] and contributed to short- and long-term environmental degradation and health issues. There was a risk that the inappropriate use of portable toilets (e.g., chemical toilets) was resulting in negative environmental impacts. Hazardous waste, particularly bio-hazardous waste, did not appear to be well managed. Some proposed solutions for waste management, particularly sewage ponds, did not appear to be viable in the long term and could contribute to further environmental damage.
3. **Geophysical and Hydro-Meteorological Hazards Monitoring:** Geological and hydro-meteorological hazards had likely become more dangerous since the earthquake, with the likelihood of increased landslides, flooding and similar impacts with the onset of seasonal rains. These hazard events will affect populations without basic shelter and who may have moved to more hazardous locations than before the earthquake.

4. **Shelter and Shelter Sites:** Ad hoc shelter sites were established on the outskirts of Port au Prince, in ecologically fragile areas, near wetlands, and with limited resources for construction. Shelter in most shelter sites did not meet standards for transitional shelter needs (e.g., suitable for three to five years of use). Plans to build transitional shelter required upwards of 20,000 tons of wood, to be delivered in 45 days. Unless this wood was imported, significant additional damage to the already stressed Haitian environment was expected. The possible damage from shelter sites and transitional shelter was avoidable or could have been significantly reduced. However, an increase in squatting on hillsides (e.g., in the locations of previous, now earthquake-destroyed, buildings) or on new lands identified an obvious immediate need for improved planning and the management of transitional and permanent shelter assistance.
5. **Debris Management:** Between 20 and 25 million cubic yards of debris needed to be appropriately managed to avoid damage to the environment, livelihoods and recovery efforts. Debris disposal was [disorganized], and a proper management process slowly began to be established through a Government of Haiti-USG-UN Development Programme task force. This effort received an environmental review, but further monitoring and reviews would be needed as operations expanded to deconstruct thousands of government and privately owned buildings.
6. **Livelihoods and Food Security:** Livelihoods and food security were significantly affected, with hundreds of thousands of households losing productive assets, having social networks disrupted and facing widespread challenges in meeting food and other basic needs. Disaster survivors had to consider livelihood and food security options that could have a negative impact on the environment (e.g., increased charcoal production) and that could be extremely unsafe (e.g., recovering reinforcing rods from destroyed buildings). At the same time, livelihood strategies were in flux and food markets were unstable, presenting challenges in directing assistance to minimize negative environmental impacts.

Source: Kelly, Charles, and Scott Solberg. 2010. *Rapid Environmental Impact Assessment: Haiti Earthquake - January 12, 2010.* CHF International, Sun Mountain International, and U.S. Agency for International Development. March.

GLOSSARY

The following is a comprehensive list of the key terms used throughout the Green Recovery and Reconstruction Toolkit. In some cases, the definitions have been adapted from the original source. If no source is given, this indicates that the module author developed a common definition for use in the toolkit.

Anaerobic Filter (or Biofilter): Filter system mainly used for treatment of secondary effluent from primary treatment chambers such as septic tanks. The anaerobic filter comprises a watertight tank containing a bed of submerged media, which acts as a support matrix for anaerobic biological activity. For humanitarian aid agencies, the prefabricated biofilters that combine primary and secondary treatment into one unit can provide a higher level of treatment than do traditional systems such as precast cylindrical septic tanks or soakage pit systems. Source: SANDEC. 2006. *Greywater Management in Low and Middle Income Countries.* Swiss Federal Institute of Aquatic Science and Technology. Switzerland.

Better Management Practices (BMPs): BMPs are flexible, field-tested, and cost-effective techniques that protect the environment by helping to measurably reduce major impacts of growing of commodities on the planet's water, air, soil, and biological diversity. They help producers make a profit in a sustainable way. BMPs have been developed for a wide range of activities, including fishing, farming, and forestry. Source: Clay, Jason. 2004. *World agriculture and the environment: a commodity-by-commodity guide to impacts and practices.* Island Press: Washington, DC.

Biodiversity: Biological diversity means the variability among living organisms from all sources, including inter alia, terrestrial, and marine and other aquatic ecosystems, as well as the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems. Source: United Nations. Convention on Biological Diversity. www.cbd.int/convention/articles.shtml?a=cbd-02 (Accessed on June 18, 2010)

Carbon Footprint: The total set of greenhouse gas emissions caused directly and indirectly by an individual, organization, event, or product. For simplicity of reporting, the carbon footprint is often expressed in terms of the amount of carbon dioxide, or its equivalent of other greenhouse gases, emitted. Source: Carbon Trust. Carbon Footprinting. www.carbontrust.co.uk (Accessed on June 22, 2010)

Carbon Offset: A financial instrument aimed at a reduction in greenhouse gas emissions. Carbon offsets are measured in metric tons of carbon dioxide-equivalent (CO_2e) and may represent six primary categories of greenhouse gases. One carbon offset represents the reduction of one metric ton of carbon dioxide or its equivalent in other greenhouse gases. Source: World Bank. 2007. *State and Trends of the Carbon Market.* Washington, DC

Climate Change: The climate of a place or region is considered to have changed if over an extended period (typically decades or longer) there is a statistically significant change in measurements of either the mean state or the variability of the climate for that place or region. Changes in climate may be due to natural processes or to persistent anthropogenic changes in atmosphere or in land use. Source: UN International Strategy for Disaster Reduction. Terminology of disaster risk reduction. www.unisdr.org/eng/terminology/terminology-2009-eng.html (Accessed on April 1, 2010)

Construction: Construction is broadly defined as the process or mechanism for the realization of human settlements and the creation of infrastructure that supports development. This includes the extraction and processing of raw materials, the manufacturing of construction materials and components, the construction project cycle from feasibility to deconstruction, and the management and operation of the built environment.

Source: du Plessis, Chrisna. 2002. *Agenda 21 for Sustainable Construction in Developing Countries*. Pretoria, South Africa: CSIR Building and Construction Technology.

Disaster: Serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of the affected society to cope using only its own resources. Disasters are often classified according to their speed of onset (sudden or slow) and their cause (natural or man-made). Disasters occur when a natural or human-made hazard meets and adversely impacts vulnerable people, their communities, and/or their environment. Source: UNDP/UNDRO. 1992. *Overview of Disaster Management*. 2nd Ed.

Disaster preparedness: Activities designed to minimize loss of life and damage; organize the temporary removal of people and property from a threatened location; and facilitate timely and effective rescue, relief, and rehabilitation. Source: UNDP/UNDRO. 1992. *Overview of Disaster Management*. 2nd Ed.

Disaster Risk: Potential disaster losses in lives, health status, livelihoods, assets, and services that could occur to a particular community or a society over some specified future time period. Risk can be expressed as a simple mathematical formula: Risk = Hazard X Vulnerability. This formula illustrates the concept that the greater the potential occurrence of a hazard and the more vulnerable a population, the greater the risk. Source: UN International Strategy for Disaster Reduction. Terminology of disaster risk reduction. www.unisdr.org/eng/terminology/terminology-2009-eng.html (Accessed on April 1, 2010)

Disaster Risk Reduction: The practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events. Source: UN International Strategy for Disaster Reduction. Terminology of disaster risk reduction. www.unisdr.org/eng/terminology/terminology-2009-eng.html (Accessed on April 1, 2010)

Ecosystem: Dynamic complexes of plants, animals, and other living communities and the nonliving environment interacting as functional units. Humans are an integral part of ecosystems. Source: UN. Convention on Biological Diversity. www.cbd.int/convention/articles.shtml?a=cbd-02 (Accessed on June 18, 2010)

Ecosystem Services: The benefits that people and communities obtain from ecosystems. This definition is drawn from the Millennium Ecosystem Assessment. The benefits that ecosystems can provide include "regulating services" such as regulation of floods, drought, land degradation, and disease; "provisioning services" such as provision of food and water; "supporting services" such as help with soil formation and nutrient cycling; and "cultural services" such as recreational, spiritual, religious, and other nonmaterial benefits. Integrated management of land, water, and living resources that promotes conservation and sustainable use provides the basis for maintenance of ecosystem services, including those that contribute to the reduction of disaster risks. Source: UN International Strategy for Disaster Reduction. Terminology of disaster risk reduction. www.unisdr.org/eng/terminology/terminology-2009-eng.html (Accessed on April 1, 2010)

Embodied Energy: The available energy that was used in the work of making a product. Embodied energy is an accounting methodology used to find the sum total of the energy necessary for an entire product life cycle. Source: Glavinich, Thomas. 2008. *Contractor's Guide to Green Building Construction: Management, Project Delivery, Documentation, and Risk Reduction*. John Wiley & Sons, Inc: New Jersey.

Environment: The complex of physical, chemical, and biotic factors (such as climate, soil, and living things) that act upon individual organisms and communities, including humans, and ultimately determine their form

and survival. It is also the aggregate of social and cultural conditions that influence the life of an individual or community. The environment includes natural resources and ecosystem services that comprise essential life-supporting functions for humans, including clean water, food, materials for shelter, and livelihood generation. Source: Adapted from: *Merriam Webster Dictionary, "Environment."* www.merriam-webster.com/netdict/environment (Accessed on June 15, 2010)

Environmental Impact Assessment: A tool used to identify the environmental, social, and economic impacts of a project prior to decision making. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment, and present the predictions and options to decision makers. Source: International Association of Environmental Impact Assessment in cooperation with Institute of Environmental Assessment. 1999. *Principles of Environmental Impact Assessment Best Practice.*

Green Construction: Green construction is planning and managing a construction project in accordance with the building design in order to minimize the impact of the construction process on the environment. This includes 1) improving the efficiency of the construction process; 2) conserving energy, water, and other resources during construction; and 3) minimizing the amount of construction waste. A "green building" is one that provides the specific building performance requirements while minimizing disturbance to and improving the functioning of local, regional, and global ecosystems both during and after the structure's construction and specified service life. Source: Glavinich, Thomas E. 2008. *Contractor's Guide to Green Building Construction: Management, Project Delivery, Documentation, and Risk Reduction*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Green Purchasing: Green Purchasing is often referred to as environmentally preferable purchasing (EPP), and is the affirmative selection and acquisition of products and services that most effectively minimize negative environmental impacts over their life cycle of manufacturing, transportation, use, and recycling or disposal. Examples of environmentally preferable characteristics include products and services that conserve energy and water and minimize generation of waste and release of pollutants; products made from recycled materials and that can be reused or recycled; energy from renewable resources such as biobased fuels and solar and wind power; alternate fuel vehicles; and products using alternatives to hazardous or toxic chemicals, radioactive materials, and biohazardous agents. Source: U.S. Environmental Protection Agency. 1999. Final Guidance on Environmentally Preferred Purchasing. *Federal Register*. Vol. 64 No. 161.

Greening: The process of transforming artifacts such as a space, a lifestyle, or a brand image into a more environmentally friendly version (i.e., "greening your home" or "greening your office"). The act of greening involves incorporating "green" products and processes into one's environment, such as the home, workplace, and general lifestyle. Source: Based on: Glavinich, T. 2008. *Contractor's Guide to Green Building Construction: Management, Project Delivery, Documentation, and Risk Reduction*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Hazard: 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. Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological, and biological) or induced by human processes (environmental degradation and technological hazards). Source: UN International Strategy for Disaster Reduction. Terminology of disaster risk reduction. www.unisdr.org/eng/terminology/terminology-2009-eng.html (Accessed on April 1, 2010)

Impact: Any effect caused by a proposed activity on the environment, including effects on human health and safety, flora, fauna, soil, air, water, climate, landscape and historical monuments, or other physical structures, or the interaction among those factors. It also includes effects on cultural heritage or socioeconomic conditions resulting from alterations to those factors. Source: United Nations Economic Commission for Europe. 1991. *The Convention on Environmental Impact Assessment in a Transboundary Context.* www.unece.org (Accessed June 22, 2010)

Indicator: A measurement of achievement or change for the specific objective. The change can be positive or negative, direct or indirect. They provide a way of measuring and communicating the impact, or result, of programs as well as the process, or methods used. The indicator may be qualitative or quantitative. Indicators are usually classified according to their level: *input* indicators (which measure the resources provided), *output* indicators (direct results), *outcome* indicators (benefits for the target group) and impact indicators (long-term consequences). Source: Chaplowe, Scott G. 2008. *Monitoring and Evaluation Planning*. American Red Cross/CRS M&E Module Series. American Red Cross and Catholic Relief Services: Washington, DC and Baltimore, MD.

Integrated Water Resources Management: Systemic, participatory process for the sustainable development, allocation, and monitoring of water resource use in the context of social, economic, and environmental objectives. Source: Based on: Sustainable Development Policy Institute. Training Workshop on Integrated Water Resource Management. www.sdpi.org (Accessed June 22, 2010)

Life Cycle Assessment (LCA): A technique to assess the environmental aspects and potential impacts of a product, process, or service by compiling an inventory of relevant energy and material inputs and environmental releases; evaluating the potential environmental impacts associated with identified inputs and releases; and interpreting the results to help make a more informed decision. Source: Scientific Applications International Corporation. 2006. Life Cycle Assessment: Principle's and Practice. Report prepared for U.S. EPA.

Life Cycle Materials Management: Maximizing the productive use and reuse of a material throughout its life cycle in order to minimize the amount of materials involved and the associated environmental impacts.

Life Cycle of a Material: The various stages of a building material, from the extraction or harvesting of raw materials to their reuse, recycling, and disposal.

Livelihoods: A livelihood comprises the capabilities, assets (including both material and social resources), and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and can maintain or enhance its capabilities and assets both now and in the future, without undermining the natural resource base. Source: DFID. 1999. *Sustainable Livelihoods Approach Guidance Sheets*. London: Department for International Development.

Logframe: Logical framework, or logframe, analysis is a popular tool for project design and management. Logframe analysis provides a structured logical approach to the determination of project priorities, design and budget and to the identification of related results and performance targets. It also provides an iterative management tool for project implementation, monitoring and evaluation. Logframe analysis begins with problem analysis followed by the determination of objectives, before moving on to identify project activities, related performance indicators and key assumptions and risks that could influence the project's success. Source: Provention Consortium. 2007. *Logical and Results Based Frameworks.* Tools for Mainstreaming Disaster Risk Reduction. Guidance Note 6. Geneva, Switzerland.

Primary Wastewater Treatment: Use of gravity to separate settleable and floatable materials from the wastewater. Source: National Research Council. 1993. *Managing Wastewater in Coastal Urban Areas.* Washington DC: National Academy Press.

Project Design: An early stage of the project cycle in which a project's objectives and intended outcomes are described and the project's inputs and activities are identified.

Project Evaluation: Systematic and impartial examination of humanitarian action intended to draw lessons that improve policy and practice, and enhance accountability. Source: Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP). Report Types. www.alnap.org (Accessed June 25, 2010)

Project Monitoring: A continuous and systematic process of recording, collecting, measuring, analyzing, and communicating information. Source: Chaplowe, Scott G. 2008. *Monitoring and Evaluation Planning.* American Red Cross/CRS M&E Module Series. American Red Cross and Catholic Relief Services : Washington, DC and Baltimore, MD.

Reconstruction: The actions taken to reestablish a community after a period of recovery subsequent to a disaster. Actions would include construction of permanent housing, full restoration of all services, and complete resumption of the pre-disaster state. Source: UNDP/UNDRO. 1992. *Overview of Disaster Management.* 2nd Ed.

Recovery: The restoration, and improvement where appropriate, of facilities, livelihoods, and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors. Source: UN International Strategy for Disaster Reduction. Terminology of disaster risk reduction. www.unisdr.org/eng/terminology/terminology-2009-eng.html (Accessed on April 1, 2010)

Recycle: Melting, crushing, or otherwise altering a component and separating it from the other materials with which it was originally produced. The component then reenters the manufacturing process as a raw material (e.g., discarded plastic bags reprocessed into plastic water bottles). Source: Based on: Glavinich, Thomas E. 2008. *Contractor's Guide to Green Building Construction: Management, Project Delivery, Documentation, and Risk Reduction.* Hoboken, New Jersey: John Wiley & Sons, Inc.

Resilience: The capacity of a system, community, or society potentially exposed to hazards to adapt, by resisting or changing, in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures. Source: UN International Strategy for Disaster Reduction. Terminology of disaster risk reduction. www.unisdr.org/eng/terminology/terminology-2009-eng.html (Accessed on April 1, 2010)

Response (also called Disaster Relief): The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety, and meet the basic subsistence needs of the people affected.

Comment: Disaster response is predominantly focused on immediate and short-term needs and is sometimes called disaster relief. The division between this response stage and the subsequent recovery stage is not clear-cut. Some response actions, such as the supply of temporary housing and water supplies, may extend well into the recovery stage.

Source: UN International Strategy for Disaster Reduction. Terminology of disaster risk reduction. www.unisdr.org/eng/terminology/terminology-2009-eng.html (Accessed on April 1, 2010)

Reuse: The reuse of an existing component in largely unchanged form and for a similar function (e.g., reusing ceramic roof tiles for a reconstructed house). Source: Based on: Glavinich, Thomas E. 2008. Contractor's Guide to Green Building Construction: Management, Project Delivery, Documentation, and Risk Reduction. Hoboken, New Jersey: John Wiley & Sons, Inc.

Secondary Wastewater Treatment: Use of both biological (i.e., microorganisms) and physical (i.e., gravity) processes designed to remove biological oxygen demand (BOD) and total suspended solids (TSS) from wastewater. Source: National Research Council. 1993. *Managing Wastewater in Coastal Urban Areas.* Washington DC: National Academy Press.

Site Development: The physical process of construction at a building site. These construction-related activities include clearing land, mobilizing resources to be used in the physical infrastructure (including water), the fabrication of building components on site, and the process of assembling components and raw materials into the physical elements planned for the site. The site development process also includes the provision of access to basic amenities (e.g., water, sewage, fuel) as well as improvements to the environmental conditions of the site (e.g., through planting vegetation or other environment-focused actions).

Site Selection: The process encompasses many steps from planning to construction, including initial inventory, assessment, alternative analysis, detailed design, and construction procedures and services. Site selection includes the housing, basic services (e.g., water, fuel, sewage, etc.), access infrastructure (e.g., roads, paths, bridges, etc.) and social and economic structures commonly used by site residents (e.g., schools, clinics, markets, transport facilities, etc.).

SMART Indicator: An indicator that meets the SMART criteria: **S**pecific, **M**easurable, **A**chievable, **R**elevant, and **T**ime-bound. Source: Based on: Doran, G. T. 1981. There's a S.M.A.R.T. way to write management›s goals and objectives. *Management Review:* 70, Issue 11.

Sustainable Construction: Sustainable construction goes beyond the definition of "green construction" and offers a more holistic approach to defining the interactions between construction and the environment. Sustainable construction means that the principles of sustainable development are applied to the comprehensive construction cycle, from the extraction and processing of raw materials through the planning, design, and construction of buildings and infrastructure, and is also concerned with any building's final deconstruction and the management of the resultant waste. It is a holistic process aimed at restoring and maintaining harmony between the natural and built environments, while creating settlements that affirm human dignity and encourage economic equity. Source: du Plessis, Chrisna. 2002. Agenda 21 for Sustainable Construction in Developing Countries. Pretoria, South Africa: CSIR Building and Construction Technology.

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Source*:* World Commission on Environment and Development. 1987. *Report of the World Commission on Environment and Development: Our Common Future.* Document A/42/427. www.un-documents.net (Accessed June 22, 2010)

Tertiary Wastewater Treatment: Use of a wide variety of physical, biological, and chemical processes aimed at removing nitrogen and phosphorus from wastewater. Source: National Research Council. 1993. *Managing Wastewater in Coastal Urban Areas.* Washington DC: National Academy Press. p. 58

Vulnerability. *Human* vulnerability is the relative lack of capacity of a person or community to anticipate, cope with, resist, and recover from the impact of a hazard. *Structural or physical* vulnerability is the extent to which a structure or service is likely to be damaged or disrupted by a hazard event. *Community* vulnerability exists

when the elements at risk are in the path or area of the hazard and are susceptible to damage by it. The losses caused by a hazard, such as a storm or earthquake, will be proportionally much greater for more vulnerable populations, e.g., those living in poverty, with weak structures, and without adequate coping strategies. Source: UNDHA. 1997. *Building Capacities for Risk Reduction.* 1st Ed.

Watershed: An area of land that drains down slope to the lowest point. The water moves through a network of drainage pathways, both underground and on the surface. Generally, these pathways converge into streams and rivers that become progressively larger as the water moves downstream, eventually reaching a water basin (i.e., lake, estuary, ocean). Source: Based on: Oregon Watershed Enhancement Board. 1999. *Oregon Watershed Assessment Manual*. www.oregon.gov Salem.

ACRONYMS

The following is a comprehensive list of the acronyms used throughout the Green Recovery and Reconstruction Toolkit.

ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
ADRA	Adventist Development and Relief Agency
AECB	Association for Environment Conscious Building
AJK	Azad Jammu Kashmir
ALNAP	Active Learning Network for Accountability and Performance in Humanitarian Action
ANSI	American National Standards Institute
BMPS	best management practices
BOD	biological oxygen demand
CAP	Consolidated Appeals Process
CEDRA	Climate Change and Environmental Degradation Risk and Adaptation Assessment
CFL	compact fluorescent lamp
CGIAR	Consultative Group on International Agricultural Research
CHAPS	Common Humanitarian Assistance Program
CIDEM	Centro de Investigación y Desarrollo de Estructuras y Materiales
CO	Country Office
CRISTAL	Community-based Risk Screening Tool – Adaptation and Livelihoods
CRS	Catholic Relief Services
CVA	community vulnerability assessment
DFID	Department for International Development
DRR	disaster risk reduction
EAWAG	Swiss Federal Institute of Aquatic Science and Technology

ECB	Emergency Capacity Building Project
EE	embodied energy
EIA	environmental impact assessment
EMMA	Emergency Market Mapping and Analysis Toolkit
EMP	environmental management plan
ENA	Environmental Needs Assessment in Post-Disaster Situations
ENCAP	Environmentally Sound Design and Management Capacity Building for Partners and Programs in Africa
EPP	environmentally preferable purchasing
ESR	Environmental Stewardship Review for Humanitarian Aid
FAO	Food and Agriculture Organization
FEAT	Flash Environmental Assessment Tool
FRAME	Framework for Assessing, Monitoring and Evaluating the Environment in Refuge Related Operations
FSC	Forest Stewardship Council
G2O2	Greening Organizational Operations
GBCI	Green Building Certification Institute
GBP	Green Building Programme
GIS	geographic information system
GRR	Green Recovery and Reconstruction
GRRT	Green Recovery and Reconstruction Toolkit
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
GWP	Global Water Partnership
HQ	headquarters
HVAC	heating, ventilation, and air conditioning
IAS	International Accreditation Service
IASC	Inter-Agency Standing Committee

IAIA	International Association for Impact Assessment
IBRD	International Bank for Reconstruction and Development
ICE	Inventory of Carbon and Energy
ICT	information and communication technology
IDA	International Development Association
IDP	internally displaced peoples
IDRC	International Development Research Centre
IFC	International Finance Corporation
IFRC	International Federation of Red Cross and Red Crescent Societies
IFMA	International Facilities Management Association
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
IRC	International Rescue Committee
ISAAC	Institute for Applied Sustainability to the Built Environment
ISDR	International Strategy for Disaster Reduction
ISO	International Standards Organization
IT	information technology
ITDG	Intermediate Technology Development Group
IUCN	International Union for the Conservation of Nature
ISWM	integrated solid waste management
IWA	International Water Association
IWMI	International Water Management Institute
IWRM	integrated water resource management
IWQA	International Water Quality Association
IWSA	International Water Supply Association

KW H	Kilowatt hour
LCA	life cycle assessment
LEDEG	Ladakh Ecological Development Group
LEED	Leadership in Energy & Environmental Design
M&E	monitoring and evaluation
MAC	Marine Aquarium Council
MDGS	Millennium Development Goals
MSC	Marine Stewardship Council
NACA	Network of Aquaculture Centers
NGO	non-governmental organization
NSF-ERS	National Science Foundation - Engineering and Research Services
NWFP	North Western Frontier Province
OCHA	Office for the Coordination of Humanitarian Affairs
PDNA	Post Disaster Needs Assessment
PEFC	Programme for the Endorsement of Forest Certification
PET	Polyethylene terephthalate
PMI	Indonesian Red Cross Society
PVC	Polyvinyl chloride
PV	photovoltaic
REA	Rapid Environmental Assessment
RIVM	Dutch National Institute for Public Health and the Environment
SC	sustainable construction
SCC	Standards Council of Canada
SEA	Strategic Environmental Impact Assessment
SIDA	Swedish International Development Agency

SKAT	Swiss Centre for Development Cooperation in Technology and Management
SL	sustainable livelihoods
SMART	Specific, Measurable, Achievable, Relevant, and Time-bound
SODIS	solar water disinfection
TRP	Tsunami Recovery Program
TSS	total suspended solids
UN	United Nations
UNDHA	United Nations Department of Humanitarian Affairs
UNDP	United Nations Development Programme
UNDRO	United Nations Disaster Relief Organization
UNEP	United Nations Environment Program
UNGM	United Nations Global Marketplace
UN-HABITAT	United Nations Human Settlements Programme
UNHCR	United Nations High Commissioner for Refugees
UNICEF	The United Nations Children's Fund
USAID	United States Agency for International Development
USAID-ESP	United States Agency for International Development- Environmental Services Program
VROM	Dutch Ministry of Spatial Planning, Housing and the Environment
WEDC	Water, Engineering, and Development Centre
WGBC	World Green Building Council
WHO	World Health Organization
WWF	World Wildlife Fund

American Red Cross

Soon after the 2004 Indian Ocean tsunami, the American Red Cross and the World Wildlife Fund (WWF) formed an innovative, five-year partnership to help ensure that the recovery efforts of the American Red Cross did not have unintended negative effects on the environment. Combining the environmental expertise of WWF with the humanitarian aid expertise of the American Red Cross, the partnership has worked across the tsunami-affected region to make sure that recovery programs include environmentally sustainable considerations, which are critical to ensuring a long-lasting recovery for communities.

The Green Recovery and Reconstruction Toolkit has been informed by our experiences in this partnership as well as over 30 international authors and experts who have contributed to its content. WWF and the American Red Cross offer the knowledge captured here in the hopes that the humanitarian and environmental communities will continue to work together to effectively incorporate environmentally sustainable solutions into disaster recovery. The development and publication of the Green Recovery and Reconstruction Toolkit was made possible with support from the American Red Cross.