

# Abandoned, lost or otherwise discarded fishing gear



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# Abandoned, lost or otherwise discarded fishing gear

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## Preparation of this document

This document has been prepared by Graeme Macfadyen, Tim Huntington and Rod Cappell of Poseidon Aquatic Resource Management Ltd as part of the 2007 Memorandum of Understanding between the Food and Agriculture Organization of the United Nations (FAO) and the Regional Seas Programme of the United Nations Environment Programme. The document draws on a wide range of data and information sources. It covers the issue of abandoned, lost or otherwise discarded fishing gear (ALDFG) in coastal and marine areas, but has not investigated ALDFG in riverine and lacustrine environments.

A review of available background material has been complemented by e-mail and telephone communication with various industry and government sources, and through the use of a semi-structured online questionnaire which was completed by a number of fisheries experts with an interest in, or previous experience of, issues related to ALDFG.

# Abstract

Abandoned, lost or otherwise discarded fishing gear (ALDFG) is a problem that is increasingly of concern. Various United Nations General Assembly resolutions now provide a mandate for, and indeed require, action to reduce ALDFG and marine debris in general. Consequently, the United Nations Environment Programme (UNEP) and the Food and Agriculture Organization of the United Nations (FAO) entered into an agreement to carry out a study in relation to ALDFG in order to raise awareness of the extent of the problem and to recommend action to mitigate the problem of ALDFG by flag states, regional fisheries management bodies and organizations, and international organizations, such as UNEP, the International Maritime Organization (IMO) and FAO.

This report reviews the magnitude and composition of ALDFG, and while noting that information is not comprehensive and does not allow for any global estimates, suggests that gillnets and fishing traps/pots may be the most common type of ALDFG, although netting fragments may also be common in some locations.

The impacts of ALDFG are also considered and include: continued catching of target and non-target species (such as turtles, seabirds and marine mammals); alterations to the benthic environment; navigational hazards; beach debris/litter; introduction of synthetic material into the marine food web; introduction of alien species transported by ALDFG; and a variety of costs related to clean-up operations and impacts on business activities. In general, gillnets and pots/traps are most likely to “ghost fish” while other gear, such as trawls and longlines, are more likely to cause entanglement of marine organisms, including protected species, and habitat damage.

The factors which cause fishing gear to be abandoned, lost or otherwise discarded are numerous and include: adverse weather; operational fishing factors including the cost of gear retrieval; gear conflicts; illegal, unregulated and unreported (IUU) fishing; vandalism/theft; and access to and cost and availability of shoreside collection facilities. Weather, operational fishing factors and gear conflicts are probably the most significant factors, but the causes of ALDFG accumulation are poorly documented and not well understood. A detailed understanding of why gear is abandoned, lost or discarded is needed when designing and tailoring effective measures to reduce ALDFG in particular locations.

A variety of measures are currently in place to reduce ALDFG, and these are profiled in this report. They include those which are preventative or *ex-ante*, and those which are curative or *ex-post*. Evidence suggests that while both are important, much of the emphasis to date has been placed on curative measures such as gear retrieval programmes and clean-up of beach litter, while preventative measures may generally be more cost-effective in reducing ALDFG debris and its impacts.

This report concludes with a number of recommendations for future action to reduce ALDFG debris, be it on a mandatory or voluntary basis. It also considers at what scale and which stakeholders (e.g. international organizations, national government, the private sector, research institutions) might be best placed to address the wide range of possible measures to reduce the amount of ALDFG debris.

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## Foreword

Fishing gear has been lost, abandoned or otherwise discarded in all seas and oceans ever since fishing began. The extent and impacts of the problem have increased significantly over the last 50 years with the increasing levels of fishing effort and capacity in the world's oceans and the increasing durability of fishing gear. Fishing activity has now extended to previously untouched offshore and deep-sea environments, which are often very sensitive to the impacts of abandoned, lost or otherwise discarded fishing gear (ALDFG).

ALDFG is of increasing concern due to its numerous negative environmental and economic impacts, including navigational hazards and associated safety issues. The ability of ALDFG to continue to fish (often referred to as “ghost fishing”) has detrimental impacts on fish stocks and potential impacts on endangered species and benthic environments. ALDFG also results in both economic and social costs that can be significant.

The transboundary nature of the problem means that regional and international cooperation to deter ALDFG is vital. International recognition of the ALDFG problem as one aspect of the larger global challenge of marine litter is demonstrated through the large number of international organizations, activities and agreements that now focus on marine debris, as well as the numerous national and local level initiatives that are being implemented around the world.

The issue of ALDFG has been raised at the level of the United Nations General Assembly (UNGA) on several occasions:

- Resolution A/RES/60/30 of 2005 notes the lack of information and data on marine debris and encourages relevant national and international organizations to undertake further studies on the extent and nature of the problem;
- Resolution A/RES/60/31 of 2005 calls upon States, the Food and Agriculture Organization (FAO), the International Maritime Organization (IMO), the United Nations Environment Programme (UNEP), and in particular its Regional Seas Programme (RSP), regional and subregional fisheries management organizations and arrangements and other appropriate intergovernmental organizations to take action to address the issue of lost or abandoned fishing gear and related marine debris through the collection of data on gear loss, economic costs to fisheries and other sectors, and the impact on marine ecosystems;
- Resolution A/RES/61/222 of 2006 welcomes the activities of the UNEP relating to marine debris carried out in cooperation with relevant United Nations bodies and organizations; and
- Resolution A/RES/61/105 of 2006 reaffirms the importance it attaches to the issue of lost, abandoned, or discarded fishing gear and related marine debris expressed in its resolution 60/31.

As early as the 1980s, FAO recognized this issue as a major global problem and serious threat to the marine and coastal ecosystems. FAO is currently working to address the ALDFG problem through its Impact of Fishing on the Environment Programme. FAO has also considered the problem in the FAO Committee on Fisheries (COFI) and considers marine debris and ALDFG as an important issue in the Ecosystem Approach to Fisheries. The FAO Code of Conduct for Responsible Fisheries (CCRF) was adopted (1995) to promote responsible fishing practices, and it encourages states to tackle issues associated with the impacts of fishing on the marine environment. Implementation of the CCRF has high priority for FAO both

globally and regionally. In this process, the requirements to minimize ALDFG, and the responsibility to recover such gear and to deliver it to port for destruction/recycling should be continuously highlighted.

In response to the UNGA calls, the UNEP (Global Plan of Action (GPA) and the RSP), through its Global Initiative on Marine Litter, which includes the issue of ALDFG, took an active lead in addressing the challenge by assisting 12 Regional Seas around the world in organizing and implementing regional activities and strategies on marine litter. The 12 Regional Seas include the Baltic Sea, the Black Sea, the Caspian, the East Asian Seas, the Mediterranean Sea, the Commission for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), the Red Sea and the Gulf of Aden, the South Asian Seas, the Northwest Pacific, the Southeast Pacific, Eastern Africa and the Wider Caribbean.

While there remains a lack of comprehensive data on ALDFG, the growing recognition of problems caused by ALDFG suggests a need to develop a coordinated and effective response by a wide range of ALDFG stakeholders. These stakeholders include the UNGA, IMO, FAO, UNEP, the Intergovernmental Oceanographic Commission (IOC), Regional Fishery Bodies (RFB), Regional Seas conventions and action plans, the Global Environment Facility – Large Marine Ecosystem (GEF-LME) projects, regional economic groupings, governments, non-governmental organizations and the fishing industry itself.

To establish an appropriate response to the problem of ALDFG and the request of the UNGA, FAO and UNEP joined forces for the preparation of this report on *Abandoned, lost or otherwise discarded fishing gear*. This report gathers available information and examples from around the world on several aspects of ALDFG and marine litter in general including: (a) the magnitude and composition of ALDFG; (b) the impacts of ALDFG and associated financial costs; (c) reasons why fishing gear is abandoned, lost or otherwise discarded; and (d) measures being taken to combat ALDFG and the success of current efforts. It concludes with a series of recommendations to address the problem.

It is the sincere hope of UNEP and FAO that this report will provide the basis for a coordinated and cooperative approach of international, regional and national efforts to seriously address the issue. This, in turn, should contribute to a significant decrease in quantities of ALDFG across our seas and oceans every year, and consequently will contribute to the protection and conservation of our marine and coastal ecosystems and resources.

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## Acronyms and abbreviations

ALDFG	abandoned, lost or otherwise discarded fishing gear
ANZECC	Australian and New Zealand Environment Conservation Council
APEC	Asia-Pacific Economic Cooperation
APFIC	Asia-Pacific Fisheries Commission
ASV	autonomous survey vessel
BIM	Bord Iascaigh Mhara (Irish Fisheries Board)
BOBP	Bay of Bengal Programme
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCRF	Code of Conduct for Responsible Fisheries
COFI	Committee on Fisheries
CPR	continuous plankton recorder
CRFM	Caribbean Regional Fisheries Mechanism
DFO	Department of Fisheries and Oceans (Canada)
EAF	Ecosystem Approach to Fisheries
EC	European Commission
ETESP	Earthquake and Tsunami Emergency Support Project
EU	European Union
FAD	fish aggregating device
FANTARED	ghost net (in Spanish)
FAO	Food and Agriculture Organization of the United Nations
FAOSLAC	FAO Subregional Office for Latin America and the Caribbean
FIIT	Fishing Technology Service (FAO)
FRS	Fisheries Research Services (Scotland)
GFCM	General Fisheries Commission for the Mediterranean
GPA	Global Plan of Action
GPS	global positioning system
GSMFC	Gulf States Marine Fisheries Commission
GT	gross tonnage
HERZ	high entanglement risk zones
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tuna
ICES	International Council for the Exploration of the Sea
IEEP	Institute for European Environmental Policy
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission (UNESCO)
IPHC	International Pacific Halibut Commission
IPOA	International Plan of Action
IUU	illegal, unreported and unregulated (fishing)
MARPOL	International Convention for the Prevention of Pollution from Ships
MCS	monitoring, control and surveillance
MEPC	Marine Environment Protection Committee (of the IMO)
NAFO	Northwest Atlantic Fisheries Organization
NOAA	National Oceanic and Atmospheric Administration
NOWPAP	Northwest Pacific Action Plan
NPOA	National Plan of Action

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NRC	National Research Council (United States of America)
OSPAR	Oslo-Paris Commission for the Protection of the Marine Environment of the North-East Atlantic
RFB	Regional Fishery Body
RFMO	Regional Fisheries Management Organization
ROPME	Regional Organization for the Protection of the Marine Environment
ROV	remotely operated vehicle
RSP	Regional Seas Programme (of the UNEP)
SCUBA	self-contained underwater breathing apparatus
SPC	South Pacific Commission
SPREP	South Pacific Regional Environment Programme
SSS	side scan sonar
TED	turtle exclusion device
UNEP	United Nations Environment Programme
UNGA	United Nations General Assembly
UNICPOLOS	UN Open-ended Informal Consultative Process on Oceans and the Law of the Sea
USGS	United States Geological Survey
VMS	vessel monitoring system
WCPCF	Western and Central Pacific Fisheries Commission
WECAFC	Western Central Atlantic Fishery Commission
WWF	World Wide Fund for Nature

# Executive summary

## INTRODUCTION

Abandoned, lost or otherwise discarded fishing gear (ALDFG) is of increasing concern due to its numerous negative impacts. The ability of ALDFG to continue to fish (often referred to as “ghost fishing”) has detrimental impacts on fish stocks and potential impacts on endangered species and benthic environments. Fishing gear has been abandoned, lost or otherwise discarded since fishing began, but increases in the scale of fishing operations and technologies used in recent decades mean that the extent and impact of ALDFG debris have increased significantly with the use of synthetic materials, the overall increase in fishing capacity and the targeting of more distant and deepwater grounds. ALDFG is also a concern because of its potential to become a navigational hazard (with associated safety issues) in coastal and offshore areas.

The issue of ALDFG has been raised at the United Nations General Assembly (UNGA) on several occasions and as ALDFG is part of a wider problem of marine pollution, it comes under the remit of the International Maritime Organization (IMO). The IMO’s mandate includes the International Convention for the Prevention of Pollution from Ships (MARPOL), and the IMO’s Marine Environmental Protection Committee in 2006 established a correspondence group, which includes the Food and Agriculture Organization (FAO), to review MARPOL’s Annex V. The United Nations Environment Programme (UNEP) is dealing with the issue of ALDFG as part of a broader Global Initiative on Marine Litter that is being implemented through the UNEP Regional Seas Programme.

FAO has also considered the problem in the FAO Committee of Fisheries (COFI) and considers marine debris and abandoned, lost or otherwise discarded fishing gear an area of major concern. The FAO Code of Conduct for Responsible Fisheries (CCRF) was introduced to promote responsible fishing practices and encourages states to tackle issues associated with fishing impact on the marine environment. Article 8.7 of the CCRF specifically addresses the requirements of MARPOL.

At a regional level, the Asia-Pacific Economic Cooperation (APEC) has recognized the problem of ALDFG and is seeking solutions to the problem and agreed the Bali Plan of Action (September, 2005) to support efforts “to address derelict fishing gear and derelict vessels, including the implementation of recommendations from research already undertaken in the APEC context”. The European Commission (EC) Communication on Promoting more Environmentally-friendly Fishing Methods (EC, 2004) identifies the need to address ghost fishing as part of the broader drive to tackle unwanted catches. EC Regulation 356/2005 (EC, 2005) also lays down rules for the marking of passive gear and beam trawls in EC waters.

At a national level, some countries have taken unilateral action against ALDFG components of marine litter. For instance the Marine Debris Research, Prevention, and Reduction Act came into law in late 2006 in the United States of America, which establishes programmes to identify, assess, reduce and prevent marine debris and its effects on the marine environment and navigation safety. Some states in the United States of America also have their own laws addressing the problem of marine debris, while other states have made substantial progress through voluntary programmes.

To establish an appropriate response to the problem of ALDFG, this report gathers available information and examples from around the world on several aspects of ALDFG.



**Report objectives and structure.** While there remains a lack of comprehensive data on ALDFG, the growing recognition of problems caused by ALDFG suggests a need to develop a coordinated and effective response by a wide range of ALDFG stakeholders. These stakeholders include UNGA, IMO, FAO, UNEP, the Intergovernmental Oceanographic Commission (IOC), Regional Fishery Bodies (RFB), Regional Seas organizations, regional economic groupings, governments, non-governmental organizations and the fishing industry itself.

To establish an appropriate response to the problem of ALDFG, the report gathers available information and examples from around the world on the following aspects of ALDFG in particular and marine litter in general:

- The magnitude and composition of ALDFG (Chapter 2);
- The impacts of ALDFG and the associated financial costs (Chapter 3);
- The reasons why fishing gear is abandoned, lost or otherwise discarded (Chapter 4); and
- The measures being taken to combat ALDFG and the degree of success achieved to mitigate ALDFG impacts (Chapter 5).

The report concludes with a series of recommendations to address the problem (Chapter 6).

### MAGNITUDE OF MARINE LITTER AND ALDFG

Marine litter is either sea-based or land-based, with fishing activity just one of many different potential sources. The report concludes that there is no overall figure for the contribution of ALDFG to marine litter. A number of estimates suggest very different contributions of fishing activity to total marine litter based on locality. Close to or on the shore, the majority of litter originates from land-based sources.

When considered on a global basis, and including litter that does not get washed up on beaches, it appears likely that merchant shipping contributes far more to marine litter than ALDFG from fishing vessels. There are significant differences in terms of the weight and the type of impacts on the environment of marine litter from merchant shipping and synthetic forms of ALDFG. Attempts at broad-scale quantification of marine litter enable only a crude approximation of ALDFG comprising less than 10 percent of global marine litter by volume,<sup>1</sup> with land-based sources being the predominate cause of marine debris in coastal areas and merchant shipping the key sea-based source of litter.

Table 6 (page 27) summarizes ALDFG indicators from a number of fisheries around the world. It should be noted that information on fisheries in which ALDFG has been reported is drawn from sources published over an extended period. It is possible that some of these fisheries have changed in nature and thus the information presented may not reflect the current ALDFG situation.

The table demonstrates the wide variability of loss rates from different fisheries and also highlights the patchiness of data on ALDFG. It should be noted that reports of gear loss do not necessarily equal the same volume of ALDFG remaining in the environment indefinitely, as some may subsequently be retrieved by other operators in the fishery. Furthermore it should be noted that the activity of many of the inshore fisheries in North America and Europe has contracted, while fishing effort elsewhere may have expanded.

ALDFG tends to accumulate and often reside for extended time periods in ocean convergence zones. Mass concentrations of marine debris in areas such as the equatorial convergence zone are of particular concern, creating “rafts” of assorted debris, including various plastics, ropes, fishing nets, and cargo-associated wastes that

<sup>1</sup> It should be noted that literature on marine litter in general and ALDFG in particular uses a mixture of volume, abundance and weight, complicating global estimates and comprising their robustness.

often extend for many kilometres. The ocean convergence zones have been modeled and mapped by various researchers (e.g. Figure 5, page 26).

### IMPACTS OF ALDFG

The ability of ALDFG to “ghost fish” is one of the most significant impacts of ALDFG and is highly specific to a number of factors. These include the gear type (whether it has been abandoned as a set gear maximized for fishing or discarded/lost where it is less likely to fish) and the nature of the local environment (especially in terms of currents, depth and location). ALDFG has a number of environmental impacts, which can be grouped as follows:

- **Continued catch of target and non-target species.** The state of the gear at the point of loss is important. For example, lost nets may operate at maximum fishing efficiency and will thus have high ghost fishing catches and, if well anchored, be slow to collapse. Some abandoned or lost gears may collapse immediately and have lower initial fishing efficiencies, unless they become snagged on rock, coral or wrecks where they are held in a fixed fishing position. Discarded gear or parts thereof would also have a low fishing efficiency. Fish dying in nets may also attract scavengers that are then caught in the nets, resulting in cyclical catching by the fishing gear.
- **Interactions with threatened/endangered species.** ALDFG, especially when made of persistent synthetic material, can impact marine fauna such as sea birds, turtles, seals or cetaceans through entanglement or ingestion. Entanglement is generally considered far more likely a cause of mortality than ingestion
- **Physical impacts on the benthos.** *Gillnets* may have little impact on the benthic fauna and the bottom substrate. However, they may be dragged along the bottom by strong currents and wind during retrieval, potentially harming fragile organisms like sponges and corals. In deep water areas where the current is strong and heavy weights (>100 kg) are required to anchor nets, there may be localized impacts. The potential physical impacts of ALD *traps* depend upon the type of habitat and the occurrence of these habitats relative to the distribution of traps. In general, sand and mud-bottom habitats are less affected by crab and lobster traps than sensitive bottom habitats such as sea grass beds or areas where emergent fauna such as corals and sponges occur. ADL *hook and line*, an important commercial and recreational gear, has a low capture efficiency but may entangle both marine animals and habitats, especially in complex inshore habitats such as reef structures.
- **Distribution of marine and terrestrial litter.** At a general level, the UNEP Global Programme of Action (UNEP, 2003) states that as much as 70 percent of the entire input of marine litter to the world’s oceans sinks to the bottom and is found on the sea bed, both in shallow coastal areas and in much deeper parts of the oceans. Accumulation of litter in offshore sinks may lead to the smothering of benthic communities on soft and hard seabed substrates.
- **Introduction of synthetic material into the marine food web.** Modern plastics can last up to 600 years in the marine environment, depending upon water conditions, ultraviolet light penetration and the level of physical abrasion. Furthermore, the impact of microscopic plastic fragments and fibers, which result from the degradation of larger items, is not known. Thompson *et al.* (2004) examined the abundance of microplastics in beaches, estuarine and subtidal sediments and found them to be particularly abundant in subtidal sediments. The high accumulation potential suggests that microplastics could be a potential source of toxic chemicals in the marine environment.

ALDFG also results in both **economic and social costs** that can be significant. A key socio-economic impact is the navigational threat of ALDFG to marine users. It is very difficult to rate or compare the magnitude of the wide range of socio-economic

costs, as literature is very scarce and there are particular problems in quantifying and comparing social costs. Estimating the costs associated with compliance, rescue, and/or research costs associated with ALDFG is complex, and does not seem to have been attempted to date.

The lack of accurate data on the costs of measures to reduce ALDFG, plus a failure to quantify the benefits that would result from reduced ALDFG, mean that there are few attempts to balance the respective costs and benefits of different measures designed to reduce ALDFG.

### CAUSES OF ALDFG

It is important to recognize that due to the environment in which fishing takes place, and the technology used, some degree of ALDFG is inevitable and unavoidable. As with the magnitude of ALDFG, the causes of ALDFG vary between and within fisheries. When one considers that gear may be a) abandoned, b) lost, or c) discarded, it is clear that some ALDFG may be intentional and some unintentional. Correspondingly, the methods used for reducing abandoned, lost and discarded fishing gear may therefore need to be diverse (Smith, 2001).

Direct causes of ALDFG result from a variety of pressures on fishers, namely *enforcement pressure* causing those operating illegally to abandon gear; *operational pressure* and weather making it more likely that gear will be left or discarded; *economic pressure* leading to dumping of unwanted fishing gear at sea rather than disposal onshore; and *spatial pressures* resulting in the loss or damage of gear through gear conflicts. Indirect causes include the unavailability of onshore waste disposal facilities, as well as their accessibility and cost of use.

### MEASURES TO ADDRESS ALDFG

Measures to specifically address ALDFG can broadly be divided between measures that *prevent* (avoid the occurrence of ALDFG in the environment); *mitigate* (reduce the impact of ALDFG in the environment) and *cure* (remove ALDFG from the environment). Experience to date illustrates that many of these measures can be applied at a variety of levels (internationally, nationally, regionally, locally) and through a variety of mechanisms. To successfully reduce the problem of ALDFG, and more generally to reduce its contribution to marine debris, it is likely that actions and solutions will need to address all three types of measures, i.e. preventative, mitigating and curative.

Also of considerable importance is that some measures may need to be supported by a legal requirement, while others may be just as effective if introduced on a voluntary basis and when incentives are provided. The likely success of introduced measures therefore may depend strongly on whether the correct approach is taken with regards to a mandatory or voluntary/incentivized approach.

**Preventative measures** are identified as the most effective way to tackle ALDFG, as they avoid the occurrence of ALDFG and its associated impacts. Measures include gear marking; the use of onboard technology to avoid loss or improve the location of gear; and the provision of adequate, affordable, accessible onshore port reception/collection facilities. It is also acknowledged that effort reduction measures such as limits to the amount of gear that can be used (e.g. pot/trap limits) or the soak-time (the amount of time gear can remain in the water) could reduce operational losses. Spatial management (e.g. zoning schemes) is also a useful tool in addressing gear conflict, which can be a significant cause of ALDFG. Measures to increase the effectiveness of port State measures in tackling illegal, unreported and unregulated (IUU) fishing would also reduce the abandonment of gear, which contributes to ALDFG.

**Mitigation measures** to reduce the impact of ALDFG are limited in their extent and application as many may increase costs through reduced effectiveness of gear or higher gear prices. Consequently, the development of innovative materials has been

slow and the return to biodegradable netting by the industry has been very limited. Trials are continuing on net materials that increase sound reflectivity and hence could reduce the by-catch of non-target species such as cetaceans. These and other innovative solutions are being encouraged through initiatives such as the International Smart Gear Competition ([www.smartgear.org](http://www.smartgear.org)) of the World Wide Fund for Nature (WWF).

**Curative measures** are inevitably reactive to the presence of ALDFG in the environment and will therefore always be less effective than avoiding ALDFG in the first instance. However curative measures have still been shown to be cost-effective when considering the costs of leaving the ALDFG *in situ*. Measures can be seen to be broadly sequential in the identification, removal from the environment and appropriate disposal of ALDFG. They include efforts to locate lost gear using various technologies such as the side scan sonar for sea-bed surveys; the introduction of systems to report lost gear; gear recovery programmes; and the disposal/recycling of ALDFG material.

**Raising awareness** of the ALDFG problem is a cross-cutting measure that can aid the development and implementation of any of the measures previously described. It can target fishers themselves, port operators, marine users or the general public through local, national regional or international campaigns. Education can, if effective, facilitate a change in behaviour and result in self-policing by stakeholders, and it has the potential to extend beyond those directly targeted, to change behaviour in society. To raise awareness effectively, the specific problem being encountered needs to be understood so that actions can be appropriately targeted.

The review concludes the following:

- ALDFG is a serious global marine environmental problem, causing ecological, biodiversity, economic and shoreside impacts.
- There is a paucity of quantitative data on ALDFG for many regions of the world. Relatively good data is available from a few concentrated geographical areas where intensive studies have been conducted, such as near the Hawaiian Islands, the Seas of Northeast Asia and the North Pacific. However in many other regions there is very little or absolutely no data.
- Sound international policy, legislative and regulatory regimes have been developed and are in place (e.g. MARPOL Annex V). However, there are significant deficiencies in the implementation and enforcement of these regimes.
- Addressing the problem is challenging, as it depends to a significant degree on changing human behaviour in addition to providing the relatively straightforward technological fixes.
- A concerted global effort is needed to begin to address the problem, involving continued close cooperation between the main relevant UN agencies (FAO, IMO and UNEP), Regional Fishery Bodies (RFB), Regional Seas organizations, governments, the fishing industry, ports and environmental non-governmental organizations (NGOs).

The report recommends<sup>2</sup> that:

- UN agencies work collaboratively in addressing the revision of MARPOL Annex V and its guidelines with respect to ALDFG, with a particular focus on the marking of fishing gear to identify ownership, defining what constitutes reasonable losses of gear, providing port reception facilities, and lowering the limit of gross tonnage (GT) that requires fishing vessels to carry garbage record books;
- best practice technical guidelines be developed for policy-makers, Regional Fisheries Management Organizations (RFMOs) and resource managers to assist them with formulation of ALDFG abatement plans;

<sup>2</sup> The full set of recommendations can be found in Chapter 6.

- a determined and sustained global awareness and outreach programme be designed and implemented to effect a cultural shift and behavioural change by adopting innovative communication approaches. The primary audience should be the fishing industry and port users/operators. The programme should be implemented regionally and be regionally relevant and culturally appropriate;
- a programme of innovative economic incentives/measures be developed to prevent/reduce abandonment, loss and the discarding of fishing gear at sea; and
- programmes of monitoring and, where necessary, implementation of measures be developed to reduce ALDFG in regions of the world where little or no data is available (e.g. seas around Africa, South Asia and South America).