

Disaster response and risk management in the fisheries sector



Cover photo:

Fishermen who lost their homes, boats and livelihoods salvage what they can from their decimated boat after the tsunami ravaged the Indian coast in December 2004. FAO/24469/A. Vitale.

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ISBN 978-92-5-105765-0

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Preparation of this document

Over the last decade, FAO has become increasingly involved in disaster response and emergency assistance to coastal communities suffering from the consequences of natural calamities such as hurricanes and floods. Based on the experience of this involvement, together with the growing number of disasters affecting the fisheries sector, it was felt that there was a need to study the characteristics of coastal communities and the specific needs of fishers, fish farmers and others involved in fisheries and aquaculture with respect to disaster response and risk management. Accordingly, in 2004, a draft document entitled “Responding to disasters in the fisheries sector” was prepared by Florence Poulain (a consultant for the Fisheries and Aquaculture Economics and Policy Division [FIE]). However, finalization of this document was interrupted by the tragedy of the tsunami in southeast Asia in December 2004.

The tsunami affected coastal communities in particular and the FAO Fisheries and Aquaculture Department (FI) were greatly involved in the disaster response. As a result of the lessons learned from this experience, the “Responding to disasters in the fisheries sector” document needed to be revisited. A revised draft document was prepared by the Fishing Technology Service (FIIT) of the Fish Products and Industry Division (FII) with the assistance of Lena Westlund, a consultant who was closely involved in the tsunami response. Support was also received from the Fisheries and Aquaculture Economics and Policy Division (FIE), the Fisheries and Aquaculture Management Division (FIM) and the Emergency Operations and Rehabilitation Division (TCE).

This revised draft was presented in a seminar on Disaster Risk Management and Response in the Fisheries Sector, organized by FI on 4 October 2006. The participants in the seminar provided many constructive comments and the draft underwent further substantial revision as a result. The final draft of the document, entitled *Disaster response and risk management in the fisheries sector*, was further reviewed by staff of FI and TCE before it was finalized in January 2007. The document should nevertheless be considered as work in progress that will be further revised and expanded as more experience is gained.

Abstract

This document gives an overview of FAO's work with regard to natural and human-induced disasters in the fisheries and aquaculture sectors, together with the lessons learned and experience gained on how to improve disaster response, preparedness and prevention in these sectors.

Over the last few decades, natural and human-induced disasters have become more frequent and increasingly destructive. Populations depending on fisheries and aquaculture for their livelihoods have become more and more vulnerable and have been seriously affected by loss of life and property. These disasters are beyond the control of the victims. Even before disaster strikes, fishing and aquaculture communities face a multitude of problems that increase their vulnerability to hazards, such as marine and industrial pollution, environmental degradation, overexploitation of natural resources, conflicts with industrial fishing operations and precarious economic situations as a result of poverty and food insecurity.

In order to provide adequate disaster response in emergency situations and to help communities to be better prepared and warned of potential threats through preventive disaster risk management (DRM), it is imperative that the particular characteristics of the fisheries and aquaculture sectors and the livelihood contexts of small-scale fishers and fish farmers and their communities be clearly understood from the technical, social and economic points of view.

Disasters cause serious disruption to communities, their governments and society as a whole. In many cases the rehabilitation and reconstruction process necessitates external assistance to guarantee return to basic livelihoods as quickly as possible. Therefore one of the main purposes of this document is to support policy- and decision-makers involved in disaster response and DRM by increasing their effectiveness in addressing the needs of fishers and coastal communities in relation to disasters. The document is divided into two parts: Part 1 describes disasters in the context of the fisheries sector and Part 2 provides recommendations. These practical recommendations are aimed at those involved in assisting fishing communities in emergency disaster rehabilitation and mitigation. It offers guidance for those working in both the fisheries sector and in emergency and disaster relief and management but who may not have pertinent information for the fisheries and aquaculture sectors.

Implementation of these guidelines and recommendations should provide the basis for good policy- and decision-making. As a resource guide, it is hoped that the publication will assist governments and those working in disaster and emergency situations to formulate plans to reduce or prevent the risks and impacts of disasters, manage disaster relief operations more effectively and steer the recovery process on to the fastest track, "building back better".

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Disaster response and risk management in the fisheries sector.

FAO Fisheries Technical Paper. No. 479. Rome, FAO. 2007. 56p.

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Acknowledgements

The authors would like to express their sincere thanks to all colleagues in FAO who contributed to the preparation of this document. We gratefully acknowledge the excellent support and suggestions received from Michael Arbuckle, Ari Gudmundsson, Helga Josupeit, Marc Nolting, Melba Reantaso, Rohana Subasinghe, Ross Shotton, Susana Siar, Jeremy Turner, Stefania Vanuccini, Grimur Valdimarsson and Rolf Willmann of the FAO Fisheries and Aquaculture Department. Jean Collins, the Fisheries Librarian, was, as usual, extremely helpful, as was the FAO Representation in the Philippines. Sylvie Wabbes provided valuable comments on behalf of the Emergency Operations and Rehabilitation Division (TCE). The authors are also grateful for the useful feedback provided by many of the participants in the seminar of 4 October 2006, notably Fernanda Guerrieri, Stephan Baas, Kisan Gunjal, Hilde Niggemann and Florence Rolle. The financial contribution to the study and this publication by the Fish Products and Industry Division (FII), the Fisheries and Aquaculture Economics and Policy Division (FIE) and TCE is also acknowledged with appreciation. Finally, we would like to thank Roberta Mitchell, Tina Farmer, Françoise Schatto and Rachel Golder for their valuable assistance in preparing the document for publication.

Acronyms and abbreviations

AAPQIS	Aquatic Animal Pathogen and Quarantine Information System
ADB	Asian Development Bank
ADRC	Asian Disaster Reduction Center
APFIC	Asia-Pacific Fishery Commission
BMPs	Better management practices
BRR	<i>Badan Rehabilitasi dan Rekonstruksi</i> (Aceh and Nias Rehabilitation and Reconstruction Agency)
CCRF	Code of Conduct for Responsible Fisheries
CFSAMs	Crop and Food Supply Assessment Missions
CIDA	Canadian International Development Agency
CONSRN	Consortium to Restore Shattered Livelihoods in Tsunami-devastated Nations
CRED	Centre for Research on the Epidemiology of Disasters
DFID	Department For International Development (Government of the United Kingdom and Northern Ireland)
DRM	Disaster risk management
EM-DAT	OFDA/CRED International Disaster Database
EMPRES	Emergency Prevention System (for Transboundary Animal and Plant Pests and Diseases)
EUS	Epizootic ulcerative syndrome
FAD	Fish aggregating device
FII	Fish Products and Industry Division (FAO)
FIIT	Fishing Technology Service (FAO)
FIVIMS	Food Insecurity and Vulnerability Information and Mapping Systems
GDP	Gross domestic product
GIEWS	Global Information and Early Warning System on Food and Agriculture
HABs	Harmful algal blooms
HIV/AIDS	Human immunodeficiency virus/acquired immunodeficiency syndrome
ICMH	International Centre for Migration and Health
IDAF	Programme for Integrated Development of Artisanal Fisheries in West Africa
IDP	Internally displaced person
IFRC	International Federation of Red Cross and Red Crescent Societies
ILO	International Labour Organisation
IMO	International Maritime Organization

IOC	Intergovernmental Oceanographic Commission
ISDR	International Strategy for Disaster Reduction
KHV	Koi herpes virus
MMAF	Ministry of Marine Affairs and Fisheries (Indonesia)
NACA	Network of Aquaculture Centers in Asia-Pacific
NGO	Non-governmental organization
OFDA	Office of United States Foreign Disaster Assistance (USAID)
PTWC	Pacific Tsunami Warning Center
SDC	Sustainable Development Commission
SEAGA	Socio-economic and Gender Analysis Programme
SIDS	Small Island Developing States
SLA	Sustainable livelihoods approach
TCE	Emergency Operations and Rehabilitation Division (FAO)
TEC	Tsunami Evaluation Coalition
UCDP	Uppsala Conflict Data Program
UN	United Nations
UNDMTS	United Nations Disaster Management Teams
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
US\$	United States dollar
VHF	Very high frequency
WFP	United Nations World Food Programme
WHO	World Health Organization

Executive summary

Over the last few decades, natural disasters have become more frequent and increasingly destructive. Populations depending on fisheries and aquaculture for their livelihoods are threatened not only by natural hazards but also by human-induced events and other developments beyond their control. The particular characteristics of the fisheries sector and the livelihood context of small-scale fishers and fish farmers and their communities need to be clearly understood in order to be able to provide adequate disaster response in an emergency situation and to help these people to be better prepared for and warned of potential future threats through preventive disaster risk management (DRM).

The purpose of this document is to help decision-makers involved in disaster response and DRM to increase their effectiveness in addressing the needs of fishers and coastal communities in relation to disasters. The document aims to provide practical recommendations for those involved in assisting fishers in emergency and rehabilitation situations and for those working in different aspects of disaster prevention and preparedness but who may have limited experience and knowledge of the fisheries and aquaculture sector. The report is moreover intended for those working in the fisheries sector and needing some guidance on disaster response and DRM in general.

A disaster is a serious disruption in the life of a community or society that causes extended losses and requires external assistance. Disaster risk is a function of a hazard, and the vulnerability and exposure of the community or society to the hazard. Disasters can be classified in three categories: *natural disasters*, *technological disasters* and *complex emergencies*. *Natural disasters* include disasters originating from hydrometeorological hazards (floods, waves and surges, storms, droughts, etc.), geological hazards (earthquakes, volcanic eruptions, etc.) and biological hazards (epidemics, insect infestations, etc.). *Technological disasters* are defined as being directly related to human activity and as a result of failure of a technology or of management, or of an accident involving machinery or infrastructure. The definition of a *complex emergency* is a humanitarian crisis resulting from military conflict and for which external assistance is needed.

Fisheries contribute to food supplies, employment and income in national and local economies. Capture fishing and aquaculture production activities provide direct employment and revenue to an estimated 38 million people worldwide. In addition, there are likely to be more than 100 million people employed in fisheries associated activities, e.g. in processing and trading. A total of 90 percent of these livelihoods are in the small-scale sector. Fish has a highly desirable nutrient profile: it provides an excellent source of quality animal protein, essential fatty acids, vitamins and minerals. The sector may also be an important source of foreign exchange earnings in many developing countries.

Most small-scale fishers and fish workers live in developing countries and often face a multitude of problems that increase their vulnerability to hazards, such as pollution, environmental degradation and overexploitation of resources, high levels of accidents and conflicts with large industrial fishing operations. Many coastal communities are also particularly vulnerable to hazards resulting from poverty and food insecurity.

Disasters affect the fisheries sector in many different ways. Natural disasters often lead to large numbers of casualties and cause tangible losses in the form of damaged and lost boats, gear, fish cages and aquaculture broodstock and other productive assets, destruction of infrastructure such as landing facilities, and loss of production, e.g. fish escaping from aquaculture ponds. Environmental damage through accidents, such as an oil spill, may cause the closing of a fishery. As opposed to sudden natural disasters, other hazards build up over time. Outbreaks of disease and other threats to farmed fish in particular cause production losses. Military conflicts, civil wars and complex emergencies are particularly difficult situations with considerable loss of human life and long recovery periods if and when a peace agreement is achieved.

Disaster response and DRM can be described as a sequence of events or phases, each requiring different and specific actions. This disaster cycle – or emergency sequence – includes three main groups of actions: i) disaster impact and needs assessment, and relief and emergency response; ii) rehabilitation, reconstruction and recovery; and iii) prevention, preparedness and early warning. Based on FAO's experience from its involvement in recent disasters, a set of recommendations has been developed for this report to provide guidance with regard to disaster response and DRM in fishing and fish farming communities.

The recommendations given below deal specifically with concerns regarding disasters in the fisheries sector, although some are also relevant in other contexts, and intend to complement existing FAO guidelines. They are directed towards those responsible for and involved in emergency assistance and DRM, i.e. governments in disaster-stricken countries and their humanitarian and development partners.

1. Availability of fish and fishery products should be included in food supply assessments and the resumption of fish production given priority in areas where fish is an important part of the diet and of the livelihood of the communities.
2. Relevant fisheries/aquaculture experts – local and international as required – should form part of assessment teams.
3. Needs assessments should take a holistic approach and a livelihood focus but the specific characteristics of the fisheries sector need to be taken into consideration in disaster response.
4. Beneficiary selection needs to be based on a good understanding of local livelihood systems and community structures and involve the target communities themselves.
5. Strategic planning for longer-term rehabilitation and recovery should be undertaken at the early stage of emergency interventions to ensure long-

term sustainability of livelihoods and natural resources at all stages of the disaster response.

6. Coordination of national and international agencies and organizations involved in disaster response needs to be ensured and appropriate budgets for supporting the responsible authorities in this task should be allocated by their humanitarian and development partners.
7. The participation of the affected households and local institutions in assessments, planning, implementation and monitoring has to be ensured for effective and efficient emergency and rehabilitation support.
8. Training and technical support is needed to ensure that assistance is sound and appropriate and technically competent humanitarian and development agencies should make such support an important component of their disaster response.
9. Needs assessments should continue on a regular basis and special attention should be given to issues related to the impact of assistance on fishery resources and the environment. These should be combined with monitoring of the effectiveness of the assistance provided and its impact on livelihoods, and lessons learned should be fed back into the ongoing activities of assistance programmes.
10. Local natural resource management and conservation capacities and capabilities should be strengthened as part of rehabilitation, reconstruction and recovery. Sustainable aquaculture practices and comanagement approaches for fisheries management should be promoted.
11. Rehabilitation, reconstruction and recovery activities should aim at building livelihoods that are better than those existing before the disaster; any contribution to “poverty traps” should be avoided.
12. The promotion of responsible and sustainable fisheries and aquaculture should be given high priority as part of disaster prevention and in addressing the vulnerabilities of fishing and fish farming communities.
13. Increased assistance should be provided to developing countries and coastal communities for improving safety at sea, particularly in coastal areas prone to natural disasters.
14. Aquaculture planning should be improved and the preparedness for dealing with disease outbreaks and other threats in the growing aquaculture subsector needs to be strengthened at the local, national, regional and global levels.
15. The fisheries sector should be explicitly included in the national disaster response and preparedness institutional set-up and form an integral part of disaster preparedness plans. Such plans should be established by disaster-prone countries and the necessary capacities and capabilities for implementing them developed.
16. The resilience of disaster-prone coastal communities should be strengthened, building on existing strengths, coping strategies and measures and local or indigenous knowledge.

17. Effective early warning systems and other mechanisms for disaster mitigation such as cyclone shelters need to be developed and/or improved, as required. These need to take the specific requirements of fishing communities into consideration, e.g. covering migratory fishers and fish workers.
18. Information on and the understanding of disasters and their impact on the livelihoods of fishing communities and their environment need to be improved. Lessons learned from disaster impact and response should be systematically analysed and used to improve future interventions and preventive work at the national and international levels.

Lessons learned from the 2004 tsunami response show that some of the main issues with regard to disaster response in the fisheries sector are related to coordination and technical support. FAO has a long experience of working closely with governments and fishing communities on a variety of development activities and is a recognized partner for technical assistance and advice. This, together with the Organization's position as a neutral United Nations agency, puts FAO in a unique position for assisting disaster-stricken governments in coordination and providing technical advice. It would therefore be desirable that donors and development partners support this role and include funding for support to coordination and technical assistance as part of their response to disasters.

Introduction

BACKGROUND

Over the last few decades, natural disasters have become more frequent and increasingly destructive. More than 2 million people have been killed in the last 30 years and 255 million people on average were affected by natural disasters globally, from 1994 to 2003 (Guha-Sapir, Hargitt and Hoyois, 2004). Combined with increased vulnerabilities resulting from changing socio-economic, technological and demographic conditions, both natural and human-induced disasters continue to threaten populations all over the world, jeopardizing the sustainable development of developing countries (ISDR, 2005).

Responding to the needs of populations suffering from the impact of natural disasters, FAO has expanded its activities in the area of emergency and rehabilitation assistance. Most of these activities concern agriculture but there are also a number of interventions addressing needs in the fisheries and aquaculture sector. For example, over the last few years, assistance has been provided to victims of Hurricane Ivan, which hit several countries in the Caribbean (including Jamaica, Grenada, the Bahamas, and Saint Vincent and the Grenadines) in the early autumn of 2004; the tsunami on 26 December 2004, which affected countries on several continents; Typhoon Gloria in the Philippines (2002); the floods and Eline and Dera cyclones in Mozambique (2000); and the floods in Viet Nam (2000 and 2002) and in Bangladesh (1998).

Populations depending on fisheries and aquaculture for their livelihoods are threatened not only by natural hazards but also by human-induced events and developments beyond their control. Most small-scale fishers and fish workers live in developing countries and they often face a multitude of problems that increase their vulnerability to hazards, such as pollution, environmental degradation, overexploitation of resources, high levels of accidents at sea and conflicts with industrial fishing operations. Many coastal communities are also particularly vulnerable to hazards resulting from poverty and food insecurity. The particular characteristics of the fisheries sector and the livelihood context of small-scale fishers and fish farmers and their communities need to be clearly understood in order to be able to provide adequate disaster response in an emergency situation and to help these people to be better prepared for and warned of potential future threats through preventive disaster risk management (DRM).

PURPOSE AND STRUCTURE OF THIS REPORT

The purpose of this document is to help decision-makers involved in disaster response and DRM to increase their effectiveness in addressing the needs of fishers

and coastal communities in relation to disasters. The document aims to provide practical recommendations for those involved in assisting fishers in emergency and rehabilitation situations and for those working in different areas of disaster prevention and preparedness but who may have limited experience and knowledge of the fisheries and aquaculture sector. The report is moreover intended for those working in the fisheries sector needing some guidance on disaster response and DRM in general. By providing examples of the effects of disasters on the fisheries and aquaculture sector, the document also intends to increase awareness of the vulnerability of small-scale fishers and fish workers to natural and human-induced hazards.

The report is based on FAO's experience of emergency and rehabilitation interventions but also provides examples of disaster impact outside the scope of the Organization's work in order to give a more complete and broader sectoral overview. It does not intend to be a guide for disaster response in general – reference is made to other publications in this regard – but points to some important aspects of disasters that are specific to fisheries and aquaculture. Focus is given to lessons learned from the response to the 2004 tsunami in Southeast Asia, since this was a major recent disaster that affected the fisheries sector and attracted an unprecedented amount of funding for relief and rehabilitation.

In line with FAO's overall focus on development in rural areas, the document is mainly concerned with the small-scale fisheries¹ sector in developing countries. The terms “fisheries” and the “fisheries sector” refer to both capture fisheries and aquaculture, as well as to their upstream and downstream activities, unless otherwise specified.

The document is divided into two parts. Part I gives background information, starting with a chapter on the definitions of the terminology and concepts relevant to disasters, together with examples of different types of disasters impacting on the fisheries sector. It also discusses fisheries sector characteristics and gives an overview of the vulnerability context common to many coastal communities. In Part II, recommendations for disaster response and DRM in the fisheries sector are presented. These recommendations are discussed within the framework of FAO's role and experiences from recent emergencies, development activities and policy work. The report concludes with some remarks underlining the main concerns with regard to disasters and the fisheries sector.

The document should be considered as work in progress that will need to be revised and expanded as more experience is gained.

¹ The small-scale fisheries sector is not homogenous across regions and countries and no unanimous definition exists. It is generally a dynamic and evolving sector and is usually labour intensive, expending relatively small amounts of capital and energy. Small-scale fishers use small vessels and often fish inshore for local and domestic markets although export-oriented production has increased significantly over the last two decades (FAO, 2005a and FAO Fisheries and Aquaculture Department Glossary at <http://www.fao.org/fi/glossary/default.asp>).

PART I

**Disasters and the fisheries
sector: the context**

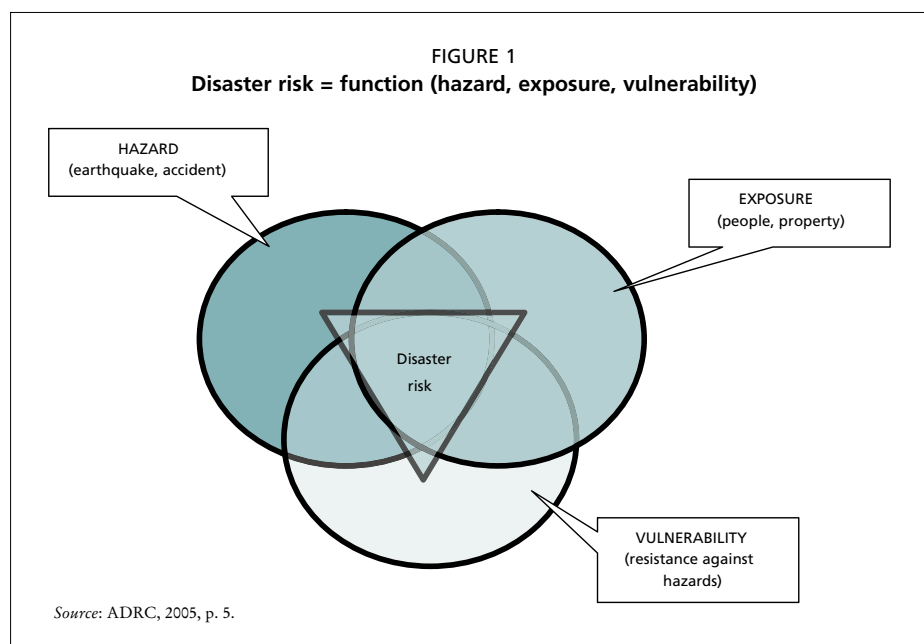
Concepts and terminology of disasters

DISASTERS AND DISASTER RISK

A *disaster* is “the occurrence of a sudden or major misfortune which disrupts the basic fabric and normal functioning of a society (or a community). An event or a series of events which give rise to casualties and/or damage or loss of property, infrastructure, essential services or means of livelihood on a scale which is beyond the normal capacity of the affected communities to cope with unaided” (FAO, 1998). Natural phenomena, such as earthquakes, floods and cyclones – referred to as *natural hazards* – are not disasters in themselves. A natural or other hazard only becomes a disaster when people are affected or costs are incurred.

An *emergency* is “an extraordinary situation in which people are unable to meet their basic survival needs, or there are serious and immediate threats to human life and well-being” (FAO, 1998). A disaster does not always lead to an emergency. It depends on the gravity of its consequences and the coping capacity of the country and people affected.

The *disaster* – and *emergency* – *risk* is a function of *exposure*, such as people and property, and *vulnerability* to the hazard (see Figure 1).



Vulnerability is defined as “a condition resulting from physical, social, economic and environmental factors or processes, which increases the susceptibility of a community to the impact of a hazard” (ADRC, 2005, p. 5). Poverty is a main cause of vulnerability in many parts of the world and there is a clear link between disaster risk and development. Over the last decade, an average of 44 people were killed per natural disaster in countries with a high human development index (United Nations Development Programme Human Development Index), while the average death toll in countries with a low index was 300 people per event (FAO, 2005b).

To reduce disaster risk, it is important to reduce exposure, i.e. keep people as far away from the hazard as possible and minimize the level of vulnerability. This can be achieved by removing the underlying causes of the vulnerability through, for example, poverty alleviation (ADRC, 2005). Vulnerability and exposure can also be reduced by preparedness and early warning mechanisms.

TYPES OF DISASTERS

Disasters may occur suddenly or they may develop over time. Natural events such as earthquakes and cyclones are often rapid onset disasters. Disasters caused by the spread of an animal pest or disease, or the degradation of a political situation leading to conflict, are likely to develop over time. There are also situations where several types of disasters are combined, or where one disaster leads to, or replaces, another. Moreover, in some cases, what may appear to be triggered by natural hazards is in fact a result of human activity. For example, serious soil erosion in a river catchment area, caused by deforestation and land degradation, may generate heavy soil sedimentation and result in flooding and subsequent disaster. Inappropriate health management in aquaculture could cause a disease outbreak, resulting in the mass mortality of farmed organisms (fish, shrimp, shellfish, etc.) and threats to human health.

The Centre for Research on the Epidemiology of Disasters (CRED) maintains a database on disasters together with the United States Agency for International Development (USAID) Office of Foreign Disaster Assistance (OFDA): the International Disasters Database (EM-DAT). Generally, disasters are classified in three categories: *natural disasters*, *technological disasters* and *complex emergencies*.

Natural disasters

Natural disasters include disasters originating from hydrometeorological hazards (floods, waves and surges, storms, droughts, etc.), geological hazards (earthquakes, volcanic eruptions, etc.) and biological hazards (epidemics, insect infestations, etc.). According to EM-DAT, 305 and 360 natural disasters incurred in 2004 and 2005, respectively. A total of 336 500 people were reported to have been killed by natural disasters in the two years and more than 300 million people were affected. Besides the two major events – the southeast Asian tsunami in December 2004 and the earthquake in Pakistan in October 2005 – floods were the main cause



FISHERIES DIVISION, MINISTRY OF AGRICULTURE, JAMAICA

Damage by Hurricane Ivan, Rae Town fishing beach, Kingston Town, Jamaica (2004)

of the disasters. The total costs of natural disasters in 2005, including the damage caused by Hurricane Katrina in August 2005, have been estimated at over US\$150 billion (EM-DAT, 2005).²

Although data specific to fisheries are not available in the international statistics – the numbers quoted above are global cross-sectoral values – it is evident that the fisheries sector is particularly prone to disasters of a *hydrometeorological* nature such as storms and floods because most fishing and fish farming takes place in coastal areas with a relatively high exposure to these hazards. Cyclones, hurricanes and typhoons³ are among the most destructive natural phenomena and are often combined with floods and tidal waves.

The year 2004 was disastrous with regard to hurricanes in the Caribbean; close to 3 000 people died and some 1 million were affected (EM-DAT, 2006) (see Box 1). In Box 2, details of Typhoon Gloria hitting the Philippines in 2002 are given. Floods also affected fishing communities in, for example, Viet Nam in 2000 and 2002, Mozambique – in combination with the Eline and Dera cyclones – in 2000 and Bangladesh in 1998.

In the aquaculture sector, hydrometeorological conditions such as storms, superchills⁴ and frost can cause significant loss of fish and hence financial implications as well as potential unemployment. In the winter of 2002/2003, large numbers of fish were killed on fish farms in eastern Canada and Maine (United States) through superchill and ice drifts (Perry, 2003).

² The international insurance company Munich Re reports a total of 650 loss events caused by natural disasters in 2005, amounting to a total cost of US\$210 billion, reportedly a new record. About half of the recorded loss events were windstorms (Munich Re Group, 2005).

³ Cyclone is the name given to a tropical revolving storm occurring in the Indian Ocean, Arabian Sea or Bay of Bengal. A hurricane is the name given to the same storm in the West Indies or off the American seaboard and typhoon is the name given to the same storm in the Western Pacific (Yadava, Turner and Calvert, 2000).

⁴ The seawater temperature falls below 0°C.

BOX 1

Hurricanes in the Caribbean in 2004

The Atlantic hurricane season of 2004 was well above average with regard to activity and included 15 named storms. It officially started on 1 June and lasted until 30 November and was one of the deadliest and most costly seasons ever recorded. The four hurricanes, Charley, Frances, Ivan and Jeanne, were particularly damaging. Jeanne killed some 2 750 people in Haiti in September and, together with Frances, also hit the Bahamas while Ivan wreaked havoc in the Cayman Islands, Grenada, Jamaica, and Saint Vincent and the Grenadines. Charley caused serious damage in Cuba. All four storms also hit Florida in the United States.

In Grenada, most of the 110 000 inhabitants were affected, to a greater or lesser extent, by Hurricane Ivan and 39 people were killed. About half of the population became homeless as the hurricane destroyed some 90 percent of all houses. The fisheries sector, constituting an important part of the island's economy and employing 2 500 fulltime fishers as well as a number of fish vendors and exporters, was badly affected. Of a total fleet of 760 fishing vessels measuring 4-20 m, 21 were lost and 120 damaged. Fishing gear and safety equipment were also lost or damaged as well as important infrastructure, e.g. a fishers' communication network that operated with the coastguard for vessel monitoring and safety at sea. The hurricane affected the livelihoods of some 2 200 people who were directly or indirectly dependent on the fisheries sector.

Sources: Wikipedia, 2006; EM-DAT, 2006; FAO, 2004c; FAO, 2004d.

One recent example of a *geological* disaster severely affecting coastal communities on several continents is the tsunami of 26 December 2004. Fishing and coastal communities, as well as other livelihood groups, were severely impacted, notably in India, Indonesia, Malaysia, Maldives, Myanmar, Seychelles, Somalia, Sri Lanka, Thailand and Yemen. It is estimated that over 200 000 people lost their lives, although the exact number will never be known. Millions of people were affected economically, losing their livelihood assets and income sources. The tsunami was triggered by another geological hazard: the earthquake in the Indian Ocean. Some areas already affected by the first earthquake and the tsunami suffered from subsequent earthquakes (e.g. Nias Island, Indonesia). In July 2006, the Indonesian island of Java suffered another combined earthquake and tsunami disaster with hundreds of casualties.

Biological hazards affecting the fisheries sector include disease outbreaks, particularly in fish and shellfish farms, and phytoplankton and jellyfish occurrences. These can cause significant economic losses and impacts on the livelihoods of fish farmers. ADB/NACA⁵ (1991) estimated the value of lost farm production to

⁵ Asian Development Bank (ADB) and Network of Aquaculture Centers in Asia-Pacific (NACA).

BOX 2

Typhoon Gloria in the Philippines

In July 2002, Typhoon Gloria (also called Chata'an) struck 19 provinces across the Philippines and brought rains that flooded large parts of several regions. A total of 700 000 people were affected and 74 casualties, including 33 deaths, were reported. In the two regions of Central Luzon and Ilocos, which are regularly hit by typhoons, the 2002 windstorm was particularly strong and caused considerable loss of crops, livestock and fish. Damage to these sectors was estimated at US\$6.4 million. Tarlac, Pampanga and Bulacan in Central Luzon and Pangasinan in northern Luzon (Ilocos) were the provinces most affected.

The typhoon affected a total of almost 6 000 ha of fish ponds in the four provinces. Worst affected was the province of Pampanga with almost 2 500 ha of ponds damaged. The total cost of the damage to the fisheries sector in all four provinces was estimated at US\$4.4 million. Many small-scale fish farmers were affected, losing ongoing fish production in their ponds and suffering damage to ponds and infrastructure. An estimated 7 000 fish farmers were affected and between 2 000 and 3 000 tonnes of fish were probably lost.

Sources: EM-DAT, 2006; FAO, 2003.

fish diseases in 15 developing Asian countries to be US\$1.36 billion in 1990. This included diseases such as epizootic ulcerative syndrome (EUS), penaeid shrimp diseases and a variety of other diseases causing losses in freshwater finfish pond culture and marine cage culture of finfish. Aquaculture – in particular marine cage culture – can also be affected by jellyfish and phytoplankton. If the phytoplankton produces toxins, harmful algal blooms (HABs) may result. Some of the toxins produced are harmful to consumers of shellfish. Non-harmful toxins can also kill fish because of the low oxygen conditions the bloom creates (FRS, 2006).

Technological disasters

Technological disasters are defined as being directly related to human activity and to the failure of a technology or accident involving machinery or infrastructure. EM-DAT includes industrial accidents (chemical spills, collapses of industrial infrastructure, explosions, fires, radiation, etc.), transport accidents (air, rail, road or water) and other miscellaneous accidents (collapses of domestic/non-industrial structures, explosions, fires, etc.) in this category.

The human casualties of technological disasters are fewer than those of natural disasters. According to EM-DAT, close to 66 000 people were killed and some 951 000 affected by technological disasters in the period 2000–2005 (EM-DAT, 2006). However, in addition to the direct impact on people, technological disasters can have significant effects on the environment through the pollution of air and

BOX 3

Oil spills – the Exxon Valdez incident in Alaska

In the early spring of 1989, the Exxon Valdez supertanker struck a reef in the Prince Edward Sound in south central Alaska and 40 million litres of oil spilled. The accident is the largest oil spill in United States history and obviously caused widespread ecological damage throughout the region. It also had significant social and psychological consequences for the human population of the area.

The south central Alaskan fishing economy is based on five main product groups: Pacific salmon, shellfish, Pacific herring, Pacific halibut and groundfish. The total catch in 1988 was 240 000 tonnes for a value of US\$393 million. After the accident, the government closed several fisheries for the whole of 1989 because of contamination. Others were closed for a limited time until the risk of contact with the oil had decreased.

While the costs of the accident were enormous – research funded by the state of Alaska estimated total damage to the natural environment at US\$3 billion – the spill generated income for the inhabitants of the area. Local residents were employed in the clean-up operations and local fishing boats were rented for transport. The remuneration paid to local communities for these services far exceeded the economic losses to fisheries; for example, the total wages paid in the community of Valdez increased by almost 300 percent in the summer after the accident compared with 1988. Exxon has also paid financial compensation to many residents although the amounts of these settlements are confidential and several claim cases had still not been settled in 2006, 17 years after the accident.

In spite of the immediate economic boom generated by the oil spill, it had negative psychological, social and cultural impacts. The money itself created considerable friction and there was a decline in traditional social relations and health status; a decrease in subsistence production; increased drinking, drug abuse and domestic violence; and increased post-traumatic stress, anxiety disorders and depression. Native people suffered disproportionately and their subsistence ways of life were seriously disturbed when important foods such as salmon, harbour seals, herring, crabs and clams became scarce or were poisoned because of the spill. It has also been noted that the economic climate in south central Alaska deteriorated significantly after a few years although the extent to which the oil spill may have influenced this development remains to be determined.

Sources: Cohen, 1995, Davis, 1996; Environment Economics, 2006; Eyak Preservation Council, 2005.

water. Effects may also be long-lasting; the International Federation of Red Cross and Red Crescent Societies (IFRC) was still providing support in 2001 to victims of the Chernobyl nuclear reactor explosion in 1986 (IFRC, 2006). Over a decade after the Exxon Valdez oil spill in Alaska in 1989, the affected sea bird populations were still showing signs of recovery (New Scientist, 2001). For the fisheries industry, oil spills caused by transport accidents are of particular danger because of the direct and potential longer-term effects on the environment (see Box 3).

BOX 4

Complex emergencies

The official definition of a complex emergency is “a humanitarian crisis in a country, region or society where there is total or considerable breakdown of authority resulting from internal or external conflict and which requires an international response that goes beyond the mandate or capacity of any single agency and/or the ongoing United Nations country programme”.

Complex emergencies are typically characterized by:

- extensive violence and loss of life; massive displacements of people; widespread damage to societies and economies;
- the need for large-scale, multifaceted humanitarian assistance;
- the hindrance or prevention of humanitarian assistance by political and military constraints;
- significant security risks for humanitarian relief workers in some areas.

Source: Section C. What is a complex emergency? (OCHA, 1999).

Fishing is considered the world’s most dangerous professional occupation and it is estimated that there are more than 24 000 deaths per year (ICSF, 2001). The reasons for these casualties include capsizing, foundering, fires or explosions and collisions (Petursdottir, Hannibalsson and Turner, 2001). In recent years, one type of collision that has become increasingly frequent in coastal communities in developing countries is that between local, small-scale fishing craft and larger vessels, especially industrial trawlers fishing for shrimp and fish in shallow waters. This issue is further discussed in the section on vulnerability (see p. 17).

Complex emergencies

In the period between 1989 and 2003, 121 armed conflicts were reported in the world (UCDP, 2005). The striking similarities among current conflicts are that most of them occur in poor countries. Almost all are civil wars and the majority of victims are civilians, not combatants. In today’s wars, typically over 90 percent of the victims are civilians (OCHA, 1999). When a conflict leads to a humanitarian crisis, the situation is defined as a complex emergency (see Box 4). Such a situation can be further aggravated by a natural disaster as, for example, recently in the Sudan (see Box 9 in Part II).

Wars leave people without homes, food or sources of income and often cause massive displacement. Fishing communities are no exception to this, especially as conflicts over natural resources such as land and water are spreading. In Box 5, an account is given of the impact of the long-lasting civil war on fishing communities in Sierra Leone. The situation in the Democratic Republic of the Congo is a more recent example of a complex emergency involving fisheries. Wars can also have a direct impact on fishery resources and the environment as was noted with regard

BOX 5

Civil war and fisheries in Sierra Leone

Continued civil strife, lasting for more than ten years from 1991 to 2002, caused massive displacement of fishers to safe locations, leaving behind their belongings, including boats and fishing gear. Fishing equipment, smoking ovens and houses were also looted, which impacted negatively on the livelihoods of fishers and rendered them more vulnerable to food insecurity. During the invasion of Freetown in early 1999, the Ministry of Fisheries and Marine Resources wing at Kissy dockyard was destroyed and all vehicles were stolen. The Ministry, which caters for the artisanal fisheries sector, had all its warehouses, offices, workshops and outboard engines plundered and vandalized. The lack of vehicles and outboard engines weakened the capacity of the Ministry to reach the fishing communities and to provide the required extension services.

This disruption of fishing activities caused a sharp decline in fish supplies to local markets. The short supply of fish, which used to be the cheapest source of animal protein, caused prices to rise to a level that many poor people could not afford. As a result, protein intake of the poor population declined, causing a rise in malnutrition. Nutrition surveys carried out by United Nations (UN) agencies and non-governmental organizations (NGOs) indicated a deteriorating nutritional situation, particularly among women and children. High disease and mortality rates among children were attributed to chronic malnutrition, especially resulting from inadequate animal protein intake.

Source: FAO, no date (a).

to the Kuwaiti prawn fishery after the Gulf War. The oil pollution during the war appears to have had a long-term negative impact on the productivity of the prawn stocks. Landings of finfish in relation to prawn catches increased in the postwar period compared with before the war. This may indicate that the war changed the fishery ecosystem structure in Kuwaiti waters (Chen and Ye, 2003).

Fisheries sector characteristics and vulnerability context

FISHERS AND FISH WORKERS

In 2002, capture fishing and aquaculture production activities provided direct employment and revenue for an estimated 38 million people worldwide. In addition, there are likely to be more than 100 million people employed in fisheries associated activities, e.g. in processing and trading (FAO, 2005a). A wide diversity of stakeholders is involved in the sector, ranging from wealthy investors in capital-intensive production and processing units to subsistence fishers. Division of labour often occurs on a gender basis, with men fishing and women processing and trading although this division is not always strict and may depend on cultural and religious traditions. In aquaculture, fish feeding and pond management are often the responsibility of women, particularly in Asia. Women and children may also be involved in small-scale fishing and men in processing and trade activities.

While employment in fishing has been declining for several years in industrialized countries, it has grown in many developing countries. An estimated 90 percent of the 38 million people employed globally in the sector are small-scale fishers and operators. The highest numbers of fishers and aquaculture workers are in Asia, i.e. 87 percent of the world total (FAO, 2004a). Most of these people work in small-scale artisanal or subsistence activities to provide nourishment for their families and communities. In small island developing states (SIDS),⁶ a high percentage of the total economically active population is employed in fisheries.

There are a large number of subsistence fishers or rural dwellers involved in seasonal and occasional fisheries activities, particularly in Asia and Africa, who are not recorded in official statistics. It is thus likely that there are many more people directly dependent on fisheries for a significant part of their livelihood than reported. Moreover, for poor households in coastal communities in many developing countries the fisheries sector often provides a kind of safety net in situations where access to other capital and production factors is limited. If access

⁶ SIDS, i.e. small island states and low-lying coastal countries, were identified as a special group of developing countries in the 1992 Earth Summit and include the following 40 FAO Members: Antigua and Barbuda, the Bahamas, Bahrain, Barbados, Belize, Cape Verde, the Comoros, the Cook Islands, Cuba, Cyprus, Dominica, Dominican Republic, Fiji, Grenada, Guinea-Bissau, Guyana, Haiti, Jamaica, Kiribati, Maldives, Malta, the Marshall Islands, Mauritius, the Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Sao Tome et Principe, Seychelles, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Solomon Islands, Suriname, Tonga, Trinidad and Tobago, Tuvalu, Vanuatu (FAO, 2004b).

*Women fish traders
in Nouakchott
fish market,
Mauritania*



L. WESTLUND

to fishing grounds is relatively free, poor people may rely on these local common resources to sustain their livelihoods (see Box 6) (FAO, 2005a).

It should also be noted that while the livelihoods of coastal community households may be centred around fishing and fish farming, other income-generating and subsistence activities can also play important roles, e.g. tourism, homestead farming and other agricultural production, including livestock. These cross-sectoral linkages are not always fully recognized.

SOURCE OF FOOD AND INCOME

Fish contributes substantially to the world food supply, either directly for human consumption or as feed for livestock and in aquaculture production. In 2004, 75 percent of the 140.5 million tonnes of fish produced globally were used for direct human consumption and 25 percent for non-food products, including animal feed (FAO, 2006b). The apparent total per capita food fish supply was estimated to be 16.6 kg (live weight equivalent).⁷

Fish has a highly desirable nutrient profile and provides an excellent source of quality animal protein. The role of fish in the world's protein supply has increased, providing 15.5 percent of total animal protein supplies in 2003. Worldwide, it is estimated that fish provides at least 30 percent of the animal protein intake of 1 billion people and that about 56 percent of the world's population derives at least 20 percent of their animal protein from fish. Fish proteins are particularly critical in the diets of some densely populated countries where the total protein intake level may be low. Fish contributes about 50 percent of total animal protein in Bangladesh, Cambodia, Equatorial Guinea, the Gambia, Ghana, Guinea,

⁷ 13.5 kg if excluding China.

BOX 6

Fisheries as a safety net for the poor

While small-scale fisheries contribute to poverty reduction by providing employment for a large number of established fishers and fish workers, they probably play an even more important role in poverty prevention. There is evidence suggesting that, in many developing countries, fishing and associated activities may not generate high incomes for the households involved, but rather help them to sustain their livelihoods and stop them from falling deeper into poverty. If access to fishing grounds is relatively free and access to other capital (e.g. finance through credit) and production factors (e.g. land) is restricted, poor people are more likely to turn to the common fishery resources for their livelihoods. Moreover, in a situation where the normal means of income generation have been disrupted, e.g. the household head has lost his or her job or in a more widespread disaster situation, fishing may provide a safety net function also for vulnerable population groups who were not previously poor.

These poverty prevention mechanisms are socially important, providing a “welfare” system that may not be available otherwise, although perhaps less attractive from an economic point of view. The open access regime, which is the basis for the system to function, also raises other important questions. Many fishery resources suffer from high fishing pressure and there are arguments for controlling access to ensure the sustainability of these resources and their ability to provide livelihoods for coastal populations and small-scale fishers in the longer term. The trade-off between critical *poverty prevention* and sustainable longer-term *poverty reduction* is a political dilemma that requires further thought and attention.

Source: FAO, 2005a.

Indonesia, Japan, Myanmar, Sierra Leone and Sri Lanka (FAO, 2006c). With regard to SIDS, fish is particularly important for its protein, essential fatty acids, vitamins and minerals and as a contribution to food supplies in general.

The fisheries sector typically contributes 0.5–2.5 percent of national gross domestic products (GDPs), although it may be more in some countries where it constitutes a key economic sector, e.g. in SIDS (FAO, 2005a). Fisheries in many countries are an important source of foreign exchange. World exports of fish and fishery products increased to US\$71.5 billion (export value) in 2004, representing a 23 percent growth since 2000. In quantity (live weight equivalent), exports are reported to be around 53 million tonnes. In 2004, the share of developing countries in fish exports was 48 percent in value and 57 percent in quantity terms.

VULNERABILITY OF SMALL-SCALE FISHING COMMUNITIES

The level of vulnerability is decided by the sensitivity of a household or a community to a certain hazard risk and their adaptive capacity to deal with the risk. As explained at the beginning of the previous chapter, poor people tend to

be more vulnerable than non-poor, but also within a given environment some groups may be more vulnerable than others because of the nature of the livelihood activities on which they depend (FAO, 2005a).

In many developing countries, fishing communities situated in low-lying coastal areas are exposed to a number of natural hazards and are consequently most vulnerable. Although boat and gear owners and traders may be among the wealthier members of a community, income from fishing is uncertain and seasonal. Fishers are highly dependent on fishing for their livelihood with little possibility of finding alternative employment. Their access to land is generally limited and their assets, in the form of boats and gear, are more exposed to natural hazards and hence more easily lost than land-based property. Aquaculture ponds and infrastructure are also often situated in areas exposed to windstorms, floods and other hydrometeorological hazards. Moreover, they may rely on water resources shared with other users and as a consequence there is exposure to pollution and damage caused by these users (such as industry, agriculture, tourism and transport). Small-scale operators usually have only limited market power and are in many cases price takers sensitive to fluctuations in international prices of fish and production inputs. Fish is a highly perishable product that needs to be sold and consumed quickly. In areas with limited suitable storage, processing facilities and means of transport, small-scale fishers are in a weak marketing position.

Fishing is a high-risk profession and safety at sea is often substandard in the small-scale sector. Small-scale fishers are the weaker party in conflicts with other users, such as industrial trawlers trespassing on inshore fishing grounds, and may be pushed to take additional risks in order to fish. In a study undertaken by the Programme for Integrated Development of Artisanal Fisheries in West Africa (IDAF) in seven West African countries from 1991 to 1994, incidents with industrial vessels getting their trawls entangled in fishing nets and dragging them away while canoes were fishing were among the main accidents at sea (IDAF, 1995). During the study period, 518 accidents were reported, 340 people were killed and 285 injured. In Mauritania, Senegal, the Gambia, Guinea and Sierra Leone where fishing takes place in open waters, 35 percent of accidents were caused by entanglement and dragging of gear involving trawlers.

In these situations, and also because illegal industrial fishing depletes resources near the shore, small craft may seek alternative fishing grounds further offshore where nets can be set safely away from the trawlers that would otherwise destroy the gear. These grounds may however be less well known and have different weather and sea conditions and hence constitute increased risks in other respects. Many countries have regulations protecting small-scale fisheries and trawlers are not allowed to fish in inshore areas. However, in many cases the regulations are not enforced and trawlers are still to be found in the area reserved for smaller craft.

Similarly, coastal fish farmers (practising cage culture) are increasingly confronted with other resource users that place demands on the same water area. This often leads to conflicts and sometimes fish farming activities are forced to

move from coastal areas to further offshore. The exposure of fish cages to natural hazards (storms, large waves, etc.) is much higher; hence risks increase significantly for these fish farming communities.

Fishers are dependent on the sustainability of fishery resources and are thus sensitive to threats to the resource base. Available data show that a large number of fish stocks are overfished (see Box 7). In earlier times, small-scale fisheries generally represented localized activities, using selective gear and techniques, and governed by traditional management systems. Their impact on fishery resources resembled that of natural predation and did not constitute a threat to the longer-term sustainability of the resource. Today, with the increased international demand for fish, overfishing occurs in both small- and large-scale fisheries. Small-scale fisheries are increasingly fishing for commercial purposes and export, rather than being a subsistence activity, and they compete for resources with industrial fishing. Most small-scale fisheries are located in developing countries and are poorly regulated. Unsustainable fishing practices also exist in the small-scale fisheries sector, e.g. the use of explosives and poisons or destructive gear (Drammeh, 2000). Moreover, climatic changes, environmental degradation and damage to habitats caused by activities outside the fisheries sector (e.g. pollution from industry or agriculture) are other factors adding to the uncertain conditions in which many small-scale fishers operate.

In many coastal communities, access to financial credit and insurance is restricted. The communities are also often poorly served by roads and other infrastructure, as well as by social services (FAO, no date [a]). Access to education and health services is commonly of particular concern to migrant fishers and their families. Epidemics such as HIV/AIDS form part of the vulnerability context of many coastal communities in developing countries. Globally, an estimated 38.6 million people were living with HIV in 2005; 24.5 million live in sub-Saharan Africa and the links between ill-health and poverty are well known (UNAIDS,



Pens for rearing fish in Thailand

BOX 7

Overfishing and the global status of fish stocks

Over the last few decades, the world's fishery resources have been increasingly subjected to overexploitation, detrimental fishing practices and environmental degradation. About a quarter of the marine stocks monitored by FAO (441 fish stocks representing 80 percent of the total global marine catch) were overexploited, depleted or recovering from depletion in 2003. Half of the stocks were considered fully exploited and only a quarter could perhaps produce more. The western and eastern Central Atlantic, northwest Atlantic, western Indian Ocean and northwest Pacific are the areas with the highest proportions (69–77 percent) of fully exploited stocks. The southeast Atlantic, southwest Pacific, northeast Atlantic and – for tuna and tuna-like species – Oceanic areas of the Atlantic and Indian Ocean have the largest share (46–60 percent) of overexploited, depleted and recovering stocks. However, there appears to be a levelling off in the increase of overexploited stocks at the global level and the proportion of overexploited, depleted and recovering stocks has not increased during the last few years as it did steadily from 1950 to the mid-1990s. While this is a positive sign, it is still a weak trend and many stocks need to be monitored and managed judiciously to ensure sustainability.

It should be noted that information about the conditions of many small-scale inshore fisheries is unfortunately not always available and the status of these stocks is therefore not monitored. Data on inland fisheries are also generally poor but there are indications that many coastal, lake and river resources suffer from unsustainable fishing activities and the threat of habitat degradation.

Sources: FAO, 2004a; FAO, 2005c.

2006). Recent studies show that fishers in developing countries frequently suffer from HIV prevalence rates many times higher than those of the general population (FAO, no date [b]) (see Box 8).

SUMMARY OF DISASTER IMPACTS ON THE FISHERIES SECTOR

Disasters affect the fisheries sector in many different ways. The loss of lives is the most dramatic impact, affecting not only surviving household members but also potentially upsetting economic and social activities and systems outside the immediate family. Natural disasters that strike suddenly without warning can cause tangible losses in the form of damaged and lost boats, gear, fish cages, aquaculture broodstock and other productive assets; destruction of infrastructure such as landing and fish processing facilities; and loss of production, for example, fish escaping from aquaculture ponds. The longer-term effects may also be considerable but sometimes difficult to appreciate, especially since the immediate impact is overwhelmingly visible.

As opposed to sudden natural disasters, other hazards build up over time and it may even be difficult to decide on the exact time when a certain event became

BOX 8

HIV/AIDS in fishing communities on Lake Victoria

The impact of the HIV/AIDS epidemic in Africa was first noted in a fishing village on Lake Victoria in Uganda in 1982. The rate of HIV/AIDS in fishing villages throughout the African Great Lakes region is believed to be consistently higher than in the surrounding agricultural areas and as much as five to ten times higher than those in the general population. Fishers in fishing villages around Lake Victoria in Kenya, the United Republic of Tanzania and Uganda are five times more likely to die in AIDS-related diseases than farmers in the region. It is believed that seroprevalence levels may have reached 30–70 percent in the late 1990s.

HIV prevalence levels of women working in fishing villages are not known but could be even higher than those of men considering women's vulnerability as a result of their subordinate economic and social position. Women also begin their sexual life earlier than men and lack negotiating powers on safe sex practices. Many women residing on the shores of Lake Victoria have few livelihood options. The restructuring of the distribution and marketing chain has meant that more fish (Nile perch) is now transported directly from the beach by lorries for processing and export. The fish smoking that women used to be involved in is now less common.

The impact of HIV/AIDS on individual fishers and fish workers includes job loss, stigmatization and isolation. Fishing households with infected family members suffer reduced incomes and may have to spend their savings on medical care. Productive assets may have to be sold, children withdrawn from school and poorer diets adopted.

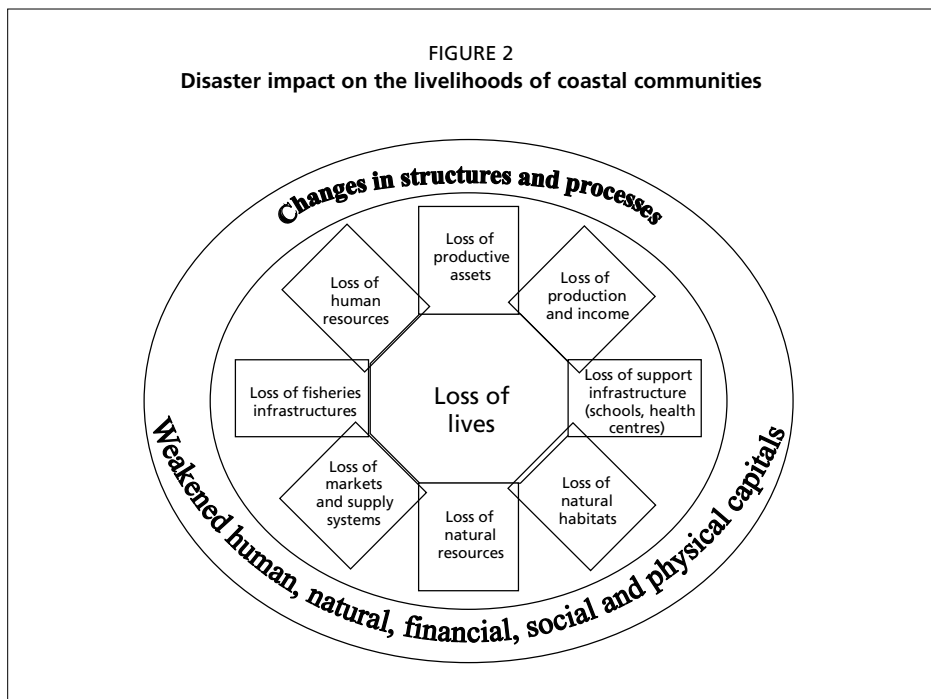
Sources: FAO, no date [b]; Bishop-Sambrook and Tanzarn, 2003.

a disaster. Disease outbreaks and other threats to farmed fish in particular cause loss of production. These losses have direct consequences on the incomes of the affected communities that in turn may influence other aspects of their livelihoods such as employment, health and education.

Environmental damage through accidents, such as an oil spill, may result in the closing of a fishery. In some cases, alternative job opportunities may be created but changes in lifestyle may be difficult to deal with and the social and cultural patterns of affected communities may be influenced.

Military conflicts, civil wars and complex emergencies in particular are especially difficult situations with considerable loss of human life and long recovery periods if and when a peace agreement is achieved.

The longer-term effects of a disaster are not only created by the disaster itself but also influenced by the response to the disaster – by the affected populations themselves, their government and other organizations providing assistance. The event, its impact and the damage caused as well as the response form an intricate pattern of causes and effects influencing the lives and livelihoods of the affected coastal communities both in the short and long term. Figure 2 gives a schematic



overview on how disasters can impact coastal communities, relating the effects to a sustainable livelihoods approach (SLA).⁸

⁸ For more information on SLA, see, for example, the United Kingdom Government Department For International Development (DFID) guidance sheets at the sustainable livelihoods Web site http://www.livelihoods.org/info/guidance_sheets_pdfs

PART II

**Recommendations for disaster
response and risk management
in fisheries**

The disaster sequence

As seen from the review in Part I, the fisheries sector is increasingly a victim of disasters. The specific characteristics and requirements of the sector – and in particular of small-scale fishers, fish farmers and fish workers – need to be understood and taken into consideration to ensure effective responses to disasters and to reduce and manage disaster risk.

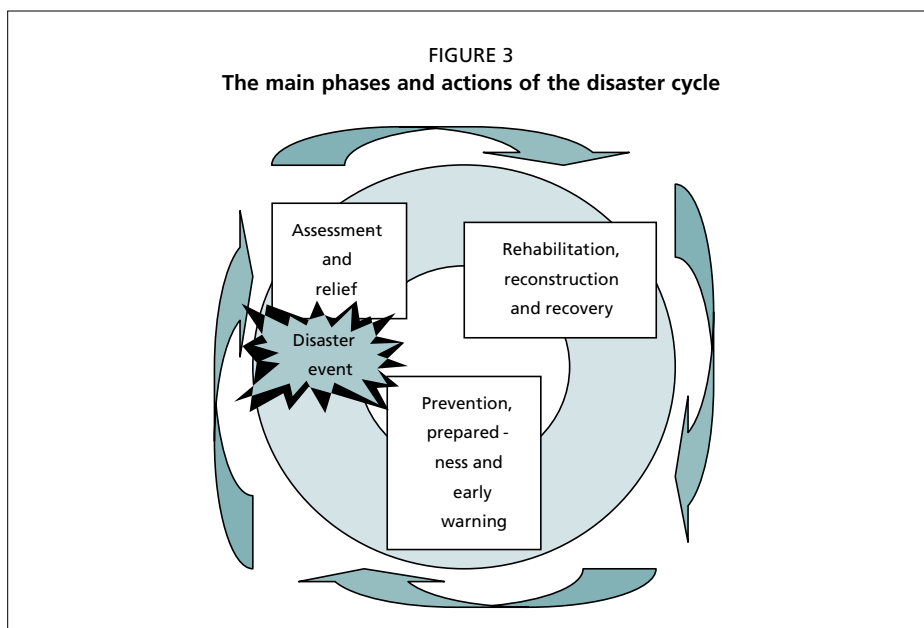
Disaster response and disaster risk management (DRM) can be described as a sequence of events or phases, each requiring different and specific actions. This *disaster cycle* or *emergency sequence* includes the following main types of actions.⁹

- *Prevention* of events and processes that could result in disasters.
- *Preparedness* to respond rapidly and effectively if disasters occur.
- *Early warning* to provide information before potentially disastrous events and as soon as possible immediately afterwards.
- *Impact and immediate needs assessment* following a disaster.
- *Relief or emergency response* to address immediate humanitarian needs and to protect livelihoods following a disaster.
- *Rehabilitation* to initialize the restoration and rebuilding of livelihoods.
- *Reconstruction* for replacing destroyed infrastructure.
- *Sustainable recovery* for longer-term re-establishment and enhancement of livelihoods and livelihood support structures.

While these actions may seem distinct, they are not necessarily so over time and there is often a need to carry out actions related to different phases of the disaster cycle simultaneously. Longer-term development objectives need to be considered throughout the emergency sequence, including in the immediate relief phase, and the concept of a *relief-development continuum* should be adopted.

With regard to prevention, preparedness and early warning, DRM is the core concept and covers “the systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards”. *Disaster risk reduction* is a closely related term and refers to the “conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or

⁹ More information on the emergency sequence can be found in FAO’s Emergency Activities Technical Handbook Series (FAO, 1998).



to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development” (Terminology, ISDR, 2005).¹⁰

The eight phases of the disaster cycle can be subdivided into three main categories of events and related assistance. Reorganizing their order and placing the action immediately after a disaster first, these categories include: i) disaster impact and needs assessment, and relief and emergency response; ii) rehabilitation, reconstruction and recovery; and iii) prevention, preparedness and early warning (see Figure 3). The recommendations presented below are organized accordingly.

SUMMARY OF RECOMMENDATIONS

Based on FAO’s experience from its involvement in recent disasters, a set of recommendations has been developed for this report to provide guidance with regard to disaster response and DRM in fishing and fish farming communities. These recommendations deal specifically with concerns regarding disasters in the fisheries sector, although some are also relevant in other contexts, and intend to complement other FAO guidelines.¹¹ They are directed towards those responsible for and involved in emergency assistance and DRM, i.e. governments in disaster-stricken countries and their humanitarian and development partners.

¹⁰ Guidelines for the assessment of institutional DRM systems (*Rapid guide for missions: DRM systems analysis*) are in the process of being developed by FAO’s Natural Resources Management and Environment Department (former Sustainable Development Department).

¹¹ In addition to FAO’s Technical Handbook Series (FAO, 1998), see also, for example, Bessuges *et al.*, 2004. In collaboration with the International Labour Organisation (ILO), FAO is currently developing guidelines for livelihood assessment in relation to disasters (*Rapid livelihood assessment: a tool for rapid analysis and response to the impact of disasters on the lives and livelihoods of people*) that will be available shortly.

Recommendations with regard to disaster impact and needs assessment, and relief and emergency response

1. Availability of fish and fishery products should be included in food supply assessments and the resumption of fish production given priority in areas where fish is an important part of the diet and of the livelihood of the communities.
2. Relevant fisheries/aquaculture experts – local and international as required – should form part of assessment teams.
3. Needs assessments should take a holistic approach and a livelihood focus but the specific characteristics of the fisheries sector need to be taken into consideration in disaster response.
4. Beneficiary selection needs to be based on a good understanding of local livelihood systems and community structures and involve the target communities themselves.
5. Strategic planning for longer-term rehabilitation and recovery should be undertaken at the early stage of emergency interventions to ensure the long-term sustainability of livelihoods and natural resources at all stages of the disaster response.
6. Coordination of national and international agencies and organizations involved in disaster response needs to be ensured and appropriate budgets for supporting the responsible authorities in this task should be allocated by their humanitarian and development partners.
7. The participation of the affected households and local institutions in assessments, planning, implementing and monitoring has to be ensured for effective and efficient emergency and rehabilitation support.
8. Training and technical support is needed to ensure that assistance is sound and appropriate and technically competent humanitarian and development agencies should make such support an important component of their disaster response.

Recommendations with regard to rehabilitation, reconstruction and recovery

9. Needs assessments should continue on a regular basis and special attention should be given to issues related to the impact of assistance on fishery resources and the environment. These should be combined with monitoring of the effectiveness of the assistance provided and its impact on livelihoods, and lessons learned should be fed back into the ongoing activities of assistance programmes.
10. Local natural resource management and conservation capacities and capabilities should be strengthened as part of rehabilitation, reconstruction and recovery. Sustainable aquaculture practices and comanagement approaches for fisheries management should be promoted.
11. Rehabilitation, reconstruction and recovery activities should aim at building livelihoods that are better than those existing before the disaster; any contribution to “poverty traps” should be avoided.

Recommendations with regard to prevention, preparedness and early warning

12. The promotion of responsible and sustainable fisheries and aquaculture should be given high priority as part of disaster prevention and in addressing the vulnerabilities of fishing and fish farming communities.
13. Increased assistance should be provided to developing countries and coastal communities for improving safety at sea, particularly in coastal areas prone to natural disasters.
14. Aquaculture planning should be improved and the preparedness for dealing with disease outbreaks and other threats in the growing aquaculture subsector needs to be strengthened at the local, national, regional and global levels.
15. The fisheries sector should be explicitly included in the national disaster response and preparedness institutional set-up and form an integral part of disaster preparedness plans. Such plans should be established by disaster-prone countries and the necessary capacities and capabilities for implementing them developed.
16. The resilience of disaster-prone coastal communities should be strengthened, building on existing strengths, coping strategies and measures and local or indigenous knowledge.
17. Effective early warning systems and other mechanisms for disaster mitigation such as cyclone shelters need to be developed and/or improved, as required. These need to take the specific requirements of fishing communities into consideration, e.g. covering migratory fishers and fish workers.
18. Information on and the understanding of disasters and their impact on the livelihoods of fishing communities and their environment need to be improved. Lessons learned from disaster impact and response should be systematically analysed and used to improve future interventions and preventive work at the national and international levels.

DISASTER IMPACT AND NEEDS ASSESSMENT, AND RELIEF AND EMERGENCY RESPONSE

Immediately after a disaster, the first actions by humanitarian and development agencies generally include an assessment of the nature, extent and impact of the disaster. The immediate needs of the affected populations are evaluated and the results of these assessments will guide the initial response, i.e. the relief interventions and early rehabilitation support. FAO is generally involved in impact and immediate needs assessments of affected populations in relation to agriculture, fisheries and forestry. Crop and Food Supply Assessment Missions (CFSAMs) are often carried out jointly with the World Food Programme (WFP) to identify vulnerable groups and the need for food aid. Other assessments cover the capacity for agricultural production in the affected areas and needs for support to resume food production. FAO is also implementing more livelihood-based assessments at the early stages after a disaster (see footnote 11).

While immediate emergency assistance and relief are generally understood to mean life-saving interventions such as search and rescue; evacuation; distribution of food and water; restoration of immediate personal security; and temporary provision of sanitation, health care and shelter, FAO includes agricultural relief in its definition, which refers to the provision of essential agricultural inputs in order to assist affected populations to resume basic food production as soon as possible. With regard to fisheries, this includes, for example, boats and gear, fish processing equipment and inputs for aquaculture production (such as fingerlings, broodstock, feed, nets and chemicals).

Recommendation 1. Availability of fish and fishery products should be included in food supply assessments and the resumption of fish production given priority in areas where fish is an important part of the diet and of the livelihood of the affected communities

Food supply assessments tend to concentrate on staple food production and hence have a crop and agricultural focus. However, fish and fishery products can be important food items in local diets and the resumption of fish production needs to be considered a priority. As explained in Box 5, the decline in fish supply for the local market caused increased malnutrition in Sierra Leone during the civil war. In the southern Sudan, suffering from a long-lasting conflict, the fisheries sector plays an important direct role in food supply and food security (see Box 9). In other disasters, the fisheries sector is the one most badly affected. The floods in Bangladesh in 1998 affected mainly the fish farming subsector. Over 71 500 ha of ponds were affected and 63 000 tonnes of fish and shrimps were lost. Roads were damaged and the disruption of the transport system hampered marketing and distribution of fish and fishery products. The tsunami in December 2004 affected coastal communities and fishers and fish farmers in particular. It is estimated that 10 000 of the 88 000 fishers in Aceh Province in Indonesia lost their lives and fish production fell by 50–60 percent in 2005. Landless families who previously worked on *tambaks* (shrimp/fish ponds) were identified among the most affected households. In Box 10 details are given on the impact of the 2004 tsunami on the fisheries sector in Indonesia.

Recommendation 2. Relevant fisheries/aquaculture experts – local and international as required – should form part of assessment teams

When carrying out needs assessments of the fisheries sector with regard to inputs for a quick restart of food production as well as for activities aiming at the restoration of livelihoods, it is important to ensure that the assessment team has the necessary knowledge of the sector. Fishing craft, gear and other equipment vary considerably from one place to another, even sometimes within relatively limited geographic areas, and inputs provided must meet local requirements. At the same time, non-sustainable practices should not be encouraged and the distribution of, for example, destructive fishing gear should not be allowed. Local (e.g. community-based) and national laws and regulations on fishing gear and practices should be

BOX 9

The complex emergency in the southern Sudan and its fisheries

The combination of civil war, drought and floods has created a situation of complex emergency with disastrous effects on the Sudan's agriculture-based economy. The fisheries sector, which plays an important role in food security in several parts of the country, has also been badly affected. The inland water areas – wetlands and permanent swamps – in the southern Sudan have significant natural fishery resources estimated to be able to sustain an annual fish production of 80 000–100 000 tonnes. In the large swamp area As Sudd there are some 3 500 fishers, mainly from the Nilotic and Falata tribes, who are well known for their traditional fishing skills. However, as a result of the civil war that began in 1955 and lasted for all but 11 of the 49 years of Sudanese independence until the 2005 peace agreement, both subsistence and commercial fishing activities have undergone significant changes. In addition to constraints with regard to supply of equipment and limited access to fishing grounds through insecurity, there is also the problem of high densities of aquatic plants (macrophytes) impeding navigation. Consequently, fish catches in As Sudd are estimated at only about 30 000 tonnes per year. Post-harvest losses are also significant and are estimated to reach 40 percent during the rainy season.

At the same time as many fishers have lost their equipment and market and supply channels have been disrupted, subsistence fishing has become essential for the food security of vulnerable households. Fish and fishery products meet 15–20 percent of the nutritional needs of the majority of the population of the southern Sudan and fish constitutes an essential source of protein. Relief agencies active in the area have become aware of the importance of fisheries from a nutritional point of view and, since the mid-1990s, improved nutritional levels have been observed in areas where fishing and processing inputs and basic technical assistance have been provided as part of relief assistance. Field observations have indicated that in locations where fishing equipment has been lacking or not distributed in sufficient quantities, people have relied more heavily on traditional sources of animal protein to bridge the hunger gap existing before the first harvest. Insects (termites, dried locusts), bleeding cattle, dried wild meat or the use of poison to obtain fish are the most common traditional sources during this period. On the other hand, in locations that received fishing equipment, fish (especially fresh and sundried) takes precedence as a primary source of cheap animal protein. Internally displaced persons (IDPs) and other vulnerable population groups with access to fishing equipment have also been able to rebuild lost assets and gain access to other goods and services. It would appear that fishing and its associated activities constitute an important source of both income and food supplies.

Sources: Bellemans, 2002; FAO, 2002; FAO, no date [c].

adhered to, as should existing fisheries and integrated management plans. Where aquaculture made an important contribution to livelihoods and food security, the potential to restore this activity in a sustainable manner should be explored. This implies that a good understanding of the sector and its local context is required on behalf of those making decisions with regard to assistance.

BOX 10

Impact of the 2004 tsunami on the fisheries sector in Aceh Province, Indonesia

The earthquake and subsequent tsunami struck on the morning of 26 December 2004. Coastal communities in more than ten countries in Asia, Africa and the Middle East were affected. Because of its closeness to the epicentre of the earthquake, the Province of Aceh (Nanggroe Aceh Darussalam) in northern Sumatra, Indonesia, was the worst affected area in terms of the number of people killed, wounded or displaced; the magnitude of the physical destruction; the economic damage; and the geographic extension of the area impacted. Coastal communities were severely affected with high death tolls and loss of livelihood assets. Many of the total estimated death toll of 167 000 were members of fishing or fish farming households, although no exact figures are available. The majority of the casualties were women (3:1 versus men), children and the elderly.

Some 7 200 boats of the Acehnese pre-tsunami fleet of over 18 000 craft were lost and another 4 000–5 000 damaged. The value of lost and damaged boats has been estimated at approximately US\$10 million and a further US\$10 million for 6 700 lost/damaged engines. About 20 000 units of fishing gear valued at US\$18 million were also lost. Assessments indicate that 55 percent of the fishing harbours and landing sites were damaged. This damage was almost total on the west coast and significant on the east coast with most, if not all, community landing sites in affected areas destroyed. It is estimated that some 15 of the 20 damaged ice plants in Aceh had been operational at the time of the tsunami. All the larger plants on the west coast were destroyed.

Fish processing infrastructures (sheds, drying racks and cooking equipment) were lost in large numbers since they were situated on the beaches. A total of 1 235 fish drying facilities, mostly for anchovies (*ikan teri*) were lost or damaged beyond repair, with the greater majority on the east coast. Salt farm units were also severely damaged, with saltpans inundated, sheds destroyed and cooking gear swept away. Moreover, the boat building trade was affected primarily by loss of lives, as well as tools and other productive assets.

In the aquaculture subsector, farmers lost ponds, their crops and thus their working capital with prawn seeds and milkfish being swept away. It is estimated that about 20 800 ha of ponds were damaged out of the 47 600 ha existing before the tsunami. Some ponds that were not directly damaged may now be inoperable through sedimentation of the water canal systems. Of the 223 shrimp hatcheries across Aceh, 193 were damaged with seed and broodstock lost. On Nias and Simeulue Islands, many of the fish net cages were damaged or destroyed.

The tsunami destroyed the Government's Regional Brackishwater Aquaculture Development Centre in Ujung Batee near Banda Aceh, the capital, and the shrimp hatchery facility of the Fisheries Senior High School in Ladong near Banda Aceh. Other government offices and services were debilitated because of loss of lives, equipment and infrastructure. Moreover, non-official social structures were affected, although the *Panglima Laot* (Acehnese fishers' association) was empowered by external aid to play an important role early on in the recovery process with regard to fisheries. However, the already weak ability to manage the fisheries sector overall was detrimentally impacted by the tsunami.

A boat wreckage lies stranded and displaced on the remains of the Banda Aceh main fish market after having been swept from its moorings by the tsunami tidal waves (2005)



FAO/ITOE

Recommendation 3. Needs assessments should take a holistic approach and a livelihood focus but the specific characteristics of the fisheries sector need to be taken into consideration in disaster response

Considering the characteristics of the small-scale fisheries sector, illustrated, for example, by the factors making it vulnerable to HIV/AIDS (see Box 8), it is evident that, when providing assistance after a disaster, there should be a clear focus on the particular needs of fishers and fish workers. There is a risk that important aspects may be overlooked if this sector is “grouped together” with farmers who, in many emergency interventions, may be the larger group of victims needing assistance. Budgets need to be allocated, as required, for the particular needs of fishers and fish workers, their communities and supporting institutions.

At the same time, intersectoral linkages need to be understood since the livelihood strategies of coastal communities and poor households are often complex. Assessments need to be holistic and take a livelihood approach. The importance of not only including primary fish production and the need for production inputs and tools in assessments guiding relief and early rehabilitation is further discussed in the section on rehabilitation, reconstruction and recovery on p. 35.

Recommendation 4. Beneficiary selection needs to be based on a good understanding of local livelihood systems and community structures and involve the target communities themselves

Needs assessments play a critical role in beneficiary selection. Generally, interventions tend to aim at targeting the “the poorest and most affected” by

the disaster but there is often no clear interpretation of this concept and relevant beneficiary groups can be difficult to identify properly, especially when needs assessments have to be carried out quickly (FAO, 2006d). The “poorest” and “the most affected” do not necessarily constitute the same people, and those who have lost the most – for example, former owners of boats and gear – may not be those who have experienced the most disastrous impact on their livelihoods, e.g. the former crew on the boats. At the same time, disasters do not differentiate between rich and poor and after the 2004 tsunami fairly prosperous people also suddenly found themselves with nothing. Similarly, fish farming households are often not considered as being among the poorest of the poor, since they have access to land and water. Nevertheless, land or water may have been leased or obtained on credit and a disaster would have thrown the household into poverty and indebtedness.

There is a risk of the beneficiary selection process becoming politicized. For example, after the 2004 tsunami in parts of Sri Lanka, some genuine fishers had still not received boats although the number of boats provided exceeded the pre-tsunami fleet (see below and Box 11). Fishing boats had obviously also been distributed to non-fishers (ADB, 2005). This could be a result of a more general problem with beneficiary targeting but it could also indicate a bias in the selection of beneficiaries, coupled with “new” assessments giving higher numbers of lost boats than originally calculated.

A dilemma in disaster response regarding the supply of inputs to replace assets lost is that those who did not own assets in the first place may be overlooked, or will be dependent upon the replacement of assets from those who were their former employers. Women who work in fish processing and trading may fall into this category and livelihood contexts and community structures should be clearly understood and taken into account in needs assessments and beneficiary identification.

FAO generally depends on government and other partners, including stakeholders and the communities for the identification of beneficiaries. Experience shows that targeting of beneficiaries benefits from i) clear criteria on targeting that are understood by all those involved; ii) decentralizing the selection process to the local level; and iii) including several institutions and stakeholder groups, as well as the intended beneficiaries, in the process (FAO, 2006d).

Recommendation 5. Strategic planning for longer-term rehabilitation and recovery should be undertaken at the early stage of emergency interventions to ensure the long-term sustainability of livelihoods and natural resources at all stages of the disaster response

While immediate emergency assistance is characterized by the need for quick action to save lives and re-establish basic livelihoods, it is important to take a longer-term view during the relief and emergency phase. In this respect, providing inputs to the fisheries sector differs from agriculture since fishing is dependent on a natural resource – renewable but still limited – in a more direct way than farming. While distributing fishing gear may be an excellent strategy for improving food security in certain situations and areas, care has to be taken if fishery resources are close to

BOX 11

Oversupply of boats after the 2004 tsunami

After the 2004 tsunami, the provision of small fishing boats was an attractive project thanks to its visibility and perceived simplicity. While fishers did need new boats to take up their activities once again, an oversupply of boats would be a threat to fishery resources. Unfortunately, little is known of the status of most of the inshore resources of the tsunami-affected countries but, even before the disaster, there were indications of overfishing and it is difficult to predict what fishing effort resources can sustain. Similar concerns exist for the offshore fishery resources and this lack of knowledge makes it difficult to judge the suggested alternative strategy of supplying larger boats that can fish further out to sea.

In Aceh Province, Indonesia, 4 000 fishing boats had been delivered at the end of 2005 and many more were under construction, indicating that replacements are likely to exceed the approximately 7 200 boats that were reported lost in the tsunami. A similar situation has developed in Sri Lanka and in some areas there are now more small fishing boats than before the tsunami.

Source: CONSRN, 2005.

being fully exploited or the carrying capacity of the resource base is not known. If fishing effort increases beyond the sustainability of the resource, the fishery-based livelihoods created may prove not to be sustainable in the longer term.

Experience shows that there is a clear link between emergency efforts and longer-term development that has to be considered in early disaster response. A parallel process of providing immediate relief together with a mid- to long-term planning effort is therefore required. The oversupply of small fishing boats in some of the Asian countries as part of the assistance after the 2004 tsunami confirms the necessity of long-term planning early on in order to ensure that the assistance given is sustainable (see Box 11). This also implies the application of the relief-development continuum (see the beginning of this chapter); rehabilitation and recovery have to be thought about in advance when providing emergency assistance. The development of multi-annual fisheries sector strategies and plans is a useful tool in this process (see also p. 38).

Recommendation 6. Coordination of national and international agencies and organizations involved in disaster response needs to be ensured and appropriate budgets for supporting the responsible authorities in this task should be allocated by their humanitarian and development partners

The question of oversupply of boats is related to the necessity of efficient coordination of assistance provided to communities after a disaster. The national FAO Representations play an important role in coordinating agricultural (and

fisheries) relief efforts by the United Nations (UN) and other agencies at the national level. The FAO Representations are important partners in national-level United Nations Disaster Management Teams (UNDMTs) consisting of relevant members of the various UN agencies active in the country. In many of the countries affected by the 2004 tsunami, the large number of donors, aid organizations and assistance activities made coordination and planning difficult. The FAO Fisheries Department was given a mandate by member governments to take a leading role in providing technical support and assisting governments in affected countries in coordinating the tsunami response.¹²

In Aceh Province and Nias Island, the Indonesian Government set up a special institution at ministerial level – the Aceh and Nias Rehabilitation and Reconstruction Agency (BRR) – for the coordination of emergency and rehabilitation efforts. In February 2005, FAO was formally given the role by the Governor of Aceh Province of supporting BRR and the Ministry of Marine Affairs and Fisheries (MMAF) in the coordination of assistance to the fisheries sector.¹³ With support from FAO, BRR and MMAF organized monthly sector coordination meetings with their humanitarian and development partners and a fisheries and aquaculture steering committee was established. Specific planning seminars were also held, both for capture fisheries and aquaculture rehabilitation activities, and a fisheries sector strategy for the rehabilitation and reconstruction work was developed during the early assessments. A similar process took place in Sri Lanka where FAO was also formally appointed to support coordination. However, in spite of government efforts and support from FAO, the task of coordinating the vast number of humanitarian and development actors and the amount of assistance provided was overwhelming.

Recommendation 7. The participation of the affected households and local institutions in assessments, planning, implementing and monitoring has to be ensured for effective and efficient emergency and rehabilitation support

There is a fine balance between getting things done quickly, and planning and doing things properly. Aid should be “quick, good and participatory” but this is often easier said than done. However, a fundamental principle that needs to be applied in assessments and selection of beneficiaries – as well as in subsequent relief, rehabilitation and recovery work, and when addressing prevention and preparedness – is the participation of local communities and institutions, i.e. those directly concerned by the disaster or hazard. This may sound self-evident

¹² The 2005 Rome Declaration on Fisheries and the Tsunami adopted by the FAO Ministerial Meeting on Fisheries in Rome on 12 March 2005, “supported the need for FAO to play a leading role in advising and supporting the international community in matters relevant to sustainable fisheries and aquaculture rehabilitation and restoration of marine habitats” (see <ftp://ftp.fao.org/fi/DOCUMENT/ministerial/2005/tsunami/declaration.pdf>).

¹³ Applies to the three sectors under FAO’s mandate: agriculture, fisheries and forestry.

but the importance of participation and consultation merits being repeated. The coping capacity of those suffering from the consequences of a disaster is often impressive. The affected households are those who know what they need most, and fishers know what types of boat and gear they should use. Assessments should differentiate and prioritize between different types of needs, e.g. those that are perceived as priorities by the beneficiaries themselves as opposed to those defined by humanitarian and development agencies. Some identified needs may have existed before the disaster and some may be better met through local available capacity (TEC, 2006).

Recommendation 8. Training and technical support is needed to ensure that assistance is sound and appropriate and technically competent humanitarian and development agencies should make such support an important component of their disaster response

The provision of many poorly built boats in Indonesia after the 2004 tsunami (see Box 12) clearly indicates that training and technical support should be incorporated into early disaster response activities. Similarly, the support to fish farmers in flood-affected areas in Bangladesh (1998) and Viet Nam (2000) in the form of fingerlings, shrimp post-larvae and broodstock shows that low-quality inputs and insufficient technical assistance result in limited impact of interventions. Training in water quality management, aquatic animal disease prevention measures and protection of ponds against pollution, which was given to some of the affected farmers, significantly increased the impact of the assistance. This goes hand in hand with the need for effective coordination of the emergency response where minimum construction standards should be enforced. FAO played an important role in this process by providing training in boat building to partner organizations and to the Indonesian Government. New safer designs for boats were also developed.



*Boatbuilder Ranali
Usman in Aceh,
Indonesia, checks planks
for his next vessel (2005)*

BOX 12

Low-quality boats in the tsunami response

In many of the countries affected by the 2004 tsunami, the quality of the fishing boats provided has been dangerously poor, for a number of reasons. Boats have been built to a price rather than to a standard and high demand has caused inexperienced boat builders to claim expertise they do not have. Some boat builders have been taking orders that they were unable to handle adequately in the short time agreed and the agencies and organizations ordering the boats have not been monitoring their boat building programmes sufficiently.

Most of the problems with boat quality are basic and include:

- poorly selected timber, including sapwood and split wood;
- thin planking, large frame spacing and small keel timbers;
- substandard frame joints with unsuitable arrangement of fastenings;
- fastenings causing numerous splits in planks;
- inadequate through-hull fittings and pipe work;
- use of plain steel fastenings (Gudmundsson and Davy, 2006, p. 13).

Many aid organizations that became involved in boat building did not have the necessary knowledge to provide the right inputs, or preferred to ignore technical standards and scientific norms in their eagerness to use the money they had received; above all, they needed to show to their donors that they had spent it. However, this short-sightedness may lead to the new boats not being used by the intended beneficiaries, in that they require significant maintenance, have a short life span (meaning that additional boat replacement programmes will be needed in the future), and are mainly used for other purposes than fishing. FAO has recommended that unsafe boats are not handed over to beneficiaries but be modified or even broken up. The Organization has also provided training for boat builders, developed good practice standards, drafted regulations for “minimum standards” for construction and worked closely with NGOs and others to raise awareness on quality issues and to provide technical assistance.

Source: Gudmundsson and Davy, 2006.

REHABILITATION, RECONSTRUCTION AND SUSTAINABLE RECOVERY

Rehabilitation, reconstruction and sustainable recovery refer to the activities after the immediate relief and emergency phase and include early support to restoring livelihoods, assets and production levels (*rehabilitation*), to rebuilding infrastructure (*reconstruction*) and to restoring means of production and re-enacting institutions and services destroyed by a disaster (*sustainable recovery*). However, the link between the different phases is vague and, for example, in a specific situation at a given moment, different groups of the affected population may be at different stages in the post-disaster process.

BOX 13

Floods in Bangladesh in 1998

FAO conducted a detailed independent assessment of the impact and damage caused by the floods in Bangladesh in 1998 in collaboration with DFID. Project proposals for short-, medium- and long-term rehabilitation programmes for submission to donors were also prepared. It was noted that there was a lack of hard data on production losses and infrastructure damage, rendering the planning of rehabilitation difficult. A need to strengthen information systems and mechanisms for undertaking damage assessments was noted. Nevertheless, the assessment showed that the coping capacity of local communities was remarkable. Fishers and fish farmers had taken precautionary measures before and during the floods, although damage could not be avoided, and they were preparing to start production again. The provision of soft loans to assist them in repairing damage, replacing equipment and procuring inputs was identified as a main priority for assistance. It was further recommended to support, in parallel with assistance given to poor fish farmers to start their production once again, the re-establishment of supply and distribution systems by assisting seed and feed producers and ice manufacturers to start production since their inputs are essential for fishers and fish farmers. This parallel support should include the replacement of lost broodstock, preferably from domestic sources in order to avoid the potential risk of introducing new pathogens to the country. Recommendations for longer-term interventions included awareness building and training on disaster preparedness and post-disaster management with emphasis on participation by local communities.

Source: FAO, 1999.

Recommendation 9. Needs assessments should continue on a regular basis and special attention should be given to issues related to the impact of assistance on fishery resources and the environment. These should be combined with monitoring of the effectiveness of the assistance provided and its impact on livelihoods, and lessons learned should be fed back into the ongoing activities of assistance programmes

The needs assessments discussed above in relation to relief are not one-off activities but exercises that continue on a regular basis throughout all the phases of the disaster response. Needs for humanitarian relief tend to change extremely quickly as assistance is being provided but needs with regard to livelihood rehabilitation should be carefully monitored. An example from the 2004 tsunami disaster response, mentioned earlier, is the provision of boats in Indonesia and Sri Lanka. The repair and construction of small fishing craft became a popular activity for both small NGOs and larger donors and the need for boats and the number of boats supplied and planned were difficult to monitor. In both countries, FAO supported the governments in organizing regular coordination meetings and in requesting aid organizations to report on their boat supply plans. In spite of these efforts, mismatches between needs and inputs occurred, indicating that

stronger coordination based on regular needs assessments and monitoring was necessary. Considering that many of the inshore fishery resources showed signs of overexploitation even before the tsunami, the creation of fishing overcapacity could be a threat to the sustainable livelihoods of coastal communities.

Lessons learned from FAO's aquaculture sector emergency assistance in Viet Nam and Bangladesh include issues such as the identification of suitable species to be cultured in water environments with low water quality for culture caused by the floods; use of indigenous species; suitable polyculture practices; and the use of culture systems and management measures that reduce the risks to fish standing stocks from future floods.

In this context, the need to monitor the impact of the assistance provided, and not only the inputs given, should be stressed. While it may be easier to count the number of, for example, nets distributed, it is more important to understand the use of these nets and what impact on livelihoods their distribution has made. This element of monitoring the effectiveness of assistance is often weak but could impart important lessons in continued support.

Recommendation 10. Local natural resource management and conservation capacities and capabilities should be strengthened as part of rehabilitation, reconstruction and recovery. Sustainable aquaculture practices and comanagement approaches for fisheries management should be promoted

While immediate needs assessments may focus on food supply and food security (through, for example, the CFSAMs), the impact on other livelihood aspects and needs should be identified as soon as possible.¹⁴ With regard to fisheries, this would include, for example, fish processing facilities, distribution and marketing channels, hatchery production of fingerlings for fish and shellfish farming, availability of feed and other aquaculture supplies, as well as institutional support structures necessary for extension services and fisheries management. The links among these different parts of the fisheries system and the “sea to table” chain of activities need to be understood. It is, for example, not possible to rehabilitate fish farming activities in a sustainable way if the supply of inputs and markets is not ensured (see the example of Bangladesh in Box 13). Moreover, an analysis of alternative livelihood options should be included, particularly in areas where fishery resources are under pressure and a limit to the number of fishers may be desirable.

The issue of overexploitation and other threats to fishery resources need to be taken into consideration in disaster response, risk reduction and management. One important aspect is to include technical support and development of fisheries management capacities and capabilities as a fundamental building block for sustainable recovery. The same is true for the aquaculture subsector where sustainable fish and shellfish farming practices should be promoted.

¹⁴ Greater focus will be given to livelihoods at the early stages of FAO needs assessments in accordance with the new guidelines being developed (see footnote 11).

Villagers come together with fishers to fish in flooded areas in Tangail District, Bangladesh



FAO/MARTIN

Exactly how these capacities and capabilities should be built and strengthened depends on the particular local situation, existing institutions and stakeholders. Participatory approaches and thorough analytical processes are required. Comanagement, i.e. a partnership approach where government and fishery resource users share responsibility and authority for the management of a fishery or fisheries in an area, based on their own collaboration and with other stakeholders, is considered an internationally accepted “best practice” in fisheries management.¹⁵ Rehabilitation, reconstruction and recovery support should promote the implementation of these practices.

Recommendation 11. Rehabilitation, reconstruction and recovery activities should aim at building livelihoods that are better than those existing before the disaster; any contribution to “poverty traps” should be avoided

Clear sector strategies represent another important tool for sustainable recovery. Building on the impact and needs assessments carried out after the 2004 tsunami, FAO – in collaboration with other international agencies – assisted the Governments of Indonesia and Sri Lanka in developing fisheries sector strategies, covering not only relief and rehabilitation needs but also longer-term recovery and development. The national fisheries sector strategy in Sri Lanka “offers an opportunity not only for restoring the fishing industry and protecting fishing communities and the industry from future disasters, but also for bringing necessary urgent improvements to create conditions for sustainable management and development of Sri Lanka’s fisheries and coastal zones and to improve the living conditions of fishing communities. Hence, employment generation, private sector development and poverty alleviation are major objectives in the reconstruction and development of the fisheries sector. This is in line with the country’s National Poverty Reduction Strategy and the Millennium Development Goals (MDGs) Strategy” (FAO, 2006a).

¹⁵ See, for example, APFIC/FAO, 2005.

After the 2004 tsunami, the expression “build back better” was coined to describe the opportunity that the devastating destruction represented. Conditions and structures that had earlier kept people trapped in poverty should not be recreated. Within the framework of the boat building training and technical advice provided through experienced international boat builders and naval architects, FAO worked with local boatyards to promote the use of better-quality timber, appropriate metal fasteners and improved construction techniques. Based on existing boat types, improved construction designs were developed to enhance the standard and safety of the boats being built to replace those lost in the tsunami. However, many tsunami-affected countries lack regulations governing the construction of small fishing vessels and do not have the capacity to inspect boats and enforce those regulations that do exist. In Sri Lanka, FAO has assisted the Government in developing new regulations for fibreglass boats and, in Indonesia, similar regulations have been developed for wooden boats. These are important steps towards making small fishing vessels safer.

In the aquaculture sector in Aceh, FAO worked with small-scale fish and shrimp farmers to form groups to market their produce. By empowering small-scale producers, their bargaining power with large-scale commercial fish traders and exporters can be improved, allowing them to better their revenues. Rebuilding aquaculture systems in a more environmentally sustainable manner is another important challenge in the rehabilitation and reconstruction process, requiring training and technical assistance.

PREVENTION, PREPAREDNESS AND EARLY WARNING

Prevention refers to activities aiming at reducing vulnerabilities to natural and sociopolitical events that could result in disasters. Disaster prevention measures often form part of longer-term programmes to promote resilience and sustainability. *Preparedness* includes measures taken in advance to ensure that the necessary capacities and mechanisms are in place to respond quickly and effectively to disasters when they occur. *Early warning* mechanisms provide early and relevant information on potential or actual disasters and their impact. FAO monitors the food supply and demand around the world through the Global Information and Early Warning System on Food and Agriculture (GIEWS) and provides information on transboundary diseases and migratory pest through the Emergency Prevention System (for Transboundary Animal and Plant Pests and Diseases) (EMPRES). Other examples include the Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS), the Desert Locust Information Service and the Livestock Early Warning System.

Recommendation 12. The promotion of responsible and sustainable fisheries and aquaculture should be given high priority as part of disaster prevention and in addressing the vulnerabilities of fishing and fish farming communities

In the fisheries sector, FAO’s work focuses on three main strategic objectives:

BOX 14

The Code of Conduct for Responsible Fisheries (CCRF)

Against a background of clear signs of overexploitation of important fish stocks, changes in ecosystems, significant economic losses and international conflicts with regard to management and fish trade, FAO developed the CCRF, which was adopted in 1995. It is a voluntary instrument, setting out principles and international standards for responsible practices with regard to effective conservation, management and development of living aquatic resources within the context of a sustainable ecosystem and biodiversity.

The CCRF makes specific reference to actions to be taken in case of an emergency when living aquatic resources are threatened. Article 7.5.5 states that “if a natural phenomenon has a significant adverse impact on the status of living aquatic resources, States should adopt conservation and management measures on an emergency basis to ensure that fishing activity does not exacerbate such adverse impact. States should also adopt such measures on an emergency basis where fishing activity presents a serious threat to the sustainability of such resources. Measures taken on an emergency basis should be temporary and should be based on the best scientific evidence available” (FAO, 1995, p. 13). This recommendation is part of the precautionary approach, which is one of the fundamental principles of the CCRF. The precautionary approach states that absence of scientific information is no excuse for not implementing management measures but that states are responsible for adopting appropriate measures for the long-term sustainable use of fisheries resources and the conservation of the aquatic environment.

The FAO Fisheries Department promotes the implementation of the CCRF and acts as a catalyst. A number of technical guidelines have been developed to support the implementation; others (FAO, 2005a) deal specifically with the needs and responsibilities of small-scale fisheries. If the recommendations given were to be implemented and fisher communities could escape poverty, their vulnerability to disasters would be significantly reduced.

Sources: FAO, 1995; FAO, 2005a.

i) the promotion of responsible fisheries sector management through the implementation of the Code of Conduct for Responsible Fisheries (CCRF); ii) an increased contribution of responsible fisheries and aquaculture to world food supplies and food security; and iii) global monitoring and strategic analysis of fisheries. The CCRF, endorsed by all FAO member countries, is at the core of FAO’s policy on sustainable management of capture fisheries and aquaculture and hence an important instrument for addressing vulnerabilities and promoting resilience (see Box 14).

Fish farming, or aquaculture, is regarded worldwide as one of the fastest growing food-producing subsectors, showing a continuous increase in total production throughout the last decade, particularly in developing countries. With the increasing demand for fish and the fast growth in aquaculture production, the current trend is towards intensification and commercialization. As in other

farming sectors, the risk of disease problems increases when production intensifies and expands. Today, disease is the major constraint to further development of the culture of aquatic species. One of the FAO Fisheries and Aquaculture Department's priority areas with regard to aquaculture is the improvement of safety and quality of aquaculture products. Risk management is gaining interest within the aquaculture sector and there is a trend towards the development of better management practices (BMPs), codes of good practice and other improved management and operational procedures. FAO takes an active role in this work and collaborates closely with a number of cooperating partners.

Recommendation 13. Increased assistance should be provided to developing countries and coastal communities for improving safety at sea, particularly in coastal areas prone to natural disasters

Alongside the promotion of sustainable management practices in fisheries and aquaculture, specific examples of work by FAO related to disaster prevention and preparedness in the fisheries sector include the improvement of safety at sea for small-scale fishers and the strengthening of capacities of fish and shellfish farmers and institutions in developing countries for disease control in aquaculture.

The concept of safety at sea consists of several interrelated components, i.e. minimum standards for boat construction, rules for onboard safety equipment, fishing regulations, development of communication systems, search and rescue operations, etc. Numerous initiatives have been undertaken to address these issues by the FAO Fishing Technology Service (FIIT). However, many aspects are closely related to fisheries management and regulations and it is an area of wider concern for the Fisheries and Aquaculture Department.¹⁶ Many developing countries have inadequate regulations for safety at sea and safety standards are poor; improving these conditions is an important area of disaster prevention. Box 15 gives an account of some of the main projects and studies carried out by FAO in the area of safety at sea.

Other preventive measures that should be considered by countries and communities in areas prone to natural disasters such as windstorms and floods include building onshore fishing facilities such as markets that are windstorm resistant, making small craft beachable or trailerable and ensuring that fishers know when to remove gear from the sea (FAO, 2006 draft). These measures are also related to early warning, discussed below.

Recommendation 14. Aquaculture planning should be improved and the preparedness for dealing with disease outbreaks and other threats in the growing aquaculture subsector needs to be strengthened at the local, national, regional and global levels

Aquaculture ponds, cages and other structures are often situated in areas prone to disasters, where they are exposed to, among others, floods, tidal waves, storms

¹⁶ See, for example, Petursdottir, Hannibalsson and Turner, 2001.

BOX 15

FAO safety at sea activities

FAO, through its Fisheries and Aquaculture Department, participates regularly in meetings and workshops related to safety at sea and has developed a Global Programme with a strategy for working on the improvement of safety at sea for small-scale fishers. Within this programme, studies and workshops are being implemented in Latin America, East and West Africa, South Asia and elsewhere. These initiatives are to be followed by regional development projects. Already, studies on the reasons for accidents at sea related to small-scale fishing have been carried out through the regional project of the Programme for Integrated Development of Artisanal Fisheries in West Africa (IDAF) (see also p. 18). In cooperation with the International Labour Organisation (ILO) and International Maritime Organization (IMO), FAO has contributed to the publications *Code of safety for fishermen and fishing vessels* and *Voluntary guidelines for the design, construction and equipment of small fishing vessels*. Other examples of projects addressing safety at sea include the Development of Standards for the Construction and Inspection of Small Fishing Vessels project in the Caribbean, studies and workshops in the South Pacific and several activities under the umbrella of the emergency response to the 2004 tsunami.

Sources: Gillet, 2003; FAO, 2005b; IDAF, 1995.

and pollution by other sectors. Poorly constructed and sited ponds may also increase the risk of floods. Appropriate planning of aquaculture development and construction is needed to minimize exposure to these hazards. Poor planning of the development of aquaculture has led to slow, uncoordinated, unbalanced and unsustainable growth of the sector in some countries and regions. However, the human and institutional capacity to plan aquaculture development is often lacking in those countries that need it most; a situation that has to be addressed. Aquaculture planning helps to reduce risks, informs decision-making, establishes trust and conveys information. To be applicable and effective in achieving the desired goals and objectives, aquaculture planning outcomes rely on political support, stakeholder participation and resource commitment (FAO, 2006e).

Concerning the spread of fish disease, risk reduction and emergency response, FAO has been active in providing assistance to governments, at country and regional levels. The need to develop the capability to deal with disease emergencies, including capacity building in regular planning and training, is stressed (FAO, 2005d). There is also a need to have access to appropriate equipment and necessary legal mechanisms (Arthur *et al.*, 2005). Moreover, it is important to strengthen diagnostic and control capabilities, improve the capacity of rural fish farmers to deal with disease outbreaks, improve national regulatory frameworks and disease surveillance, and develop and implement national strategies on aquatic animal health management (AAPQIS, 2004).

Recommendation 15. The fisheries sector should be explicitly included in the national disaster response and preparedness institutional set-up and form an integral part of disaster preparedness plans. Such plans should be established by disaster-prone countries and the necessary capacities and capabilities for implementing them developed

Some of the most important measures that can be taken to minimize disaster impact are related to preparedness. By anticipating threats, making contingency plans and taking appropriate precautions much damage can be avoided. This includes ensuring that DRM considerations are included in overall development plans, especially in countries prone to disasters. Similarly, the incorporation of disaster preparedness and response aspects in fisheries management plans should be considered. Preparedness also involves the establishment of disaster preparedness plans and the strengthening of relevant institutions and processes for implementing these plans. Many countries have emergency plans for potential marine pollution disasters caused by, for example, oil spills.¹⁷ Whenever relevant, the fisheries sector needs to be considered in national and local disaster preparedness plans and disaster institutional response mechanisms. Staff of fisheries authorities and development partners are often key agents in a disaster affecting the fisheries sector and can provide vital links with fishing communities. Building capacity within relevant government departments and among development partners on how to respond and mitigate potential disasters needs to be part of preparedness activities (see Box 16).

Recommendation 16. The resilience of disaster-prone coastal communities should be strengthened, building on existing strengths, coping strategies and measures and local or indigenous knowledge

Referring back to assessments and beneficiary targeting at the time of emergencies, discussed earlier, preparedness in disaster-prone areas should include the development of pre-disaster information on vulnerable communities, e.g. number and structure of households, occupations, special needs and circumstances. This, together with the development of rapid assessment methodologies – such as the new FAO guidelines for rapid livelihood assessment – could greatly improve needs assessments and beneficiary identification in case of an emergency.

People living in areas prone to natural disasters have developed coping strategies. When looking at building resilience, these livelihood strategies and local knowledge should be the starting-point. In Bangladesh where floods are recurrent events although with different magnitudes, affected communities have developed these strategies. Fish farmers hit by the flood in 1998 had taken precautionary measures to mitigate the expected impact of the floods although damage could not be completely avoided (see Box 13).

¹⁷ For more information, see IMO (<http://www.imo.org>), International Convention for the Prevention of Pollution from Ships (1973, modified 1978) and International Convention on Oil Pollution Preparedness, Response and Cooperation (1990).

BOX 16

Disaster preparedness: institutional set-up and plans for the fisheries sector

Countries and communities susceptible to natural disasters should develop disaster preparedness plans. These plans should describe measures and processes for responding to disasters rapidly and effectively with a view to minimizing the intensity and scale of a potential emergency. As part of overall disaster preparedness plans, food and agriculture – including fisheries – should be specifically addressed and include the following.

- A risk and vulnerability profile describing the disaster risk faced as well as likely impacts and needs based on earlier experience and/or neighbouring countries or areas.
- Food security information systems summarizing the status, outputs and use of food security information systems and reserve stocks.
- Institutional capability outlining responsibilities among different stakeholders for the disaster preparedness plan and response, and including contact information for responsible officers within each institution.
- Response capability describing the resources available to respond to disasters such as food reserves, fishing inputs, transport capacity, emergency funds, technical and managerial structures and capacity.
- Training and public education, making an inventory of completed and planned training and public education with regard to disaster preparedness as well as an analysis of future training needs.
- Response mechanisms and contingency plans, describing measures to address a disaster, i.e. assessment methods, declaration of emergency, alert and international appeals, institutional structures and management, security arrangements, displacement and evacuation, relief and mitigation mechanisms, logistics, food quality control, coordination and communication, monitoring and evaluation, a charter of code of conduct, and disaster response simulations to test and rehearse procedures.

Sources: FAO, 1998; FAO, 2006 draft.

Microfinance services have shown to be important components of coping strategies and effective tools for decreasing and sharing risks in aquaculture and fisheries. Credit is often used to implement better management practices and reduce risks, while insurance is increasingly used to guarantee repayment of loans and enable fishers and aquaculturists to restart their productive activities after a disaster. Aquaculture insurance increasingly receives attention from the insurance and reinsurance industry. Efforts are being made to extend its availability to small-scale aquaculture and fisheries activities. However, in many regions, i.e. sub-Saharan Africa, South America and large parts of Asia, both knowledge and availability of insurance are often limited although the potential need and demand for insurance are growing (van Anrooy *et al.*, 2006).

BOX 17

Details of the deaths in Bhairavapalem and Balusutippa villages, Andhra Pradesh, India, caused by the cyclone in November 1996

Location	No. of deaths		Cause of death
	Bhairavapalem	Balusutippa	
Seashore shrimp seed collection sites	66	331	Shrimp seed collectors were camping in remote open seashore areas away from villages. No warning or rescue team reached them and they were washed away by the tidal waves.
Mechanized boats fishing at sea	33	21	Fishing boats that were already at sea several days before the event were caught in the path of the cyclone. Only those with transistor radios received warnings and not all managed to move to safe locations in time.
River fishing areas	7	23	Many of the fishers who had set up seasonal fishing camps on the shores of the Godavari river did not receive warnings.
Village homes	6	1	Both villages are low lying, exposed to waterbodies and close to the river mouth. Warnings – given only by transistors and television – were not taken seriously or only considered at the last moment. Houses, most of which were thatched, collapsed.

Source: Yadava, Turner and Calvert, 2000.

Recommendation 17. Effective early warning systems and other mechanisms for disaster mitigation such as cyclone shelters need to be developed and/or improved, as required. These need to take the specific requirements of fishing communities into consideration, e.g. covering migratory fishers and fish workers

The establishment of early warning systems for alerting communities to oncoming cyclones, tsunamis or other natural hazards is important for saving lives and limiting damage by natural disasters in coastal areas. Ensuring that there are appropriate shelters and evacuation plans are other central aspects. In many developing countries shelters and warning systems exist but they are not always sufficient and adequate. Migrating fishers and their households are in particular danger as they often live in substandard temporary dwellings, stay in remote areas where warnings may not reach them and only have limited access to existing shelters. In Box 17, information on how the cyclone in 1996 in Andhra Pradesh caused a serious death toll among fishers and their families is given. As a follow-up to the cyclone, FAO implemented a project with the objective of reducing the vulnerability of fishing communities in Andhra Pradesh to natural disasters (see Box 18).

Recommendation 18. Information on and the understanding of disasters and their impact on the livelihoods of fishing communities and their environment need to be improved. Lessons learned from disaster impact and response should be systematically analysed and used to improve future interventions and preventive work at the national and international levels

The tsunami in December 2004 clearly demonstrated the need for a tsunami warning system in the Indian Ocean. Such a system already exists for the Pacific

BOX 18

Project on training in sea safety development programmes in Andhra Pradesh, India

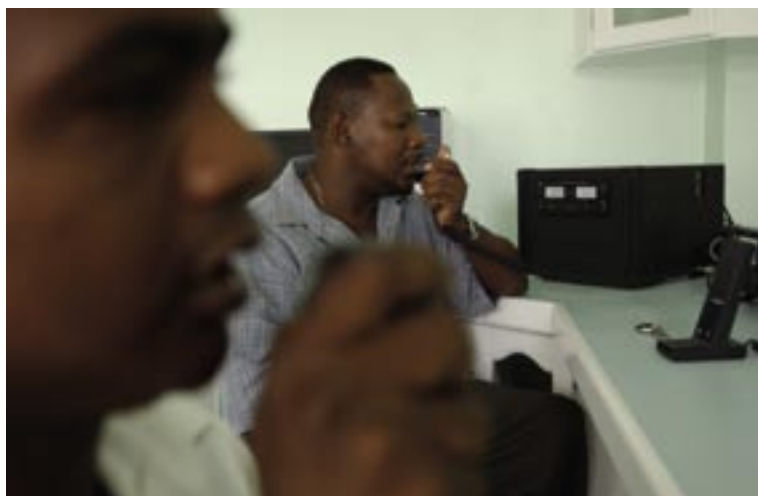
The project, which was implemented during a two-year period from May 1997 to April 1999, included activities to decrease the vulnerability of crews on mechanized fishing boats and that of shrimp seed collectors and villagers. A marine VHF (very high frequency) radio communications system for communicating warnings, weather forecasts and other information to small mechanized vessels was introduced. In addition to the provision of 140 VHF sets and training of 280 crew members, 100 life floats were distributed under this safety at sea component of the project. Several activities were also carried out with regard to disaster preparedness and awareness raising, including training of government and NGO storm safety extension officers, study visits to Thailand and Bangladesh for fisheries officials, and the organization of a workshop. The conclusions and main recommendations for further work and follow-up were the following.

- Legislation for safety at sea should be improved.
- More emphasis should be placed on disaster preparedness as opposed to the current focus on disaster response.
- Weather bulletins and warnings should be adapted for easy understanding by village populations.
- Disaster preparedness should be integrated into all development activities.
- Television and radios should be used more for communicating warnings and for educational purposes to improve community-based disaster preparedness.

Sources: FAO, 2002b; Yadava, Turner and Calvert, 2000.

Ocean; the Pacific Tsunami Warning System was established in 1965 with international collaboration and under the leadership of the Intergovernmental Oceanographic Commission (IOC). It is hosted by the regional Pacific Tsunami Warning Center (PTWC) in Honolulu, Hawaii (UN Atlas of the Oceans, no date). For the development of the Indian Ocean tsunami warning system, the IOC of the United Nations Educational, Scientific and Cultural Organization (UNESCO) took the lead in collaboration with a large number of international partners. The system became operational in mid-2006 and is currently operated by an interim warning centre in cooperation with the Japan Meteorological Agency. In order for the system to be effective and sustainable, continued international cooperation is required, together with the establishment of appropriate structures to ensure that warnings reach populations and communities at risk (United States Department of State, 2006).

The effects of natural and technological disasters and complex emergencies on fishing communities are extensive and affect their livelihoods in multiple ways. However, there is a lack of comprehensive data on disaster impacts and on the



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Fisheries officers in Grenada test new radio equipment that will allow them to warn the island's fishing fleet of approaching hurricanes and tropical storms

effectiveness of disaster response. Often the impact continues to be felt long after the disaster event and after emergency assistance has ended. The preparedness, coping capacity and resilience of the affected population and the appropriateness of the external assistance provided are determinants as to how effectively and efficiently communities and their environment can recover from disaster damages. These factors consist of a number of aspects that need to be considered in a coherent framework of DRM. Although evaluations of the effectiveness of disaster response are subsequently carried out, it would appear that the lessons learned are sometimes forgotten when the focus has moved on to the next task or new emergency. However, considerable experience exists from disaster response in general and increasingly from fisheries disaster response and impact and this knowledge must be shared, disseminated and exploited.

Concluding remarks

Most small-scale fishers, aquaculturists and fish workers live in developing countries and the fisheries sector is an important contributor to food security and poverty alleviation. However, fishing and coastal aquaculture communities are often faced with a wide range of problems and they experience high levels of vulnerability to external shocks. Coastal communities are particularly sensitive to natural disasters. In the tsunami disaster in 2004, poor people in coastal areas were disproportionately affected, clearly demonstrating the link between poverty and vulnerability to disasters. That poverty is a fundamental factor contributing to disaster risk has also been confirmed by the impact of many other disasters.

Coastal communities are dependent on fishery resources for their livelihoods; safeguarding the long-term sustainability of this natural resource base must be a key development priority, together with poverty alleviation. The sustainable utilization of fishery resources and the promotion of sustainable aquaculture practices need to be taken into consideration in disaster response and a longer-term perspective incorporated in the early phases of emergency and rehabilitation.

While improving and strengthening responses to disasters should be of prime concern for governments and the international community, there is also a strong need for preventive work in the form of disaster preparedness, building resilience and addressing the underlying factors of disaster vulnerability. This is especially important in regions prone to natural disasters. The specific characteristics and needs of the fisheries sector should be considered in this work and incorporated into overall DRM systems. At the same time as a perspective of long-term sustainability needs to be built into disaster response and emergency interventions, disaster risk considerations should be built into sustainable development policies, planning and programmes.

Lessons learned from the 2004 tsunami response show that some of the main issues with regard to disaster response in the fisheries sector are related to coordination and technical support. FAO has long experience of working closely with governments and fishing and aquaculture communities on a variety of development activities and is a recognized partner for technical assistance and advice. This, together with the Organization's position as a neutral UN agency, puts FAO in a unique position for assisting disaster-stricken governments in coordination and providing technical advice. However, FAO is not a donor and it has only limited financial resources for emergency and rehabilitation interventions through its Regular Programme budget. These limited funds can play a vital role, above all in the initial phases of the disaster response. However, it is desirable that donors recognize the comparative advantage of FAO in relation to disasters in the fisheries sector and promote the role it could play by funding support to

coordination and technical assistance as part of their early response. The findings of the Tsunami Evaluation Coalition (TEC)¹⁸ confirm that “specialized UN agencies should focus primarily on their role as sectoral or cluster lead agency (assessment and coordination) and avoid being overly distracted by the direct implementation of response activities that other humanitarian actors could do” (TEC, 2006).

The information available on the impact of natural and technological disasters and complex emergencies on fishing and aquaculture communities and on the livelihoods of sectoral stakeholders is fairly limited and not easily accessible. Moreover, the findings, results and lessons learned of fisheries and aquaculture emergency interventions are not well-documented or shared within and outside the sector. FAO has aimed in this document to collect, analyse and disseminate an important part of the experience and information existing within the Organization on the subject. It is clear that as this experience further develops the need may arise to revise the document and expand it with new evidence, information and experience. Therefore, it should be considered as work in progress.

¹⁸ This specific needs assessment TEC evaluation was managed by WHO, FAO and SDC with the financial support of CIDA, DFID, Germany, SDC, USAID, and FAO, UNICEF, WFP and WHO. The work was carried out by Dr Claude de Ville de Goyet and Lezlie C. Morinière of the International Centre for Migration and Health (ICMH). See bibliography for full reference (TEC, 2006).

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Over the last few decades, natural and human-induced disasters have become more frequent and increasingly destructive. Populations depending on fisheries and aquaculture for their livelihoods have become more and more vulnerable and have been seriously affected by loss of life and property. This document gives an overview of FAO's work with regard to such disasters in the fisheries and aquaculture sectors, together with the lessons learned and experience gained on how to improve disaster response, preparedness and prevention in these sectors. One of the main purposes of this document is to support policy- and decision-makers involved in disaster response and disaster risk management by increasing their effectiveness in addressing the needs of fishers and coastal communities in relation to disasters.

ISBN 978-92-5-105795-3 ISSN 0429-0045



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TGMA/12/17E/107 07/1360