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Sources Of Information Supporting Estimates Of Unreported Fishery Catches (IUU) For 59 Countries And The High Seas

Fisheries Centre, University of British Columbia, Canada

SOURCES OF INFORMATION SUPPORTING ESTIMATES OF UNREPORTED FISHERY CATCHES (IUU) FOR 59 COUNTRIES AND THE HIGH SEAS

by
Ganapathiraju Pramod, Tony J. Pitcher,
John Pearce, and David Agnew

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CONTENTS

A Research Report from the Fisheries Centre at UBC and MRAG, London, UK

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DIRECTOR'S FOREWORD

Two of the many myths about marine fisheries are that they globally catch about 90 million tonnes per year, and that this catch is stagnating because we are now extracting the 'maximum sustainable yield', thus fulfilling decades-old predictions of a global potential yield near 100 million tonnes per year. And Bjørn Lomborg – he of the '*Skeptical Environmentalist*' – even glibly adds that the 10 million tonnes between present catches and the predicted potential is the (small) price we have to pay for overfishing.

The whole thing is, unfortunately, not even remotely so. In fact, a new concept, that of Illegal, Unreported and Unregulated (IUU) catches had to be invented (in addition to the concepts of 'by-catch' or 'discards') to be able to approach the reality that the 'catches' reported to FAO by member countries are only a part of (sometimes even a small part) of official landings, i.e., that the latter, in most cases, considerably under estimate real 'catches'.

Perhaps is appropriate here to recall that the catch of a fishery (or more precisely its 'yield', i.e., its catch in weight) consist of the landing that is reported, plus the landing that is not reported (because it was caught illegally, or by small-scale fishers that nobody cares about), plus the by-catch that was discarded (and which consist of dead animals in the overwhelming majority of cases) plus the losses due to ghost fishing, i.e., the weight of the animals killed by gear (e.g., traps, or gill nets) discarded or lost by that fishery. It is now understood that, to understand a fishery, all these sources of death must be accounted for, especially in the context of ecosystem based management of fisheries. An ecosystem can be, for example, the Exclusive Economic Zone of a given country, in which case complete catches must be known for all fleets, whether national or distant-water fleets.

The fisheries science community has only recently realized the danger of taking at face value the 'catches' that member countries submit to FAO. However, their gradual replacement by sound statistics is going to be difficult, as an early experience I had with the catch of the People's Republic of China illustrates (although the problem, in this case, was over-reporting of catches). Indeed, I predict that a few governments are going to be put on the spot by the present report, which documents substantial IUU catch for many of the many countries it covers. Some of their representatives will even argue with the data presented therein. But they will not present better data.

As the alert reader will notice, this report emphasizes industrial fisheries, and the 'Illegal' part of IUU catches. Thus, it neatly complements *Fisheries Centre Research Reports* vol. 14(8) (2006), and 15(2) (2008), which present initial steps toward accounting for the catch of small scale fisheries, a major part of the second 'U' of IUU. Here too we welcome the outcome of a neat collaboration between the Fisheries Centre and the Marine Resources Assessment Group from the United Kingdom, both groups that have been working on estimating IUU for some time. Through concerted efforts of this sort, it should be possible to overcome some of the myths that the existence of IUU catches have allowed to emerge. The present report will be an important step in this direction.

Daniel Pauly,
Director, Fisheries Centre

EXECUTIVE SUMMARY

Illegal and unreported fishing prejudices the managed recovery of the world's oceans from severe fish depletions. It is reported to lead to a loss of many billions of dollars of annual economic benefits and has wider consequences for conservation and food supply.

Estimating the level of illegal fishing is, by its very nature, extremely difficult and has not previously been attempted on a global scale. Fishing vessels, especially those fishing in high seas waters and under third party access agreements to EEZ waters, are highly mobile. Although there are a number of studies of the level of IUU fishing in individual fisheries (both EEZs and high seas), in this work we have attempted, for the first time, a detailed study that can provide global estimates of current and historical illegal and unreported catches.

This Report documents source material used in assembling quantitative estimates of illegal fishery catches, unreported catches and discards used in a series of spreadsheet analyses as part of a global estimate of IUU fishing. The results, together with details of the methods used, are published in Agnew *et al.* (2008, and *in prep*.) and in Pitcher *et al.* (*in prep*.).

High Seas material is based on information from six selected RFMOs, supplemented with notes on high seas activities from individual countries. Information on individual countries is based on material extracted from previous country reports covering compliance with the FAO (UN) Code of Conduct for Responsible Fishing (Pitcher *et al.* 2006, 2008, 2009), supplemented with some additional and more recent notes. The 59 countries covered here amount to approximately the top 96% of the world fish catch.

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John Pearce and David Agnew (MRAG, London, UK)

CCAMLR (COMMISSION FOR THE CONSERVATION OF ANTARCTIC MARINE LIVING RESOURCES): ANTARCTIC (HIGH SEAS AND AREAS UNDER NATIONAL JURISDICTION)

Summary of information concerning IUU fishing

Overview

The Antarctic Ocean is covered by three FAO regions 48 (Atlantic Antarctic), 58 (Indian Antarctic) and 88 (Pacific Antarctic). The development of fisheries within Antarctic waters commenced in the late 1960's and 1970's with the development of fisheries for notothenids and for krill in area 48 around South Georgia.

Illegal, Unreported and Unregulated fishing

The Sub-Antarctic and Antarctic fisheries for Patagonian and Antarctic toothfish species *Dissostichus eleginoides* and *D. mawsoni* have been subject to Illegal and Unregulated fishing from the early 1990s These high value species are caught by longlines at between 500m and 2000m deep around the Antarctic continent and sub-Antarctic islands. IUU fishing for toothfish in the Southern Ocean has received a great deal of attention over the past few years. The illegal toothfish fishery was first recorded in 1991 with catches being taken from subarea 48.3 around South Georgia. With increasing surveillance around South Georgia the illegal fishers moved their attention eastwards towards the South African and French territories of Prince Edward and Marion Islands and Crozet Islands, and by late 1996 had reached Kerguelen Island and the Heard and MacDonald Islands. At its height, in 1997, CCAMLR estimates that 32,600 t was taken illegally by bottom longliners with a value of $160M (Agnew 2000). By 2004 CCAMLR estimated that the catch was about 3000 t, which equates to about $40M (CCAMLR, 2004). Thus, even at its height the value of this IUU catch was not particularly significant in world terms.

The reason why this fishery attracted so much publicity is probably that IUU was well estimated, publicly discussed by CCAMLR and publicised by a number of NGO and industry groups (e.g., ISOFISH ; Fallon and Krikoken, 2004) due to the potentially damaging effects of the illegal fleets on endangered seabird populations. The majority of the early IUU catch was taken from the EEZ areas within the CCAMLR Convention Area but by 2002 the growing enforcement presence from the coastal states had forced IUU vessels to fish more in high seas parts of the Convention Area, especially close to the Antarctic continent in the Indian Ocean sector (Area 58) and in the Ross Sea (88.1 / 88.2). There have even been suggestions that there is an organised crime component to IUU fishing for toothfish (Austral Fisheries, 2002).

A full series of estimated IUU catches by area is published annually by CCAMLR (e.g., CCAMLR, 2007a).

Discards

Very few discards occur in the Antarctic fisheries in terms of volume. Catches are dominated by the krill fisheries which do not suffer from a large scale discarding problem as the majority of the krill catch will be mealed. Some catches within the other Antarctic fisheries for icefish and toothfish may be discarded e.g., undersized icefish. CCAMLR Conservation Measures are implemented by Contracting Parties' vessels. Discarding is monitored by independent scientific observers on board the vessels. A number of rules have been implemented to minimise the discarding of fish, e.g., CCAMLR Conservation Measure 33/03 details a "move on" rule where a vessel catching greater than 1t of any bycatch species (which may be discarded) must move 5 nautical miles before setting again (CCAMLR, 2007b).

For all high-latitude fisheries (i.e. south of 60°S), such as those in the Ross Sea, there is a discard ban within CCAMLR waters. This is implemented in CM 26-01(2006) where para 5 states that "Vessels fishing south of 60°S shall be prohibited from dumping or discharging:..." which includes offal which would include any discarded fish.

Unreported catches

Most the fisheries within CCAMLR have relatively few problems with bycatch (e.g., krill) and are well reported by their flag states to CCAMLR. There have been minor problems with the non-reporting of

bycatch species such as skates and rays and macrourids. These non-reporting problems have been identified and rectified in many cases due to the level of scientific observer coverage within the fisheries. CCAMLR as an RFMO has the highest proportion of observer coverage of any RFMO at 100% in most fisheries.

There may be an additional mis-reporting of the catch of krill as the majority of krill catches are mealed and have widely varying conversion factors between vessels. As this is the one CCAMLR fishery currently without 100% observer coverage the fresh weight catches cannot be verified independently as for the other fisheries.

Unreported artisanal catches

There are no artisanal fisheries operating in the Antarctic Ocean.

Unreported recreational catches

There are no known recreational fisheries operating in the Antarctic Ocean.

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CCSBT (COMMISSION FOR THE CONSERVATION OF SOUTHERN BLUEFIN TUNA)

Summary of information concerning IUU fishing

Overview

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) is a Regional Fisheries Management Organisation with a single species focus on southern bluefin tuna (*Thunnus maccoyii*). CCSBT was created in 1984 and currently has 5 members, Australia, Japan, Korea, New Zealand and Taiwan. The fishery is dominated by longline vessels although some pole and line vessels operate and additional some purse seine fishing occurs to supply raw material for ranching and farming activities.

The number of fishing vessels selected for targeting southern bluefin tuna in the 2005 fishing season was 168. The number of vessels on the high seas off Tasmania / Sydney was 45, the number of vessels on the high seas off Cape Town was 119, and the number of vessels in Southern Indian Ocean was 58 respectively.

In the 1999 fishing season, 227 fishing vessels (30 vessels less than the 1998 fishing seasons) operated, since Japan cut the number of far-seas tuna longliners following the Plan of Action agreed by FAO. In the 2000 fishing season, the number of vessels for SBT was reduced to 172 in accordance with the reduction of the catch limit based on the provisional measures prescribed by ITLOS. However, since the provisional measures were revoked, 27 vessels were added to the original, and, consequently 199 vessels operated for SBT based on the increase of the catch limit in September. In the 2001, 2002, 2003 and 2004 fishing season, the number of vessels for SBT was 227, 224, 221 and 222 respectively.

Illegal, Unregulated and Unreported

The level of IUU was estimated at 110 % of the quota levels in 2004. This has been estimated at in 1985 – 1993 45,000t ($6-8 billion Australian dollars) and 1994 – 2005 13,300t ($4-5 billion Australian dollars: Australia, 2005). This is the combined estimate of catches taken by flag of convenience vessels and unreported catches taken by Members.

In the recent past, CCBST has reported that significant and increasing volumes of southern bluefin tuna were being taken by flag of convenience vessels and these catches were not being reported. This has been of major concern to the CCSBT as within the current management strategy that has been put in place to allow the stock to rebuild its biomass, the stock needs to be carefully managed and the catch taken by these vessels will undermine the conservation measures taken by Members. In order to reduce this problem CCSBT has sought the cooperation of these flag states in supporting its management and conservation measures. The flag states have also been informed that if they continue to catch southern bluefin tuna, the Commission will consider measures, including trade restrictive measures, to be taken against them in accordance with the Action Plan.

Catches of southern bluefin tuna by Japan were systematically underreported over the period 1985 to 2005 (CCSBT was created in 1994). The extremely high demand for this highly valued product in the Japanese sashimi market lead to the very high market price for the southern bluefin tuna which in turn contributed to the level of IUU by the Japanese fleet. In 2006 the management model that is used to assess the southern bluefin tuna stocks by CCSBT (the "SBT Operating Model") was used to evaluate the levels of underreported catches. This estimation process was critical in gaining an understanding of the effects of the additional unrecorded catches on the dynamics of the southern bluefin tuna stock. Results suggested that the spawning biomass is at a low fraction of its original biomass (B_o) and well as below the level that could produce maximum sustainable yield (B_{MSY}). The recruitment strength indications in the last few years are estimated to be well below the levels that were observed in the period 1950-1980. All scenarios that CCBST investigated suggested that recruitment in the 1990s fluctuated with no overall trend.

The level of reported catch was verified against historical trade statistics by an independent panel. This identified a significant underreporting of southern bluefin tuna catch. This underreported and over-quota catch has left this stock in a highly vulnerable position. Estimates of the population size if the over-quota catches had not been taken have estimated that the stock size would be at 5-6 times its current level and

would be well on the way to recovering to the target biomass of the 1980 level if this would not have already been achieved it would have been very likely by the proposed target date of 2020.

In order to ensure that underreported catch cannot enter markets a number of measures have been implemented over the last decade:

- 100% Tagging and tracking of fish through Japanese markets;
- 100% inspection of all SBT vessels landing;
- Trade Information Scheme (TIS) document required for all exports; [1]
- Landings limited to 8 specific Japanese ports;
- Agreed reduction in quota for Japanese vessels and set for 5 years (2007 – 2011) as follows;

	Nominal catch (t)	*Allocated catch (t)*
Japan (2007 – 2011)	6065	3000
Australia (2007 – 2009)	5265	5265
New Zealand (2007 – 2009)	420	420
Korea (2007 – 2009)	1140	1140
Taiwan (2007 – 2009)	1140	1140

- Furthermore, to contribute to the recovery of the SBT stock, Taiwan and the Republic of Korea undertook to maintain their actual catch below 1,000 tonnes for a minimum of 3 years. This will result in an actual catch level below 11,530 tonnes for a 3 year period.
- Possession, sale or purchase of illegally caught/landed SBT, in other words a tag-less SBT without justifiable reasons, is prohibited.

The trade information scheme operates around the central principle that all CCSBT Members and Cooperating Non-Members require all imports of southern bluefin tuna to be accompanied by a completed CCSBT Statistical Document (similar to the ICCAT bigeye tuna scheme and CCAMLR's Catch Documentation Scheme for toothfish). The Document must be endorsed by an authorised competent authority in the exporting country and includes extensive details of the shipment such as name of fishing vessel, gear type, area of catch, dates, etc. Shipments not accompanied by this form must be denied entry by the Member country. Completed forms are lodged with the CCSBT Secretariat and are used to maintain a database for monitoring catches and trade. Reconciliation of these forms is conducted against electronic lists of exports submitted by CCSBT Members and Cooperating Non-Members.

The Scheme requires the Document to include the country of destination and to set minimum standards for completion of TIS documents. The requirement to include destination country was made in the light of markets for SBT developing outside CCSBT Members. The CCSBT is also seeking the Cooperation of Non-Member importing countries with the TIS aims. The United States has passed domestic legislation to recognise CCSBT documents with effect from 1 July 2005, which brings trade to the United States under the provisions of the CCSBT Scheme.

The primary implication of the higher catch levels, compared to the estimated catch history with the underreported catches included, is that estimated total spawning stock size is more than double that assessed previously by CCBST. However if quotas were maintained at the previous levels of 14,925t projections predict a short-term decline followed by generally stable but not recovering spawning biomass. Catches of over the previous quota levels would result in very serious threats to the stock and not allow any potential for recovery. In order to allow the spawning biomass to recover the quota allocations should be set at levels lower than before under all the scenarios considered, hence the quota of 11325t and the undertaking of Korea and Taiwan to not take their allocations.

Furthermore there is an additional complication in that southern bluefin tuna is also subject to ranching or farming and the levels of wild caught fish that are subsequently "enhanced" by farms may not be recorded fully. Southern bluefin tuna farming and market data from 2006 again suggest that southern bluefin tuna catches may have been substantially underreported over the past two decades.

The impact of these unreported catches on the estimates of past total catch and CPUE suggest that the current southern bluefin tuna Management Procedure may not be appropriate and that the Management

[1] http://www.ccsbt.org/docs/pdf/about_the_commission/trade_information_scheme.pdf

Procedure will need to be revaluated.

Discards

Due to the very high values that southern bluefin tuna obtain in the market place it is extremely unlikely that any southern bluefin tuna will be discarded.

Unreported artisanal and recreational catches

There are no known artisanal or recreational fisheries catching southern bluefin tuna.

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ICCAT (INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS): ATLANTIC OCEAN (PELAGIC HIGH SEAS)

Summary of information concerning IUU fishing

Overview

30 species are of direct importance to ICCAT with bigeye tuna, yellowfin tuna and skipjack being the most significant in terms of catch volumes. Illegal, unregulated and unreported (IUU) fishing operations in the context of high seas fishing are limited to unregulated and unreported catches. IUU catches have historically been estimated by ICCAT for key species (e.g., bigeye tuna IUU, estimated by analysis of Japanese import data) though concern exists over their accuracy.

Illegal, Unreported and Unregulated catches

IUU longliners commenced operations in the ICCAT regulatory area in the early 1980s, with estimated unregulated catches peaking in 1998 (ICCAT, 2008). IUU bigeye tuna catches in the ICCAT regulatory area were estimated at 25 000 and 3 000 tonnes for 1998 and 2002 respectively, or 33 % and 4 % of total catches (ICCAT, 2008). This decrease may have been caused by ICCAT resolutions and recommendations implemented to combat IUU including an IUU vessel list (ICCAT, 2007), restrictions on transhipments (ICCAT 1998, 2006) and trade restrictions imposed on countries known to have been involved in IUU fishing within the ICCAT regulatory area (e.g., Georgia[2]). IUU catches of bluefin tuna in the ICCAT regulatory area were estimated at 1 to 5% of total reported catch (Restrepo, 2004).

Discards

Estimated discard rates in the tuna fisheries within the ICCAT regulatory area are in general low, where available (ICCAT, 2008).

Unreported artisanal catches

Little information is available on artisanal catches in the high seas of the ICCAT regulatory area.

Unreported recreational catches

Little information is available about recreational catches in the high seas of the ICCAT regulatory area.

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IOTC (INDIAN OCEAN TUNA COMMISSION) WITH CCSBT: WESTERN INDIAN OCEAN (PELAGIC HIGH SEAS)

Summary of information concerning IUU fishing

Overview

The key fisheries in the high seas of the Indian Ocean are those targeting sharks and tunas. Catches have risen steadily from 1950 onwards, increasing from approximately 1 500 tonnes in 1950 to 1 600 000 tonnes in 2003 with catches of tuna species dominating by catch volume (46 % for the period 1950 – 2003)[3]. Illegal, unregulated and unreported (IUU) fishing operations in the context of high seas fishing are limited to unregulated and unreported catches.

Illegal, Unregulated and Unreported catches

Unreported catches in the Indian Ocean in general have been high. IOTC have estimated IUU catches in the Indian Ocean to be approximately 10% of reported catches (Herrera, 2003). CCSBT has estimated IUU catches as 35 % of its reported catches (CCSBT, 2007). The levels of unreported tuna catches are assumed to have remained relatively stable throughout 1950 – 2003. Small longline vessels have historically been implicated in unreported fishing in the Indian Ocean (MRAG, 2005). Clarke *et al.* (2006) analysed global trade data for shark species and concluded that global trade is three to four times that of recorded catches. It is likely that unreported catches of sharks in IOTC since 2003 have decreased due to the implementation of resolutions aiming to combat the practise of shark finning (e.g., IOTC Resolution 05/05). Both IOTC and CCSBT have introduced measures to combat IUU including an IUU vessel blacklist (IOTC 2006, 2006) and a Trade Information Scheme (CCSBT, 2006).

Discards

In general, little quantitative information is available on discard rates in the West Indian Ocean. It is assumed that discards rates in the tuna fishery were high from 1950 through to 1983. After this period the discard rate decreased with the shift from longline gear to purse seiners.

Unreported artisanal and recreational catches

There are very limited artisanal catches and little information is available about recreational catches in the High Seas of the Western Indian Ocean.

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[3] High seas catches for West and East Indian Ocean taken from www.seaaroundus.org.

NAFO (NORTHWEST ATLANTIC FISHERIES ORGANIZATION): NORTHWEST ATLANTIC OCEAN (HIGH SEAS)

Summary of information concerning IUU fishing

Overview

The high seas of the North West Atlantic Ocean are located within the Northwest Atlantic Fisheries Organisation's (NAFO) regulatory area. Major directed fisheries within the NAFO regulatory area have targeted *inter alia* Greenland halibut, plaice, Atlantic redfish, northern prawn, capelin, herring, cod and haddock[4]. The cod fisheries on the Flemish cap and the high seas region of the Grand Banks provided the highest catch volumes through to the collapse of the Grand Banks fishery in 1992 with the northern prawn fishery providing the highest catches in the last 10 years.

Illegal, Unreported and Unregulated catches

The issue of IUU fishing in NAFO is primarily limited to the unregulated and unreported fishing activities of non contracting parties, although 4.5%, 9.5% and 6.1% of inspections (which would be conducted on Contracting Party vessels) resulted in citations for 2004, 2005 and 2006 respectively. The most frequent infractions included: misreporting of catches; illegal gear attachments; and, infringement of by-catch requirements (NAFO, 2007).

Unregulated catches peaked in the NAFO regulatory area at 47,000 tonnes in 1991, subsequently decreasing to an estimated level of 1,000 tonnes in 1998 (Bray, 2000). These catches were made by 47 and 4 vessels respectively, flagged to non-contracting parties. NAFO has implemented a variety of measures to curb IUU fishing, including the formation of the Standing Committee on Fishing Activities of non-Contracting Parties in the Regulatory Area, the NAFO scheme to promote compliance by non-contracting party vessels and the NAFO IUU vessel black-list (NAFO, 2008). The implementation of NAFO's IUU mitigation measures has been successful in reducing levels of unregulated and unreported catches.

Discards

Discard rates associated with the main NAFO fisheries are relatively high (Kelleher, 2005), for example discard rates of Spanish vessels in the cod fisheries have been estimated as high as 25% (López Losa, 2001). Bycatch reduction devices have been implemented by Canadian vessels operating in the NAFO fisheries and NAFO has initiated work on a establishing a database on discards. All vessels should report discard information on exiting the NAFO Regulatory Area using their vessel monitoring system and an NAF (North Atlantic Format) message.

The shrimp fisheries within NAFO waters are likely to have the same discard rates as the fisheries within the Greenland EEZ. Sünksen (2007) examined the discard levels of fish in the shrimp fishery within the Greenlandic Exclusive Economic Zone in 2006 and 2007 for NAFO divisions 1B-1E and ICES XIVb. The average discard rates of fish as recorded by the onboard scientific observers ranged by area from 1.6 % by weight of the shrimp in NAFO 1B to 5.8 % in ICES XIVb (average 2.2%). The rates normally reported without observer coverage the discard level on average has remained well below 1% for several years.

Unreported artisanal catches

Few, artisanal fisheries exist in the High Seas of the Northwest Atlantic Ocean, if any.

Unreported recreational catches

Little information is available about recreational catches in the High Seas of the Northwest Atlantic Ocean.

[4] High seas catches for the Northwest Atlantic Ocean were taken from www.seaaroundus.org.

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NEAFC (NORTH EAST ATLANTIC FISHERIES COMMISSION): NORTH EAST ATLANTIC OCEAN (HIGH SEAS)

Summary of information concerning IUU fishing

Overview

Stock assessments within the northeast Atlantic Ocean are carried out by the International Council for the Exploration for the Sea (ICES). The Northeast Atlantic Fisheries Commission (NEAFC) is the recognized regional fisheries management organization and implements ICES recommendations within the High Seas areas of concern. NEAFC itself, however, does not make estimates of IUU fishing in its area. IUU catches are an increasing concern to ICES as a major source of uncertainty in stock assessments within the northeast Atlantic Ocean (ICES, 2005, 2007). Accurate reports of IUU fishing available to the various ICES working groups are rare and the working groups use analytical techniques similar to those reviewed in MRAG (2005).

Illegal, Unregulated and Unreported Catches

There is a unregulated and unreported fishery for redfish in NEAFC waters just outside the Icelandic EEZ along the ridge to the southwest of Iceland. Here redfish (*Sebastes mentella* and to a lesser degree *Sebastes marinus)* is a straddling stock which is managed on the high seas under NEAFC regulation. Straddling stocks are typically under intensive fishing pressure from inside and outside the regulated areas. Redfish are also typical of a slow growing deep water species that requires highly precautionary management to avoid overfishing and any over-quota IUU fishing effort is a high risk to the stock. Catches from the fishery are estimated by the Icelandic Authorities at 30,000t per year [5] which equates to 330 million Norwegian Kr (US$ 58.586 million).The good management of this fishery is also critical as the Reykjanes ridge is an important site for cold-water *lophelia* corals. Bottom trawling which may be banned in the legal regulated fleet but an unregulated fleet may ignore such conservation measures and would therefore put these areas of slow growing corals at a much higher risk.

There are a number of successful IUU mitigation strategies that have been recently implemented in this fishery. NEAFC has a detailed IUU list published on its website detailed the vessels involved in the fishery and requests Members to exercise port state control of vessels on IUU list and not allowing them to use their ports. The use of vessel detection systems (VDS) and vessel monitoring systems (VMS) allows identification / enumeration of the level of IUU activity in the fishery. The activities of the IUU fleet have also received a significant amount of negative publicity from environmental organisations.

Cod and haddock in Arctic waters covered by ICES have two areas of high seas enclosed by coastal EEZs. These fisheries have identified problems with unreported catches that have been estimated by the ICES Arctic Fisheries Working Group (AFWG) by calculating the difference between reported catches and landings. These unreported and unallocated catches were of the order of 10-25% between 1990 and 1994 and 15-25% between 2002 and 2007 (ICES, 2008). Illegal catches taken in the mainly EEZ fisheries of the Barents sea are assigned to Norway and Russia in our respective analyses of these countries. WWF reports Norwegian Ministry of Fisheries estimates of the following percentage of the Russian quota being taken, additionally, by Russian vessels in the Barents sea from 2002 – 2007: cod 47%, 57%, 37%, 47%, 38%, 21%; and haddock 71%, 28%, 33%.

Whitefish fisheries around the high seas areas and coastal EEZs of the Rockall Bank are also identified as having "Problem but no estimates" for IUU. This is particularly relevant to the cod and whiting fisheries and discards in this fishery are also a problem for whiting where it may be discarded for the more valuable cod catches.

Mackerel catches in the northeast Atlantic are also identified as having an IUU problem but again no formal estimates of the level of IUU in this fishery are available to ICES working groups.

[5] http://www.fiskaren.no/incoming/article100308.ece

ICES (2005) reports that unregulated and unreported fishing is a "Problem but no estimates" for all the deep water fish species assessed by WG-DEEP for ICES region 10 which covers most of the deep sea ICES areas. These species include black scabbardfish (*Aphanopus carbo*), blue ling (*Molva dypterygia*), goldeneye perch (*Beryx splendens*), greater forkbeard (*Phycis blennoides*), greater silver smelt (*Glossanodon leioglossus*), ling (*Molva molva*), orange roughy (*Hoplostethus atlanticus*), roundnose grenadier (*Coryphaenoides rupestris*) and tusk (*Brosme brosme*). Of these the stocks of blue ling, ling and tusk are listed as critical stocks.

Discards

ICES (2005) reported that discards were a problem in 36% of all stocks and only not a problem in 3% of all stocks. The remaining 61% were reported as unknown highlighting a major data deficiency problem. With regard to ICES critical stocks 50% of stocks were reported to have a known discard problem, no critical stocks are reported as having no discard problem and the remaining 50% were reported as unknown. For deep-water species that are entirely on the high seas there are known discard problems although the level of data collection is too poor to provide accurate data on the levels of discards to contribute to stock assessments in many cases. Many deep-water species caught in these fisheries are discarded as there do not currently exist markets for these species. Discards within ICES are not recorded as a matter of course and EC fisheries legislation does not require mandatory recording of discards, at best discard data may be collected on a three yearly basis (EC Regulation 1639/2001) for some at risk stocks. The few data that are available have been compiled by the ICES Study Group on Discard and Bycatch Information (SGDBI) and more recent coordinated discard sampling has been coordinated by the ICES Planning Group on Commercial Catches, Discards and Biological Sampling (PGCCDBS)

Straddling stocks between the high seas and European coastal EEZs provide an opportunity for discarding to maximize the quotas allocated for fleets and vessels. Hi-grading of high value fish where quotas have been set for particular species is common with small or damaged fish being discarded to allow the quota to be filled with the highest value of fish possible. This problem exists in many low quota whitefish species such as cod and haddock, but without high levels of observer coverage it is difficult to detect and quantify.

The fisheries in the far northern high seas areas managed by ICES areas have relatively low discard rates. These fisheries are quite selective with a low diversity in catch composition and also because of the national policies of Norway, Iceland and the Faroe Islands. These three countries have implemented "no discard" policies locally in the fisheries in their own EEZs and these practices often carry over onto the high seas within fleets operating between the two. Due to the local discard bans a high capacity for the production of fishmeal has developed in these countries. This has been quoted by the fishing industry as a limiting factor on retention of discard species, as they may land catches but with no downstream industry with the capacity to deal with it there would not be much sense.

Unreported artisanal and recreational catches

There are very limited artisanal and recreational catches in the High Seas of the North East Atlantic Ocean.

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COUNTRY NOTES ON HIGH SEAS IUU ISSUES

Angola

No high seas IUU activity by Angolan vessels is reported by HSTF (2006).

Australia

In the southern bluefin tuna fishery Australia, through the Commission for Conservation of Southern Bluefin Tuna, has implemented a Trade Information Scheme (TIS) since June 2000 aiming to collect more information on SBT fishing through trade monitoring. This will help in deterring IUU fishing by denying access to markets for illegally caught SBT. "The core of the TIS is the provision for all members and cooperating non-members of the CCSBT to maintain requirements for all imports of SBT to be accompanied by a completed CCSBT Statistical Document. The Document must be endorsed by an authorized competent authority in the exporting country and includes extensive details of the shipment such as name of fishing vessel, gear type, area of catch, dates, etc. Shipments not accompanied by this form must be denied entry by the member country. Completed forms are lodged with the CCSBT Secretariat and are used to maintain a database for monitoring catches and trade" (CCSBT, 2006). Further, 10 % of the current SBT fishing activity is monitored through observer coverage in the CCSBT convention area. (CCAMLR, 2005).

Also in the southern bluefin tuna fisheries "During the 2003–04 and 2004–05 seasons, no discarding of SBT was reported in logbooks collected in the purse seine fishery in the Great Australian Bight. In 2004, AFMA observers monitored longline operations in the Eastern Tuna and Billfish Fishery during the months and areas in which SBT are most likely to be taken incidentally (i.e. south of 30◦S from May to September). Observer data showed that 61% of longlined SBT were discarded during the observed operations. In contrast, the level of SBT discards recorded in logbooks from other vessels fishing during the same period south of 300S was only 10%. In response to this new information the Australian Fisheries Management Authority has implemented tighter access controls and implemented 100% observer coverage for the 2005 season" (CCSBT, 2005).

In the CCAMLR convention area a Centralised Vessel Monitoring System (C-VMS) has been in operation since May 2005. During 2005 Australian flagged vessels submitted data on C-VMS to CCAMLR. Vessels from Australia, Korea, Chile, New Zealand and Ukraine also voluntarily reported VMS data on fishing activities outside the convention area. Australian vessels also issued electronic catch, export and re-export documents to the commission for the electronic web-based (E-CDS) Catch Documentation Scheme

"Fishing will not be allowed on the high seas (outside 200 nautical miles) adjacent to the AFZ around Norfolk Island, unless an AFMA observer is on board to verify the catch taken in the fishery and on the high seas" (AFMA, 2000).

China

High seas and international fisheries by Chinese vessels reveal a different story to Chinese domestic fisheries: some examples are documented below.

"Fishermen in Cameroon have a rough time with Chinese trawlers. A fisherman said: "They come and fish right on the shores which is reserved for us". They complained that the Chinese use a twin-fishing trawler system with a single net tugged between two trawlers. As the trawlers positioned about 100 or more meters apart, anything in their path is caught in the trawl. The disgruntled fishermen held that trawlers operators had threatened to shoot them whenever they confront them in the seas on account of their nets or canoes having been destroyed by them… According to a representative from the Fisheries authorities, regulation requires that the trawlers limit themselves to three nautical miles into the ocean. She insisted that such indiscriminate fishing methods carried out by the Chinese trawlers could lead to very poor fish production." (Cameroon Online, 2007).

"Turtle poaching in the waters off Sabah may be more widespread than imagined – a second illegal

Chinese fishing vessel was caught Wednesday, laden with more than 250 protected turtles. The staggering number of Greenback and Hawksbill turtles - including about 20 that were alive – were recovered from the vessel from Hanian, … The marine police, who were keeping surveillance under Ops Octopus, spotted the foreign vessel, with 17 crewmen, about 17.5 nautical miles from the island about 9.05am. Just two days ago police pulled up a similar fishing vessel, also from Hainan, at Mantanani Kecil Island, off Kota Belud, and recovered 72 dead turtles of the same protected species." Daily Express, Malaysia (2007).

"International fisheries law enforcement operations continue with the interception of two Chinese fishing boats suspected of high-seas driftnet fishing in the North Pacific Ocean. September 24, a Coast Guard HH-65 helicopter, deployed from Coast Guard Cutter Boutwell, observed Zhe Dai Yuan Yu 829 concealing net spreaders. Once boarded … the master of the vessel admitted to having two groups of nets approximately 18,000 to 21,000 feet in length. These illegal driftnets were also spotted on board the Lu Rong Yu 829 during a separate boarding. The vessel had also attempted to disguise its name and origin. Both vessels reportedly contained squid, shark fins and various other marine life. They were confirmed to be registered in the People's Republic of China and taken into custody." (U.S. Coast Guard 2007).

However, in this latter example, some cooperation with the Chinese government led to the arrest. "The presence of a Chinese Fisheries Law Enforcement Command ship rider on board Boutwell expedited the boarding and seizure process, basically allowing the Chinese to enforce Chinese law on a Chinese vessel," Capt. Michael Neussl, chief of staff for the 17th Coast Guard District in Juneau, Alaska, said. The United States, Japan, Canada, Russia, South Korea and China are part of the North Pacific Coast Guard Forum, which was developed to fight illegal fishing and increase international maritime safety and security, according to the release. As part of that mission, the [US] Coast Guard regularly participates in international cooperative efforts against high-seas drift-net fishing."

Ecuador

Gianni *et al.* (2005) identify some Ecuador-flagged vessels fishing on the High Seas, with Japanese or Taiwanese owners, involved in the illegal supply of fish to the Japanese market.

Faroes

Greenpeace has recently reported that there is significant IUU activity by vessels fishing for redfish in the vicinity of Irminger Sea, (NEAFC area).

France

"A 2003 article in the Boston Globe newspaper in the US mentioned that Pac-Fish Inc. was investigated by US authorities (NOAA) in Boston for importing 33 tonnes of toothfish from the IUU fishing vessel Arvisa I – a vessel with a well known history of IUU fishing subsequently arrested by French authorities for illegal fishing in the Kerguelen Island EEZ." "In June 2004 [the Honduran flagged Uruguayan vessel] Apache was detected by the French patrol vessel Albatross fishing illegally within the EEZ of the Kerguelen Islands. She was placed under arrest and taken to Reunion where she is still being held. In September a French court convicted the captain and crew of illegal fishing." (Gianni and Simpson 2005).

Ghana

The vessel Hsiang Pao No. 601 registered to Ghanaian company Kwo-Jeng Marine Services Limited has been engaging in re-flagged to Trinidad and Tobago and engaging in Illegal long line fishing" (Komatsu, 2000). However, no subsequent reports are available to substantiate the same. One vessel 'Alos', has been reported to be flagged to Ghana, participating in IUU activity for Patagonian toothfish in 2003 according to Gianni and Simpson (2005).

Japan

Gianni and Simpson (2005) report, "At-sea trans-shipment of the catch in the Atlantic, Pacific and Indian Oceans is a major component of the infrastructure supporting longline fishing fleets targeting high value species of tuna operating on the high seas. These trans-shipment vessels are purpose built to freeze the

catch to minus 40º Celsius and keep it deep-frozen to preserve the quality of the fish, which is sold as sashimi grade tuna on the Japanese market ... the major ports of entry for trans-shipment vessels bringing sashimi grade tuna into Japan are Shimizu and Yokosuka."

Malaysia

Gianni *et al.* (2005) provide a single reference to Malaysia: a vessel landing illegal toothfish in a Malaysian port. MRAG (2005) reports that, "Over 90% of abalone harvested in South Africa is exported, primarily to Hong Kong, but also to China, Japan, Malaysia, the Republic of Korea, Philippines, Singapore and Taiwan."

Russia

Russian-owned vessels are listed 11th out of the top 20 worst FOC offenders in Gianni and Simpson (2005). Many Russian-owned vessels are flagged in Bolivia. Gianni and Simpson (2005) write, "Pacific Andes, a company based in Hong Kong, is believed to be the parent company of Sun Hope Investments in Jakarta. In its report on Pacific Andes activities entitled *The Alphabet Boats, A Case Study of Tooth fish Poaching in the Southern Ocean*, COLTO responds to Pacific Andes's denials by stating that: "what Pacific Andes does not deny is that it does service the 'alphabet' boats and does purchase and process the fish they catch. This would appear to be just another of Pacific Andes' customarily highly leveraged arrangements with the fishing operations it sold out of in 1998 – in retaining exclusive marketing arrangements as part of the sale agreements. The 'alphabet' boats are, of course, technically operated and controlled by their Spanish skippers while being owned by dummy companies in (at various times) the British Virgin Islands, Russia, Belize, Bolivia and elsewhere ... As for getting the right certification and documentation, it is generally regarded as a fairly simple task to get officials in agencies under inadequate central government control in flag states like Bolivia and Russia and port states like Indonesia to generate 'appropriate' paperwork. There are a number of measures under ongoing discussion among CCAMLR governments aimed at closing loopholes in their tooth fish Catch Documentation Scheme and at making it easier to detect bogus documentation."

Netherlands

There is considerable FOC activity in Netherlands fisheries jurisdictions. According to Gianni and Simpson (2005), Netherlands Antilles has over 20 FOC vessels involved in illegal Japanese sashimi trade and five Spanish-owned vessels flagged in Netherlands Antilles are named in this report. The ITF Fair Practices Committee (or the FPC sub-committee) decides on the stauts of FOC countries. The FPC maintains a list of countries offering FOC facilities and from time to time adds or deletes countries from the list. The basis for membership in this select club is the so-called "Rochdale Criteria" laid down by a British Committee of Inquiry in 1970. These were:

- the country allows non-citizens to own and control vessels;
- access to and transfer from the register is easy;
- taxes on shipping income are low or non-existent;
- the country of registration doesn¹t need the shipping tonnage for its own purposes but is keen to earn the tonnage fees;
- manning by non-nationals is freely permitted;
- the country lacks the power (or the will) to impose national or international regulations on its ship-owners.

Second registers, charter arrangements and other methods are designed to get around ITF policy, and so defining an FOC is becoming more and more difficult. However, ships registered in an FOC register which can demonstrate that they are genuinely owned in that country are not treated as FOCs. Equally, ships from countries not on the list will be treated as FOCs if the ITF receives information that they are beneficially owned in another country.

According to the Global Policy Forum (2003) the following 27 countries have been declared FOCs by the ITF: Antigua and Barbuda, Aruba (the Netherlands), Bahamas, Barbados, Belize, Bermuda (the UK), Burma, Cambodia, Canary Islands (Spain), Cayman Islands (UK), Cook Islands (New Zealand), Cyprus,

German International Ship Register (GIS), Gibraltar (UK), Honduras, Lebanon, Liberia, Luxembourg, Malta, Marshall Islands (USA), Mauritius, Netherlands Antilles, Panama, St. Vincent, Sri Lanka, Tuvalu, Vanuatu.

In 2002 the European Parliament stated the following in the 'Resolution on the Role of Flags of Convenience in the Fisheries Sector' A5-0405/2001 (Greenpeace, 2002): "… that the use of flags of convenience is generally motivated by a desire to minimize costs and circumvent certain tax regulations by means of complex legal devices and results in numerous difficulties with regard to the attribution of responsibility in the event of illegal fishing, accidents at sea and , in general, with regard with the competition rules to which sea transport is subject."

New Zealand

CCAMLR estimates that IUU catches of Antarctic tooth fish, which are mainly taken by New Zealand in area 88 (NZ Sea Food council, 2001), are probably low. "This encouraging tendency seems to result from surveillance and patrol efforts by the New Zealand government in recent years in the Ross Sea area (sub area 88.1) and it also appears difficult for illegal fishers to find a close port of convenience for landings" (Lack and Sant, 2001; Corveler, 2002).

Norway

ISOFISH (1998) reports some involvement of Norwegian companies in the illegal toothfish fishery, identifing three principal Norwegian groups involved in toothfish poaching operations in the Southern Ocean. While commending the Norwegian Government for having introduced new regulations to allow it to control the activities of Norwegians on Norwegian ships anywhere in the world, ISOFISH urged them to require all Norwegian crew on foreign flagged fishing vessels to be licensed by Norway. ISOFISH also proposed some specific measures which it believes the Norwegian Government should take to stop poaching and support for poachers by companies and individuals subject to its jurisdiction, including:

- withdrawing public money from all companies associated with those in operational control of past or present toothfish poaching operations;
- publishing a blacklist of Norwegian individuals known to be associated with fish poaching operations anywhere in the world (especially in the CCAMLR area); and
- demanding that Norwegian banks and other investors immediately conduct internal inquiries to identify and then terminate any and all support for and involvement with poachers identified on the blacklist.

Gianni and Simpson (2005) report, "A number of positive measures have been taken by States individually to discourage nationals and companies within their jurisdiction from engaging in IUU fishing. Amongst the most effective are measures adopted by Norway which preclude any vessel with a previous history of IUU fishing from obtaining a licence to fish in Norwegian waters. This appears, for example, to have been an effective means of deterring Norwegian owned vessels from engaging in IUU fishing in the Southern Ocean." See: http://www.fiskeridir.no/fiskeridir/ressursforvaltning/blacklisted_vessels.

Reflagging is not reported to be a serious problem, and foreign vessels fishing in Norwegian waters are, like Norwegian vessels, obliged to go through detailed reporting. However, three Norwegian owned Panamanian-flagged vessels appear in a list of 132 refrigerated cargo vessels that are reported as trans-shipment of fish for the Japanese market (other than Sashimi grade tuna) are reported by Gianni *et al.* (2005).

In 1996, the Vietnamese customs seized four tonnes of whale meat allegedly of Norwegian origin destined for Japan. The Norwegian police decided to investigate this case in Norway and concluded that no connection could be established between the shipment seized in Vietnam and Norway" (Mr Stein Owe, pers. com. to TRAFFIC Europe, 3 November 1999).

Illegal whaling itself appears to be well under control (Raymakers, 2001): "Norwegian whalers have been prosecuted for not complying with Norwegian laws on whaling. In 1994, the Norwegian coastguard discovered that a whaling vessel had caught one whale more than its assigned quota. The inspector on

board was allegedly asleep when the whale was harpooned and brought on board. The owner of the vessel was fined NOK 10,000 (US$ 1,600 – 1994 exchange rate). In addition, both the owner and its vessel have been excluded from taking part in whaling for five years (Anon, 1997b). "… There has been one recorded attempt of smuggling of whale meat out of Norway. In 1993, two carriers were stopped and their merchandise seized. The police decided not to forward the case to the Norwegian court of justice. The case was closed six years later, in December 1999, without giving any explanation about the reason for such a long investigation. The whale meat was confiscated and destroyed soon after the seizure was performed. The two smugglers were given fines of NOK 20,000 and 10,000 (US$2800 and 1400) respectively and were charged NOK 40,000 and 20,000 (US$5600 and 2800), the equivalent of the profit they would have made if they had succeeded their attempt, i.e. the commercial value of goods they were smuggling (Moy, 1999).

South Africa

South Africa is tracking the problem of FOCs (Flag of Convenience) by prohibiting offloading in its ports by suspicious vessels, using a vessel blacklist drawn up by ICCAT. Cape Town is one of the most important harbors in the south Atlantic for fishing vessels and their transport and chandler vessels (EJF, 2005). South Africa, in the context of ICCAT (International Commission for the Conservation of Atlantic Tunas), has taken steps to combat FOCs by announcing that it will prohibit any fishing ship that does not fly the flag of an ICCAT member country, or that is on the ICCAT blacklist, from offloading in its ports. Previously, Cape Town seems to have been a preferred destination for pirate tuna fleets (SeaWeb, 2002), and, together with Durban, the two ports are still mentioned as ports of call for freezer vessels suspected of having a role in illegal shipments of tuna to Japan (Gianni *et al.*, 2005). Some SA vessels are known to re-flag and fish under flags of convenience but this is not thought to be a widespread practice. There is movement of vessels between SA and Namibia with some changing of flag. The main problem is SA has an old fleet and there are not many new vessels being built so there is pressure to bring in capacity from outside of SA, mainly from the EU. The authorities are aware of the issue and are attempting to address the problem.

In 2004 South African maritime patrols collaborating with French navy patrol boats (there is an agreement between both countries to fight IUU) reported illegal fishing of the Patagonian toothfish around the French Antarctic island of Kerguelen (5,000 km south-east of Cape Town) according to the European Cetacean Bycatch Campaign (2004). The Department of Environmental Affairs and Tourism's fishery compliance official assisted the French sea patrol unit to arrest an illegal fishing vessel in French fishing waters. (South African Government Information, 2004).

In August 1997 the SA Cabinet approved plans to mount a joint operation to counteract the illegal fishing of the Patagonian toothfish in South Africa's territorial waters, around the Prince Edward Islands. The joint operation includes the DEAT, the SA Defence Force, and the Departments of Foreign Affairs and Justice (Jordan, 1998).

South Korea

Korea's distant water fleets, although technically under the management of RFMOs, and with the overall responsibility of the flag state, appear to be fishing illegally in waters beyond the EEZ and on the high seas.

"In accordance with the Third Korea-China High-Level Meeting on Fisheries held in Beijing on June 8, 2005, the following steps will be implemented 1) Relevant officials in fishery monitoring and surveillance of both Parties are scheduled to conduct boarding exchanges between fishery supervision vessels, once in late May 2006. Both Parties decided that the West Sea specifically forbidden zone and the Yangtze River preservation zone will be designed as the area for the mutual boarding exchanges" (http://www.momaf.go.kr/eng/fish/science/F_resources.asp).

Clarke (2007) however suggest a different scenario for South Korean fleets operating outside its EEZ "According to one interview respondent, there is a considerable amount of South Korean vessel activity (fishing and cargo) in the area near the Kurils and he believed these vessels may be funnelling Russian salmon to Pusan. Illegal fishing activities by South Korean vessels in the area north-east of Hokkaido have been documented (Associated Press, 2006a). Also, South Korean (and Chinese) flagged vessels were some

of the 67 vessels sighted illegally fishing with driftnets for salmon just outside the Japanese EEZ in July–November 2006 (Kitagawa, 2007).“Some incidents of IUU fishing by South Korean vessels in or near Russian waters have been reported but these activities may be unrelated to the third party salmon trade. South Korean cargo vessel involvement could not be assessed. Despite South Korea’s recent international commitment to fight IUU fishing, its vessels have been implicated in numerous IUU fish activities both on the high seas and in EEZs (MRAG, 2005) including the NPAFC high seas Convention Area in 2006 (Kitagawa, 2007)”.

Korean vessels have been re-flagged in Panama and have been involved in IUU fishing of Patagonian toothfish. There is also transshipment of fish on board vessels that are also are flagged to contracting parties of ICCAT, with most flagged to Panama and Japan. All are owned and managed by companies based in countries that are members of ICCAT, with most based in Japan and Korea. South Korea comes 6th out of 20 nations blacklisted for extreme FOC fishing activities (Gianni *et al.*,2005). Many Korean-owned ships are flagged in Panama or Liberia. Out of a list of 77 refrigerated cargo vessels likely to be transshipping at sea and delivering sashimi grade tuna to Japan, 12 (16%) were Korean-owned. Moreover, Koreans owned or managed 18/132 (14%) listed refrigerated cargo vessels that are suspected of transshipping fish (other than Sashimi grade tuna) at sea from time to time.

Spain

A WWF report (Gianni and Simpson, 2005) reveals the link between illegal fishing operations in the world’s oceans and countries that offer cheap registration services, or flags of convenience, to fishing vessels. The report shows that EU nations top the list of countries of residence of the owners or operators of fishing vessels operating under flags of convenience, with Spain/Canary Islands comprising approximately one-half of the EU total. Spanish fishermen are desperate to catch more fish and move into other waters. Because the stocks in their own EEZ have been severely depleted, Spanish fishing operations have spread all over the world. Their regular grounds include Canada and Morocco, and they were forced out of Namibian waters early in 1991 (European Commission, 2005). A report released in 2004 by the EC highlights that “monitoring of activities of fishing vessels from EU operating beyond Community waters remains an issue which must be particularly targeted … much data is entirely absent for certain activities in waters where EU agreements with third parties have been concluded”. Furthermore, ”the satisfactory integration of monitoring systems which allow systematic cross-checking of information from VMS, the fleet register, logbooks and sales notes, remains the exception”. It concludes: ”The great challenge is to use existing tools to their full potential. Accordingly, cooperation and coordination between administrations at all levels must be greatly strengthened and the proposed Community Fisheries Control Agency will have a crucial role to play in this respect” (European Commission, 2005).

By registering under the UK flag, Spanish vessels have irresponsibly fished for part of the quota set aside by the EC for the United Kingdom. By doing so, the Spanish, the UK claimed, had an adverse effect on their fishing industry (European Commission, 2005). The Spanish, on the other hand, claimed that they had not been poaching or "quota-hopping" in UK waters. Even though each EC country has had exclusive fishing zones (200 miles from shore) since 1977, an agreement between the EC and Spain had allowed for several Spanish boats to be registered under the British flag. The Spanish claimed that “many of the vessels they operated had been acquired from British fishermen who had ceased operations.” (European Commission, 2005).

The UN General Assembly Resolution 44/225 prohibits the use of driftnets greater than 2.5 km in length on the high sea. The EU legislation in 1997 prohibits keeping on board and use of drift nets greater than 2.5 km both in high seas and community waters, w.e.f January 1, 2002. This measure has been opposed by some member states notably France, Spain and Italy. Churchill (1999) states that a number of vessels of these countries were subsequently re-flagged to other countries to avoid the driftnet ban.

Spanish-owned vessels are notorious throughout the world for trying to avoid fishery compliance enforcement actions by reflagging. To its credit, Spain has enacted legislation which allows prosecution of their nationals who may be engaged in illegal fishing on board fishing vessels flagged in third countries (Greenpeace, 2003). But Spain is among the top 20 countries in the world where registered owners of ‘Flags Of Convenience’ vessels are based (Greenpeace, 1999) [WWF (2005) identifies Spain as being 4th in the world.] The “Salvatora” typifies the problem of FOC fishing by Spain, because this ship flies the flag of

Belize but is owned by a company based in Galicia, Spain (Greenpeace, 1999). This ship was illegally fishing in the southern ocean and planning to offload its catch in Mauritius (Greenpeace, 1999).

A Spanish vessel was caught fishing in the Namibian exclusive economic zone (EEZ) by a patrol vessel: the Spanish Embassy told New Era in 2004 that it would give its full cooperation in the investigation of the Spanish-registered vessel caught fishing in Namibian waters (EuroCBC, 2004).

Since 1997 Spanish vessels have been taking large quantities of swordfish off Chile, now one of the last abundant sources of swordfish world-wide. In an attempt to halt the slaughter, and claiming management under the Straddling Stocks agreement, Chile refused to re-provision Spanish vessels in Chilean ports. Then Spain persuaded EU bureaucrats in Brussels to threaten a ban on Chilean wine imports to Europe. So Chile had to give in. Broadbill swordfish are the losers (Pitcher, 2001). Spain is documented as a refuge for illegal fishers of Chilean sea bass and swordfish. For example, 75% of swordfish sold in Spain – the principal world market – were illegally caught and catches are clearly under-reported (Raymakers and Lynham, 1999). In 2004, it was reported that the high productive regions associated with seamounts (i.e., Azores seamounts in the Iberian region) are not just poorly protected within the EEZ but are also practically unprotected in international waters, and their conservation is required as part of the global common heritage belonging to all nations (Morato and Pauly, 2004).

Illegal Spanish fishers in this region are noted as a significant problem (Morato *et al.*, 2001). Spain is one of the 23 members of CCAMLR (Convention for the Conservation of Antarctic Marine Living Resources), an organization that is responsible for fisheries management in the Southern Ocean as well as enforcement of conservation and management measures to protect this area. Illegal and unregulated fishing is completely undermining attempts to conserve the biodiversity of the Southern Ocean (Greenpeace, 2003). CCAMLR is considering proposals by Greenpeace to stop illegal fishing in the Southern Ocean. Some of these initiatives include (Greenpeace, 2003b):

"a) Greenpeace believes CCAMLR should declare and enforce a moratorium on fishing for toothfish. This moratorium needs to be supported by a trade ban in toothfish, such a ban to require toothfish to be listed for protection on CITES Appendix 1; that is, no international trade.
b) Mandatory Vessel Monitoring Systems--to be effective immediately. Satellite-linked vessel monitoring systems allow governments to track all legal fishing vessels operating in the Southern Oceans.
c) Denial of port access to illegal fishing vessels. All countries must ban illegal fishing vessels from using their ports. Ships without vessel monitoring systems and proof that they are legally fishing must be banned from non-emergency port access."

It is not yet clear how effectively these requirements have been addressed by Spain.

There are also persistent reports that Spanish vessels abuse joint-venture arrangements in African and other countries (one trick is said to be to process under-sized fish into fish sausages on board). "South Africa Marine and Coastal Management (MCM) services have come under fire for allowing Spanish trawlers to strike deals with local hake quota holders. Hake stocks are believed to be under pressure yet the number of fishing rights issued in the hake sector has skyrocketed in recent years, with many new rights holders seeking boats to catch ever smaller quotas. But Spanish trawlers have found new ways of stretching quotas: they process hake into sausage. A company that places independent scientific observers on board local and foreign fishing vessels for MCM to collect information on fishing practices, says "we believe a lot of small fish (hake) are going into the sausage machine." The problem is also that MCM has not yet determined an official conversion factor for this sausage, which means it is difficult to estimate the volumes of fish being processed and therefore actual catches cannot be accurately determined, providing a potential loophole which could allow quotas to be stretched. The former head of MCM, said the Spanish "creep" into the local fishing industry was progressing rapidly and that they had done the same thing in Namibia a decade ago. Namibian fishing stocks are now extremely low. "One might say today that the more Namibia fisheries have 'transformed' and taken on a 'black' identity, the more they have in fact become Spanish." He said the Spanish had a poor record. "Their record off Brazil and Argentina is well known. They raided fisheries in joint venture agreements and when the fisheries collapsed, they disappeared. Their conduct up the African coast, all the way to Morocco, is horrendous." (Cape Argus 2007), November 10th.

Taiwan

MRAG (2005) states that, "Many IUU vessels are flagged to Distant Water Fishing Nations (DWFN), which are China, Taiwan, Korea, Spain and Russia. However, there is also significant IUU fishing, both in high seas and EEZs, by vessels flagged to developing countries. The principal problem with all these vessels is a lack of control by their flag states which leads to IUU fishing." Taiwan is involved in the illegal tuna and abalone trade. MRAG (2005) reports, "…IUU fishing in the Indian Ocean amounted to 130,000 tonnes in 2001 …. the problem is particularly pronounced for small longline vessels and that these vessels often do not report to their flag authorities or to the countries in which they are based (Taiwan-owned vessels below 100 GT)." For tuna, there may have been a recent improvement; "… [Indian Ocean] IUU amounts to about 33% of reported catches, although this may now have dropped to about 10% with Taiwan recently gaining membership of the Commission.

"Taiwanese fishing companies have now deliberately built a fleet of vessels that fall just under the 24 meter minimum length for application of most ICCAT measures. These 23.9 meter vessels have operated extensively in the Caribbean decimating shark stocks and causing serious billfish bycatch problems. The government of Taiwan either lacks the means or will to control this situation" (Delaney, 2003).

Moreover, over the past four years, MRAG (2005) reports a persistent series of incidents involving Taiwanese fishing vessels. For example, "In 2001, Tanzanian officials carried out a major patrol operation against illegal vessels and pirate ships in the country's Indian Ocean waters as part of a five-African nation programme sponsored by the European Union (EU)… findings included 13,000 tonnes taken by Taiwanese ships". "in 2003 … Skipper Lin Ven Chang was arrested after allegedly fishing illegally in New Caledonian waters, attempting to escape and removing identification from his vessel Shang Sheng. The vessel and crew were escorted to Noumea." "In 2004 Seven inspectors from Mozambique and three from South Africa were on a joint patrol when they found 2 vessels suspected of fishing illegally in Mozambican waters. One ship (Indonesian) had on board several km of fine mesh gill net, whilst the other (Taiwanese) was carrying large mesh demersal gill-nets when it is licensed to purse seine." Also in 2004 Argentina sank an illegal Taiwanese squid fishing vessel: "Chin Hsing was jigging 'near' Argentine waters when hit and sunk by a missile fired by the Argentine naval ship Granville. Argentina claims that, while Granville fired warning shots, the jigger's crew set fire and tried to scuttle her." In 2005, "Officials of the ARA Guerrico corvette of the Argentinean Navy's Maritime Patrolling Division arrested a Taiwan-flagged squid jigger, Hsien Hua 6, for fishing without authorisation for Argentine shortfin squid within the Argentine exclusive economic zone (EEZ) 250 km to the southeast of Puerto Deseado. The Taiwanese squid jigger, with a 30-member crew, was chased by the corvette that eventually succeeded in overtaking the vessel preventing its escape, ordering it to stop-down its engines." Also in 2005, "The crew of the patrol vessel Prefecto Derbes, owned by the Argentine Coast Guard (PNA), apprehended a Taiwanese squid jigger, Chich Man 1, illegally fishing Argentine shortfin squid within the Argentine exclusive economic zone (EEZ), off the Chubut coasts."

There are also serious FOC issues with Taiwan from the information currently available. For example, MRAG (2005) reports, "While the registration nationalities of fishing vessels are located in around 80 countries, most of the beneficial owners are based in Taiwan, Japan and the European Union."

"This is a real problem as a significant portion of new large-scale fishing vessels appear to be built with a view to engaging in IUU fishing. Of the 51 fishing vessels over 24 metres built in Taiwan during the same period, 50 were flagged in FOC countries by the end of 2003 – only one was flagged in Taiwan. Taiwan, Honduras, Panama, Spain, and Belize are the top five countries where companies that own or operate fishing vessels flagged to one of the top 14 FOC fishing countries are based. Taiwan and several other countries not generally considered to be FOC countries. Taiwan, Honduras, Panama, Spain, and Belize are the top five countries where companies that own or operate fishing vessels flagged to one of the top FOC fishing countries are based" (Gianni *et al.* 2005). There are 142 fishing vessels of more than 24m length, whose Country of Residence of Owner, Number of fishing vessels Percentage of all fishing vessels Manager, or Group are based in Taiwan, accounting to about 11.2 % of the 14 countries where FOC vessels are based. "Most of the vessels registered to an FOC country or listed as flag 'unknown' were built in Taiwan. Furthermore, by the end of 2003, of the 51 vessels, ≥ 24 m built in Taiwan during this period, only one was flagged to Taiwan; the remainder were flagged in FOC countries. According to the Organization

for Promotion of Responsible Tuna Fisheries and a number of other sources, many of the Taiwanese large-scale tuna longline vessels have recently reflagged to Taiwan. Some Taiwanese shipyards have a large percentage of the vessels they build adopt Flags of Convenience immediately when launched. The Lien Cherng Shipbuilding Co. Ltd. of Kaohsiung, for example, launched 18 vessels in the last five years, all flying FOCs when they left the shipyard. Ten of these 18 vessels have been implicated in IUU fishing for Patagonian toothfish. 46 Taiwanese owned longliners between 22.5 and 23.9 metres, mostly fishing in the Eastern Pacific and Caribbean, on the Lloyd's Register of Ships. 90 Honduran flagged fishing vessels ≥ 24 metres are listed on the Lloyd's Register of Ships as owned and/or operated by companies based in Taiwan). 28 tuna longline vessels owned by Taiwanese companies – 25 flagged to Taiwan and three to Vanuatu –transshipped their catches to the Lung Yuin while it was in the Pacific prior to its return to Japan" (Gianni and Simpson, 2005).

"Taiwanese fishing companies have now deliberately built a fleet of vessels that fall just under the 24 meter minimum length for application of most ICCAT measures. These 23.9 meter vessels have operated extensively in the Caribbean decimating shark stocks and causing serious billfish bycatch problems. The government of Taiwan either lacks the means or will to control this situation" (Delaney, 2003).

"Catches of non-target species (for tuna fisheries in south pacific) were estimated to have accounted for 0.71 percent of the total purse seine catch, including discards" (Lawson, 2001).

Taiwan

"At present the greatest proportion of non-party, unregulated Southern Blue fin tuna catch is taken by Taiwan, Indonesia and the Republic of Korea. There is particular concern that some of these fish are being taken on the spawning grounds in the Java Sea" (Foster, 1998).

Observer data is limited to catch rates determined from catch and effort data of RFMOs, stratified by time and area, which is probably provided by vessel operators. So, it is questionable as to how much of the data are trustworthy from the records, as there are no onboard observers on any of these vessels. Limited observer data is available for tuna from the South-Pacific area.

Thailand

There have been improvements in Thai fishery census reporting; "Thai Fishery census data give the number of boats fishing in other country's waters (by country). The recorded catch also includes other EEZs. SAU estimates Thai catch in Myanmar, Malaysia, Indonesia. Thai catch in Indonesia is 30% of that taken by Indonesia" (Staples – pers. comm.), although there are serious discrepancies between this total catch and that estimated taken by Indonesian vessels (Nurhakim *et al.* 2008). It has to be emphasized that some of the neighbouring nations indirectly recognize presence of Thai vessels in their countries as they have fisheries agreements to allow their vessels to fish in their waters. (e.g., Indonesia, Myanmar; Anon, pers.comm.)

Gianni *et al.* (2005) report three Thai-owned vessels out of a list of 132 refrigerated cargo vessels suspected of transshipment of fish into the Japanese market. MRAG (2005) states that in the Indian Ocean the ex-Russian fleet routinely transships at sea and there is also some transshipment in PNG ports to service canneries in Thailand. Foreign fleets fishing for tuna in the EEZ of PNG often transship Beche-de-mer onto reefer vessels in parts of Wewak, Manus, Kavieng, Rabaul, Lae and Madang for shipment to canneries in Thailand, Philippines and American Samoa (MRAG 2005).

Ukraine

Ukrainian flagged vessels have been engaged in illegal fishing in Southern Ocean. There is no information available on domestic fisheries, but in the Black Sea illegal activity by vessels from several nations has been reported. "Questions were raised at CCAMLR XXIII in 2004 by New Zealand about the vessels Mellas and Simeiz, formerly the Florens 1 and Eva 1, both of which had been engaged in IUU fishing activities in the CCAMLR area. These vessels eventually reflagged to, and were licensed to fish by, Ukraine in the CCAMLR area even though they remained under control of the same operator, apparently with the knowledge of the flag State. In addition, of the 10 toothfish vessels built at the Lien Cherng shipyard in

Taiwan since 2000 originally flagged to Bolivia, six have since been reflagged to CCAMLR member countries Russia, Chile and Ukraine. All of these vessels have been engaged in IUU fishing at some point since built according to the Coalition of Legal Toothfish Operators (COLTO) and documents submitted to CCAMLR. Mellas and the Simeiz (both flagged to Ukraine) – are managed by Chuan- Chuan Yoo, a company based in Taiwan. Chuan- Chuan Yoo and an associated company, Kando Maritime, also manage several other toothfish vessels, including the Ukranian flagged Sonrisa, the Belize flagged South Ocean, and the Georgia flagged Jian Yuan, Kang Yuan and Kiev" (Gianni and Simpson, 2005).

Further, Gianni and Simpson (2005) report two Taiwanese vessels Mellas and Simeiz to have been flagged to Ukraine and suspected to be engaged in IUU fishing for Patagonian toothfish in the Southern Ocean.

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ANGOLA

Summary of information concerning IUU fishing

Overview

Prior to independence from Portugal in 1975 the industrial fishing sector was dominated by foreign vessels and foreign nationals. A large fishmeal industry supplied by purse-seine fleets was developed in the early 1950s with total catches exceeding 300,000 t by the middle of that decade (Campos Rosado, 1974a). After a decline in fish caught in 1960, the production increased and reached nearly 600 000 t in 1972, but then the fishery collapsed during the war of independence" (Agostinho *et al.* 2005). "The abandonment of part of the productive infrastructure in the ports contributed to the near collapse of the lucrative industry into the 1980s. By 1986, for example, only 70 of the 143 fishing boats in Namibe, the port that normally handled two-thirds of the Angolan catch, were operable. Furthermore, most of the fish-processing factories were in need of repair. Pre 1975 there was also a very active artisanal or inshore fishing sector that provided both food and income to the local coastal population. The war of independence and the subsequent civil war resulted in the collapse of the industrial fisheries sector in Angola and large-scale shifts in the population to the coastal regions (Agostinho *et al.* 2005).

Offshore industrial fisheries were gradually re-established after independence and the cessation of civil hostilities. Pressure on nearshore fish resources has steadily increased because there are very few alternative livelihood options (Agostinho *et al.* 2005). A large proportion of the population still has no access to water, basic sanitation, medical care and education, and all forms of communication networks are in poor condition.

Massive changes are expected in Angola's marine fisheries with the advent of 600 vessels that have been ordered by the government to expand its landings. The ordered fishing vessels include several hundred 7.4 and 9.6 metre artisanal boats, purse seiners (18–25 metre), longliners (34 metre), shrimp boats (34 metre), catamarans (18 metre), fuel supply ship (89 metre) and 10 fishery patrol vessels (Strutt, 2007).

Illegal fishing

The Directorate of Surveillance (Direcção Nacional de Inspecção e Fiscalização) under the Ministry of Fisheries is responsible for fisheries surveillance in the Angolan EEZ.

Apart from conflicts between national fleets, frequent conflicts have also been reported with foreign fleets, flags of convenience vessels and IUU vessels fishing in the Angolan EEZ. Angola's marine fishery is managed through the Fisheries Act of 1992, which has specific articles related to policy, licensing and surveillance. Conflicts are bound to occur as both the industrial and small- scale fisheries sectors target the same sardine and horse mackerel stocks in inshore waters. Each individual fishery licence is unique and not transferable from one boat to another, as per Art. 14 º of Lei das Pescas nº20/02. Articles 3 º n º 2 and 13 º of the Executive Order of 2 February 2002, states that coastal waters from shore to 4 nautical miles is reserved for artisanal boats, beyond 6 nautical miles for semi-industrial boats, beyond 8 nautical miles for pelagic purse seiners and deep sea boats. Shrimp boats are authorised to operate beyond 12 miles, while crab boats can operate from beyond 5 miles. Articles 49º, 50º, 51º, 53º and 54º of Lei das Pescas nº20/02, state that activity of boats in unauthorised zones would be considered as infraction. Article 18 of the Fisheries Law of 2002 also states that Centro de Informação e Monitorização das Pescas (CIMP) has the right to fine infractions with amounts ranging from US$5,000 to 10,000 depending on the nature of the activity. CIMP is also responsible for implementation of satellite monitoring of industrial boats that operate in the Angolan EEZ through reception and processing of data received at its monitoring centres (Anon, 2007).

National as well as foreign fleets fishing within Angolan waters have been reported as engaging in illegal fishing. Distant water fleets from several nations operated off the Angolan coast, with rusting hulls of Soviet trawlers in Luanda Harbour bearing testimony to this fact. Gianni and Simpson (2005) report significant IUU activity within the periphery of the Angolan EEZ. MRAG (2005) reports that off the Angolan coast there are significant demersal shrimp and ground fish resources that are vulnerable to IUU

fishing. This is especially important as there is a significant offshore fishery for tuna stocks, but most of the coastal states, including Angola, do not possess adequate infrastructure to monitor and control presence of foreign vessels. IUU activity is capable of exerting substantial impact, as small-scale and subsistence fisheries depend on the same pelagic fish stocks targeted by foreign and IUU vessels in Angola. Conflicts between IUU vessels and small-scale vessels have been reported in Angolan waters. MRAG (2005) report further states that high numbers of tunas and sharks have been caught by IUU longliners. During April to May 2004, a joint SADC patrol inspected 19 vessels, six of which were seized for reported serious infringements of fisheries laws.

Use of gill nets by IUU vessels has also been reported from the Angolan coast. Community observer schemes have been introduced to mitigate this problem in inshore waters, but offshore surveillance suffers from inadequate monitoring due to absence of regular aerial surveillance. Of vessels apprehended between 2003 and 2005, some 13% were fishing illegally without licences. These were largely national pelagic trawl vessels but also included some Japanese longliners. A further 21% were caught during the closed season which indicates an invalid licence and a lack of intention to declare catch. Vessels engaged in IUU activities include both those of DWFN and vessels flying flags of convenience as well as national and foreign vessels licensed to fish within the Angolan EEZ. There has been some border hopping from Namibia in the south and Spanish shrimp vessels from the Democratic Republic of the Congo in the north (MRAG, 2005).

Patrolling has improved over the years from one patrol vessel during the period 1980 to 1994, to three vessels since 1995. Efficacy of the single patrol vessel in controlling illegal fishing remains low to moderate during 1980–94 given the endurance limits of these vessels while operating in offshore waters. However, things have improved in the overall MCS infrastructure, with 100 illegally operating vessels arrested during the period 1980–94, to a reported infringement rate of 14.6% during aerial surveillance in 2004. Estimates of IUU losses range from 22.5% in the small pelagic sector to 11.8 % in the shrimp sector, while losses through discards of demersal fish accounted for 13.7%. The illegal catch was estimated to be equal to 13% of this total, although this would increase to 21% if fishing in the closed season is taken into account. Of the 111 prosecutions reported in 2004, 39% were for entering a prohibited zone, 5.4% for unlicensed fishing, 6.3% for under-reporting and 2% for fishing in a closed season (MRAG, 2005).

Discards

Demersal finfish and shrimp trawl fisheries have significant discards. 16.7% of total landings are discarded according to Kelleher (2005). No formal catch inspection scheme is reported for the entire coast, although there has been some data collection in and around Luanda for some years. However, there has been some improvement since late 1980s, when frame surveys were begun (Tony. J. Pitcher, pers. comm.). Another area of concern is that there are no estimates of discards from licensed and unlicensed foreign trawlers, which might significantly raise the estimates of discarding from Angolan waters. This estimate might be particularly high for unlicensed vessels where economic profitability might prompt them to retain commercially useful species while discarding other species. Being a tropical environment the range and quantity of species discarded from these illegal vessels is assumed to be very high.

Unreported catches in the commercial sector

Fisheries statistics data are not collected regularly in Angolan fisheries. Sardinella, horse mackerel and sardine stocks have been assessed using acoustic methods since 1985 as part of the Nansen programme (Fridtjof Nansen surveys). Due to absence of reliable catch statistics, current management recommendations are largely based on catch trends from surveys. Some stocks are managed through Total Allowable Catch (TAC), which does not discriminate between different species of sardines or horse mackerel species. Hake stocks (*Merluccius polli* & *M. capensis*) were investigated through bottom trawl surveys by RV *Goa* between 1970 and 1992 and through Nansen surveys using Fridtjof Nansen between 1984 and 2003 (Lankester, 2002). Currently no observer scheme exists in either the industrial or artisanal fishery sectors. The Directorate of Surveillance (Direcção Nacional de Fiscalização) under the Ministry of Fisheries is responsible for fisheries surveillance in the Angolan EEZ.

TACs are allocated for some commercial species. Moreover, the country does not have the required manpower and infrastructure to enforce TACs in its widely dispersed landing centres. TAC limits are

currently in place for deepwater rose shrimp, striped red shrimp, deep-sea crabs, sardines, horse mackerel, chub mackerel, sea breams, grunts, croakers and groupers, Angolan hake, Cape hake, bigeye grunt and sharks (FAO, 2004). TAC estimates are made for pelagic and demersal fishes. Fishing rights are inheritable and transferable among individuals. Fishing quota is also transferable with the fishing rights. The fishing quota may also be used as warranty for credit with the authorisation of the Fisheries Ministry. The Minister is also authorised to regulate access to fishing through closed periods/areas and gear restrictions (FAO, 2004).

"Filling the vacuum created by the Portuguese withdrawal were fleets from other foreign nations including in particular the Soviet Union and some European countries. The benefits of this foreign fishing were doubtful. Some of the foreign fishing fleets operating in Angolan waters were required by the government to land a portion of their catch at Angolan ports to increase the local supply of fish. Fishing agreements of this kind had been reached with the Soviet Union, which operated the largest number of boats in Angolan waters, and with Spain, Japan, and Italy. Spain also agreed to help rehabilitate the Angolan fishing industry in exchange for fishing rights. In other cases, the government allowed foreign fleets to export their entire catch in exchange for licence fees. The scale of fish catches attained by the foreign fleets is not clear from available data but it is evident that serious overexploitation of resources was being practised in the extreme conditions prevailing" (Davies, 2005).

Unreported catches in the artisanal sector

The government appears to have initiated proper data collection for fisheries landings since 2000. Currently the data is only collected by communities where co-operatives exist, and maintained simultaneously in Artfish database which is managed by government–run Institute for the Development of Artisanal Fisheries (IPA) (Anon, 2004). The artisanal sector provides income to 100,000 fishermen and women in the post-harvest sector. In 2001, IPA surveyed between 23,000 and 25,000 artisanal fishers.

In the pre-war era the artisanal fisheries sector was efficient as fishers worked through co-operatives which were well managed by local councils. The co-operatives kept accurate record of landings and quantity of catch caught in order to prevent overfishing. Currently most fishermen organise themselves and must work in groups to help finance purchase of gears and vessels. Post war there have been no restrictions in the artisanal fishery to promote sustainable harvest of stocks. Further, the sector has also been affected by frequent encroachment of coastal areas by large foreign vessels from Spain operating under an EU–Angola fisheries agreement, essentially depriving them of their livelihood. The inshore 12-mile limit has been poorly enforced leading to frequent conflicts between artisanal and industrial fishermen (Lankester, 2002).

Unreported catches in the recreational sector

Little information is available about recreational catches in Angolan fisheries.

Note

This material is based on a country synopsis, with additional material, published in Pramod and Pitcher (2006).

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Table. Angola illegal fishing incidents.

No.	Species	Date	Type of IUU	IUU flag state	Number of IUU vessels	Action taken
1.	Finfishes nei	2004	Illegal	Togo, China, Angola	6	[1]Infringements included fishing in protected areas, not carrying licences and using gear not allowed under their licence – Vessels seized by South Africa Development Community (SADC) patrol vessel
2.	Finfishes nei	1997–98	Illegal	Unknown	-	[2]Encroachment by industrial trawlers, use of illegal beach netting methods. A major problem the Ministry faces is that some trawlers operate illegally in the coastal zone, too close to the shore; vessel monitoring system started in 1999
3.	Finfishes nei	2004	Illegal	China & others	18	[3]During a ten-day aerial surveillance operation, 18 of the 75 industrial vessels identified were fined for serious infringements of Angolan fisheries legislation. Chinese-registered vessels were using trawls while registered to fish only with purse seine. Other infringements included fishing in banned areas

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ARGENTINA

Summary of information concerning IUU fishing

Illegal fishing

Illegal fishing is identified as a serious problem for the country (FAO, 2003), especially in Patagonia (Anon, pers. comm.). Illegal fishing occurs not only for species that are fully exploited, such as hake and toothfish, but also for squids. According to information reported in CeDePesca (2003a) the occurrence of foreign fishing vessels inside the 200 mile EEZ has increased by almost 50% in the previous three years. According to the same source, during 17 patrol surveys carried during a single month, a total of 225 foreign vessels were found to be operating illegally, the majority from China, Taiwan and Korea. Argentinean legislation clearly states all the obligations that any vessel fishing in areas adjacent to the Argentinean EEZ must meet. Navy patrols attempt to control the intrusion of foreign flagged vessels without permission to enter the Argentinean EEZ, and some foreign vessels have even been sunk (New York Times (1994).

In response to over fishing and near collapse of the hake fishery, a closed area off the coast of Chubut was established in 1998 to protect juvenile hake (Godelman, 2004). Because of lack of effective means of control this measure was not successful. For instance in 2002 and 2003 (when the vessel monitoring system was not operating) juveniles (two-year-olds) accounted for more than 70% of the fishing mortality compared between 15 and 40% in previous years (INIDEP, 2004).

A combination of factors undermined the sustained recovery of the hake stock: (a) at any one time between 14 and 23 freezer trawlers held licences to fish without being challenged by the state; b) in 2002 the satellite vessel monitoring system was not operating because payment was in arrears (it became operational again in 2004; c) the system of onboard observers was interrupted failed; d) suspected corruption in the catch inspection scheme, reinitiated in 2000, led to misreporting of hake and other resources and undermined efforts to control quotas and assess the status of the stock; e) since 2003 the authorities have not been able to maintain the system of catch allocation by vessel and fleet operation has been unrestricted; f) throughout, fishing effort has continuously increased because licences have been transferred (Godelman, 2004).

Narvarte *et al.* (2007) report that there are significant problems the artisanal mollusc diver-based fishery where fishing occurs at depths greater than 12 metres, which is prohibited.

The Argentine Naval Prefecture (PNA) is responsible for fisheries enforcement within territorial and tidal waters (Organic Act. No.18,398) and within fishing control functions pursuant to Federal Fishing Regulations (Act No. 24,922) and has entered into several agreements with provinces and national bodies to control and enforce commercial, recreational and sport fishing regulations in coastal waters (PNA, 2008).

Effective fisheries enforcement has been hampered by failure of the administrative system under a succession of ruling regimes. For example 1999 saw the implementation of a new Law of Emergency that prevented freezer ships from operating north of 48º S parallel, but the satellite monitoring system was out of action and there were no onboard inspectors and the legislation was completely ineffective. However since the end of 2000, the situation has improved and satellite monitoring has resumed.

Discards

Argentina is one of the top ten producers of cartilaginous fish, but some species are completely discarded and more detailed information is required in order to determine their exploitation status. Discards are assumed to be high for some pelagic fish stocks like sharks and rays.

Article 21 of the Argentinean Fisheries Code (Ley de Pesca) forbids discard on the grounds that it contravenes responsible fisheries practices (Godelman, 2004). However, discards are a serious problem especially for hake and shrimp and it is estimated that since 2000 between 24,000 and 70,000 t of fish

have been discarded annually by these fisheries (INIDEP, 2004). Other fisheries with high discard rates are the shrimp beam trawl fishery (50%, plus substantial quantities of juvenile hake), the Patagonian scallop dredge fishery and other clam fisheries. On the other hand, the squid fishery (jig and trawl) and the pelagic fisheries for southern blue whiting have low discard rates. The minimisation of discards requires technologies that reduce by-catch, and economic measures such as catch–quota incentives that increase the value of the quota. However, discards are still considerable. In the coastal trawl fishery, batoid discards ranged from 21% to 50% of the total batoid fishes caught (Tamini *et al.* 2006). Kelleher (2005) estimates that 15% of the total Argentinean catch is discarded.

During the 1990s, the hake trawl fishery discarded almost 150,000 t (Kelleher, 2005). Hake discards depend on many factors, including population structure and small fish availability, fleet distribution patterns, fishing gear technology, target species abundance and market demands/alternatives and fishers' behaviour. Lower TACs and some controls have also helped. Use of BRDs has also reduced the quantity of juveniles caught as by-catch and hence discards (Kelleher, 2005); indeed, these selectivity devices are mandatory, but it appears that this is not well enforced. INIDEP reported three strong year classes that produce high recruitment; the fishery is currently supported by these recruitments, but with a high percentage of juveniles in the catches the stock age structure will be unable to recover.

Unreported catches in the commercial sector

The catch inspection scheme is ineffective because of information gaps, incomplete data from observers (lack of finance) and lack of control of fisheries landings (FAO, 2003). Inspectors might be better placed onboard patrol vessels rather than allocated to one vessel for its entire trip. Other important issues affecting catch inspector efficiency are poor education, lack of training, a weak legal framework, failure to prosecute transgressors and corruption (Cañete, pers. comm.). The VMS is not 'black box' system and does not meet international standards. Satellite monitoring only takes place for vessels larger than 25 meters (FAO 2003

Hake discards are accounted for by indirect estimates (INIDEP, 2004; Godelman, 2004). No information is available for the other stocks.. Estimates of hake by-catch in the shrimp fishery are used to manage the fishery, especially inside the hake closed area. INIDEP scientists use catch records from all the fleets (national and international) inside and outside the EEZ. However, the authorities set the annual CMP (maximum allowable catch) taking catches by foreign fleets into account (Cañete, pers. comm.). Recent problems with the catch inspection scheme, vessel monitoring systems and observer programme have reduced the capacity to collect reliable statistics. There is a high level of uncertainty in the fishery statistics because of poor quality information tools (for example., no set-by-set logbooks), lack of controls, corruption, lack of integration and cross controls between different sources and lack of funds and political will to implement an integrated fishery monitoring system according to international standards. Inspection levels are low and predictable, leading to estimated losses of 40,000 t of merluza that is landed illegally and the large quantities of discards in the merluza and prawn fisheries (Cañete, pers. comm.). Observer coverage also remains very low at 4% of the fishing trips. This should be increased to nearer to 15% if it is to generate representative data (CeDePesca, 2003b; CeDePesca, 2006).

Unreported catches in the artisanal sector

There are no special national regulations for small-scale fisheries; the general regulations are applicable. Fishers need national licences and have to be registered with the DNPyA (Dirección Nacional de Pesca y Acuicultura). Since they fish in areas of provincial jurisdiction, the operation is regulated by each province (FAO, 2003). The most important fleet target is a multi-specific fishery called 'coastal varied'. INIDEP recommends identifying fishing units related to the spatial distribution patterns. These areas of ichthyologic coastal associations constitute a useful tool for the design of the fishery management plan (Carozza *et al.* 2005). In response to these recommendations, the CFP (Resolution 07/2005) established management and administration measures applied to the coastal varied group. The measures include the use of a vessel monitoring system and the use of onboard observers whenever possible. At times, part of the offshore fleet (targeted on hake) fishes in the coastal zone, which has an additional impact on the resources and works in competition with the small-scale fleet (Cañete, pers. comm.). Substantial progress has been achieved in monitoring the artisanal fishery since 2007 when the Patagonian province of Chubut launched satellite monitoring for artisanal fishing vessels, with the first leg of the monitoring programme

covering vessels positioned in the Gulf of San Jose. This system will help the Fisheries Department to define fisheries catching areas. "The data accumulation process will enable us to determine areas and times of the year when fishing is more profitable for coastal vessels" (Anon, 2007).

In the small-scale mollusc fishery of San Mat´ıas Gulf, no management measures exist for octopus (*Octopus tehuelchus*) – 125 fishermen catch up to 30 t/year, ribbed mussel (*Aulacomya ater*) – 20 vessels catch up to 120 t per year, snail (*Buccinanops globulosum*, *B. cochlidium*, *Zidona dufresnei*) – up to 2.92 t per year. The Argentine Naval Prefecture (PNA) regularly carries out inspections of fishing vessels, which are required to give notice of every trip prior to departure. Diving-based fisheries are also regulated by PNA which supervises enforcement of a regulation, which requires each diving vessel to carry two commercially or professionally certified divers (Narvarte *et al.* 2007).

"The fishery control entity (Fisheries Police) has operational limitations with regard to addressing the large number of fisheries operations related to shellfish harvesting. The extensive distances in Patagonia frequently impede capacity for access to some landing sites. The existing framework to define the penalties and to enforce regulations on the artisanal subsector remains, in general, excessively flexible, and penalties for infractions of existing norms are generally difficult to apply in practice.

At present, fishers are directly responsible for management measures, and they do not report illegal fisheries practices, or entry of new, illegal users to the system. The lack of effective organisation in the artisanal sector is identified as one of the deficiencies affecting sustainable fisheries development" (Narvarte *et al.* 2007).

There is considerable anecdotal evidence of high illegal catches in the period following the economic difficulties in 2000–2004, and so our estimates of the upper confidence interval of illegal catches are as high as 80%. The lower boundary of the confidence interval has not been raised in proportion, reflecting the uncertainty inherent in such values.

Unreported catches in the recreational sector

Recreational fishers target marine fish like liza, robalo and flounders that ascend through river mouths and tidal areas. "Some southern Patagonia and Tierra del Fuego rivers draining into the Atlantic and Pacific oceans sustain runs of anadromous salmonids which gave rise to world-class and recreational fisheries (Vigliano *et al.* 2006).

Mustelus schmitti, *Galeorhinus galeus*, *Carcharhinus brachyurus*. *C. brachyurus* and *Carcharias taurus* are very important in the recreational fishing sector, but no data are available about catches and effort. Further, no information is available on quantity of discards for two sharks *Squalus* spp. and *Schroederichthys bivius*, which are caught in longline and recreational sectors and discarded due to low market demand (Chiaramonte 1998).

Note

This material is based on a country synopsis, with additional material, published by Kalikoski *et al.* (2006).

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Table. Argentina illegal fishing incidents.

.	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Finfishes nei	1997	Illegal	Spain	1	[1,2]Argentina claimed the freezer vessel *Arpon* was fishing illegally within the EEZ; vessel arrested and charged with illegal fishing. The vessel was in Argentina for more than 100 days as it did not pledge a sufficient bond. ANAMER, The Spanish association for freezer vessels claimed the vessel was fishing in waters beyond Argentinean jurisdiction
2.	Squids	2007	Illegal	Taiwan	1	[3] *Yuanfa* No. 16 was arrested for illegally fishing in the Argentinean EEZ, 199 nautical miles off Comodoro Rivadavia. Vessel 47.50 m in length, 8.90 m wide (beam), and 3.85 m in height; carrying 4.8 t (370 boxes)of Argentinean shortfin squid (Illex argentinus)
3.	Squids	2004	Illegal	Taiwan	18	[4] Argentinean navy found 18 Taiwanese vessels (squid jiggers) fishing illegally about 80 miles inside her waters. The Taiwanese vessels fled; Navy began chasing *Chin Hsing*. Jigger's crew set fire to the vessel and tried to scuttle her; Navy put out the fire and towed it to port
4.	Squids	2004	Illegal	Taiwan	1	[5]Crew of the Taiwanese squid jigger *Jim Chin Tsai* set fire to and scuttled their ship while being pursued by the Argentine Navy. A corvette was on patrol about 330 miles east of Comodoro Rivadavia when she sighted the vessel operating inside the Argentinean EEZ
5.	Finfishes nei	1993	Illegal	Poland	1	[6]The Polish trawler *Garnela* was arrested by the Argentinean Navy for violating Argentina's 200 mile zone. The owners contested the court's fine in Abhia Blanca stating that the fine was higher than the market value of the 23-year-old trawler. In March 1994, the ship's manager finally decided to give the vessel as a gift to the Argentinean government after failing to get the vessel released

1. Anon (1997a) Halt Seizures – Spain, Fishing News International, Vol.36, No.7, page 3.
2. Anon (1997b) Spain protests on ship arrest. Fishing News international, Vol.36, No.10, October 1997, page 4.
3. Anon (2007) Taiwanese vessel arrested on poaching charges, Fish Information Services, January 04, 2007.
4. Anon (2004a) News – Navy fires on Taiwan jigger, Fishing News international, 01 March 2004.
5. Anon (2004b) News – Another ship is scuttled, Fishing News International, 01 March, 2004.
6. Anon (1994) Final resolution of Polish trawler held in Argentina, World Fishing, 1994, page 4.

AUSTRALIA

Summary of information concerning IUU fishing

Overview

Fishing is one of the major commercial sectors in Australia generating AU$2.2 billion to the economy each year. The per capita fish consumption is around 16 kg. Fisheries resources within the EEZ are managed under commonwealth and state / territory legislations. Commonwealth is responsible for management of fisheries beyond three nautical miles while the six states are responsible for management in their adjacent waters. Exceptions with respect to historical dividing lines between commonwealth and state occur through Offshore Constitutional Settlement (OCS, which was introduced in the 1980s to allow flexibility in fisheries management. The Australian Fisheries Management Agency (AFMA) manages all the commonwealth fisheries and works in collaboration with several agencies like Agriculture, Fisheries and Forestry Australia (AFFA), which deals with broader fisheries policy and international negotiations, and Environment Australia for inputs into ecological sustainable development issues in fisheries management. AFMA manages more than 20 commonwealth fisheries worth more than AU$500 million, which also include fisheries in Australia's external territories. Landing facilities and processing facilities are owned and operated by the private sector with the exception of port infrastructure, which is under government control. All state and territory governments have well-developed and integrated management, administration, compliance and research infrastructure for managing fisheries under their jurisdiction. States manage inshore species such as rock lobster and abalone while AFMA manages deepwater finfish and tuna species.

The Australian Fishing Zone (AFZ) is the third largest in the world.(after France and the USA). It covers nearly 9 million sq. km, and includes diverse habitats ranging from inland rivers, mangrove lined creeks, estuaries, to shallow coastal bays and coral reefs. The geographical isolation from other continents and its wide range of habitat types has led to evolution of unique habitats like the Great Barrier Reef (perhaps the only oceanic structure that can viewed from above the earth). However, in contrast to waters in other regions, the presence of diverse and abundant tropical and temperate fish habitats has not supported an equally productive fishery. This is because of the narrow continental shelf, low nutrients in its coastal waters, little run-off from a dry Australian continent coupled with the predominantly southward flow of coastal currents and the lack of permanent upwelling along the coast (DAFF, 2005). In fact, in 1999 Australia was ranked only 46th in the world for fish catches (Watson, 1999 rankings). Prior to the declaration of the Australian Fishing Zone, foreign vessels from Japan, Chinese Taipei and Indonesia operated within 200 miles. In 1979 Australia developed fishing access agreements with Japan (tuna longlining), and Korea (squid jigging); joint venture agreements with Japan (tuna longlining), Chinese Taipei (shark gill netting, pair trawling, demersal longlining) and Thailand (demersal trawling). The foreign vessels were charged access fees and required to comply with licensing requirements, logbook, radio reporting, and observer programmes. However. since 1997 no licensed foreign fishing vessels have been permitted in the AFZ.

Illegal fishing

There are only a few areas of significant concern for Australia in respect of illegal fishing over the last 15 years.

Australia's remote sub-Antarctic territories of Heard and the McDonald Islands lie in the southern Indian Ocean about 4,000 km southwest of Perth. Since 1997, six vessels have been apprehended by Australian authorities for illegal fishing in these waters. Illegal catches have been estimated and reported to CCAMLR (CCAMLR 2007) and are included in our analysis under Illegal and unreported catches attributed to CCAMLR. Illegal fishing also occurs in Australia's northern waters, and is largely undertaken by traditional or small-scale Indonesian vessels. In the early 2000, peaking in 2004 and 2005 significant numbers of Indonesian vessels were arrested fishing in Western Australian, Northern Territory and Queensland waters Government estimates suggest one foreign fishing vessel per day was being arrested (R. Baird, pers. comm.). Foreign fishing vessels primarily targeting sharks, pelagic fishes and red snappers are known to encroach into Gulf of Carpentaria waters. However, increasing efforts to prevent illegal

fishing through increased patrolling and apprehension of foreign boats have reduced illegal fishing in recent years. In the Northern Territories shark fishery there are reports that unreported domestic catches coupled with unaccounted removal of around 1,500 t of sharks per year has affected the northern Australian stock component due to foreign fishing in Arafura Sea. Foreign fishing vessels have been excluded from Gulf of Carpentaria since 1979 (DPIFM, 2005).

An interim report on maritime security and illegal fishing by the Labour government in 2006 mentions increasing sophistication of illegal fishing trade by fishers from Indonesia. The report states that, increasingly, traditional Indonesian fishers have been replaced commercial vessels operated by a small number of owners. The Taskforce report also describes the increasing presence of Chinese financiers, who are involved in funding illegal fishing activities. The cycle of indebtedness and push of an Indonesian fisher towards illegal activity starts with *Bas*, the Indonesian boss funding trip and boat expenses for each trip. If the fisher has a successful trip, he can manage to pay the expenses of the trip, but an unsuccessful trip veers the fisher towards debt to the *Bas*. Hence, even when boats and fishers are apprehended, the main people behind the operations are unaffected and ready to finance other operations, taking advantage of fishers who are ready to take the risks, as rewards from just one successful trip can be very high. Another popular strategy is the use of small, but fast shark boats equipped with two 24–28 hp engines and GPS to fish off northwestern Australian coast to target sharks, which fetch a higher price compared to other fish species. This type of illegal fishing is very profitable (Anon, 2006).The report also states that Thai and Chinese illegal fishing vessels often target reef fish for the Asian hotel trade. These operations involve 10–14 'ice boats' of up to 60 t supplying fish to mother ships located at a safe distance within Australian waters (Anon, 2006).

MRAG (2005) states that 26% of abalone caught in Australia is caught illegally. Illegal activity in Australia (and similarly in other countries) includes poaching by unlicensed operators, breaches of quota/bag limits by licensed operators or recreational fishers, harvesting undersized abalone, illegally processing abalone (whether for domestic sale or export), exporting abalone without export permits, substituting illegal produced for legal product and misreporting goods (DAFF, 2005 ; MRAG, 2005). Abalone and rock lobster have been illegally traded in New South Wales for a long time. Some measures have been initiated in the past decade, with limited success. Palmer (2004) states that poor attitudes towards the necessity for resource protection, unwillingness to report illegal activities and inadequate enforcement capacity have contributed to persistence of illegal trade of abalone and oysters in inshore waters. Further, he states that with the current knowledge, illegal harvest of abalone cannot be accurately predicted in NSW, with conservative estimates suggesting theft of around 20–60% of total allowable catch. This situation is further aggravated as abalone poachers do not follow size limit regulations, which is causing long-term damage to the resource. Intelligence from state fisheries and law enforcement agencies across Australia suggests that the problem is significant (Nobes *et al.* 2004).

Control of illegal fishing is effective to a large extent, although several gaps need to be addressed in the domestic fisheries. The number of vessels apprehended for illegally fishing within Australian Fishing Vessels has increased from 138 in 2003 to 161 in 2004. Recent figures show 281 apprehensions (ENS, 2006) arising from 607 vessel interceptions in northern waters in 2005. The remaining 327 had their fishing gear and catch confiscated (Anon, 2006). The Government of Australia's National Compliance strategy 2005-2010 outlines the priorities of Australian Fisheries Agencies, which aim to promote voluntary compliance and create deterrence to illegal fishing both in territorial and EEZ waters. Australian legislation has provisions for large penalties for illegal fishing vessels, including forfeiture of foreign vessels Australian flagged vessels can be fined up to AU$55 and foreign fishing vessels up to AU$825,000 under FMA. Australia has allocated $US163 million over five years for a full-time boat patrol. The *Oceanic Viking* patrols even the sub-Antarctic waters. Australian nationals are also required to comply with Regional fishery Management Organizations (RFMO) guidelines. The Fisheries Management Act of 1991 also allows Australia's Attorney General to authorise a foreign country to take a specified action against Australian flagged vessel if it contravenes RFMO Conservation or management measures on the high seas. Further, it is an offence for an Australian flagged vessel to fish in high seas without authorisation.

Australian fishing vessels operating within the EEZ are monitored through vessel monitoring systems, Prior-to-landing reports, catch disposal records, and fish receiver records. AFMA has undertaken increased monitoring, control and surveillance in areas prone to frequent incursions by foreign vessels leading to decline in IUU activities. More information on National Compliance Strategy (2005–2010) is

available on the AFMA website (www.afma.gov.au).

In 2003, the government of Victoria allocated AU$1.05 million over a four-year period to fund a 24-hour illegal fishing reporting line (13FISH). This has resulted in the conviction of people involved in illegal netting and catching commercial quantities of abalone. Fisheries officers perform spot checks all over Victoria. Fines can range up to AU$120,000 and/or sentences of up to 10 years and confiscation of equipment. "In the first 16 months of operation, 1,740 calls were made, and as a direct result of the information received, over 150 Penalty Infringement Notices have been issued. There have also been at least 30 successful prosecutions including the seizure of boats and equipment – and a number of significant investigations have been undertaken" (DPI Victoria, 2006).

Discards

"The National Policy on Fisheries By-catch defines by-catch at its broadest level, to include all material, living and non-living, other than targeted species which is caught while fishing. For practical purposes, the National Policy defines by-catch to include discards (that part of the catch returned to the water) and also that part of the catch that is not landed but is killed as a result of interactions with fishing gear. By-product is defined as non-targeted catch that is commercially valuable and therefore retained by fishers. For the purposes of this Management Plan, by-catch and by-product have the same meaning as the definitions set out in the National Policy on Fisheries By-catch" (Noell *et al.* 2006). Eight fisheries currently have by-catch action plans in the commercial fisheries sector (AFMA, 2000).

Australia has one of the highest discard rates in the world rate; an estimated 55.3% according to Kelleher (2005). There are also significant discards in beach seine landings, estuarine seine fishery (Kennelly and Gray, 2000) tuna and prawn fisheries. However in certain jurisdictions by-catch rates have been regulated through management actions. For example, "the Australia sub-Antarctic BCAP: where any haul contains more than 100 kg of mackerel icefish, and more than 10% of the icefish by number are smaller than 240 mm total length, the fishing vessel shall move to another fishing location at least five nautical miles distant. The fishing vessel shall not return to any point within five nautical miles of the location where the catch of small icefish exceeded 10% for a period of five days. If, in the course of fishing, the by-catch in any one haul of any species for which by-catch limitations apply is equal to or greater than 2 t, the fishing vessel shall not fish using that method of fishing at any point within five nautical miles of the location where the by-catch exceeded 2 t for a period of at least five days" (Kelleher, 2005). Hill and Wassenberg (2000) studied the impact of discards on species composition and biomass in prawn fishery in the vicinity of the Great Barrier Reef. They showed that prawn trawling led to an increase in crested tern populations due to scavenging on floating discards and alteration in benthic biomass diversity due to survival of certain groups of invertebrates compared to others altering ecosystem structure. The study revealed that 98% of discarded finfish and cephalopods die immediately, with a survival of 12% of crabs, bivalves and echinoderms which subsequently alter the ecosystem structure.

In the South Eastern scalefish and shark fishery "An onboard scientific monitoring programme has shown that a significant proportion of the catch of some quota species is discarded at sea. Therefore the actual catch is considerably greater for some species. Over the period 1984 to 2003, dramatic changes in the species composition of the catch have occurred. These were initially due to the collapse of the eastern gemfish fishery and the discovery of orange roughy resources. In 1984, 21% of the catch was eastern gemfish, with tiger flathead and redfish being the next most important species. By 1990, the orange roughy 'boom' was well under way, with 74% of the recorded catch of quota species being this species and landings of the more traditional species being reduced to only a few percent of the total tonnage. Following the decline of the orange roughy fishery, the proportion of this species in the catch (excluding catches from outside the quota zones) dropped to 12% in 2003. Good seasons for blue grenadier in 2002 and 2003 resulted in this species comprising one-third or more of the total South East Trawl catch in these years" (Smith and Wayte, 2005).

"Information on the discarded portion of the SEF catch is gathered by the Integrated Scientific Monitoring Program (ISMP) based at MAFRI in Victoria. On-board field scientists sample the retained and discarded catches taken by SEF trawlers. The total discard weight of quota species during 2003 was estimated as 1,856 t, which is 164 t less than the weight discarded in 2001 (2,020 t). The overall discard rate for quota species during 2003 was about 8.3%, which is higher than in 2002 (7%). For non-quota species, the total

discarded weight increased from 12,770 t in 2002 to 15,852 t in 2003. The retained weight of non-quota species also increased from approximately 5,000 t in 2002 to 6,030 t in 2003. Discard rates for non-quota species increased from 66% in 2002 to 68 % in 2003. This compares to a discard rate of around 70% in 1998 and 1999" (Talman *et al.* 2004; Smith and Wayte, 2005). In the commonwealth tuna and billfish fisheries "The Fisheries Advisory Group (FAG) was provided with the (Eastern Tuna Bill Fish Fisheries) ETBF Data Summary for 2002/2003 and noted that the weight discrepancy between processed fish and whole fish that was reported the previous year should be rectified with the new logbook. Industry advised it is difficult to estimate weights accurately so most fishers tend to use ranges (i.e. 15–20, 20–25, 25–30 kg etc.) when recording weights and this usually results in underestimates. In relation to a query as to why the number of key species discarded was high, it was noted that the number of fish discarded may actually be recorded as a weight so it is not necessarily accurate. Also, traditionally smaller yellowfin and bigeye less than 10–12 kg have been discarded if retrieved alive" (AFMA, 2003).

Bromhead and Wise (2005) give estimates of discards in the east coast tuna and billfish fisheries. Their study states that there are significant spatio-temporal differences in reported by-catch between vessels with observers and without observers. Significant discards for albacore tuna occur along waters off the southeast coast of Tasmania, as high as 50–100%, although logbook records indicate very little or no discarding for this fishery. Reported discard rates for different species are as follows: albacore tuna, 0.8–1.3%; dolphin fish, 5–8%; and shortfin mako shark, 2–19%. Reported discards in eastern longline fishery comprise 31,493 discards for lancet fish since 2001, and 15,111 discards for blue sharks, which are a frequent by-catch in longline gear. Other discards in eastern long line fishery included ocean sunfish and indo-pacific sail fish. Information on discards of other finfish species in longline fishery are also given in Bromhead and Wise (2005).

"Data collected through the integrated scientific monitoring program indicate that around 7% of commercial quota species in the south east trawl fishery (SETF), valued at around AU$3 million, were discarded in 2003. Analysis of the discarding data suggests that this involves the discarding of smaller less valuable fish, a process referred to as 'high-grading' as fishers seek to maximise the value of their quota. The majority of redfish between 10 and 15 cm in length caught in the New South Wales zone of the SETF were discarded in 2003. However, redfish over 20 cm in length were almost all retained" (Elliston *et al.* 2005).

The quantity of coral reef finfish discarded is very much less, as most of the important commercial species are retained. "Juvenile snapper have also been reported in trawl by-catch, particularly in the Moreton Bay trawl fishery. Under a model developed by Sumpton and Jackson, it was estimated that approximately 30 t of snapper was caught and released by trawl operators annually, with the majority dying. By-catch in the recreational sector includes any fish that is released, regardless of whether it is discarded because it is undersized or because of a 'catch and release' philosophy. Release rates for some rocky reef species have been estimated through the RFISH surveys. The release rate for snapper is estimated to be particularly high, with the RFISH survey suggesting approximately 75% of fish are released, and the NRIFS suggesting a release rate of 66% across Australia. In regard to pearl perch, the RFISH survey estimates that between 40% and 45% of fish are released. There is some concern that the mortality rates of some released rocky reef fish, particularly snapper, amberjack, teraglin jew and samson fish, may be quite high because of their susceptibility to barotraumas" (DPI&F, 2006a). Mortality in the beche-de-mer discards is expected to be lower given that specimens are taken from shallow waters, kept in sea water prior to release and returned to site of capture quickly. Department of Primary Industry and Fisheries, and industry itself, are proactive in increasing the survival of incidental species through codes of conduct (Environmental Management system – EMS Program) and other arrangements such as closures and net mesh restrictions. High catch utilisation rates and low levels of by-catch in the GOCIFF net fishery have led to fewer discards during fishing operations. By-catch is also monitored by DPI&F observers' onboard fishing vessels (DPI&F, 2006b). In the finfish (stout whiting) trawl fishery around 27 t of stout whiting was discarded in 2004, with the reported weight of by-catch species discarded varying over the years due to changes in trip limits, reporting requirements, market prices and effort levels. Discards of blue swimmer crab in 2004 were five times the weight discarded in 2002. Stout whiting also forms a significant portion of by-catch taken with trawl gear operating in southern part of the East Coast Otter Trawl Fishery where operators caught and discarded 1,255 t of stout whiting in 2004. Since 2000, all stout whiting caught by T1 gear must be discarded as by-catch. Recent changes in regulations require all otter trawl vessels to install Turtle exclusion and Bycatch reduction devices in every trawl net. These have led to significant reduction in by-

catch of stout whiting with catch rates falling by up to 57% in gears installed with BRDs (DPI&F, 2006c). The fate of discards from prawn trawlers fishing in the vicinity of the great Great Barrier Reef has been studied by Hill and Wassenberg (2000).

In the Barramundi, fishery nets are quite selective and non-target species are either retained as byproduct or discarded as by-catch depending on market price and availability of targeted species. A small percentage of catch is discarded, which includes blue salmon, queen fish, trevally, triple-tail and sharks. Non-retained species comprised less than 1% of total catch in demersal and Timor reef fishery. Discards included edible species like the Chinaman fish (*Symphorus neamatophorus*), red sea bass (*Lutjanus bohar*), big eye trevally (*Caranx sexfasciatus*) and starry trigger fish (*Abalistes stellatus*). In the Northern Territories finfish trawl fishery, 17% of total catch is discarded, largely sharks and rays (a 'no-take' policy for these species exists). However, some operators use a system of grids and rails on the fish hopper to enable live escape of sharks and rays into the water in a timely manner (DPIFM, 2005).

In the Western Australian demersal gill net and longline fisheries, fishery landings records of by-catch have been estimated by bootstrapping observed catch rates (McAuley and Simpfendorfer, 2003).

Sea urchins are caught and processed throughout the year in Tasmanian waters but peak activity is in December, which is peak spawning season. Subsequent catches during January and February have low urchin roe, and samples are often cracked open in processing factories to check roe condition. Crates with low-yielding sea urchins are usually discarded. Hence, there is a need to assess the need for fishing in post spawning months when only post spawners are left in the fishery (DPIWE, 2004).

According to Knuckey *et al.* (2002), although no information was currently available on the proportion of discarded by-catch of all species taken in hauling nets, their study of the by-catch and subsequent fate in the inshore net fishery in Victoria, (which is similar to that of the South Australian marine scalefish fishery) indicated an average release rate of 60–70% (numbers and weight) with a subsequent average mortality of released species of 20%. Information on the release and mortality rates available for the primary target species of the Marine Scalefish Fishery is also available (Noell *et al.* 2006).

Gray et al (2001) estimated the discarded catches from commercial beach-seining operations in Botany Bay. Discards from prawn trawling in New South Wales have also been quantified (Gray *et al.* 1990).

Unreported catches for skipjack tuna include an estimate of 10–20% for areas. Bromhead and Wise (2005) report a discrepancy between observed and reported catches in four of the 10 study areas. They report "For albacore tuna, yellowfin tuna and black oilfish, observed discard rates were significantly higher than reported in all four time-areas, while observed dolphinfish, blue shark, shortbill spearfish, oilfish, skipjack tuna, bigeye tuna and swordfish discards were higher in two of the time-areas." Discard rates were significantly higher than what was reported in the logbook according to them. Bromhead and Wise (2005) recorded an average discard rate of 5.69% in the longline fishery for skipjack during the period 2000 to 2003. Moreover, discards are not considered or reported in the WCPFC area (Lawson, 2005).

By-catch

"Trawl by-catch of juvenile snapper is also a concern; however this source of mortality has been reduced over recent years as the level of trawling in Moreton Bay has declined by approximately 30% since the introduction of the Fisheries (East Coast Trawl) Management Plan 1999" (Gaddes, 2004). By-catch in the beche-de-mer fishery is restricted to releasing undersized specimens of target species. In the Queensland spanner crab fishery there are low levels of by-catch, the majority being sea urchins and star fish etc, with by-catch rates varying between less than 0.01 and 5.16 individuals per dilly lift. Moreover, DEH requires all by-catch to be reported in a logbook (DPI&F, 2006d). A progressive reduction in the by-catch of sand lobsters and squids has been observed in the East Coast Trawl Fishery after introduction of BRDs and TEDs between 1999 and 2000 (Bibby and Kerrigan, 2003). They also report that in the east coast trawl fishery, boat operators, while targeting other species, regularly discarded large catches of bay prawns due to lack of market demand. DPI&F (2006d) report states recent otter trawl by-catch research identified and classified over 1,300 species of small fish, crabs, penaeid prawns and bottom-dwelling invertebrate species like sponges, sea stars and gastropod shellfish.

In the Spanish mackerel fishery, monitoring (through observer trips) of the commercial fishery identified very low levels of by-catch and no interaction with protected species. In demersal fishery all the species caught in the fishery are landed and sold. In the shark fishery "Catches of sharks other than blacktips increased from 399 t (24%) of fishery's catch in 2003 to 649 tones (40%) in 2004" (DPIFM, 2005). The principal by-catch species caught included several species from Carcharhinidae family, mostly *Carcharhinus* spp., *Rhizoprionodon* spp. and hammerhead sharks (*Eusphyra blochii* and *Sphyrna* spp.) In the mud crab fishery, by-catch is made up of unmarketable mud crabs, cod, catfish and occasional blue swimmer crabs, the majority of which are released alive (DPIFM, 2005). Ward (2000) found that 14 species of sea snake were caught as by-catch of trawlers operating in the northern prawn fishery but that no data suggest that this fishery seriously threatens any population of sea snake.

Commercial prawn trawling has affected many smaller juveniles of commercially important fishes in the Shark Bay trawl fishery, including the pink snapper, leading to depletion of adult stocks. The reason for this affect is that the natural mortality of young snappers (6–18 months) is very high (up to 92%) due to predation in the first year, (Moran and Kangas, 2003).

In the giant crab fishery, strict controls are in place to restrict by-catch with limits on amount harvested for both target species and by-catch to maintain precautionary management strategy. If by-catch exceeds the allocated amount the TAC could be adjusted to account for the over-catch (Sloan, 2002). In the South Australian scalefish fishery, strict by-catch limits are enforced both in state and Commonwealth government managed waters (Noell *et al.* 2006).

By-catch in prawn fisheries of New South Wales has been well studied over the years by several authors and grids are mandatory (Liggins and Kennelly, 1996; Kennelly *et al.* 1998; Liggins *et al.* 1996). The by-catch in the prawn seine net fishery in southeastern Australia included large numbers of small (<15 cm total length) finfish species of commercial and recreational importance including *Gerres subfasciatus*, *Rhabdosargus sarba* and *Acanthopagrus australis*, as well as several small demersal species of lesser market value (Gray, 2001).

Unreported catches in the artisanal sector

According to Henry and Lyle (2003) "indigenous fishers in Australia harvested (caught and retained) approximately 900,000 finfish, 1.1 million molluscs, 660,000 prawns and yabbies, 180,000 crabs and lobsters and smaller number of other miscellaneous species during the survey. Since negligible quantities of seafood (54,700 aquatic animals or 1.7% of the total catch numbers) were not retained, the above description of indigenous catch has been limited to the harvested (caught and kept) component only. The most prominent finfish species/groups (by number) were mullet, catfish, perch/snappers, bream and barramundi. In excess of 50,000 fish of each species/group were harvested by indigenous fishers in the study region. The largest proportion (by number) were taken in the Northern Territory (40% of the total indigenous finfish), followed by Queensland (38%) and West Australia (22%).

Unreported catches in the recreational sector

The recreational fishing sector represents an important source of revenue and more catches in recent decades on the east coast of Australia. In the states of Queensland and New South Wales income from licensed recreational fisheries may be even higher than revenues from commercial fisheries sectors. Henry and Lyle (2003) state that an estimated 20.6 million fisher days of recreational fishing effort was spent during the period May 2000 to April 2001 alone. Two states of New South Wales (6.9 million fisher days, 30.4 million fisher hours), and Queensland (4.6 million fisher days, 25.4 million fisher hours) recorded the highest fishing effort, accounting for more than half the national total, followed by Western Australia (3.4 million fisher days, 19.7 million fisher hours) during this period.

The distribution of fishing effort by water-body type was as follows: 41% of total fishing effort (9.5 million events) took place in coastal waters (shoreline to 5 km), 35% in estuarine waters (8.1 million events), with a low level of 4% (937,000 events) recreational effort in offshore waters (>5 km from the coast), while freshwater recreational fishing accounted for up to 20% of national fishing effort (Henry and Lyle, 2003). The distribution of effort by fishing methods was as follows: line fishing using bait / artificial lure / jigs,

and set lines represented 85% with 19.7 million fishing events, followed by fishing with pots and traps (1.7 million events or 7% of total effort). Netting methods such as cast nets, scoop nets, push nets and set nets (gill nets) accounted for 3% of the total effort (634,000 events). Diving using spears, underwater hand collection etc. contributed to 1% of the total effort. SCUBA was the primary equipment followed by snorkel diving (hand collection) – 55% of the dive events, followed by spearfishing (36%) and surface spearing (9%).

Estimate of total harvest from recreational fisheries can be split into two categories: harvested or retained catches; and released or discarded components. The harvested component includes catches harvested for consumption or use as bait, and legal catch retained through bag and size limits. To draw an estimate on extent of catches harvested by the recreational sector, estimates during May 2000 and April 2001 show that about 60.4 million finfish, 11.5 million small bait fish, 6.1 million crabs and lobsters, 47.7 million prawns and yabbes, 1.8 million cephalopods, 7.2 million other molluscs and 1.2 million other species were harvested by recreational fishers in Australia. Among the marine finfish harvested, whiting comprised the bulk of catches by number followed by flathead, herring, Australian salmon, bream, mullet garfish, tailor and pink snapper. Henry and Lyle (2003) further state that small baitfish like herring, pilchards, whitebait and small juvenile fish were also taken by recreational fishers. These fishes represented a large catch by numbers, but their catches were small when quantified by volume or weight of the catches. A detailed explanation of their catches, by species, is also available in the above report. The authors also state that a significant portion of catch was released or discarded. For example up to 18 million flathead, bream and whiting were released nationally during the above-mentioned period.

Henry and Lyle (2003) estimated that during the period May 2000 and April 2001, the total finfish harvest by recreational fishers was in excess of 27,000 t nationally, with another 3,000 t of non-fish species taken during this period. Of the above figure, the highest quantity of finfish 8,100 t was taken in Queensland, followed by 6,600 t in New South Wales, 4,800 t in Western Australia and 3300 t in South Australia. In the non-fish category, 1,000 t was harvested in Western Australia, 900 t in South Australia and 800 t in Queensland. The relative conversion of numbers to fish gave an estimate of 2,300 t of flathead, 1,800 t of mackerels and 1,700 t of bream for the top-three harvested species. Other species included 1,400 t of pink snapper, 1,300 t of tuna/bonitos, 1,200 t of sharks/rays, 1,000 t of emperors, 1,000 t of red snapper, 900 t of jewfish and 700 t of coral trout. Among shellfish an estimated 815,886 kg of mud crabs, 453,095 kg of lobsters, 104,565 kg of abalone and 194,394 kg of prawns were harvested by recreational fishers.

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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Table 3. Australia illegal fishing incidents

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Finfishes nei	2006	Illegal	China	1	[1]The Chinese trawler had a fishing net onboard and crew tried to outrun the Navy before being caught; trawler was escorted to Darwin
2.	Toothfish	1998	Illegal	Honduras	1	[2]The vessel *Big Star* was fishing eight miles inside the Heard and McDonald EEZ. After the master was charged and bond paid the vessel was released. The fine included value of the vessel
3.	Finfishes nei	1995	Illegal	Unknown	1	[3] The 53.6 m trawler *Arrow* was charged with making 15 trawls in a prohibited area in Canterbury bight. The vessel was operating in an area restricted to vessels >43 metres; all three defendants were convicted and fined and the vessel forfeited
4.	Toothfish	1997	Illegal	Panama	1	[4,5] The 44 m *Aliza Glacial* arrest was the first Australian apprehension of toothfish vessels inside CCAMLR waters
5.	Toothfish	1997	Illegal	Belize	1	[6,7] The *Salvora* was apprehended for fishing without a licence for toothfish in Heard and McDonald EEZ in mid-October 1997
6.	Sea Cucumbers	1993-2002	Illegal	Indonesia	1	[8]illegal fishing for sea cucumbers in Australian waters (Torres Strait) with both day and night poaching irrespective of the fishing closure since 1993 to 2002 period; one Indonesian vessel arrested and charged with illegal fishing
7.	Finfishes nei	2001	Illegal	Sri Lanka	2	[9] The two 50 ft. vessels were found off the western Australian coast on separate dates; The skipper of the first boat was fined AU$65,000 (US$34,150) and the four-man crew released; skipper of second vessel pleaded guilty, yet to be sentenced

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BANGLADESH

Summary of information concerning IUU fishing

Overview

Bangladesh, with a coastline of 710 km and an EEZ of 166,000 square km, "derives only 20% of its total fishery production from marine capture landings, with the bulk of landings coming from vast network of perennial rivers flowing into coastal areas.

Its status as a Least Developed Country has led to the fisheries sector acting as buffer for poor performance of other sectors like agriculture and natural catastrophes such as annual floods (most coastal areas are below sea level leading to seasonal flooding of several low lying areas during the monsoon season). The fisheries sector is also affected by shortage of trained manpower, lack of concrete management policy and inadequate infrastructure and monetary allocation to scattered fishing centres.

Fisheries is a major fast-growing source of employment in coastal areas. It contributes 6% of GDP and provides 60% of animal protein needs, making it a crucial sector for meeting food needs of the lower income people. Khan and Haque (2003) reported that the fisheries sector was responsible for approximately 3% of the total employment in the country; the export value of fish grew at the highest rate of 25.17% per annum between 1972 and 1996; and the share of fish and fish products in total export value has been increasing over a period of 24 years.

10% of the fisheries catch in Bangladesh is lost due to spoilage. An estimated 200,000 t of fish per year is lost or consumed in putrid condition (Anon 2006a).

The Indian shad (*Hilsa ilisha*) is the single most important commercial fish in Bangladesh contributing the bulk of its fisheries production both in coastal and inland waters. The fish is exploited by both artisanal and industrial vessels in coastal waters. The fishery supported a vibrant fishing industry from the 1970s until the 1990s, assuming an almost iconic status among both fishermen and its consumers. Loss of habitat, combined with problems due to pollution and urbanisation have led a sharp decline in the fishery. Increasing use of destructive gears like *jhatka jal* (a kind of gillnet used in rivers to catch juveniles) to compensate for declining yields has caused massive recruitment overfishing.

The Department of Fisheries under Ministry of Fisheries and Livestock is responsible for collecting and fishery statistics via District Fishery Officers. In the marine industrial fisheries, catch and effort data are collected from commercial trawlers for four shrimp species and finfish (Kamal, 1989). Vessels in mechanised and non-mechanised sectors are required to be licensed.

In Bangladesh the extent of freshwater and brackish water fisheries is high compared to marine fisheries due to large volume of freshwater runoff from numerous rivers emptying through Bangladesh into Bay of Bengal extending the freshwater influence farther into the Territorial zone. Most of the fresh and brackish water resources are allocated to fishers through periodic licensing system.

Figures suggest that industrial fishing in Bangladesh has already exceeded the maximum sustainable yield (MSY) level. The recent trend in coastal fishing shows omens of bad harvests and finally extinction of marine fishery resources in the Bay of Bengal. "All fishers whom we interviewed in four sample sites reported declining fish catch in their daily fishing trips" (Khan and Haque, 2003).

Illegal fishing

Estimates of IUU catches for Bangladeshi fisheries are difficult as there is no clear dichotomy between fresh water, brackish and marine fisheries landings. Hence, some fish resources exploited in the vicinity of mangroves and coastal waters with brackish water influence are reported as freshwater stocks. Study areas subjected to marine water influence during high tides, including mangroves fringing the seaward side may be treated as marine. There is also large under-reporting in small-scale and subsistence fisheries on the southeastern section of the coast, where catches in marine and estuarine jurisdiction are landed far inland,

resulting in under-reporting from the marine jurisdiction. There is no accurate inventory for the number of fishermen and fishing nets in subsistence and small-scale fisheries, making current enumeration of total landings erroneous.

Marine resource management laws are not regularly updated. Bangladesh does not have an at-sea boarding and inspection capability and uses only port inspections with lack of formalised procedures for inspection reports and absence of a data management system with cross checks on catches and landings (Flewwelling, 2001). Further, with declining yields due to overfishing, fishermen are increasingly resorting to measures such as use of more nets and smaller meshed nets to ensure historic catch levels (Anon, 2006b).

The DOF recently acquired two modern gunboats under the operational control of the Bangladesh Navy for patrolling the EEZ (Islam, 2003). As of April 2003, the Bangladesh Navy had seized 56 foreign trawlers and 65 fishing boats for illegal fishing within its EEZ (Anon, 2003).

"Fish trawlers catch a number of species which the small scale fishery also catches. Prominent among them are ribbonfish, Jew fish, croaker, and *Hilsa*. Shrimp trawlers also catch some fish and discard a part which would otherwise have been available to the small scale fishery. Now that both these trawler types are fishing in near-shore waters, they catch all species. They destroy nets set by small scale fishers and sometimes steal these nets. Such incidents have been increasingly reported in recent years. The Coastal Fishermen Coordination Committee, an organisation of the fishers in our study site at Chittagong, has reported that 200 such cases took place in the first two months of fishing in the 1999 season. Physical assault on small fishers is also a common feature. All this has implications for the costs of fishing by the small scale fishers and increases their risks" (Khan and Haque, 2003).

The Bangladesh Navy has implemented fishery protection campaigns, often to coincide with the Hilsa breeding season (from January to March) to protect the population of the country's most popular fish (Daily Star, 2004). During the campaigns they seize illegal fishing nets and impound fish fry. Those found fishing illegally may be fined or jailed (DoF, 2006).

Mahmoud (1995) reported 42 shrimp trawlers, 79 finfish trawlers, and 21,400 fishing boats operating in the territorial waters off the Bay of Bengal. Many of these fishing boats were unlicensed while fishing on the continental shelf, and some were fishing even during the spawning season. Institutional flaws and absence of a concrete policy have allowed illegal fishing to persist in Bangladesh fisheries (Mahmud, 2007). According to a Department of Fisheries report only 4,000 of the 43,900 mechanised and non-mechanised boats fishing in the Bay of Bengal were licensed and registered with Mercantile Marine Department (MMD) (DoF, 2006).

Mechanised trawlers are also reported to land a significant portion of their catches in non-designated landing centres, which distorts estimates from this sector. Some of the most common problems that Bangladesh faces in coastal waters include use of gill nets and fishing with smaller meshed nets for shrimp and fish fry in spawning and nursery grounds. Destructive fishing is prevalent due to poor enforcement and low levels of compliance among artisanal fishers. This is a very difficult problem to tackle as poverty and lack of alternative livelihood options prompt fishers to engage in practices that ultimately threaten the very resource that supports their food requirements. The current state of fisheries could be improved by implementing a regulatory regime with better monitoring during closed seasons, complete ban on usage of certain gears like *jhatka jal,* coupled with limits on the number of gears licensed per each community for the small-gear sector.

Discards

Discards are very high in Bangladeshi fisheries even when compared with other Asian nations. Most of the trawlers operating in Bangladesh are purchased second hand and are inadequately equipped with cooling facilities. Moreover, lack of infrastructure facilities in ports and harbours force boat operators to discard a large amount of cheap fish at sea. The Bangladesh Frozen Food Exporters Association estimates that 35,000 to 40,000 t of low-value fish are wasted every year in this way. Kelleher (2005) reports an average discard rate of 17%, with 64,578 t discarded for 314,966 t of landed catch. It is also a common practice to discard low-value fish when high-value fish are caught in subsequent hauls (Khatun *et al.* 2004).

"Finfish landed by the trawler fleet is in the range of 8 000–12 000 t, which is only 20% of the actual catch, while 80%, equivalent to 35–45 000 t (White and Khan, 1985) is discarded at sea" (Rahman *et al.* 2003). Estimates from 1980–1990 by Bangladesh Fishery Development Corporation reveal that post harvest losses from discard by Bangladeshi trawlers were estimated to range between 30,000 and 40,000 t per year (Kamal, 1994).

White and Khan (1985) estimated that shrimp trawlers have a by-catch of more than 35,000 t. Push nets exhibit discard rates of 90% for those collecting penaeid post larvae Kelleher (2005). More than 2,035 million post-larvae of tiger shrimp (*Penaeus monodon*) are collected annually by push-net, which is only a little over one percent of the total catch of the push-net fishery (Paul *et al.* 1993). The rest of the catch is thrown on the sand to die, which is equivalent to about 200 billion post-larval shrimp, and fish larvae and zooplankters. .

BOBP (1991) reports that everything except for shrimp greater than 20 cm in length is discarded by shrimp trawlers. However, the discards might have reduced over the years because of increasing demand for these fish in the shrimp feed industry. But, no current reports exist to substantiate this.

Species composition for commercial fin and shell fish has undergone rapid change with reports by FRSS since 1981 showing decline of percentage of white shrimp and increase in percentage of brown and smaller categories of shrimp in landings (Kamal, 1994). This is understandable given that 99 per cent of shrimp post larvae are collected and discarded leading to both recruitment and growth over fishing creating continuous loss of spawning stock biomass over the years.

Discards are assumed to be very low for *Hilsa ilisha*. Islam (2003) gives discard estimates for representative species like Threadfin breams (*Nemipterus spp*.) and *Polydactylus*.

Unreported catches in the commercial sector

The Ministry of Fisheries and Livestock (MOFL, 1998) estimated that in 1998 there were 1.2 million full-time and 10.2 million part-time fishers in Bangladesh. Estimates from the part-time fishers are poorly quantified, which is further aggravated by remote location of many communities (Anon 2006b) and a large brackish water area (48,365 square nautical miles) leading to significant problems in collecting catch data. Also Bangladesh is unique in terms of number of displaced people who make livelihood out of fishing, as it is prone to seasonal flooding in low-lying areas every year, leading to migration of agriculture-dependent people to fisheries to make a living every time crops are lost. Moreover, most of that catch is consumed rather than being sold in the market, with a smaller quantity sold in the informal market making it difficult to derive estimates from the artisanal sector.

There is a large organised illegal trade of *Hilsa* traded into India through the border, which remains unreported to Bangladeshi authorities. Further, fishermen from ports (in India) report that trawler and boat owners also land significant quantities of *Hilsa* directly from Bangladeshi boats through sea at Indian ports, leading to significant under-reporting. However, the exact quantity of fish traded through Bangladeshi vessels into Indian waters through sea and land remains unknown. The high price and unrelenting demand for the fish results in under-reporting of up to 3–5 times the reported statistics in this fishery. The collapse of the *Hilsa* fishery on the Indian side has also increased the amount of illegally traded *Hilsa* in India sourced through Bangladesh since 1996, largely due to the tripling of price in the last decade (Pramod, pers. observation 2002–2004).

Unreported catches in the artisanal sector

Although fishing in Sundarbans is illegal, *mowalis*, the traditional honey harvesters of Sundarbans, depend on fishing for most of the year in the mangrove areas. Very few actions have been initiated due to low volume of catches and people engaged in these areas, as survival takes precedence over regulations in this impact zone. In early 2000, up to 100 boats were engaged in fishing in this area, while up to 50 boats have been engaged in fishing in recent years (Zaman, 2004). Catches from this subsistence sector remain unreported.

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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Table 4. Bangladesh illegal fishing incidents.

No.	Species	Date	Type of IUU	IUU flag state	Number of IUU vessels	Action taken
1.	Finfishes nei	2004	Illegal	Thailand & Myanmar	>1	[1]190 Thai and Burmese nationals were jailed for six months for illegally fishing in southern Bangladesh waters; L
2.	Finfishes nei	2005	Illegal	India	1	[2]BDR jawans handed over three Indian fishermen to Debhata police along with one boat and fishing gear; vessel apprehended at Ichchamati near Bhatshala
3.	Finfishes nei	2006	Illegal	Taiwan	1	[3]The vessel *Jsing 1* apprehended near St. Martin's Island; 3 t of catch confiscated ; crew received jail sentence
4.	Finfishes nei	2006	Illegal	Thailand	1	[3]Catch was confiscated ; the vessel *Lien Hsing* was apprehended; crew received jail sentence
5.	Finfishes nei	2006	Illegal	Bangladesh	5	[4]Five trawlers fishing illegally in Paira river were caught in a storm and sank

1. Bangkok post (2004) Thais and Burmese caught for illegal fishing jailed - Imprisoned for six months in Bangladesh, 13 August 2004, Bangkok Post.
2. Daily Star (2005) 3 Indian fishermen held, boat seized, Daily Star, Bangladesh, 14 August 2005.
3. Daily Star (2006) 19 foreign crews held for illegal fishing, Daily Star, 31 March 2006.
4. Daily Star (2005) 9 fishermen missing in Paira river, Daily Star, 8 August 2005.

BRAZIL

Summary of information concerning IUU fishing

Overview

Fisheries statistics for Brazil are incomplete. There are many problems with coverage, unreported and illegal catches that are not accounted for in assessments, and lack of continuity in statistical collection. Also, the release of official catch statistics usually takes about two years; and data are not available in an electronic form, which makes any attempt to assess the status of stocks and verify statistics very difficult (Freire, 2005a).

Illegal fishing

The limited information available (sardine fishery; lobster and shrimp in the Patos Lagoon) indicate that there is a large number of illegal or clandestine boats. IUU fishing is recognised as a serious problem (FAO, 2003). US and other distant water fleets fished illegally for shrimp in northern Brazilian waters during the 1980s (Weidner and Hall, 1993), almost leading to the collapse of shrimp stocks off Amapá State (Chimanovitch, 2001). In the 1990s, vessels from Japan, Korea, Spain and Taiwan frequently called at Brazilian ports in the northeastern region for services and it is suspected that such vessels were targeting tuna in Brazilian waters (Weidner and Hall, 1993). The Saint Peter and Saint Paul Archipelago is particularly vulnerable as it is a long way from the mainland (Chimanovitch, 2001). Currently, there is no estimate of catches by distant water fleets, but they probably represent an annual loss of US$500 million for Brazil (Chimanovitch, 2001).

Practically all fisheries are regulated by licensing schemes, but the schemes are poorly enforced and ineffective According to FAO (2003) steps have been taken to combat IUU fishing, planned measures include implementation of improved monitoring, control and surveillance with the help of the Brazilian Navy and approval of the Law on Environmental Crimes (No. 6938/1988). All vessels fishing in international waters or operating chartering contracts must have a VMS (vessel monitoring system) and all vessels must have logbooks. However the logbooks system has a number of pitfalls, including non-compliance and the lack of verification mechanisms.

Detailed estimates of illegal catches in the principal fisheries are taken from Kalikoski et al (2008)

Discards

There is no systematic collection of discard statistics and with the exception of the deep-water foreign fish fleet, there are no observer programmes in place. The increase in scarcity of resources and changes in market demand probably altered the discarding practice – more species are now being landed. Even so, trawl fisheries for demersal fish and for shrimp in northern and southern Brazil are widely used without specific mandated reductions in discard. Kelleher (2005) estimates that about 10% of total Brazilian marine catches are discarded. In southern Brazil the elimination of minimum size regulations for industrial trawlers operating on the shelf is expected to decrease discards (Vasconcellos *et al.* in prep.).

In the pink shrimp fishery from Northern Brazil the by-catch and discard of fish of small size and/or low economic value is considerable (about 1 kg of shrimp to 6 kg of fish, including juveniles of other important stocks such as piramutaba). The industrial shrimp fleet even discards shrimp species that are targeted by the artisanal fishers (CEPENE, 2000). Legislation sets the minimum mesh size (ineffective for fish by-catch in trawling nets) and closed areas for trawlers (Paiva, 1997). Decree IBAMA Nº 5, 19/02/1997 mandates the use of turtle exclusion devices. In lobster fisheries legislation establishes minimum mesh sizes for traps, forbids the use of trawlers, seine and gill nets and closed nursery areas. Gill nets are being slowly phased out by law. Lobster harvesting by diving is also illegal but in some states is the dominant method used. Ivo *et al.* (1996) point out that 47 fish and 9 crustacean species are caught as by-catch in lobster fisheries, and most of them (if not all) are discarded. In the case of demersal fisheries in southern and southeastern Brazil, with the exception of regulations controlling minimum mesh size and closed areas (three miles), there are no other mandated modifications in gears to avoid by-catch.

Unreported catches in the commercial and artisanal sectors

In general, catch statistics do not account for the complete removals from stocks. There are serious limitations in the system of statistical collection, including temporal discontinuities, lack of standardisation of the methods of statistics collection among states, poor identification of the species caught (about 61% of the catches are not identified to the species level; Vasconcellos and Cochrane, 2005; Freire and Pauly, 2005), and there are no efforts to estimate the magnitude of IUU fisheries, although its importance can be substantial in some fisheries (FAO, 2000a, 2000b; Vasconcellos *et al.* in prep.; Vasconcellos *et al.* 2004). Removals by anglers are not included and there is no available information about its magnitude (Freire, 2005b). At the request of the Brazilian government, FAO has added 100,000 tonnes to official catch statistics from 1995 to 2005 to represent catches originating from recreational and subsistence fisheries, even though there is no local data (Freire, 2005a). For lobsters, there is information related to different fisheries targeting different lobster sizes, but catch statistics are not recorded at this level (Lins-Oliveira *et al.* 1997). Lack of human resources to monitor fisheries catches is also recognized as a major constraint (FAO, 2003). Despite these limitations all the available statistics are used in the assessment of stocks.

"It is important to observe that the IBAMA exercises a certain control on the species harvested by the industrial fishing firms, but there is little information on the situation of the resources captured exclusively by artisanal fishermen, mainly in estuaries, lagoons, beaches and rivers" (Diegues, 2002; Diegues, 2004).

Note

This material is based on a country synopsis, with additional material, published by Kalikoski and Vasconcellos (2006).

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Table 5. Brazil illegal fishing incidents.

No.	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Finfishes nei	2008	Illegal	Brazil (Domestic)	>1	[1]IBAMA seized 10 units of explosives from fishing boats and confiscated 90 kg of illegal fish caught through destructive fishing as part of Carapeba Operation, co-ordinated in collaboration with civil police, federal and military, as well as army and navy; Penalties imposed for the infractors are: fine of R$700 to R$100 thousand, plus R$10,00 per kg of illegal product
2.	Finfishes nei	2004	Illegal	Brazil (Domestic)	Unknown	[2]IBAMA confiscated 3 t of grouper *Epinephelus itajara* fished illegally in the coast of Pará.; apprehension took place in the city of Bragança, 230 km of Belém ; the infractors were fined R$21,.400
3.	Shrimps	2007	Illegal	Brazil (Domestic)	-	[3]IBAMA in co-operation with local police apprehended 531 kg of shrimp illegally caught during a closed season from a processing company in an operation carried out in Piuma
4.	Pink shrimp	2008	Illegal	Brazil (Domestic)	-	[4]IBAMA inspectors in co-operation with Federal police conducted a operation in a lagoon in National park of Porto Alegre; confiscated 40 kg of illegally caught shrimp; In a second operation 12 rays (threatened species), 25 hammer head shark, 25 shrimp (equivalent to 3 kg) and 100 kg of fish were confiscated from a vehicle ; the owner of the vehicle has to pay a fine of R$5,000 for the threatened species (rays), at the rate of R$500 for each individual
5.	Pink Shrimp	2008	Illegal	Brazil (Domestic)	-	[5]IBAMA in co-operation with Federal Police in Lagoon do Peixe confiscated 130 kg of pink shrimp caught illegally (it is illegal to catch shrimp below 9 cms within the lagoons)
6.	Sardine	2007	Illegal	Brazil (Domestic)	1	[6]IBAMA in co-operation with Federal police apprehended a fishing boat BR-101, and confiscated 6 t of undersized sardine (Below 17.5 cm) from Conceição de Jacareí marina; fish was followed to the cold storage and confiscated there; proprietor of the company fined R$160,000 for illegal fishing and trading
7.	Finfishes nei	2002	Illegal	China and Brazil	4	[7]Four Chinese fishing boats on lease for a national company were withheld by IBAMA for fishing in an unauthorised zone; the boat had 40 types of fish, totalling 8 t; fine unknown

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CANADA

Summary of information concerning IUU fishing

Illegal fishing

By international standards, levels of illegal fishing are quite low in Canada – which scores in the top 10% of countries. Two studies of illegal fishing, one on each coast, estimate 7% in British Columbia (Ainsworth and Pitcher, 2005) and less than 15% in Atlantic Canada (Forrest *et al.* 2004), although there have been some concerns that the true figure may be as much as 25% on the Atlantic coast (Metuzals *et al.* 2008a). Figures were higher in the 1990s, when the cod moratorium was widely flouted in Atlantic Canada (Metuzals *et al.* 2008b) and the ground trawl fishery in British Columbia was almost out of control (Pitcher, 2000).

The Department of Fisheries and Oceans news releases reports on interventions and prosecutions. Arrests of foreign vessels have also occurred, including the well-publicised seizure of the Spanish vessel *Estai*, which was fishing turbot off the Grand Banks in 1995. American and Panamanian vessels have also been arrested in recent years.

Discards

Discards are estimated by observer programmes in many Canadian fisheries (Kelleher, 2005). They are minimised by fishing practices designed to conform to discard quotas and area restrictions, but in the east coast scallop and west coast dragger fisheries, halibut must be discarded. Moreover, in east coast flatfish fisheries, discarding from high-grading is common. *i*n the west coast dragger fishery, rockfish discards are controlled though by-catch quotas and observers. Unreported discards are in the order of 8% (Ainsworth and Pitcher, 2005; Forrest *et al.* 2004).

Unreported catches in the commercial sector

Observers on most Canadian trawlers and many other vessels ensure that discards and by-catch are reported reasonably accurately. However, Olsen *et al.* (2000) noted that by-catch sampling was inadequate to assess the problem in the shrimp trawl sector, and there are unresolved issues of by-catch of eulachon, a smelt central to the culture of some native peoples on the west coast. The situation is improving though, as the most problematic areas have been closed to shrimp trawling, Ainsworth and Pitcher (2005) suggest that by-catch has declined for most Pacific sectors. Chen and Shelton (2003) note that by-catch rates in area 3P of northern cod have declined since the 1992 cod fishery moratorium.

Unreported catches in the artisanal sector

Subsistence fisheries exist in the Canadian Arctic provinces of North West Territories in the north and coastal provinces of British Columbia (Pacific Ocean) and Labrador and Quebec in the northeast Atlantic. According to Berkes (1990) these fisheries are distinct from commercial and recreational fisheries, but are not adequately quantified and not even monitored or assessed in some territories. Berkes (1990) conducted a preliminary survey of 93 communities and 10 regional communities of Labrador, Quebec, Ontario, Manitoba, Saskatchewan, British Columbia and Northwest territories and estimated a harvest figure of 60 kg of whole fish per capita per year. Estimating the actual extent of subsistence fisheries in northern Arctic is especially difficult due to the mobile nature of the people in these territories.

Bodaly (1986) give a Canada-wide estimate for subsistence fisheries in the range of 2,500–7,500 t by assuming an annual harvest value of 50 kg. Berkes (1990) corroborated this figure when he reported that even if 50,000 to 150,000 native people are assumed to be active in subsistence fisheries, the Canada-wide estimate would range from 2,500–7,500 t per year. Pearse (1988) estimated unreported catches based on information drawn from government fishery managers. These approximations stated by the author to be "very rough estimates," add up to 6,592 t per year (3,062 t in British Columbia, 1,000 t in Manitoba; 216 t in Quebec, 108 t in Maritime provinces and Labrador and 906–1,300 t in the North West Territories – the lower limit here is based on data from the Science Advisory Board, 1980).

Note

This material is based on a country synopsis, with additional material, published by Pitcher (2006) and Pitcher *et al.* (2006).

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Table 6. Canada illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Flounder	1994	Illegal	U.S.A	1	[1]The American trawler *Galicia I* was seized by a Canadian coastguard vessel while illegally fishing for flounder on the tail of Newfoundland's Grand Banks inside the Canadian EEZ.
2.	Scallops, Flounder and Monkfish	1994	Illegal	U.S.A	1	[1]The American fishing vessel was seized while illegally fishing three km inside the Canadian section off the Georges Bank. The vessel was escorted by USCG vessel to Massachusetts and the catch was auctioned.
3.	Scallops	1994	Illegal	U.S.A	1	[2]The U.S. fishing boat *Bocabay* was arrested while illegally dragging for scallops in Canadian waters. The captain pleaded guilty and was fined C$135,000.
4.	Finfishes nei	2004	Illegal	Spain	1	[3]Canada chased down and seized the vessel 28 miles beyond its 200-mile limit off the coast of Newfoundland. The vessel was escorted to St Johns harbour, where the captain was charged and later released on a bail of C$5,673 dollars.

1. Anon (1994) Two more American ships seized in Atlantic, World Fishing, 1994, p 25.
2. Anon (1994) Fine for sleeping skipper, World Fishing, June 1994, p 5.
3. Anon (1995) Trawler's Seizure Backed in Canada, New York Times, 3 March, 1995.

CHILE

Summary of information concerning IUU fishing

Overview

Chile seeks to maintain access to international markets by fulfilling the new requirements of international entities such as CITES.

In general, application of the individual transfer quota (ITQ) system in Chile has facilitated the rebuild of stocks of high-value resources (Bernal *et al.* 1999). However, ITQs in Chile today are still a minority instrument of management, i.e., only a minor fraction (less than 1%) of the total catch landed every year is under ITQ (Bernal *et al.* 1999).

Large-scale industrial interests have been in control of the valuable commercial purse seine and trawl fleets in Chile for a long time, and these groups currently retain their power in all but the inshore areas.

Illegal fishing

Illegal fishing is considered an important problem in Chile (FAO, 2003). However, the extent of illegal fishing is hard to determine, largely because Chile has an extensive coastline dotted with small communities. The measures adopted to address the problem include registration of all vessels fishing off Chile; assignment of fishing licences by fishery and area; mandatory reporting of fisheries statistics; certification of industrial landings; annual registry of vessels and fishers; registry of processing plants, and mandatory use of vessel monitoring systems by fleets operating inside and outside the EEZ (FAO, 2003). Chile's naval forces, comprising a large fleet of coastal and offshore patrol vessels backed by aerial surveillance have widespread control of their jurisdictional waters. The system is very effective and the Navy regularly intercepts foreign fishing vessels.

Hake TACs grew from 5,000 t in 1993 to 7,500 t in 1996, but diminished to 6,000 t in 1997; the presumed illegal catch has been estimated to reach up to 100% of TAC (Bernal *et al.* 1999). Kalikoski *et al.* (in press) estimate that, on average, Chilean catches and discards have been under-reported by 10% to 75%. Zuleta (2004) indicates that, until the determination of the maximum catch limit per fleet owner, the authorities did not show much concern for illegal or poorly-reported fisheries catches. The state eventually became motivated to control illegal fishing because the value of quotas would decrease and the system would lose credibility if it was not controlled.

In order to impede illegal fishing and minimise under-reporting, the Law endowed SERNAPESCA with a catch-certification system run by private companies, which registers all landings of the purse seine vessels. Chile seeks to maintain access to international markets by fulfilling the new requirements of international entities such as CITES.

Most government reports suggest an increase in illegal fishing in southern Chilean regions of X, XI and XII. However, most of these reports are concerned with domestic illegal fishing incidents rather than IUU fishing by foreign vessels, which are effectively monitored by the Chilean Navy. The government has acknowledged the scale of these activities in remote locations and has taken several steps through increased patrols by Navy on the seaward side and land-based mobile patrols and dockside monitoring for artisanal fisheries. Customs officers have also been actively involved in stemming illegal trade of loco (*Concholepas concholepas*, a large valuable endemic gastropod sold on the same world market as abalone), salmon and crabs.

Discards

Chilean law states that it is illegal to discard anything that is brought onboard the deck of a fishing vessel. Nevertheless, with the adoption of individual quotas, disruptive activities such as high-grading are becoming more common (Fishing Law, 1995). Article 3 of the same law also mandates the establishment of a percentage of landings as by-catch in fishing operations. Despite the existence of regulations

controlling gear impacts on ecosystems, the present knowledge of gear selectivity, by-catch and discards is considered non-existent, scant or insufficient for more than half the fisheries for which management plans have been developed (FIP, 2002).

Chile's report to FAO (2003) states that there is an adequate system of collection of catch and effort statistics. there are unlikely to be major species identification errors in the statistical systems, considering that only 2.5% of the total catch volume is not identified to the species level (Vasconcellos and Cochrane, 2005). For some fisheries and/or resources there is monitoring and research to a degree unusual for developing countries. In the case of the loco, Chilean scientists have examined many aspects of its biology, its role in benthic communities (Castilla and Defeo, 2001).

Unreported catches in the artisanal sector

The inception of terrestrial use rights in fisheries (TURFs) (which seek to define common property) into Chilean legislation was triggered to a large extent by a crisis in the loco fishery (Castilla and Fernández, 1998). In the 1980s and 1990s, a number of shellfishes were over-exploited and in some cases, the fishery collapsed. Fishery closures were unsuccessful, and thus extensive illegal activities occurred throughout the country.

Section 47 of the Fishing and Aquaculture General Act (FAGA) 1991 states that artisanal fishers have priority access to a band of the territorial sea of five nautical miles measured from the coast (Bernal *et al.* 1999). FAGA also defines management and exploitation areas (MEAs) for benthic resources. These MEAs, defined over reduced extensions of coastal segments (i.e., <100 ha of sea bottom), are accessed only by organised artisanal communities, and were granted for two years on the basis of previously agreed management and exploitation plans between the fishers, the maritime authorities and scientists. Community involvement improved the effectiveness of shellfish management programmes and constitutes an effective tool by which fishers, scientists and managers could interact to improve the quality of the regulatory process.

Co-management of small coastal MEAs has resulted in larger catches, catch per unit of effort and net economic revenues perceived by the fishers as a result of higher quality of the product (individual sizes) when compared with open access fishing grounds. Promising results on natural re-stocking of shellfishes in coves or *Caletas* with organised fisher communities offer hopes for the future sustainable use of benthic resources. Co-management provides fishers the possibility to share decision-making authority. Indeed, the perception of ownership by the fishers is one of the most important aspects that determined the success of this 'Wise Management Practice' developed in Chile (Defeo and Castilla, 1999; Castilla and Defeo, 2001).

According to Orenzanz et al (2005) the management system defined by the 1991 Fisheries Act has three provisions that are most important for benthic artisanal fisheries: (1) Artisanal fishers must be registered in a National Registry and fishers are generally entitled to operate only in the region where they are registered. The registry has been closed since 1995, the result being limited entry at the scale of the regions; (2) Artisanal rights are vested in fishers, not vessels, and are not transferable. A vessel loses its licence when transferred to a person who is not a registered artisanal fisher; and (3) Artisanal fishers of the central and northern zones are entitled to priority access to the coastal zone (in reality exclusive-use rights in the case of benthic shellfish). Trawling and dredging have been banned within this zone since the 1960s, Orenzanz *et al.* (2005).

Note

This material is based on a country synopsis, with additional material, published in Kalikoski *et al.* (2006), with additional information referenced below. Detailed analyses of anchovy, jack mackerel, sardine, hake, loco, and toothfish fisheries are available in Kalikoski, Pramod and Pitcher (*in prep*).

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Table 7. Chile illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1	Salmon	2007	Illegal	Domestic - Chilean artisanal vessel	1	[1]Infringements included catching salmon illegally; six people arrested; 254 kg of illegal salmon discovered, vehicle and the unregistered fishing vessels seized by naval personnel and customs officers of Rupanko
2	Salmon	2007	Illegal	Domestic - Chilean artisanal vessel	-	[2] Violations – illegally fishing for salmon during prohibited period; two people arrested and prosecuted; 200 m of net seized by Octay port naval authorities and handed to customs officers; During August 2007, the harbour authorities also seized 2,500 m of illegal fishing nets (intended for catching: salmon), illegal boats were seized and three people were caught for sport fishing violations
3	Loco	2006	Illegal	Domestic - Chilean artisanal vessel	2	[3]Officials of SERNAPESCA arrested people on a diving vessel operating in handlining areas in the jurisdiction of Tocopilla; two diving boats detected fishing for loco
4	Spider crab	2006	Illegal	Domestic	-	[4]SERNAPESCA officials of XII region seized 40 kg of illegal spider crab meat (equivalent to 160 kg of live spider crab) which was about to be traded in the commercial market; violator to be prosecuted
5	Shrimps	2007	Illegal	Domestic - Chilean industrial	1	[5]SERNAPESCA officials confiscated 2.4 t of shrimp and 720 kg of merluza from a shrimp boat at wharf, after it tried to transfer the catch from boat to boat

				vessel		at sea; the vessel was caught using its VMS signals; catch seized and the vessel will lose 10% of its quota for the next year
6	Loco	2007	Illegal	Domestic - Chilean artisanal vessel	1	[6]Two people to appear in court for illegal diving and catching loco; both diving gear and illegal catch confiscated by authorities in Tocopilla
7	Shellfish	2007	Illegal	Domestic	-	[7]3,755 kg of shellfish confiscated from a vehicle at toll gate 87 on Route 5 to the south; the illegal catch was being transported without correct documentation from SERNAPESCA
8	Salmon	2007	Illegal	Domestic	-	[8]SERNAPESCA officials made two seizures of illegally stored Atlantic salmon fillets (total 42 kg) from a vehicle on route 5 km south of the highway)
9	Clams; Salmon; Congrio	2007	Illegal	Domestic	-	[9]115 kg of ostras (clams) and 175 kg of fish caught during the closed period confiscated by SERNAPESCA officials; in a second incident, 1,290 kg of austral merluza and 44 kg of congrio seized by SERNAPESCA officials from a van for not having documentation, required for transport of marine products
10	Merluza; salmon; loco; prawns	2007	Illegal	Domestic	-	[10] In Araucanía: 40 kg of merluza, 4 kg of fresh ostión, 14 units of salmon fillets of 1 kg each and 2 kg of coloured prawn seized from a vehicle at toll gate for not having documentation; in a second seizure, 120 units of chipped loco caught during prohibition period and 29 kg of Atlantic salmon (packaged fillet), going from Montt Port to Chillán were seized from a vehicle; in a third incident, in Region IX, SERNAPESCA officials seized three boxes of salmon (around 15 kg each) from a vehicle, for not having documentation; in a fourth incident during the same month in Araucanía Region, five boxes of Atlantic salmon, five boxes of congrio and six boxes of merluza weighing 20 kg each were seized by SERNAPESCA officials
11	Salmon	2007	Illegal	Domestic	-	[11]SERNAPESCA officials seized 3 t (51 boxes) of fresh salmon from a truck; the owner and driver of the truck prosecuted; illegal catch seized
12	Ostion (bivalve)	2007	Illegal	Domestic	-	[12]3,000 units of Ostion equivalent to 60 kg seized by SERNAPESCA officials in Vilos from a person travelling on a bus for failing to produce proper documentation at Choapa; catch originated from Coquimbo and was going to Santiago
13	Atlantic salmon	2007	Illegal	Domestic	-	[13]In Talca SERNAPESCA officials seized 4 t of Atlantic salmon (134 boxes) from a truck
14	Loco	2007	Illegal	Domestic	-	[14]SERNAPESCA and customs officials of Region VIII (Talcahuano) seized an illegal shipment of 4320 kg of loco from a container intended to be shipped to Taiwan; The shipment was worth US$70,000
15	Clams	2005	Illegal	Domestic	-	[15]SERNAPESCA officials seized more than 4 t of sea food which was presumed to have originated from an area contaminated with red tide from the provinces of Chiloe in Lapa
16	Clams	2004	Illegal	Domestic	2	[16]SERNAPESCA officials seized two boats *Sayonara* and *Teresita* for fishing during prohibited period in Quellon; a total of 214 clams were seized to prevent trade of contaminated seafood harvested during red tide.
17	Clams	2004	Illegal	Domestic	10	[17]Sanitary authority officials from the X region, assisted by the navy, surprised 10 boats and seized 20 t of clams extracted from a prohibited zone to the south of Laitec island, Quellon

18	Clams	2006	Illegal	Domestic	3	[18]Three shallow-draft vessels were arrested in Quellon by sanitary officials for harvesting 14,220 kg of contaminated seafood from a shipment that arrived from a prohibited zone; the meat was contaminated with toxins
19	Clams	2006	Illegal	Domestic	1	[19]Motor boat *Lorena II* seized; sanitary authority of Quellon seized 3,570 kg of seafood contaminated with red tide; 8 t of contaminated seafood seized from Angelmo wharf, Montt Port, with a total of 24.7 t seized between January and April 2006 from the Region of Lakes
20	Salmon; jaibas, pejerreyes, congrio	2007	Illegal	Domestic	-	[20]Customs officers of Chacao in co-operation with SERNAPESCA seized an illegal shipment of 400 kg of seafood from a truck in Ancuditana; the shipment originated from Municipality of Ancud and was destined for commercial markets in Santiago
21	Salmon	2007	Illegal	Domestic	1	[21]Customs officers of Quemchi and police seized 1,983 kilos of the salmon in the Choen sector; fishermen to be prosecuted at Civil Court of Ancud
22	Loco	2007	Illegal	Domestic	-	[22]Customs officers seized 220 kg of loco (equivalent to 2,900 units) from a vehicle on Route 5 south ; According to police, the retailer intended to sell the 16 bags of molluscs in Montt Port; the locos were certified by sanitary body as consumer worthy and hence were given to charitable institutions; diver fined as per General Law of Fisheries and Aquaculture (Nº 18.892)
23	Loco	2007	Illegal	Domestic	-	[23]Customs officers of Ancud intercepted a shipment of 2,650 units of loco; the shipment, sourced from Valparaiso, was unfit for human consumption
24	Loco	2007	Illegal	Domestic	-	[24]Customs officers of Chacao seized 8,958 units of loco caught during period of prohibition; 70 kg of congrio also seized from a light truck
25	Salmon	2006	Illegal	Domestic	-	[25]Nearly 600 kg of salmon seized by Navy in co-operation with SERNAPESCA officials in the community of Quellon; violators prosecuted for transport of illegal fish
26	Loco	2004	Illegal	Domestic	1	[26]In a combined operation of Navy, SERNAPESCA and customs, officials seized 3,200 units of loco from Brave Seas and Punihuil creek (Lacuy peninsula, Anduk community) for catching molluscs during closed period

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CHINA

Summary of information concerning IUU fishing

Overview

China is a developing country with a huge population, and the expectation of traditional fishermen and farmers is wellbeing, which has led to increased fishing intensity to gain more benefits from fishing. This has resulted in a serious decline of fisheries resources over the past 20 years. Although the Chinese government has developed a series of fisheries management regulations and measures to protect and restore fishery resources, violation of regulation by current fishing vessels at sea is still quite common. This is because the fishing power is tremendous, the fishermen have a little awareness of the law, fisheries management is inadequate, and the implementation of the relevant effective systems is poor. This situation may gradually improve through sustainable economic development and strict implementation of current laws and regulations.

Illegal fishing

There reported to be considerable unregulated fishing by Chinese vessels in neighbouring waters. China has over 60 distant water fishing enterprises, comprising more than 1,600 vessels and with an annual output of 0.8 million t and a total value of US$560 million (FAO, 2001). The data from Pitcher *et al.* (2006) also shows that the number of motorised boats has increased over the years. Moreover, no demarcation is available between coastal and high seas fleets. Although China has not established an observer system, fisheries resource monitoring and inshore investigations similar to an observer system have been conducted primarily through regularly sending researchers on fishing trips with fishing boats, where they collect logbook data, record detailed species composition of the catch, and measurements of the biological condition of economically important species.

Fisheries legislation in China consists of the Fishery Law Article 30 of which states that "The amount of young fish in the catch shall not exceed the specified proportion, and in the banned fishing areas and seasons it is not allowed to trade illegal catch", while authorising inspection rights to the relevant departments to inspect the catch. Although catch inspection is one of the main responsibilities of the fishery agencies, it has not been possible to all landings as landing and marketing sites are scattered over a huge area.

Ferraro and Tu (2008) state, "…. the Chinese policy process is characterized by the intervention of strong interests and informal relationships of patron-client type especially at the level of local governments. The clientelist structure of the Chinese local state has been confirmed by episodes of bribery and collusion of individual entrepreneurs with Chinese local officials and might explain the tolerance for evasion shown by local fisheries implementors." For domestic Chinese fisheries, compared to the 1990s, current illegal fishing penalties have been increased, enforcement procedures are being gradually standardised and enforcement of prohibition of illegal operations is becoming more effective. In some provinces, during the seasonal fishing ban, the penalty for illegal fishing operations asserts that, "illegal fishing vessels, under Fisheries Law will be fined up to 50,000 yuan (about US$6,000); in serious cases, the catch, fishing gear and fishing licence will be revoked; in extreme cases, the fishing vessels will be eradicated; the legal orders will be issued". Such enforcement intensity has resulted in illegal fishing rates of less than 0.5% during the summer ban. Thus, due to the acknowledgment of sustainable uses of fisheries resources and growing awareness of the law, illegal fishing cases will likely be reduced.

Discards

Due to well-established processing and freezing technology, and the rapid development of aquaculture, almost all by-catch is taken back to the fishing ports to trade as feed. Thus, the discarding of by-catch rarely occurs in China's sea waters.

Unreported catches

Collected completely and timely; accuracy is relatively poor as fishermen mainly report total catch of commercial species only. However, independent research and monitoring by government scientists help correct for the inaccuracy to some extent. Currently, the marine fishery in China is a privately-operated economic activity, thus, current fisheries statistics have not been reported in as much detail as from the state-owned fisheries in the past. The statistics reported by fishermen primarily include the total catch, landing values and catches of the major economically important species; therefore, current fisheries statistics are vague relative to the statistics previous to 1990. However, research agencies have filled in some gaps in the catch statistics. On the whole, the current fisheries statistics somewhat reflect the development trend of the marine fisheries resource.

Although China adopts some fisheries management measures (such as fishing bans and mesh size limits), minimizing by-catch of non-target species has not been tackled because of low selectivity of trawl nets and seine nets, excess fishing fleet, and a high proportion of non-target species (e.g.,juveniles of economically important species) in the catch (Cheng *et al.* 2000). Moreover, fishermen in artisanal fisheries have been reported to change from one gear to another using the same coastal boats to target different sizes of fish stocks such as Hair tails, croakers and other finfish species. Gears such as seine nets are used widely (Ye and Beddington, 1996).

Note

This material is based on a country synopsis, with additional material, published by Cheng *et al*. (2006).

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DENMARK

Summary of information concerning IUU fishing

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

In the North Sea, ICES reports that as much as two thirds of all catches are unreported (New Scientist, 2004) (over all the ICES countries 2004/5). Although ICES (2008) reports that the situation has improved in both the North Sea and the Baltic since 2003 at the final effective date of this report (2003) it is universally acknowledged that illegal (blackfish) catches of cod and mackerel were up to 50% of the total catch.

Esmerk (2006) states that, "Illegal cod fishing is getting out of control in Denmark, according to Claus Wille, Deputy Fisheries Inspector at the Danish fishing control organisation Danmarks Fiskerikontrol. The problem has exacerbated following the EU's decision to reduce Danish cod quotas. According to Wille, fishermen among other things turn off the satellites [transponders] onboard their vessels to obstruct controls by fishing control authorities." Danish companies are also involved in the marketing of illegally caught fish. MRAG (2005) reports that Prosecution of a Shetland-based skipper and mate for landing more than £3.4 million worth of illegally caught herring and mackerel, alerted authorities to the increasingly sophisticated nature of the international racket that is known to involve surreptitious night-time fishing in remote areas, unlawful direct consignments to nationwide processors, and the involvement of processing firms in Denmark and Norway.

Denmark participates in both North Sea and Baltic fisheries. Denmark records moderate levels of infractions within the EU (EC, 2007: see table under "Italy"). The recent patrols organized by the Community Fisheries control Agency in the North Sea have also detected illegal activity in Danish waters (CFCA, 2007). Denmark employs several inspection routines for control at sea (gear and catches) and in ports there are a number of measures (landing declarations, logbooks and first sales notes) designed to tackle illegal fishing activities (BAFICO, 2003).

Discards

Discards are not minimised in most Danish fisheries. It is important to note that there is no report of discards from Denmark in the FAO's world discards report (Kelleher, 2005), however, the assumptions that discards are zero, or that there are no estimates for discards in Denmark are misleading. Overall, published information is scarce; it is not available for all fleets and not directly comparable between fleets (ICES, 2004). According to ICES (2002), discard monitoring programmes have operated in only a few fisheries since the early 1980s; it is only since the early 1990s that larger-scale coordinated discard monitoring programmes have been initiated covering major fisheries. Such programmes are costly and it takes several years to gather representative data. Information from these programmes is now beginning to emerge in stock assessment documents, but these preliminary data are still insufficient to allow accurate predictions. Also, many countries have been reluctant to make their data on discards available.

However, sampling reported by ICES (2002) in Danish demersal fleets has been ongoing since 1995. The Danish demersal fishery is complex, composed of a range of fleets using trawls, seines, and gill nets; discards (as weight of all species discarded relative to total catch) were found to be 25% in demersal trawl fisheries in the northern North Sea, 8% in the central and southern North Sea, and 19% in seiners. For gill net fisheries, the discards are dependent on the target species: in cod gill nets 5% discards were found, in plaice 8%, in turbot 20% and in sole 38%.

ICES (2002) reported that many groundfish and flatfish fisheries in the North Sea, Skagerrak, and the English Channel are characterised by extensive discarding (ICES, 2002). The general pattern is that high

discard rates are found in most flatfish fisheries, in *Nephrops* fisheries, and in some mixed gadoid fisheries targeting haddock. Danish fishers are said to have difficulties in understanding the rationale behind discarding fish as required by many EU TACs, as it does not conserve the fish stocks (Nielsen and Mathiesen, 2004).

Observer programmes have not been very effective for large-scale commercial fisheries, where observer reports of by-catch and discards are not generally available – figures are missing from FAO's recent discards analysis (Kelleher, 2005). However, several monitoring programmes have been established, For example, trawl fisheries in the North Sea (including Danish waters) have been monitored during the last decade in order to provide independent and statistically reliable estimates of the rates of marine mammal by-catch (ICES, 2002). Also, since 1995, length composition of landings and discards of anglerfish have been measured in Denmark during observer trips.

Unreported catches in the commercial sector

Observer programmes have not been very effective for large-scale commercial fisheries, where observer reports of by-catch and discards are not generally available – figures are missing from FAO's recent discards analysis (Kelleher, 2005). However, several monitoring programmes have been established, For example, trawl fisheries in the North Sea (including Danish waters) have been monitored during the last decade in order to provide independent and statistically reliable estimates of the rates of marine mammal by-catch (ICES, 2002). Also, since 1995, length composition of landings and discards of anglerfish have been measured in Denmark during observer trips.

In Danish fisheries it has not been the tradition to integrate control and surveillance perspectives in drafting regulations (Nielsen and Mathiesen, 2004). The efficacy of the enforcement activities and the legitimacy of the regulations could be improved by reallocating enforcement activities for regions and periods where it is critical that the regulations address the relevant management problems (Nielsen and Mathiesen, 2004). In 2002 Denmark initiated market sampling of landed fish for the anglerfish fishery (*Lophius* spp.) in the observer programme for this species that was established in 1995 (Thangstad *et al.* 2002).

As part of the EU cod-recovery plan, which includes certain control elements, Denmark has introduced national legislation (Regulation no. 64 of 1 February 2001), which requires that the first marketing of all cod either caught in the North Sea and Skagerrak, or landed in Skagen or in any Danish port facing the North Sea and Skagerrak, must be carried out at public auctions (in Denmark or abroad). These rules apply to all landings of cod both from Danish and foreign vessels as well as transit from another EU country or third country.

Unreported catches in the recreational sector

Recreational fishers in Denmark need to have a state permit to fish in both marine and inland waters. Reported and unreported recreational catches through fishing permits, gear and fish farming were estimated to generate DKK2475 million in 2001 (Markmann and Rasmussen, 1985), with angling tourism itself generating an annual turnover of DKK100 million (Rasmussen and Geertz-Hansen, 2001). All anglers between the age 18–67 are also required by law to pay a annual licence fee of DKK100 to fish with line and rod in marine waters, while recreational fishermen between the age of 12–67 using fixed gear like Fyke nets, gill nets and hooks are classified as amateur fishermen have to pay an annual license fee of DKK250. The Ministry of Food, Agriculture and Fisheries, is responsible for surveillance activities through spot checks to check for permits, whether fishers are using permitted methods, and to prevent capture of undersized fish (Rasmussen and Geertz-Hansen, 2001). At a minimum approximately 81 t of eels, 30 t of salmonids and 218 t of other fishes (includes bream, silver bream, *Blicca bjoerkna* (L.), and burbot etc.) were caught annually during 1983 to 1998 as per reports sent to Ministry of Food and Agriculture. Further, anglers and landowners are not required to report their catches which are mainly for their own consumption. According to the same authors approximately 1000 t of Atlantic salmon are caught annually in rivers and coastal waters. Rasmussen and Geertz-Hansen (2001) state that as per 1997 surveys by the Ministry of Food and Agriculture on recreational fisheries in Denmark, about 12.5% of the population between aged 18–67 devoted 5 million days every year to angling. Of these, 50% engaged in marine fishing while the rest engaged in angling in inland waters including streams, lakes and put-and-take ponds. No

statistics are available on angling catches.

Note

This material is based on a country synopsis, with additional material, published by Rojo-Diaz and Pitcher (2006).

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Table 8. Denmark illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Shrimps	2006	Illegal	Unknown	1	[1]'Operation black fish' arrests – In North Jutland, an unnamed company purchased 47 t of deep-sea prawns worth DKK2.3 million without the necessary licence and brought the catch directly from a fishing vessel that had not registered the catch in logbook.; vessel charged with illegal fishing
2.	Cod	2006	Illegal	Unknown	1	[1]On Langlenad, South Zealand, a company purchased cod from a fishing vessel that had not been registered at Danish Fisheries Directorate, while on the island of Bornholm; 3.5 t of fish (cod was transported without necessary legal papers)
3.	Finfishes nei	2004	Illegal	-,	-	[2]Danes are responsible for a very low level of illegal fishing in Baltic Sea. Just 2.85% (570 t) of annual total of 20,000 t according to Danish Fisheries Minister; figures come from an unpublished EU report on illegal fishing in 2004
4.	Finfishes nei	2006	Illegal	-	-	[3]'Operation black fish' found that a company based at Grenaa on the East Jutland coast sold more fish than it had purchased; the 9,000 t of illegally caught fish was discovered by Danish investigators
5.	Salmon	1991	Illegal	Panama	1	[4]Danish authorities seized the Panamanian registered *Onkel Sam* when it entered Danish port after catching salmon in north Atlantic. Although the vessel was registered in Panama, Danish authorities took legal action because the crew were Danish citizens

1. Anon (2006a) Serious offences uncovered in latest IUU clampdown, AgraNet – WorldFish Report, 28 September 2006.
2. Anon (2006b) Danes claim only tiny share of illegal Baltic catches, AgraNet – WorldFish Report, 9 March 2006.
3. Anon (2007) Danish officials uncover record illegal fish haul, AgraNet – WorldFish Report, 15 March 2007.
4. Weidner, D.M. and Hall, D.L. (1993) World Fishing Fleets, Past-Present and Future, Vol.4, Latin America, National Marine Fisheries Service, U.S. Department of Commerce, pp. 241–242.

ECUADOR

Summary of information concerning IUU fishing

Overview

According to Trujillo (2003), in Ecuador there are about 138 fishing ports, 60,000 artisanal fishermen and 16,000 boats, approximately 66% of which are motorised. Growth in artisanal fisheries was uncontrolled in the 1980s and 1990s, but a regulation introduced in 2000 banned construction and importation of all kinds of vessels, unless replacing another vessel already authorised to fish. This has been successful in controlling purse seine and long line tuna fleets as well as prawn trawlers and the small pelagic fleet. However, because construction of artisanal boats occurs along the entire Ecuadorian coast, and naval authorisation is not required for these boats to go out and fish, it has been impossible to secure compliance with this regulation within the artisanal fleet. Controlling the artisanal fleet made even more difficult because of the lack of other sources of work; lack of awareness in stakeholders about the necessity of adopting those decisions; and there are too few inspectors. In an attempt to solve the problem, in 2000 the Sub-secretariat of Fisheries implemented an extensive programme of conservation and management seminars for artisanal fishermen. These seminars cover elements of responsible fisheries as found in the FAO Code of Conduct and provide training in technical fishery improvements.

In 1984 the government declared that the marine area within eight nautical miles of the coast should be for the exclusive use of artisanal fisheries. This rule created conflicts with industrial fleets targeting shrimp and sardines closed to shore. Later, in 1990, the government authorised the activity of shrimp trawlers close to shore (Turriago, 2001).

Illegal fishing

Illegal fishing is extensive in Ecuadorian waters, including those in the Galapagos. Illegal catches of more than 300,000 sea cucumbers have been reported from Isabela Island, Galapagos National Park (MRAG 2005). In the chub mackerel fishery, large unreported catches offshore collapsed the resource in the early 1990s (Patterson *et al.* 1993). Control of access to prevent illegal fishing is not very effective, especially in the Galapagos EEZ area. For example, MRAG (2005) reports, "Of possibly 250 open register tuna vessels active in 2000, 43 were scrapped and many transferred to the Taiwanese register following the actions of the Organization for the Promotion of Responsible Tuna Fisheries (OPRT). This is an organisation whose members include the tuna industries of Japan, Taiwan, Korea, Indonesia, the Philippines, the Peoples Republic of China and Ecuador. Thus, although some IUU effort will be removed, much of it will be re-registered, and the majority of IUU related catches would now be taken in high seas waters rather than domestic waters." Shark finning is illegal in the Galapagos and yet over 80% of shark fin exports are thought to come from the islands. Following the reversal of previous law by Presidential Decree, shark finning sharks is no longer illegal on the Ecuadorean mainland, and bearch frame surveys provide reasoably accurate shark catch data, but simple artithmetical errors in failing to raise the survyed frames to all Ecuadorean landing sites has resulted in the data reported to FAO underestimating shark catch by about 60% (J. Jaquet pers. comm.)

Discards

Available data about Ecuadorian fisheries indicate very high discard rates (79%; Kelleher, 2005), probably related to the industrial shrimp fisheries. Kelleher (2005) states that, "…shrimp fisheries in the Gulf of Mexico, Atlantic United States, Ecuador and on the Guianas shelf account for a large proportion of discards." IATTC agreement # 273/2000 establishes a 'no discard' policy for tuna fishing vessels operating in the Eastern Pacific under IATTC jurisdiction (Trujillo, 2003). However there is no information available about the effectiveness of enforcement nor are there data on minimisation of discard.

Unreported catches in the commercial and artisanal sectors

There is some information on the poor quality of the system of collection of fisheries statistics. Statistics on chub mackerel catch are highly suspect: for example, working back from reported production of

fishmeal (references in Patterson *et al.* 1993), it has been estimated that under-reporting has been as high as 50%. The problem of poor species identification is not as critical considering that a few species account for a substantial proportion of total catches. About 18% of the total catch volume is not identified to the species level (Vasconcellos and Cochrane, 2005). In the early 1990s, official landing figures were so grossly inaccurate that catches had to be back-calculated from fishmeal production (Patterson *et al.* 1993).

There is little information on catch statistics for Ecuador other than the data reported to FAO, which in the early 1990s was known to be of poor quality (Patterson *et al.* 1993).

Unreported catches in the recreational sector

There is little information on recreational fisheries along the mainland Ecuador coast. But there appears to be limited recreational fishing in the Galapagos Islands. However, quantities of catch released or landed for consumption through sport or recreational fishing remains unknown.

Note

This material is based on a country synopsis, with additional material, published by Kalikoski *et al.* (2006).

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EGYPT

Summary of information concerning IUU fishing

Overview

Egyptian fisheries are unique in terms of fish productivity due to low productivity of its coastal waters both in the Mediterranean Sea and the Red Sea, which support few seasonal pelagic fish, such as sardines and anchovies. The limited productivity of coastal waters has been further aggravated by damming of the River Nile, which provided most of the nutrients to coastal waters of the Mediterranean Egyptian coast.

Traditionally, Egypt's coastal waters were exploited by nomadic tribes and migratory fishers who restricted their fishing to tidal waters, to supply fish to local markets, clans and for subsistence needs. Overfishing coupled with expansion of fishing to target demersal stocks, destructive fishing, poaching and pollution due to oil tankers have posed a significant challenge to fisheries administrators already faced with a declining trend due to serial depletion of fish stocks. There is increasing need for management of small-scale fisheries within territorial waters because an estimated 80–85% of fish landings from the Arab world come from coastal fisheries (Feidi, 1998)

The decrease in marine capture fisheries production has been offset by increasing production from inland aquaculture in recent years. Egypt is one of the major importers of fish in the Arab world along with Saudi Arabia and Qatar.

In the pelagic sector horse mackerel, scads, round herring, sardines, Indian mackerel, slimy mackerel and little tuna are the most important fishes in the Red Sea (El-Gammal and Mehanna, 2002; El-Gammal and Mehanna, 2006) while sardines, anchovies, horse mackerel, jacks, blue fishes, mullet, chub mackerel, Atlantic mackerel and tuna are important fisheries in the Mediterranean Sea (Mehanna & El-Gammal, 2005). Hariri et al (2002) state that Egypt accounted for 26% of total finfish production, with Egypt and Somalia accounting for 5% of invertebrate catches in the Red Sea in 1998.

Fishermen in Egypt have an 'average' living standard. Most support a family of 6–8 people and have no alternative employment opportunities (Hariri *et al.* 2002).

Illegal fishing

The General Authority for Fish Resources Development (GAFRD) is responsible for fisheries control, monitoring and surveillance in Egyptian waters. GAFRD works in close co-operation with Frontier Corps of Ministry of Defense to enforce laws. No information is available on compliance or enforcement competence of these authorities in the marine fisheries sector. Some of the significant challenges in Red Sea and Gulf of Suez include over-fishing, illegal mesh sizes, use of closed mesh nets and destructive fishing methods (Mehanna and El-Gammal, 2005); Dynamite fishing (Ahmed Ammar, 2001; Reigl and Luke, 1998). There are several reports of illegal fishing activities by foreign vessels in Mediterranean and Red Sea. Hariri et al (2002) report that, absence of effective monitoring, control and surveillance (MCS) has resulted in widespread poaching both by foreign and national vessels beyond coastal waters. FAO (2004) states that many traditional fishing nations in the Mediterranean Sea are fishing illegally within the Egyptian EEZ. Hassan *et al.* (2002) state that high levels of poaching in no-take zones of the Red Sea due to lack of enforcement have led to decline of grouper and parrotfish populations. During the last decade shark finning and sea cucumber extraction have emerged as potentially damaging illegal activities on Egyptian reefs. Cesar (2003) also suggests that local crew aboard dive tourism vessels are being lured into sea cucumber collection

According to Hariri et al (2002) the use of explosives has been witnessed in some sections of the Red Sea. Even though current legislation has banned certain gear types, poor enforcement has led to illegal fishing in many parts of the Red Sea. However, Mehanna (pers. comm.) states that "there is no record that explosives are used in Egyptian Red Sea. Illegal fishing methods such as electricity, poisons and explosives are very restricted in Egypt nowadays and use of such methods has been witnessed only in fresh water, such as some parts of the River Nile and some lakes."

Discards

Discards are negligible in Egyptian shrimp trawl fisheries due to utilisation of even smaller sized fish, and good market demand even for non-commercial species. However, the finfish trawlers are estimated to discard 20% of their catch during certain periods (Kelleher, 2005). There are no accurate estimates of discards from the Red Sea or the Mediterranean.

Unreported catches in the commercial sector

Khadli (pers comm) state that Egypt has developed a system to monitor catch by species at major landing centres in recent years, with more reliable estimates for industrial fisheries (compared to artisanal fisheries sector). However, the data are of not of sufficient quality to allow socio-economic evaluation of the fishing sector.

Unreported catches in the artisanal sector
"Data coverage for the artisanal fleet is reported to be good (Barrania, 1997, 2000). Effort data are available through licence allocations; the Fisheries Department and cooperatives maintain vessel registers on vessel specifications, gear and licence conditions. The coastguard authorities maintain data from fishing vessel logbooks completed by the skipper with regard to fishing grounds and trip dates. No stock assessment research has been conducted in Egypt since the early FAO/UNDP assessment studies in the 1980s" (Hariri *et al.* 2002).

However, Raey (2004) states that shortage of institutional capabilities in coastal areas has led to lack of awareness, low income, shortage of services, and absence of integrated management and monitoring of resources. And FAO (2004) report states that there is scarcity of data on fish statistics, with absence of data on potential or landing composition of fish species in the Mediterranean Sea.

Galal *et al.* (2002) report that local Bedouin fishermen are allowed to fish for subsistence even within the five no-take areas in the Sinai Peninsula. The Bedouin are permitted to use gill nets, trammel nets, deep long nets, and hook and line in certain fishable section of the Nabq protected area. Estimates from these areas have been quantified in Galal *et al.* (2002).

Unreported catches in the recreational sector

Recreational fisheries form an integral part of tourist activities along many sections of the Egyptian coastline mostly in the Red Sea area, where both large-scale recreational diving and fishing are reported. However, it is difficult to estimate the quantity of fish caught from reef-based fisheries as they are widely interspersed with other subsistence fisheries. Egypt receives nearly 2.1 million coastal tourists every year, 540,000 of whom are reported to engage in diving on coral reefs. Approximately 11% of these dive tourists are reportedly engaged in recreational fisheries (Cesar, 2003).

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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Table 9. Egypt illegal fishing incidents.

No.	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action Taken
1.	Sharks and rays	2002	Illegal	Unknown	1	[1]Mako sharks are victim of illegal fishing at St John's reef in Egyptian Red Sea; buoys are baited with baby sharks to catch mako sharks

1. Anon (2002) Red Sea shark slaughter, BBC News, 10 February, 2002.

FAROES

Summary of information concerning IUU fishing

Overview

"Approximately a third of working population (10,000) of the Faroes is employed in fisheries or fisheries related industries. Of this over a third are employed in the capture sector (3,500), which is male dominated, with a quarter (2,500) employed in processing. Nine hundred people are employed through aquaculture. Fishermen are paid according to the collective agreement between the Faroese Fishermen's Association (FF) and the Ship Owner's Association. Contrary to most other wage systems, the fisherman's compensation is directly related to the value of their production, i.e. catch value. A typical collective agreement provides the fishermen with a 27% share of the catch value, which is then equally divided among the crew members. Fishermen further receive vacation pay representing 12% of one share. Ship owners also pay a bonus to the officers so that the total net share that a ship owner pays is between 35–40%. Because such a wage system can create variations in fishermen's incomes, it is required by law to provide fishermen with a guaranteed income, which is supplemented by public funds. This minimum incomes system began in 1950. Currently, the wage system guarantees the fisherman a minimum wage equal to the daily pay of an unskilled labourer who works eight hours a day" (FAO, 2005).

There are very few small-scale fishers operating in Faroese EEZ waters. The Faroe fish market (Fiskimarkaour Foroya), a joint stock company founded in 1992, trades a substantial part of total catch landed in Faroe Islands. The company is owned and operated by trade unions, fish-processing operators, vessel operators, other companies and individuals involved in fisheries (Fishin.fo, 2004).

Illegal fishing

There is very limited published information on IUU activity within Faroese waters. "Given the rich redfish resources on the Faroe plateau some IUU or EEZ hopping activity might be prevalent within Faroese EEZ and beyond" (Greenpeace, 2006). However, ICES (2008) does not ascribe significant unreported catches to stocks under Faroese control.

Discards

Demersal fisheries are regulated by restriction of fishing days. "The advantage of the Faroes effort system is that discarding (high grading) is non-existent. Moreover, in the legislation it is forbidden to discard, meaning that landings are complete removals from the stocks" (J. Reinert, pers. comm.).

A no-discard policy is mandatory in sensitive fisheries (J. Reinert, pers. comm.). "Norway, Iceland and Faroes pursue a 'no discards' policy, while all other countries permit discards, while promoting selective fishing and increased utilisation of the catch. Discarded species include … starry ray, dab and redfish (Iceland, Faroes) …. The use of grids in shrimp trawl fisheries is relatively widespread. The use of grids in finfish trawl fisheries is less common but used *inter alia* in Argentina, Faroes, Greenland, Canada, Iceland, Norway, Russia, Sweden" (Kelleher, 2005).

"Except for some selected fisheries, no estimates of discards are available. However, since almost no quotas are used in the management of the demersal fisheries, the incentives to discard in order to high-grade the catches should be low. Moreover, according to Faroese legislation, all discarding is banned. The landings statistics are therefore regarded as being adequate for assessment purposes" (ICES, 2004). High-grading is in fact almost non existent in Faroese demersal fisheries (J. Reinert, pers. comm.).

Unreported catches

All vessels except for the smallest ones carry logbooks and must fill in landing slips with information on catch, effort (days), fishing areas etc. (J. Reinert, *pers. comm.*).

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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FRANCE

Summary of information concerning IUU fishing

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

There appears to be substantial illegal and unreported fishing in France and French overseas EEZs. For example, France has reported significant illegal catches of toothfish in Kerguelen waters since 1997 (CCAMLR, 2007). On May 30, 2005, the EC issued a report on the serious infringements to the CFP that occurred in 2003. Out of 9,500 infringements, 88% were caused by five Member States: France, Greece, Spain, Italy and Portugal. These serious infringements included unauthorised fishing; fishing without a licence or permit; using or keeping on board prohibited fishing gear or methods; landing, storing, processing and placing on sale fishery products while not complying with the rules (European Commission, 2005). By 2005 France had overall a moderate level of infringements compared to other MS, although it was still identified with Italy as having considerable compliance and reporting problems, particularly with respect to bluefin tuna in the Mediterranean (ECA, 2007).

Although the minimum size regulations from ICES and the EU are well-considered, there are many reported cases of juveniles caught by French fishers; for example, in 2005 France was fined by EU law for "letting undersized fish be offered for sale and maintaining a lax attitude" towards infringements (BBC News, 2005). "In July 2005 France was fined the largest amount imposed by the highest court of the European Union for flouting EU fisheries law over 20 years on a scale that posed a serious threat to fish stocks. Paris was fined €20 million (US$32.4 million) by the European Court of Justice after it found the French Government guilty of allowing fishermen to catch and sell small, immature fish in defiance of EU efforts to conserve fish stocks. Citing the duration and seriousness of the offences, the court also imposed a recurring fine of €57.8 million every six months until France complies with EU policy. The court considered this one of the most serious breaches of European law because France shrugged off two decades of inspections, warning letters, legal threats and court action by the European Commission, which upholds EU policy. France, one of the most frequent transgressors of EU law, was found guilty of the same offence in 1991, but largely ignored the judgment. The court has never previously imposed a lump sum fine on any country, and never before has it had to take action to force an EU member state to comply with an earlier judgment. (The Times, 2005).

France has had considerable success in combating illegal fishing around Kerguelen (Greenpeace, 2000; CCAMLR, 2007).

By-catch

The European Commission has suggested that the level of observer coverage in most of the European waters, including France, is inadequate in the by-catch of sea mammals, proposing the use of 5–10% observer coverage of pelagic fisheries as part of their strategy to reduce cetacean by-catch (RCEP, 2004).

Discards

The discards issue has hardly been addressed in France. In total, France has reported a high average discard rate of 27% in 2000 (Kelleher, 2005), but the true total figure is probably higher than this as some fisheries report as much as 100% discard (Anon, pers. comm.). Among the fisheries with the highest discard rates in European waters are those in France, Portugal and Spain targeting sardine, mackerel and anchovy. Discards in these fisheries are primarily of other non-target small pelagics including horse mackerel, *Scomber japonicus*, *Boops, Belone sp*., jellyfish, juveniles of other species and small quantities of sharks (Kelleher, 2005). High rates of discards (50%) have been reported for the French hake fishery (Kelleher, 2005) and deepwater fisheries (Allain *et al.* 2003). In 1996, the French deep-water trawl in

western waters had a discard rate of 90% (Kelleher, 2005). Also, high discard rates were reported in the French sardine and tuna fisheries, [up to] 38% (Kelleher, 2005). Coastal gill net fisheries in France have low discard rates for marketable finfish, while offshore gill net fisheries with soak times of up to six days may discard 100% of gadoid species because of the poor sanitary condition of otherwise marketable finfish (Kelleher, 2005).

In the case of the cephalopod fishery, discard monitoring programmes were established in 1996 by France, the UK and Spain using observers on board commercial fishing vessels. The overall conclusion of the surveys is that, in all three countries, the quantity of commercial squid discarded is negligible compared with the landings. As cephalopods remain a highly valued resource, often the target species of the fishery, they are discarded only in very small quantities (Graham *et al.* 1996). One of the most detailed studies on the estimated costs of actual discards was carried out in the North Sea. The study estimated that approximately 15,000 t of plaice, sole, cod and whiting discarded in the North Sea *Crangon* fishery (Revill *et al.* 1999).

Unreported catches in the commercial sector

The catch inspection scheme is not well organised in France: many illegal landings slip by the scheme; inshore catches are not consistently reported and there is confusion over reporting from French inshore and EU offshore waters (Anon; pers. comm.). The second edition of the Common Fisheries Policy compliance scoreboard is based on information transmitted by Member States (including France) to the commission as required under the CFP. Commission inspectors often report failures in the control and enforcement activities of Member States, particularly in the monitoring and reporting of catches (CFPS, 2004).

Unreported catches in the artisanal sector

There is not much information on this topic for French fisheries although there are some research programmes directed at small-scale fisheries. For example, in the Mediterranean region, in 2002 a new programme initiated by COPEMED was launched to revise the artisanal fisheries statistics produced by all countries in the COPEMED area (including France, Spain, Algeria, Italy, Libya, Malta, Morocco and Tunisia) and to improve knowledge about small-scale artisanal fisheries in the Mediterranean (FAO-COPEMED, 2000).

Note

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GERMANY

Summary of information concerning IUU fishing

Germany has adopted fish labelling (legislation to introduce EC rules into existing national laws came into force in 2002) (OECD, 2005). Angling for cod is relatively well established in Germany and it has potential for a significant amount of unregulated and unreported catches in the Baltic Sea (ICES, 2005a). In the Baltic Sea the research activities are coordinated by Institute for Baltic Sea Fisheries in Rostock. Regular stock assessment of commercially important species is undertaken by this institute to assist in formulation of TACs and distribution of quotas to different coastal provinces every year (Shivarov *et al.* 2005).

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10–20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

Reports of illegal activity by German vessels are scarce. No illegal fishing activity is reported for German vessels in the high seas by HSTF (2006). Some vessels might be involved in some level of illegal fishing within Baltic waters due to low level of surveillance activity of German vessels within this jurisdiction. No infringements were reported for Germany in the EU compliance scoreboard for 2004 (EU, 2005).

Oceana (2005) states that six German vessels were reportedly engaged in illegal fishing in NEAFC and north Atlantic waters, catching anglerfish, deep-sea red crab and deep-sea sharks. Other infringements reported include using flags of convenience, and wrong reporting of fishing effort while using gill nets for fishing for crabs and other deep sea species.

Discards

Discards for the Baltic Sea fisheries (cod, flounder) are available through the FishFrame database maintained by Germany, Sweden and Denmark. For the years 2004 and 2005, data from 154 and 121 hauls respectively has been included in the discard sampling database. The percentage of total discards per gear, per year and stock increased from 22% in 2003 to 24% in 2004 and then decreased to 16% in 2005. Smaller discard rates in the gill net fishery has necessitated sampling only from trawl and Danish seine fisheries. Only six gill nets were sampled in 2004 for discard estimates. Third and fourth quarters of the year had higher discard rates of 39% and 54% compared to the first two quarters (ICES, 2005b). "The overall (1996–2005) mean discard per year in numbers was approximately 0.8 million for gill net and 13 million for trawl fisheries. The total discard of cod in 2005 is 12 million individuals. Any interpretations of differences between years should only be done with great caution because of large uncertainties in the estimates" (ICES, 2006b). "Flounder is mostly caught as by-catch in the cod-directed fishery. Germany in Subdivision 24 (by trawl) and Poland in Subdivision 25 (mainly by gillnet) have a flounder-directed fishery. It is assumed that the amount discarded by cod fisheries is high. Discard levels depend on the length composition in a given fishery, the minimum landing size (25 cm), and on market demand (price, size category). The level of discarding has not been evaluated yet (flounder stocks in Baltic Sea)" (ICES, 2005c). Discards data is available for plaice through the discard sampling programme (ICES, 2005d).

Unreported catches in the commercial sector

Shrimp fisheries in the coastal waters of the North Sea have lead to large-scale mortalities of juvenile fish according to (Tiews, 1983; Berghahn *et al.* 1995; Berghahn *et al.* 1992; Lüdemann, 1993). However many new regulations have been introduced in the last decade by EU to decrease by-catch in cod and herring fisheries. No information is available on whether any changes have been implemented in the shrimp fisheries sector. Recent information from Pascoe and Revill (2004) suggests that currently 60% of the *Crangon* (shrimp) fleets from Germany use by-catch reduction devices. Pascoe and Revill (2004) have described the costs and benefits of using by-catch reduction devices in European shrimp trawl fisheries and add that there is need to regulate catches in this sector as 85% of brown shrimp is primarily caught in

estuaries and inshore areas of North Sea by Germany and Netherlands. The brown shrimp fishery was worth €98.2 million in 1997, and hard to regulate given the massive profits from this sector, but the main fishing areas in *Crangon* fishery also correspond to nursery grounds of many fishes like sole, plaice, cod and whiting, necessitating control on by-catch (Zijlastra *et al.* 1982). Revill et al (1999) stated that reduction in by-catch in *Crangon* fisheries in European Union could result in an additional 2,000 t of cod, 1,500 t of whiting, in the landings every year in the North Sea. As of January 2003, new European Union legislation requires all fishers to use selective gear to reduce by-catch of juvenile commercial species. However, according to Dupouy *et al.* (1998) landings of *Crangon* might decrease by 17% if new by-catch reduction devices are adopted.

Germany has permitted the use of vessel monitoring system (VMS) data for monitoring of fleet movements to ICES (ICES, 2005d). Every fishing vessel of more than 10 m length is required to collect and maintain a logbook with information on amount of fish caught, areas fished and time spent during fishing. Fishmongers/buyers or people who take over marketing of fish products at the first stage at landing centres are required to present a sales invoice to the appropriate authorities (OECD, 1997). In the NEAFC convention area (Germany is a member of NEAFC), all vessels above 24 m OAL that fish or plan to fish in the regulatory area are required to use VMS and report their position to the Fisheries Monitoring Centre of the respective flag state. The information is a then re-transmitted to NEAFC to enable control and enforcement of fishing vessels.

"Germany also considerably contributed to roundnose grenadier by-catch in Greenland waters, especially in 1998 and 1999, when 116 and 105 t were caught respectively in ICES Area XIV" (ICES, 2006b). This exceeded the allocated TAC of 47 t during those years. However, the catch has been within allocated limits since 2000. In situations where the allocated quota is less or when restrictions forbid fishing in specific areas, by-catch limits are in place. The by-catch should not exceed 5% and 2% of the total fish caught for cod and sole in any fishery (OECD, 1997).

Unreported catches in the artisanal sector

Most of small-scale fishers restrict fishing to coastal inshore waters using static gears to fish for herring. However there is uncertainty about how proportions of total quotas are allocated to individual fishers through small-scale fishers associations. Most small-scale fishers fish with traps and gill nets using small cutter (small coastal trawler) vessels, and have recently diversified to tourism to enhance revenues along with fishing. The maximum numbers of gill nets and traps are fixed along with sites and have to be leased from the government on an annual basis through fishers' co-operatives or societies. The quotas are also transferable amongst co-operative members to balance fishing opportunities and enhance capacity for the allocated quota (Doring, 2002). The professional fishing associations and the *Laender* are consulted before fishing quotas are allocated. In cases where the fishable stock is low individual fishing licences are allocated, providing individual associations or enterprises like producer organisations permission to land a specific amount of quota while fishing within a specified fishing area. In some areas, fishing licences are allocated on a weekly basis (for example in the sole fishery), ensuring an even and continuous supply of fish and preventing surplus supplies and wastage (OECD, 2003).

Unreported catches in the recreational sector

There are surveys to monitor cod caught by recreational anglers in Denmark, Sweden, Germany and Poland. Substantial recreational cod angling has been reported in German waters and these figures are not included in current stock assessments. Landings data for cod, herring and sprat are also quantified to calculate catch per unit effort, landings per unit effort and fishing effort in each sub division for trawlers, gill-netters and seiners. For the assessment year 2004, discard estimates were included in the catch-at-age (CANUM) data to allow better estimates of exploitation trends. Historical catch-at-age data, catch weights at age including estimated discards are available for Baltic fish stocks (ICES, 2005b; ICES, 2006a).

There are nearly 1.5 million active anglers who catch an estimated 17,000 t of fish in Germany. The anglers also happen to catch several commercial species in coastal waters (OECD, 2005). However, there are no catch records from this sector leading to under-estimation of total allowable catch from this sector for several commercial species like cod.

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006)

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GHANA

Summary of information concerning IUU fishing

Overview

Ghana is a major fishing nation of regional importance along the West African coast. Fishing is an important source of food, employment and revenue. Consumption of fish in Ghana is amongst the highest per capita among African nations, up to 27 kg/year (Sarpong *et al.* 2005 with 15% of protein derived from fish. Management of marine resources is very important as the fishery is limited to a very narrow continental shelf that has been unable to sustain the high fishing pressure in recent decades.

Poor economic performance since the 1970s has resulted in significant numbers of displaced workers who have taken solace in the artisanal marine sub-sector. According to Walker (2001) this influx coincided with mechanisation of inshore canoes, increased boat sizes, new gears, and enhancement of fish processing techniques fleets, which enabled fishermen to travel further away from the shore. The artisanal canoe fleet contributes 60–70% of the total annual marine fish production, and operates under open access regimes, which has lead many new entrants into the fishery, leading to overcapacity, depletion of fish stocks, increase in fishery conflicts and poverty. Excessive fishing pressure over the years coupled with changes in coastal ecosystem structure (in combination with environmental changes and short-lived outbursts of normally uncommon species) has led to declining catches of targeted species and degradation of habitats due to destructive fishing practices (Koranteng, 1998; 2002).

Rapid depletion of fisheries resources, lack of enforcement in coastal fisheries, and loss of access to fishing grounds in foreign and neighbouring countries are some of the persistent problems plaguing Ghanaian fisheries. The new Fisheries Act 625 2002 has incorporated several new regulations which aim to strengthen the licensing system, reduce fishing conflicts between the artisanal and industrial sectors, reduce overcapacity and improve recognition of ecosystem changes.

Illegal fishing

The West African coast along this section is highly vulnerable to IUU fishing and flags of convenience fishing in and within the vicinity of EEZ, with frequent intrusions reported. Compliance with laws and regulations are virtually non-existent and the government has failed to persuade fishermen in both artisanal and industrial sectors to comply with mesh size and zoning regulations. The Directorate of Fisheries has been unable to prevent illegal operation of trawlers in the In-shore Exclusion Zone (inshore to less than 30 m depth) which has been reserved for inshore fleets, resulting in high capture of juveniles in this zone. Fishing with lights, illegal since 2002, is widespread along the Central Ghana coast (Anon, 2004). Other illegal activities reported recently include fishing by industrial vessels in the Inshore Exclusive Zone (IEZ), tampering with transponders of vessel monitoring systems and damage of fishing gears by industrial vessels (Klutse, 2008). Artisanal fishers and canoe fishermen also reportedly use illegal nets, poisonous chemicals and dynamite (Anon, 2002). The only positive development has been prohibition of explosive use in fisheries through national fishers association. As this association also controls distribution of subsidised fuel for outboard engines; it has found a means of coercing fisherfolk to comply with non use of explosives in return for subsidised fuel (Lenselink, 2002).

In the inshore fisheries sector there has been persistent resistance to use of larger mesh sized nets as specified by the fisheries byelaws and fishers blame the industrial vessels fishing in the IEZ for declining fish catches.

"In 1970, there were 30 long-range vessels based in Ghana (Overa, 2002) fishing in foreign waters and high seas. In 1998, this number has grown to 95 long-range vessels (62 trawlers and 33 tuna boats) many of them fishing in the high sea and in Ghana's offshore areas. Ineffective monitoring, control and surveillance (MCS) have also been cited as major factors in the current depressed state of many fisheries in the region. Foreign vessels intrude into Ghana's EEZ and some foreign fishing companies are fronted by Ghanaian nationals in trawling operations in the already overfished demersal sector. Enforcement measures to address these issues have been weak and the government's recent proposal to license these

vessels and charge them a fee (Fish Information Services [FIS], 2002) only exacerbates the over-fishing problem in inshore fisheries. Ghana's law requires foreign companies operating in national waters to sell their catch in Ghana. However, enforcement of this rule is weak" (Atta-Mills *et al.* 2004).

In the case of the long-line tuna fisheries, considerable attention has been focused on identifying specific vessels whose practices have the most serious adverse impact on the conservation and management measures of the tuna fisheries organisations. ICCAT at its November 1999 meeting officially confirmed a list of 345 vessels engaging in fishing practices that require the most immediate attention of all concerned States. The vessels on the list fall into two basic categories. One category includes vessels registered in States that are members of the responsible fisheries organization, but which nevertheless fish in ways that are inconsistent with the conservation measures of the fisheries organization (Atta-Mills *et al.* 2004). ICCAT's list includes the name of 61 vessels registered with 4 of ICCAT's contracting parties (Ghana, Equatorial Guinea, Guinea, and Trinidad and Tobago).

Discards

There is an important penaeid shrimp fishery, but little is known about the composition, quantity or fate of the by-catch. The trawlers fish continuously day and night with finfishes making up bulk of the catch. "Over 70% of the catches by weight were finfishes with 17 of them dominating the bulk of the finfish catch (i.e. each made up more than 3% of the finfish by-catch by weight. The unwanted by-catch formed a huge biomass, >70 % by weight of total catch. By the time the catch was discarded most species in it were dead. The proportion of target penaeids in catch was small. The mean shrimp catch to mean total catch ratio was up to 1:23 during the day, and 1:9 at night. Quantities of shrimps, both landings and discards were significantly larger at night. 277 t of shrimps caught in Ghana's commercial shrimp fishery in 1994 (Fisheries Research Utilization, Fisheries Department, catch records) represents 2,216 to 6,094 t of other marine life in the by-catch for day and night respectively. Finfishes dominate the bulk of the by-catch in the Ghanaian shrimp fishery. However, a significant portion of it is landed for human consumption" (Nunoo and Evans, 1996).

"Although annual landed catch of the shrimping fleet was less than the estimated maximum sustainable yield, the low shrimp-to-fin-fish catch ratio, the high volume of discards (made up of mainly juvenile demersal fish) and the general destruction of the inshore habitat by shrimp vessels called for stringent management measures… It was estimated that on the average, for every kg of shrimp landed, another kg of fin-fish was discarded. Unable to stop the fishery, the Fisheries administrators reacted to the situation by granting shrimping licences that limit the vessels to specific areas only. It is widely believed that this regulation is not complied with and the shrimp fishery has virtually collapsed" (Directorate of Fisheries, 2003).

Unreported catches in the artisanal sector

It is estimated that a total of 500,000 Ghanaians (10% of the total population), comprising fishers, fish processors, traders and boat builders are employed in the fisheries sector (Afful, 1993; Quaatey, 1997). "Landing statistics and results of artisanal surveys can be unreliable since they usually do not include illegal, unregulated and unreported landings and are therefore often underestimated" (Atta-Mills *et al.* 2004).

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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Table 11. Ghana illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1	Finfishes nei	2000	Illegal	Unknown	2	[1]Both the vessels were registered in Spain; arrested by Ghana Navy, about 26 nautical miles south of Half Assini, while fishing in Ghana's territorial waters; Both the vessels are unlicensed; arrested vessels fined between 38 and 136 million cedis
2	Finfishes nei	2000	Illegal	Unknown	1	[1]The vessel was registered in France; unlicensed while fishing illegally in Ghanaian waters; arrested vessels fined between 38 and 136 million cedis
3	Finfishes nei	2007	Illegal	Unknown	1	[2]The Cambodian registered vessel was illegally fishing in Ghanaian waters and was selling the fish back to Ghana as imported fish; vessel escaped without paying fine from Tema Fishing harbour
4	Finfishes nei	1997	Illegal	Nigeria	1	[3]The vessel was arrested at Tema harbor by Ghana's Customs Excise and Preventive Service (CEPS) officials for illegally discharging goods to boats on high seas at Teshie, a fishing suburb in Accra

1. Anon (2000) Three foreign vessels arrested by Ghana Navy, General News of Wednesday 15 November 2000, Source: GNA. (http://www.ghanaweb.com/).
2. Anon (2007) Minister queries release of unauthorized fishing vessel, General News, (www.ghanaweb.com), Wednesday 24 October 2007, Source: GNA.
3. Anon (1997) Ghana Seizes Nigerian Ship, (www.ghanaweb.com), General News, Saturday 31 May, 1997.

ICELAND

Summary of information concerning IUU fishing

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

Iceland is fairly effective in control of access to stop illegal fishing (Pitcher *et al.* 2002). Surveillance and control activities are carried out by a fleet of patrol vessels and harbour inspectors. Compliance is thought to be increased by the market-driven Individual Transferable Quota (ITQ) system. Registration of fishing vessels is governed by the Act of Parliament, enabling the Icelandic authorities to stop any IUU fishing and penalise offenders, as appropriate. In addition investment rules, trade rules, rules regarding landing, transshipment and marketing prevent IUU (OECD, 2004).

Iceland has an effective vessel monitoring system. Electronic log books and the vessel-monitoring system (VMS) are capable of reporting real-time catch data in addition to position data. VMS signals are used to arrest and penalise vessels for fishing illegally in Iceland's EEZ (Solholm, 2007; MRAG 2004). The Directorate of Fisheries has the authority to place an inspector on board any foreign vessel that engages in fishing within Icelandic waters. Any foreign vessel found IUU fishing is subject to penalties and may be refused access to Icelandic ports (Directorate of Fisheries, 2005)

Reports suggest that pirate vessels engage in illegal fishing on the fringes of the Icelandic EEZ (but within NEAFC waters). For example, on 12 May 2006 64 ships were observed fishing for redfish (*Sebastes*) on the Reykjanes Ridge adjacent to the Icelandic EEZ. Eight were already listed as pirate vessels on the NEAFC blacklist. Redfish is one of the most economically important fish stocks in Iceland and illegal fishing of this trans-boundary stock has strong implications for conservation and management efforts in this area (Icelandic Ministry of Fisheries, 2006).

According to Icelandic authorities, in 2005 the illegal catch of redfish (30,000 t) was almost twice the legal quota (16,000 t) (Fiskaren, 2006). Greenpeace has also documented the illegal activities of fishing trawlers blacklisted by the European Union, Iceland and NEAFC (Greenpeace, 2006). However, others suggest that illegal fishing in Icelandic waters is not widespread. The overall percentage has been estimated at about 7% (Pitcher *et al.* 2002).

Discards

Discarding in Icelandic waters has been illegal since 1996, (Ministry of Fisheries, 2008. The large proportion of pelagic species in the total catch and the high manufacturing capacity for fishmeal in Iceland also contribute to a low aggregate discard rate. The mandatory use of Nordmore grids and other by-catch reduction devices (BRDs) in the shrimp fisheries results in a relatively low discard rate (Pitcher *et al.* 2002). Information is maintained on the landings and discards and the discard rate from the trawl, purse seine and gill net fisheries. There is also information on discards of non-quota species. But a general impression obtained from the literature on discards is that insufficient attention is devoted to the discards of non-commercial invertebrate species, such as echinoderms, tunicates, sponges and crabs. This may be due to the fact that the primary focus of observer reports is on the commercial species, or the notion that such invertebrates are 'rubbish', 'debris', or are of no interest (Kelleher, 2005). Fish kept on board under the no-discard rules may be marketed.

Since 1989, the Icelandic ban on discarding has been coupled with the establishment and running of a 'by-catch bank'. The primary aim of the bank was to demonstrate to fishermen and the fish trade that there were markets for unusual species of fish caught as by-catch and where necessary to introduce and promote those new species to consumers, for example by organising 'strange fish weeks' in restaurants and compiling recipe booklets and manuals to assist in identification of new species. As a result, fish such as

megrim, witch-pole dab and rough dab have become the subject of specific fisheries in Iceland, and a number of others, such as starry ray, great silver melt, grenadiers and piked dogfish, are caught and traded through normal channels, with other species such as Portuguese shark showing a potential for market expansion (Thorsteinsson and Valdimarsson, 1995).

The Marine Research Institute conducts research aimed at minimising the catch of juveniles by improving fishing gear as well as by regular closure of spawning and juvenile areas (Kelleher, 2005). In the Icelandic fishery, the by-catch was about 0.3% in the years 2002 and 2003, 0.9% in 2000, and 0.8% in 2001, as compared to 0.8% of the shrimp catch in 1999 and 1998, 1.8% in 1997, and 3% in 1996. Most of this was redfish (Skúladóttir, 2003).

"Gear restrictions are used to prevent the harvesting of undersized or juvenile fish and to minimize by-catch. One of the most commonly used restrictions is minimum mesh size" (FAO, 2004). It is a legal requirement that live cod less than 50 cm long be released, haddock caught by hook and line and less than 45 cm must be released, and diseased or damaged fish can be discarded. In addition, species for which there is no quota system and which have no commercial value may be discarded. Since it is compulsory to land smaller fish but the government does not wish to encourage their capture, there are upper limits on the percentage weight of fish that can be landed below minimum landing size. Any cod, saithe, haddock or redfish which is landed is counted against the individual quota at 50% of its weight (G. Valdimarsson, pers. comm.)

Observers onboard redfish vessels in 1998 reported that the discard rate was only 2% and data for 2000–2003 indicate that redfish discards are negligible" (NEAFC, 2004). However, the ICES (2002) Study Group on By-catch and Discard Information reported that sampling information on discarding in Icelandic cod fisheries is poor. Iceland began systematic sampling of discards on commercial cod and haddock vessels in 2001. It is known that juvenile cod are taken in cod and in herring fisheries. Plaice, megrim, long rough dab, and witch flounder are among the flatfish caught by otter trawls for cod and haddock in Icelandic waters and no discarding data was reported to ICES for these species.

Unreported catches in the artisanal and commercial sectors

Icelandic cod catches may have been underestimated by between 1% and 14% at different times, and haddock by between 1% and 28%. Since the introduction of the quota system, some vessels have been caught concealing catches of cod, and there is a known black market for haddock. It is thought that illegal landings have increased since the introduction of the quota system, especially in recent years when quotas have been expensive.

Pitcher et al (2006) state, "Certain species, particularly haddock, Atlantic halibut, common skate (*Dipturus batis*), and Greenland shark (*Somniosus microcephalus*) are caught mainly for domestic consumption. These species are commonly eaten by fishers at sea and a certain amount can also legally be taken home for the family. These amounts are unmandated, in that they are not required to be reported. Comparison of estimates of local consumption of seafood obtained from official processing statistics (5,523 t) and estimates obtained by a survey of Icelanders' diets (12,352 t) reveal a discrepancy of 6,829 t, implying that many more fish are landed than are reported. More than 70% of locally consumed fish is haddock and the figures above suggest that haddock landings are underestimated by almost 5,000 t (equivalent to approximately 12% of the reported catch)."

Unreported catches in the recreational sector

According to Toivonen *et al.* (2004), the recreational fishery in Iceland was worth US$25 million per year (much less then in other Nordic countries) with the majority generated by sport fishing in rivers and inland bodies. Unreported catch in the recreational sector is assumed to be low.

Note

This material is based on a country synopsis, with additional material, published by Varkey and Pitcher (2006).

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INDIA

Summary of information concerning IUU fishing

Overview

Fisheries plays a major role in the local and national economy of India with an annual growth rate of 5–6% contributing 1.4% of the GDP The country is the seventh largest producer of fish in the world with production reaching US$1.30 billion in 1998. There are seven million fisherfolk: one-third depend on marine fisheries for livelihood while the remaining two-thirds are dependent on a plethora of inland freshwater bodies. The per capita consumption of fish is around 3.5 kg, probably the lowest amongst Asian countries.

Illegal fishing

Fishing by mechanised craft of any type with more than six cylinder engines within territorial waters up to 12 nautical miles is prohibited. Also purse seine gear cannot be operated by any mechanised vessels within the territorial waters (Shenoy and Biradar, 2005). However, the regulations relating to the demarcation of fishing areas have inherent weaknesses. There is no surveillance to monitor areas for different types of craft, and mechanised vessels enter zones demarcated for artisanal craft (Yadava, 2003).

Flewwelling (2001) notes that the Indian coastguard service is very comprehensive and competent. and supports the MCS system for offshore and foreign fisheries border control. The coastguard undertakes surveillance beyond the territorial waters. However, although the coastguard regularly apprehends foreign fishing vessels in the Indian EEZ, there are few published reports of interventions and prosecutions.

The VMS is presently applicable only to deep-sea fishing vessels fishing in the Indian EEZ because the number of vessels is smaller and they give information to their base stations on their positions every few days. However, for the inshore fishing vessels, VMS is not applied currently because of the huge number of crafts and gears employed in inshore fisheries.

Trawlers from Thailand, Myanmar and Indonesia are responsible for most of the illegal fishing in Indian waters Rajan (2003) These poachers are reported to be discarding large quantities of fish and even conducting blast fishing (Rajan, 2003), but there is no quantifiable information on the amount of catches or discards. Indian fishermen are often arrested in Pakistan, and vice versa, for fishing in the Sir Creek estuary, a disputed border zone. There are reports of chronic large-scale illegal trawling in Orissa (Das, 2003). There is also said to be large-scale illegal fishing on the Bangladesh border (Walia, 2004). In the isolated Andaman Islands area of the Indian EEZ, illegal catches by neighboring states are very likely, and up to 100 Thai shrimp trawlers have been reported operating north of the Bay of Bengal. According to press reports, in Indian waters between 1998 and 2001 about 200 fishermen have been shot dead and over 1,500 fishermen have been arrested (Mathew, 2001).

The Rameshwaram trawlermen cross over to Sri Lankan waters, braving bullets. They take that risk since the shrimp fishing grounds on the Indian side are depleted, while rich shrimp resources exist on the Sri Lankan side. Similarly, Sri Lankans from the south of the country – mainly from Negombo – go all over the Indian Ocean, prompted by the lack of productive fishing opportunities in their waters and the abundance of tuna and shark resources in other EEZs (Mathew, 2001). India does not have the capacity to control illegal fishing along its borders with neighbouring states with which it has serious disputes (Pakistan, Sri Lanka), and it does not augur well for effective control in other zones (Bangladesh, Andaman Islands EEZ).

According to the Marine Fishing Policy, 2004, the EEZs of two Union Territories (Lakshadweep and Andaman and Nicobar Islands) are either partially or wholly in confluence with international waters. This makes these Island territories vulnerable to IUU fishing by foreign flag vessels, and makes them subject to the long-term ill effects of unregulated fishing of the straddling and highly migratory species just outside the EEZ.

Discards

While formerly there was little incentive for landing by-catch (Gordon and Blake, 1991), nowadays any quantity and any variety of by-catch is immediately purchased. In the past, in the longline fishery, large quantities of sharks were caught, fins were cut and retained, and the carcasses discarded. Now, both wet-salted shark meat and crude liver oil have a market (Salagrama, 1999).

Discards have come down significantly. Increasing competition for fishing grounds and declining catches of shrimp and other target species has coincided with a growing demand for fish in international and domestic markets and for production of fishmeal.

On the east coast, when longer fishing trips are undertaken for shrimp, the C-grade by-catch (catch that will deteriorate very fast after hauling) is discarded in the first few days, and if shrimp catches are good, all the trash fish (fishes of small size, juveniles of many commercial fish and shellfish, spoiled fish, inedible varieties like puffers and squilla) is discarded. This category constitutes about 15–20% of total catch, and about 40% of this is discarded by the trawlers on the east coast, amounting to around 26–50,000 t per annum (Salagrama, 1999). The limited capacity of the boats to hold the catches is explained as the main reason for discards Generally, trash fish from the last few hauls are brought back. During shorter trips of 1–3 days, nothing is discarded. In the rainy season, when drying is not possible, discards are greater.

Kullberg (1989) observed collection of by-catch by traditional vessels off Orissa and this has also been reported for South Gujarat (King 1989). However, the concept of transfer of by-catch at sea to collector vessels has not been successful on the east coast, and has had a negative social and economic impact in the fishing communities. Juveniles of commercial fish contribute a large percentage of the by-catch, constituting 60–90% of the low-value by-catch in some areas. The very small mesh sizes used in the cod ends and increased fishing by trawlers in the nearshore waters are reasons for this.

Discards on the west coast are considered negligible and most of the by-catch from shrimp trawlers is landed, albeit often in a poor condition (Gordon and Blake, 1991). Bostock (1986) noted that trash occupies about 62% of the total trawler catch and none of this material is discarded at sea but King (1989) found discarding to be low and infrequent.

Discards are not estimated by observer programmes and discards are not banned. 'Carpets' of discards left by illegal foreign trawlers have been reported from the Andaman Islands area of the Indian EEZ (Rajan, 2003).

Note

This material is based on a country synopsis, with additional material, published by Varkey *et al.* (2006).

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Table 12. India illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Finfishes nei tuna, sea cucumbers	2002	Illegal	Myanmar, Bangladesh, Thailand, Indonesia, Sri Lanka	>1	[1]In India's Andaman islands blast fishing and cyanide fishing reported; illegal fishing for tuna, sea cucumbers is widespread; 91 people arrested in period January to June 2006, while 26 people were arrested in 2005; illegal boats arrested were from Myanmar, Bangladesh, Thailand, Indonesia and Sri Lanka
2.	Finfishes nei	2002	Illegal	Thailand	3	[2]Indian fishermen were under fire from Thai trawlers 150 km south of Calcutta near Kendodeep island, West Bengal
3.	Finfishes nei	2006	Illegal	India	>50	[3]Trawlers fishing illegally caught 1,800 endangered Olive Ridley Turtles in the Rushikulya estuary, in a marine sanctuary in Orissa state, fishing 200–300 m within the sanctuary.; Fishing is prohibited in these waters during the breeding season of turtles
4.	Finfishes nei	2000	Illegal	Pakistan	20	[4]164 Pakistani fishermen along with 22 boats held by Indian coastal authorities for illegal fishing in India's territorial waters
5.	Finfishes nei	2007	Illegal	Pakistan	2	[5]Indian coastguard vessel arrested 13 Pakistani fishermen and seized two boats for fishing illegally in Indian waters off the coast of Okha in Gujarat; both boats were found illegally fishing 29 nautical miles northwest of Jakhau
6.	Finfishes nei, sea cucumbers	2004	Illegal		2	[6]Indian coastguard ship *Ganga Devi* arrested a boat in northern Andaman Islands from 19–26 September and 09–17 October 2004; foreign fishing boat was apprehended on 24 September 2004 from the creek of Buchanan Bay; 15 October a foreign national arrested with 40 kg of sea cucumbers
7.	Sea horses	2003	Illegal	-	-	[7]On 22 October 2003, in the area of Mannady, Chennai, police seized 6 kg of dead seahorses, reported to represent approximately 450 specimens; two people arrested who allegedly collected the specimens from coastal areas of Ramananthapuram, Tamil Nadu

8.	Sharks	2005	Illegal	India	1	[8]On 19 May 2005, 41 dead sharks (species not reported) were seized by West Bengal's wildlife authorities from a trawler 150 km from Kolkata. 14 people on the trawler were taken into custody for violating Wildlife Protection Act
9.	Finfishes nei	2006	Illegal	Bangladesh	1	[9]The Indian coastguard, Haldia Unit, seized one Bangladeshi fishing vessel with six crew onboard
10	Finfishes nei	2005	Illegal	India	7	[10]Seven fishing trawlers and 24 crew were arrested for illegally fishing along the Dharma coast during the turtle breeding season; fish catch, fishing implements, fishing nets and VHF set were also impounded by patrolling personnel of the forest department
11	Finfishes nei	2008	Illegal	India	12	[11]Between November 2007 and January 2008 72 persons were arrested and 12 fishing boats including nine trawlers and one gill-net were seized by enforcement wing of Orissa Forest Department
12	Finfishes nei	2004	Illegal	India	10	[12]Orissa Forest Department registered cases of illegal fishing in prohibited water bodies against 24 fishermen and confiscated 10 vessels for fishing in the Bhitarkanika wildlife sanctuary; fishing gear and other implements used in illegal acts were seized
13	Finfishes nei	2007	Illegal	Sri Lanka	2	[13]Two Sri Lankan fishing vessels, *Samudra Deva Matha* and *Kaveesha Putha* were arrested by Indian coastguard 24 nautical miles off Cuddalore, for illegal fishing in Indian waters on April 23, 2007; Both the vessels along with their 12 member were handed over to Sri Lankan Navy
14	Finfishes nei	2002	Illegal	India	44	[14]Up to 44 fishing boats have been seized here by the Orissa Forest Dept officials; 12 fishing trawlers were found near mouth of Devi river within a prohibited zone of 5 km from the coast on December 31; none of the trawlers had turtle excluder devices, which are mandatory on all trawlers operating along this coast

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INDONESIA

Summary of information concerning IUU fishing

Illegal fishing

Many vessels are fishing illegally in the Indonesian EEZ and instances are regularly reported in the media. Fish Information and Services (2001) reports "the country is losing US$2 billion a year to illegal fishing operators in its Exclusive Economic Zone (EEZ). Poor surveillance of the EEZ was cited as the main factor contributing to the situation. The report estimated that between 3,000 and 4,000 foreign ships illegally operate in Indonesian waters each year." At an average fish price of US$500/t (local beach price) to US$1,000/t (average international market price) the sum lost to illegal fishing is equivalent to between 2 and 4 million t of fish, or 55–110% of the Indonesian catch reported to FAO.

A number of reports indicate that illegal fishing in Indonesian waters was particularly high in the 1990s (Butcher, 2002; Erdmann, 2000). Fegan (2003) writes "It is widely known that illegal fishing by foreign-owned trawlers is a major problem for Indonesia… What is less well known is that the nation is also incurring substantial losses from the existing arrangements for legal fishing. In the Arafura Sea surrounding West Papua, hundreds of trawlers, mostly from Thailand, [take] massive quantities of fish." Fegan (2003) also reports that the navy is profiting from the plunder. Its cooperative, Inkopal, is the business partner of the leading foreign fishing companies whose trawlers ply the Arafura Sea. These vessels have been renamed 'fish net boats', which are permitted to fish east of longitude 130 E. "Where the fish-finder devices detect schools of fish but coral bottom could damage nets, trawlers work in pairs to smash the coral first… My estimate is that there are about 700–750 trawlers operating in the Arafura Sea… At least 90% of the licensed shrimp trawlers and all the fish trawlers appear to be owned by foreign Asian companies (Thailand, Taiwan, Japan, China, South Korea). The identity of the real owners is difficult to determine because almost all are registered under the name of an Indonesian company. In order to obtain a licence, a foreign trawler owner has to enter into a joint venture or a 'charter' arrangement with an Indonesian company… Inkopal appears to hold the largest batch of licences… smaller batches are held by Inkopad, the army cooperative, and Inkopau, the coastguard cooperative". Fegan (2003) continues, "There are several important incentives for them to obtain a licence… If a trawler is flagged as an Indonesian vessel it is able to purchase subsidised diesel fuel at Indonesian ports at well below the world market price [and pays]… lower domestic fees to anchor in a harbour or use a wharf. In effect, this means that Indonesia subsidises foreign vessels from richer countries to fish in its waters. Most of the Thai trawlers transfer their catches to… large freezer ships that collect the catches of several trawlers and then carry them to ports abroad, usually in Thailand. At the time of transfer, no representative of the Indonesian joint venture partner or Indonesian fisheries official is present. All of the information about the catch, such as the weight and the type of fish, is entered into a Thai-language form. That form is faxed back to the Thai companies that own the trawler and the reefer".

Although the IUU situation has at last been recognised, there is still room for improvement: according to INFOFISH (2002) at least 117 illegal fishing vessels were caught off Indonesian waters in 2001, but only 26 cases had been tried. European Cetacean Bycatch Campaign (2004) states, "Indonesia's tough new policy of sinking illegal foreign fishing boats has led to a dramatic decline in the number of incursions." Vessel monitoring has been even less effective than the catch inspection, but the recent introduction of a VMS system has improved matters. FAO (2002) reports that, "Commencing in November 1991, the government initiated a charter system to replace the licensing system for foreign vessels, which gave more access to national fishing companies in the EEZ, particularly in terms augmenting export earnings. BKPM (2006) reports, "The Fisheries and Maritime Ministry has served warnings to 13 foreign fishing vessels for alleged illegal fishing and transshipment. The illegal activities of the 13 foreign fishing vessels flying the Indonesian flag were caught by the ministry's VMS. Maritime Resources Control Director General Ardius Zainuddin described the violation as illegal, unreported and unregulated fishing (IUU fishing) including violation of fishing grounds, expired licence and transshipment.

To the north, fishery relations with Thailand and the Philippines are not good because of frequent illegal incursions by vessels of these countries into Indonesian waters (Butcher, 2002; Heazle and Butcher, 2007. The Maritime relationship with Malaysia is occasionally affected by the continuing incidents of disputed

islands, which in one case had adversely impacted Indonesia over the case of Sipadan and Ligitan islands (International Court of Justice, 2002).

Destructive fishing practices such as blast and cyanide fishing have damaged an estimated 80% of the coral reefs in eastern Indonesia. At its peak, the net quantifiable loss to the Indonesian economy due to cyanide fishing was US$46 million over four years in 1997 value terms and Pet-Soede *et al.* (1999) have estimated that the economic loss due to blast fishing after 20 years has been about US$306,800 per square kilometer. Although illegal, "The only systematic enforcement takes place when an existing dynamite/cyanide cartel pays for protection from potential competitors. In such an environment, local communities have found it very difficult to protect their reefs. Ironically, one often encounters local cyanide fishers complaining bitterly about out-of-town dynamite crews blowing up their reefs. The recent decentralisation of power to local authorities has, in general, led to even faster natural resource exploitation by local operations. Sustainability is impossible" (CCIF, 2001).

In some areas, cyanide has been used by local fishers for so long that it is considered a 'traditional' fishing technique (CCIF, 2001). Mous *et al.* (2000) report, "According to three precautionary estimations, the reef-degrading capacity of the cyanide fishery for food fish on Indonesia's coral reefs amounts to a loss of live coral cover of 0.047, 0.052 and 0.060 m^2 per 100 m^2 of reef per year … low compared to published rates of natural coral recovery … the cyanide fishery for food fish may not be as threatening to Indonesia's coral reefs as is sometimes assumed, especially not as compared to other threats such as blast fishing… or coral bleaching… The depletion of grouper stocks by the trade in live reef food fish, however, is worrying from both fisheries and conservation perspectives."

"Aquarium fishing is done with varying amounts of cyanide. Some fishers use cyanide for virtually all species, while others restrict themselves to those species at greater depth, such as the emperor cardinal. The problem is twofold: over-fishing, and coral destruction through cyanide… In Bali Barat, for example, on the western tip of Bali, over 10% of fish are taken every year by a small army of approximately 200 fishermen. In the Banggai area, one operation alone is taking 20,000 cardinals per day, over 70% of which die on their way to the Bali exporter due to inadequate handling practices … The damage done by the cyanide fishery for the much smaller-sized, ornamental fish is probably much greater than that for food fish, as the number of target fish per unit of reef area is much higher. Also, mechanical reef destruction in the fishery for ornamental fishes may be more extensive, as branching corals are broken apart over large areas, in order to retrieve small fish." The anecdotal evidence, as reported by dive operators throughout the archipelago, is deeply worrying; there are reports of entire coastlines that have been essentially stripped of coral by aquarium fishers. Fishers interviewed as part of the research for this plan report that they have to travel far, up to eight days, into the far northern and eastern reaches of the archipelago to find good fish – travel times of eight days for a two-day harvest expedition are not uncommon. It is estimated that less than 10% of the Indonesian reefs are pristine at this point, 30–40% completely destroyed, and the remainder moderately to heavily damaged" (CCIF, 2001).

One of the problems in reducing harmful blast fishing is that incomes can be much higher than with conventional fishing methods. For example, Pet-Soede et al (1999) report that, "net incomes [from blast fishing are] …comparable to the highest incomes in conventional coastal fisheries."

"According to The Military Balance, the Indonesian Navy had just 61 patrol vessels in 2003. Moreover, the report noted, the "overall serviceability of the whole fleet is low" (Heazle and Butcher, 2007; The Military Balance 2003–4). However, the government appears to have taken some steps to ameliorate the situation. "…at the direction of the ministry, the Navy appears to have stepped up efforts to capture foreign vessels fishing illegally in Indonesia. In 2004, as a result of these efforts, the number of foreign fishing vessels "operating illegally in the country's territory" had dropped over the previous four years from 7,000 to "just over 1,000" (Wijaksana Dadan, 2004). In the midst of all these changes a central feature of the Indonesian state remains in place, and that is the military's involvement in business. Even here there are signs of change. In September 2004 parliament passed a law declaring that the military would give up all its businesses by 2009" (Financial Times, 2004; Heazle and Butcher, 2006). However, the recent changes in political front suggest a need to exercise caution as to when proactive measures will be implemented to protect and sustainably exploit fisheries resources within its EEZ before it is too late. Indonesian ports are implicated in assisting illegal tuna catches to Japan and in illegal shipments of Antarctic toothfish: Gianni and Simpson (2005) state, "As for getting the right certification and documentation, it is generally

regarded as a fairly simple task to get officials in agencies under inadequate central government control in flag states like Bolivia and Russia and port states like Indonesia to generate 'appropriate' paperwork."

"Indonesia's recent efforts at the national level to control IUU fishing are becoming effective, but its legislation needs urgent review as non-sustainable measures have been included in past legislation to benefit foreign investors and local partners, e.g., redefinition of trawl nets to fish nets to allow their use in western Indonesia, etc. Interagency coordination through the National Maritime Council (DMP) has proven as ineffective as its two predecessors over the past ten years, due to lack of inter-agency cooperation, and this is expected to continue. Coastal co-management is becoming popular and growing in acceptance in donor project areas, but lack of local capacity hinder its widespread acceptance. This is further exacerbated by the continuation of centralist resistance to devolution in some agencies" (Flewwelling and Hosch, 2006).

Indonesian fishers also fish illegally elsewhere in the world, especially in Australian waters, "due to a combination of a lack of marine resources in their own waters (due to severe overexploitation), and the existence of few alternative income generating activities. If they are not caught, a single trip can provide the same economic return as a year of fishing in Indonesian waters" (EJF, 2005). Illegal Indonesian fishers are frequent occupants of Darwin's jail, and recent incidents show that an increasing number are not necessarily the traditional fishers who used to fish there. In fact, some admitted that they went to Australian waters because: (1) they were pushed away and spatially displaced by the many illegal foreign trawlers (viz., from Taiwan, Thailand and China) that came to their traditional fishing grounds in Indonesian waters, and (2) the increasing incidence of the use of blast fishing that adversely affect the fish abundance (Media Indonesia Online, 2006). Breaking News (2004) reports, "The Australian Fisheries Management Authority said 158 people had been caught operating illegally inside the northern Australian fishing zone this year – all of them from Indonesia. Shark is the most common catch for illegal operators in the region, with fins fetching high prices in Asian markets. The prized trocus shell and beche-de-mer, or sea cucumber, are also high value catches for poachers." In PNG, MRAG (2005) reports, "It is mainly the small Indonesia vessels, who are trawling, longlining, and possibly sharking for which there appears an issue. These vessels are probably in competition with the artisanal and local commercial fishery for demersals and possibly shark. Of the 65 interceptions made in PNG waters in 2004, 83% were Indonesian vessels."

Discards

There has been some observer data in the reporting of discards in the Arafura Sea trawl fishery for prawns.

Discards are low according to Kelleher (2005), since all fish caught in Indonesia have a ready market. Nevertheless, total discards are estimated at 270,000 t, 8% of r**e**ported total catch, with a high value of 88% in the Arafura Sea shrimp fishery.

Unreported catches from commercial fisheries

Fegan (2002) says, "I obtained 143 transfer lists from Thai trawlers loading their catches into a Thai 'reefer' in the Maluku Tenggara port of Tual. The lists were very detailed: they provided the weight of the catch for eighty-six different commercial species listed on the form. But neither the Indonesian 'partner' nor the Indonesian government ever see these transfer lists. All that the Indonesian government fisheries office at the port receives or seeks is the Thai reefer company's report of so many tonnes of *ikan beku campur* ('frozen mixed fish') exported. The reefer company has an in-built incentive to under-report the weight of the catch since it pays a 2.5% export tax calculated on the reported weight times the reported price per tonne of the fish. The trawler companies likewise have an interest in underreporting the quantity and value of the catch, as true reports might be used to raise licence fees to a level reflecting the profitability of trawling in Indonesian waters. Thus, the government's statistics on the quantity of fish being extracted should be considered gross underestimates. In the port of Merauke, I tried to figure out the real weight of the catch being taken out by the 'reefers.' I obtained from their skippers the hold capacity of each Thai carrier ship, looked into some of the holds to see how full they were, and learned the number of trips each vessel makes per year. My calculations gave an exported catch three times larger than that listed by the government for the same companies."

In an expert analysis by fishing sector, Willoughby et al (1999) estimate at least 3 million tonnes of unreported catch (over 80% of the reported catch).

"Enforcement includes the graduated fiscal penalties, suspension or cancellation of licences, refusal for new licences and full removal from the fishery as penalty options, but unfortunately the infractions appear to have been increasing over the past ten years despite the introduction of VMS, observers, dockside and landing site and at-sea inspections. This indicates the fact that the penalty scheme is not an effective deterrent, the education efforts to promote voluntary compliance are not effective, or that law enforcement monitoring efforts are increasing. Alternately, it could indicate that fishers have no respect for the laws and prosecutorial system, possibly due to the low deterrence measures in place, e.g., penalties are just a cost of doing business and do not significantly detract from illegal gains, e.g., the gains from illegal fishing exceed the penalties such as the ability to retain illegally caught fish and sell it for US$50,000, while the maximum fine is only equivalent to US$3,000" (Flewwelling and Hosch, 2006).

A detailed estimation of IUU in the Arafura Sea from 1970 to 2003 has been sponsored recently by FAO (Nurhakim *et al.* 2008). This entailed five workshops over two years (three in Jakarta ands two in the region) in which over 75 representatives of government research and enforcement agencies, universities, local officials, port workers, vessel owners, skippers and crew participated. Full results are still in press at the time of writing, but unrecorded catch levels as high as 700% of reported catch including discards, illegal catches from vessel types such as pair trawls and trans-shipments have been validated. The work covered the three main Arafura Sea gear types of shrimp trawls, fish trawls and bottom long-lines. The report reveals considerable levels of IUU for these three gear types:

"Up until 2004… the catch from fish trawls was not recorded, so that in this work it has been placed in the category of 'unreported catch'; in the data sources there are no explanatory notes stating that the catch from fish trawls is included in the catch recorded for any particular fishing gear… The majority of the fish trawl catch consists of 'misreported' catch, which in 1991 to 1995 reached a level of 70% with a volume of around 800,000 tons from vessels which held licences but were not recorded in Indonesian fisheries statistics… Illegal catch from fish trawls was below 17% or around 200,000 tons until 1995, then rose drastically in 1996 to form 82% (950,000 tons) then fell again in 2000 to around 450,000 tons, however in the following three years rose again to around 790,000 tons (74%). In 2004 and 2005 illegal catch fell again to around 400,000 tons or 30%."

"For shrimp trawls from 1976 to 1988, 'discards' and 'misreported' catch increased significantly from 100,000 tons and 25,000 tons in 1976 to 275,000 tons and 100,000 tons respectively in 1988 even though there was no significant increase in the percentages. This increase seems to be caused by increases in the fishing grounds (area) and number of fishing vessels. From 1999 onwards, the 'discarded' and 'misreported' catch was variable but with an overall downward trend.

"Most bottom long liners below 5 gt do not have fishing licences. There are many of these small vessels spread over a wide area so that it is hard to keep a record of their catch. These factors result in a very high level of unreported (misreported) catch which was constantly above 90% over the period from 1976 to 2005, however in terms of weight this component exhibited a downward trend from 160,000 tons in 1976 to 79,000 tons in 2005, this is thought to be due to a reduction in total catch resulting from a decline in (target) resources … The "illegal" component is due to the fact that a number of high-value species such as 'Kurisi Bali' (goldband snapper = *Pristipomoides* spp.) are sent directly to markets in Singapore without going through official procedures, and in addition a number of vessels with 'drift long line' licenses actually catch fish using 'set bottom long lines'. The average yearly volume is around 7,000 tons or 7% of the total catch.

Unreported artisanal fisheries

Over 80% of Indonesia's fisheries are small-scale and, in theory, they are covered by the fishing regulations. However, "small scale fisheries are not really considered, they do not require a fishing license as they are under certain scale of operation and they are not really counted in for management purposes (Lida Pet-Soede, pers. comm.). For tuna fisheries, Gillett (2005) states that, "In Indonesia (both Pacific and Indian Ocean areas), the only gear considered to be industrial is the conventional tuna purse seining in the north, pole-and-line fishing, using vessels larger than 15 GRT and mechanised longlining. All other

tuna fishing, including the large number of Indonesia's small pole-and-line vessels under 15 GRT, is considered to be non-industrial." Estimates vary, but somewhere between 50% and 75% of tuna taken in Indonesia comes from the small-scale sector.

Note

This material is based on a country synopsis, with additional material, published by Buchary *et al*. (2006).

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Table 13. Indonesia illegal fishing incidents,

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Finfishes nei	1996	Illegal	-	200	[1]Small-scale fishers near Jakarta reported that up to 200 trawlers were fishing as close as one km from the coast
2.	Finfishes nei	1997	Illegal	-	340	[1]Report from 1997 stated that up to 340 trawlers were fishing illegally along west coast of North Sumatra
3.	Finfishes nei	1995	Illegal	-	167	[2]Indonesian Navy destroyed 167 trawlers illegally operating near Medan
4.	Finfishes nei	1999	Illegal	Thailand	56	[3]Indonesian Navy arrested 1,200 fishermen for illegally fishing off Aceh, in Indonesia's territorial waters
5.	Tuna, shrimps	2003	Illegal	China	1	[4]One Chinese fishing boat was arrested while illegally fishing off Dolak island of Papua province; the Navy fired at the vessel after it failed to stop; boat was seized and all the 24 Chinese crew were detained at naval base in Papua's coastal town of Merauke
6.	Finfishes nei	2003	Illegal	Philippines	4	[4]49 Filipino crew were taken into custody and taken to Belitung, North Sulawesi; four vessels were sunk after firing three warning shots; all four were fishing illegally in North Sulawesi
7.	Finfishes nei	2003	Illegal	China	1	[5]The vessel *Sunflower* was caught poaching off Manado, North Sulawesi, by naval patrol vessels. The vessel was carrying 4,036 t of illegally caught fish
8.	Finfishes nei	2004-05	Illegal	Thailand & Others	550	[6]Indonesian Government has expelled 550 foreign vessels from its waters as they were operating with forged documents
9.	Finfishes nei	2004	Illegal	Thailand	5	[7] Five boats were fishing illegally near Bawean island; *Siriwan Pen* was 40 m long and 8 m wide, with space for 250 t of fish; Navy seized hundreds of tonnes of fish from the five ships
10	Humphead wrasse	2006	Illegal	-	1	[8]On 13 January 2006, 207 live specimens were seized from a fisherman in Bunaken National Marine Park
11	Humphead wrasse	2006	Illegal	-	1	[8]On 25 January 2006,Water Police working with the North Sulawesi Management Unit of Natural

						Resources Conservation seized 450 humphead wrasse from a fisherman in Likupang, North Minahasa District
12	Humphead wrasse	2006	Illegal	-	-	[8]On 30 June 2006, fisheries quarantine officers at Manado Airport seized 36 humphead wrasse. The specimens had been harvested in Malalayang, Manado, and were destined for Hong Kong
13	Finfishes nei	2004	Illegal	Thailand	17	[9]Indonesian Navy sank one Thai trawler; Indonesian fishermen reported that 17 Thai vessels were fishing illegally off Lhok Bubon, in Samatiga district; two Indonesian helicopters and two patrol boats, along with army personnel aboard fishing vessels, were deployed to find the Thai intruders; one vessel fired at patrol vessels and Navy helicopters fired back
14	Finfishes nei	2003	Illegal	Philippines	5	[10]Officers of the Eastern Indonesia Naval Fleet Command off North Sulawesi seized five Philippine vessels for illegal fishing
15	Turtles	2007	Illegal	-		[11]23 Chinese fishermen arrested by Indonesian Customs for illegal fishing in waters north of East Kalimantan province; the fishermen caught 387 turtles and tried to smuggle them abroad; fishermen awaiting trial
16	Finfishes nei	2006	Illegal	Thailand	4	[12]Four Thai vessels arrested by National Police for illegal fishing in Natuna waters (Natuna regency); none of the four boats had licences to fish in Indonesian waters
17	Finfishes nei	2007	Illegal	Vietnam	4	[13]Four Vietnamese vessels came under fire from Indonesian Navy while illegally fishing in Natuna islands
18	Finfishes nei	2003	Illegal	Thailand	1	[14]Thai trawler sunk by Indonesian Navy in the Java sea after its crew were arrested; vessel scuttled
19	Finfishes nei	2006	Illegal	China	6	[15]Indonesian navy arrested six Chinese vessels for illegally fishing in the Aru Sea, Maluku Province
20	Finfishes nei	2006	Illegal	Thailand	8	[15]Indonesian Navy arrested eight Thai fishing vessels for illegally fishing in the Aru Sea, Maluku Province; most of the impounded vessels were involved in fishing without the required official licence or were using banned trawls
21	Finfishes nei	2006	Illegal	Indonesia	9	[15]Vessels were caught red-handed while fishing illegally in the Aru Sea, Maluku Province;
22	Finfishes nei	2007	Illegal	Vietnam	9	[16]Nine vessels with 57 fishermen onboard were arrested in March 2007 for illegally entering Indonesian waters; 21 fishermen released in April 2007
23	Finfishes nei	2004	Illegal	South Korea	1	[17]South Korean mother ship vessel *MV Kyung II Ace* seized while unloading fish from two boats in the Arafura Sea off Papua province; The captain and the 32 crew were arrested by Indonesian Navy
24	Finfishes nei	2004	Illegal	China	4	[18]Four Chinese fishing boats suspected of illegal fishing in the Arafura Sea waters off Papua Island were intercepted by the Indonesian Navy, which fired 13 warning shots; *Fuyuan 123* arrested, other three vessels escaped
25	Finfishes nei	2008	Illegal	-	1	[19]The fishing vessel *Fuyan Yu 80* (1344 gt), was arrested and detained by Indonesian Navy for illegally entering Indonesian waters. The vessel was arrested in Fak-Fak waters of the Papua province

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IRAN

Summary of information concerning IUU fishing

Summary

Iran is one of the largest countries bordering the western Arabian Sea. It has a coastline of 2,700 km of which 1,800 km is in the Persian Gulf and Oman Sea. Fisheries contributed only 0.23% of the national economy in 2003. Fish is not a popular consumption item in non-coastal Iranian cities and per capita consumption is only 5.3 kg/year. Fisheries activities in Iran are concentrated in three regions: the southern fishery; the northern fishery (Caspian Sea); and the inland fishery and aquaculture. In 2003, the three fisheries produced 299,000 t, 32,000 t and 110,000 t of catches respectively (FAO, 2005).

Marine fisheries have expanded significantly since 1980 due to increasing yellowfin and skipjack tuna catches from the Gulf of Oman, Persian Gulf and Indian Ocean. Iran joined the Indian Ocean Tuna Commission in 2002 and since then the number of Iranian vessels fishing in the Indian Ocean has increased. The catches of Indo-Pacific sailfish doubled between 1994 and 2003 mainly due to increased catches by Sri Lankan and Iranian gill net fisheries in the Indian Ocean (Anon, 2006). Longtail and seer fish are caught in significant numbers in the Persian Gulf.

Iran shares fisheries resources in the Persian Gulf and the absence of EEZs in this area, has resulted in frequent conflicts (although there have been no such conflicts in the Gulf of Oman). Expansion of deep sea fishing since 1998 increased the share of tuna catches from 5% in 1995 to more than 12% in 2003. Principal fisheries in the Gulf include silver pomfret and demersal species (FAO, 2005). Iranian Fisheries Research Organization (IFRO), a state-owned company, is responsible for fisheries development. The Government recognises the need to reduce fishing effort in southern fishing grounds and is trying to cap fishing effort.

Siddeek (1999) reports occurrence of minor upwelling in the Arabian Sea and along the Iranian coast in Gulf of Oman from May to June and December to February enhancing biological and fisheries productivity in this region.

The majority of fish in marine fisheries are caught by trawling, purse seining, longlining, gill nets and traps. In artisanal fisheries 94% of tuna are caught using gill nets.

The use of ITQs and co-management to control overfishing has increased in recent years (Taghavimotlagh *et al.* 2006).

Illegal catches in the commercial sector

There is little direct information on the level of illegal fishing in Iranian waters. Sea surveillance is the usual method of control of fishing operations and 80% of monitoring is done in this way. The Department of Fisheries Resources Protection plans to operate a remote control system to monitor fishing vessels in Persian Gulf and Oman Sea due to high number of vessels operating in these fisheries (Taghavi, 1999).

Fisheries legislation covers a comprehensive list of violations, including unauthorised fishing; illegal transhipment to non-licensed vessels; selling or buying illegal fishing gear; impeding routes of migratory fish or breeding grounds; causing pollution, fishing in a closed season or place; fishing banned species; fishing without a licence; industrial fishing in coastal waters; fishing with illegal gear or having such gear on board illegally; mis-reporting of catch or not providing necessary data; lack of compliance with regulations related to vessel marks, letters and numbers required to track or identify the vessel; unlicensed fishing, processing, distribution, transaction, transportation, storage, importing and exporting of sturgeon fish and caviar; non compliance with the terms of fishing licences; unreported transfer of a fishing licence; ignoring health and quality control regulations" (Taghavi, 1999). Penalties range from confiscation of catch/vessel to imprisonment.

Discards

According to Kelleher (2005) Iran pursues a 'no-discard' policy. However, the same report states that the current discard rate is 40.3% of total landings in the trawl fishery. FAO (2005) reports an increase in landings in the Persian Gulf (southern Iran) presumably leading to increased quantities of discards and by-catch in its marine fisheries.

"The shrimp trawler catch composition consists of 10–17% shrimp, 10–25% small fish, 40–60% juvenile fish (less than 30 cm in length) and 10–20 large fish. Most of the small fish and juveniles are discarded, more so at the start of the season when shrimp catches are good. In Hormozgan province discarding is banned and a collecting scheme for such by-catch is established. The shrimp fishing season in each province is approximately six weeks, and opening and closing is based on the maturity and body length of shrimp and percentage (20%) of remaining stock" (FAO, 2000). Shrimp fishing in Iran lasts only 6–7 weeks every year so discards are minimised for most of the year. "Iran has recently introduced a system of collecting by-catch at sea in one of its provinces (Hormozgan), which is used for making fish meal. The plan was to ban discarding all kinds of by-catch in shrimp fisheries in the country" (FAO, 2000).

Unreported catches in the commercial sector

In the industrial fisheries, catch and effort information are obtained from fishing logbooks, observer programmes and landing inspections (Taghavimotlagh *et al.* 2006). "A complete enumeration (census-type) system of data collection is also done for the big trawlers and deep-sea vessels, to ensure that the Fisheries Management Department can make more effective plans and strategies for the management and the development of the fisheries. The logbook records for every trip provide catch data on major species caught, detailed effort data, fishing area, and some cost and earning data for socioeconomic purposes. However, not all data are collected on a routine and regular basis.

Unreported catches in the artisanal sector

Landings are monitored for a few pelagic and demersal species for certain provinces in the Persian Gulf. However, no information is available on whether the collected information is used to manage fish stocks on a sustainable basis.

Catch estimates of the artisanal fisheries are undertaken from surveys of landings centres, effort data is obtained from fishing permits for a complete enumeration system. The mean catch per unit of effort by strata (month, landing site, vessel type and gear) are calculated which are then used to derive estimates for the whole population (fleet) using known effort. (Taghavimotlagh *et al.* 2006). However, not all data are collected on a routine and regular basis. It is often difficult to obtain useful information from the fishing community" (Taghavi, 1999).

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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IRELAND

Summary of information concerning IUU fishing

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10–20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

The Common Fishery policy compliance scoreboard for 2005 reports major infringements by Irish fleets, including quota overruns, failing to submit catch and fishing effort declarations continuously for past three years, not submitting environmental issues report for 2004, one pending infringement procedure for overfishing, failing to submit national reports, and inefficiency or ineffectiveness of the control and inspection of the fishing industry (EU, 2005). However HSTF (2006) reports that no Irish vessels were engaged in illegal fishing activities in the high seas although there are widespread reports of the failure of the Irish fisheries authorities to apprehend infringements by local Irish vessels, in particular large illegal landings from Irish deep sea and inshore trawlers and gill nets, especially on the west coast (Table 14).

Foreign vessels have been caught illegally operating in the 'RASCO' gill net deep-water fishery off the Irish coast (OCEANA, 2005). Long and Grehan (2002) report that a Japanese bluefin tuna vessel caught fishing illegally within the Irish EEZ in 1995 was fined £800,000. In such cases, Irish law empowers the court to order confiscation of the vessel. However, penalties for violating fisheries laws do not include imprisonment.

The EU (2005) compliance scoreboard states that Ireland has overrun quotas, failed to transmit fishing effort declarations for three consecutive years, failed to submit environmental issues report, and faces pending infringement procedures for ineffectiveness of the control and inspection of the fishing industry.

Discards

The overall discard rate is very high for most species in the Celtic Sea and other Irish EEZ areas. A close study of catch statistics for major species in each ICES division reveals that discards are not adequately quantified during stock assessments, with high grading and under-reporting further compounding the estimation of total fishing mortality (ICES, 2005). Discards are still not included in calculations of total landings for the majority of stock assessments in Ireland. Allen et al (2001); Kelleher (2005) and ICES (2001) give further information on discard estimates.

In the cod fishery, there is no discard information at all for the main French fleet in which discarding and high-grading of marketable catch is thought to be substantial. Previous studies within the Irish fleet suggest that discarding of cod is low, while for the UK otter trawlers discarding can be as high as 64%.

In the haddock fishery, some discarding information is available, which indicates that discarding is substantial for younger age classes (ICES, 2005).

The majority of vessels in the Irish Sea target *Nephrops*. There is significant by-catch of haddock and to a lesser extent flatfish, whiting and Norway pout in this fishery. The minimum landing size of 20 mm carapace length for *Nephrops* has not been effectively implemented. As in other fisheries, TAC evasion measures include mis-reporting, high grading and discarding at sea, which are hard to track especially for fleets that process catch at sea (ICES, 2005). "Increasing pressure on stocks in the area known as the 'Western waters' (west of Ireland and Scotland) by Irish, French, Spanish and United Kingdom fleets has reduced average sizes of some species with a consequent increase in discards. In 1999, whiting discards (in the order of 25,000 t, particularly from the *Nephrops* fisheries) represented 60% by weight of the catch and more than 80% of the catch by number, and Irish Sea *Nephrops* fisheries have similarly high discard rates to the North Sea fisheries (Kelleher, 2005).

"Approximately 30% of Irish hake catches (ICES Areas VI and VII) are discarded, partly because of trawl damage to the fish and about 25% of the discards are of marketable size. Large quantities of pelagic species (horse mackerel, mackerel and blue whiting) are discarded by Spanish demersal trawlers because of weak market demand and quota restrictions. Quota restrictions increasingly influence high-grading and other discarding decisions in both demersal and pelagic fisheries, in particular when the catch composition consistently differs from the quota mix available to fishers, in some cases as a result of weaknesses in quota trading systems. Deepwater trawl fisheries off the west coast of Ireland (Rockall Trough, Hatton Bank) targeting roundnose grenadier, blue ling and orange roughy have high discards of shark and grenadier. Discard rates vary between 31% and 90% depending on the fleet (French, Irish and Spanish fleets participate), target species and depth range. Inshore bivalve dredge fisheries for scallop and razor recorded discard rates of 25% and 60% respectively" (Kelleher, 2005).

The Irish mid-water herring trawl fishery has a discard rate of 4.7%. In 2001, for the 155,450 t of mackerel, horse mackerel and blue whiting landed in Ireland, 19,213 t (11%) was discarded. The total discard rate accounted to 12.1% when compared with the global average (Kelleher, 2005).

Routine discard sampling is undertaken in Ireland. A monthly sampling is carried for whiting in the *Nephrops* fishery and limited monitoring is also carried out for main fleets operating out of five main ports. Some of the fisheries that have significant discards include high discards of younger individuals (<3-year-old) haddock. Whiting caught in mixed (especially megrim [*Lepidorhombus whiffiagonis*] and anglerfish) fishery is discarded due to low market. Discarding of plaice and by-catch of plaice in sole beam trawl fishery is not quantified. Discard of herring is not quantified adequately. Measures such as reduction in minimum landing size for megrim from 25 to 20 cm in 2000 led to decrease in discards from 2000–2002, but also led to an increase in high-grading.

For majority of stocks in the Irish EEZ, the current stock assessments have not taken discards into consideration while calculating total landings. This results in increased bias and uncertainty leading to optimistic and misleading forecasts for several species while allocating quotas every year. Exceptions occur for two species where data from discards is included in total catches. The two species being herring in division VIIj and Celtic sea; megrim in divisions VIIb, c,e-k and VIII a,b,d where data from discards was also included in total landings for calculation of TACs since 1993 (ICES, 2005). ICES (2005) also states that significant non-reported landings of cod in division VIa (west of Scotland) have rendered the TAC ineffective. For whiting in division Via (west of Scotland) survey and catch-at-age data were inconsistent as the proportion of discarded catch was as high as half of the annual catches by weight.

Unreported catches in the recreational fishery

Ireland issued an estimated 31,000 angling licences in 1997 (Marine Institute, 1997). Prior to 2001, recreational catch statistics were collected by Fisheries Board inspectors through private fisheries and local angling clubs. The actual extent of data covered through this procedure remains unknown.

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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Table 14. Ireland illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Finfishes nei	1997	Illegal	Spain	1	[4]UK-registered Spanish vessel charged with concealing fish; after a three-hour search an ingeniously concealed secret hold with freezing equipment and light was found and the vessel was arrested
2.	Finfishes nei	1999	IUU	UK	6	[1]Six British fishing vessels prosecuted for fishing offences in the year 1999
3.	Finfishes nei	1999	Illegal	Norway	3	[1]Three Norwegian vessels prosecuted for illegal fishing offences in the year 1999
4.	Finfishes nei	1999	Illegal	France	3	[1]Three French vessels prosecuted for illegal fishing offences in the year 1999
5.	Finfishes nei	1999	Illegal	Belgium	2	[1]Two Belgian vessels prosecuted for fishing offences in 1999
6.	Finfishes nei	1999	Illegal	Spain	2	[1]Two Spanish vessels prosecuted for fishing offences in 1999
7.	Finfishes nei	2000	Illegal	UK	4	[1]Four British vessels prosecuted for fishing offences in 2000
8.	Finfishes nei	2000	Illegal	Norway	1	[1]One Norway vessel prosecuted for fishing offences in 2000
9.	Finfishes nei	2000	Illegal	France	3	[1]Three French vessels prosecuted for fishing offences in 2000
10	Finfishes nei	2000	Illegal	Belgium	3	[1]Three Belgian vessels prosecuted for fishing offences in 2000
11	Finfishes nei	2000	Illegal	Spain	3	[1]Three Spanish vessels prosecuted for fishing offences in 2000

12	Finfishes nei	2001	Illegal	UK	1	[1]One British vessel prosecuted for fishing offences in 2001
13	Tuna	2001	Illegal	Spain	1	[2]One Spanish tuna vessel *MV Matalanas Segundo* detained for using undersized gill nets
14	Tuna	2001	Illegal	French	1	[2]One Spanish tuna vessel *L'Etel* detained for using undersized gill nets
15	Mackerel	2002	Illegal	-	2	[3]Two skippers fined £248,000 after found guilty of tampering with VMS black box and keeping false logbook records. Both vessels were landing large illegal mackerel catches
16	Finfishes nei	2006	Illegal	France	1	[5]The Spain-registered vessel *Koaxi* using French flag based in La Coruna, was taken to port of Castletown for fishing in Grand Sol, without its blue box emitting any signals; Spanish owners have to confirm accusations; detained trawler was targeting hake (in a closed fishery), crab and monkfish
17	Finfishes nei	2007	Illegal and Unreported	France	2	[6]The captains of two French trawlers were prosecuted for illegal fishing and admitted under-declaring their catch
18	Finfishes nei	2001	Illegal	Northern Ireland	1	[7]The Northern Ireland-registered vessel was detained by Irish navy for illegal; The *Rebecca Elizabeth* was boarded 20 miles east of Drogheda on suspicion of fishing inside the cod exclusion zone; vessel escorted to Howth and handed to local gardai
19	Finfishes nei	2005	Illegal	-	1	[8]The trawler *Ardent* seized off the west coast of Ireland ; vessel detained 50 miles from Achill and was escorted by the Navy to Galway for inspection
20	Herring	2008	Illegal	Ireland	1	[9]The Irish-registered *Ronan Ross* detained by Irish Navy and SFPA at Ringaskiddy on suspicion of illegally fishing for herring within 12 nautical miles; vessel in contravention of the sea fishing boat licence; fish worth €30,000 seized
21	Finfishes nei	2008	Illegal	Ireland	6	[10]Officers from the Sea Fisheries Protection Authority (SFPA) detained six Irish-registered vessels in January 2008 for alleged illegal landing of fish; vessels were detained for a series of alleged offences at locations in Wexford, Cork and Dublin

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ITALY

Summary of information concerning IUU fishing

Illegal fishing

Illegal fishing is an issue of significant concern in Italy. The main infringements, often by unlicensed fishers, are the use of illegal fishing gears (especially relating to mesh size), trawlers exceeding the size limit for fishing areas, fishing in marine protected areas, illegal extraction of mussels and illegal catches of juvenile sardines (IPSMEA, 2005). Research in Sicily has shown that it takes just two months to reach the quota for sardine catch, but fishing occurs for the whole year (ICRAM, 2004). Extraction of highly prized dattel mussel, prohibited in Italy since 1988, is still occurring in Liguria, Puglia and Campania. In 2002 a survey of illegal fisheries indicated that there were 1,000 in Sicily, 750 in Puglia and 672 in Marche (IPSMEA, 2005).

On May 2005, an EC report showed that just five Member States (Greece, France, Spain, Italy and Portugal) had been responsible for 88% of infringements to the CFP that had taken place in 2003 (European Commission, 2005d). Italy has the highest number of infringements recorded in any EU Member State as shown in the following table.

Table 15. Infringements to the CFP in Italian waters in 2005. Source: EC, 2007.

	Number of vessels	Number of serious infringements 2005	Percentage
Belgium	121	22	18%
Denmark	3,269	361	11%
Germany	2,121	96	5%
Greece	18,279	377	2%
Estonia	1,045	19	2%
Spain	13,684	2949	22%
France	7,859	864	11%
Ireland	1,415	109	8%
Italy	14,426	3280	23%
Cyprus	886	9	1%
Latvia	928	132	14%
Lithuania	271	3	1%
Malta	1,420	3	0%
Netherlands	828	117	14%
Poland	974	105	11%
Portugal	9,186	761	8%
Slovenia	173	13	8%
Finland	3,267	25	1%
Sweden	1,639	53	3%
United Kingdom	6,766	234	3%

The Italian coastguard service is responsible for most fisheries inspections and the Italian Navy monitors fisheries in the Straits of Sicily and the Adriatic Sea. Inspections at sea are carried out on an ad hoc-basis and only a very small proportion of landings are checked. (EU, 2001). In international and third-country waters Italy has a monitoring programme for the Italian vessels using drift nets. For the other Italian Mediterranean fisheries (such as trawling, purse seines and long-lines) there is no specific programme and lack of inspection is one of many areas causing concern. Italian oceanic vessels are not checked physically but inspected only through documentary investigations" (EU, 2001).

In 2005 the Italian coastguard conducted 30,000 boat inspections, inspected 166,000 markets and landing points, and seized 3,000 pieces of illegal equipment, 800 km of drift nets and 250 tons of products obtained through illegal fishing practices (Gain, 2006).

Some reports suggest unnamed boats have been targeting swordfish illegally off the west coast of Italy. The boats were modified to hide illegal nets; all exceeded the EU limit of 2.5 km net/boat (in one case 42.9 km) (Anon, 2005).

There is some evidence that Italy is trying to stop illegal fishing. Even if the problem is still present, various research Institutes (such as ICRAM and WWF) together with the coastguard are trying to step up inspections at sea (IPSMEA, 2005) and the licensing system has been improved (EU, 2001).

Discards

In the Mediterranean Sea, discards have always been an issue. Estimates of the percentage of the total biomass caught and subsequently discarded by several trawl fleets of the Mediterranean vary between 15% and 70%. One of the major artisanal fisheries employs static gill nets for which the main target species is common sole (*Solea vulgaris*) together with rays (*Raja asterias),* gurnards (*Trigla lucerna*) and crustaceans (*Squilla mantis*). Approximately 8–9% of the total catch is discarded. Gill nets are also employed to catch large specimens of European hake (*Merluccius merluccius*), which represents approximately 6–8% of the total catch. Another important fishing method is the trammel net with cuttlefish (*Sepia officinalis*) as the main target species. Quantity discarded varies between 16% and 35% and consists predominantly of damaged specimens of commercial species. The majority of discards in this fishery consist of horse mackerel (*Trachurus trachurus*). The fishing gears deployed are pelagic pair trawls and purse seines and light is used to attract fish. The catch is comprised mostly of anchovy (*Engraulis encrasicolus*) and sardines (*Sardina pilchardus*), which often occur in mixed shoals. Discards can be as high as 80%, especially when large catches of sardine are taken in the anchovy fishery. In 2002, the EU launched a Community Action Plan for Member States (including Italy) to reduce discards (EU, 2002).

The 'rapido' trawl fishery in the western Adriatic Sea targets three species of flatfish on inshore (3–6 km) muddy bottoms, and two species of pectinids on offshore sandy bottoms (10–65 km). In the flatfish fishery, the overall discarded biomass was the lowest recorded (40 kg per trawl), "The highest discards were recorded in the scallop fishery (271.4 kg per trawl), where Porifera (33%), Echinodermata (32%) and Tunicata (21%) were the main taxa caught, followed by queen scallop fishery (70 kg per trawl) where discards were dominated by Echinodermata, Arthropoda and Mollusca Bivalvia (36, 24 and 15 respectively)" (Pranovi *et al.* 2001).

Unreported catches in the commercial sector

At the Fifth Meeting of the Ad Hoc GFCM/ICCAT Working Group on Stocks of Large Pelagic Fishes in the Mediterranean Sea it was noted that "data are very uncertain and discontinuous, lacking sequence and coherence, and there is a general uncertainty on the true level of the catches as well as a lack of information on size and abundance indices" (ICCAT, 2005).

Unreported catches in the artisanal sector

The small-scale fishery segment in Italy has the greatest number of vessels, representing 65% of the total fleet. The segment covers vessels using passive gears, mainly fixed nets, which are less than 12 m long. The small scale-fishery also accounts for more than a quarter of the national value of landings (MiPAF, 2005). "According to official statistics, the Italian fleet is composed of 19.798 fishing vessels, as recorded in the maritime authority's fishing license archives. The most important sector is represented by small-scale fishery with 12,482 fishing vessels (63% of the total fleet)… The total number of fisher folk is 52,342, 49% of whom are in the artisanal fishery sector" (IREPA, 1999). "In 1999, the estimated catch of the Italian marine fisheries was 416.400 tons, 22% of which was caught by the artisanal fishery" (IREPA, 1999; Colloca *et al.* 2002).

On the basis of catch composition data it is appropriate to define flat fish and scallop rapido fishery as

multi-target fisheries, since the mean wet weight of accessory / incidental catch (FAO, 1994) often exceeded the biomass of the target species. This catch is landed and marketed, whereas in northern European countries it is usually discarded (Hall, 1999). Some of the rapid destruction of the benthic community is caused by the rapido trawl fishery for scallops and flatfish in the Adriatic sea, which fishes close inshore (Pranovi *et al.* 2000) .

Only a very small proportion of landings are checked. Local vessels are rarely checked and the checks that are made are usually on vessels from ports other than the harbour of landing.

Unreported catches in the recreational sector

Airoldi et al (2005) studied recreational fisheries from 1999 to 2004 along 40 km of shoreline in the Emilia Romagna region, North Adriatic Sea, Italy. The authors mention that although extraction of invertebrates is illegal from coastal defence structures and breakwaters, on an average approximately 2.5 kg of mussels or 1 kg of fish or crabs were collected per person each time. Other studies include Fanelli *et al.* 1994 and Marini, 1998.

Note

This material is based on a country synopsis, with additional material, published by Pramod *et al.* (2006).

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JAPAN

Summary of information concerning IUU fishing

Illegal fishing

Some illegal fishing occurs in the domestic fishery, although this is of a very low level compared to many other countries (1–5%; Clarke, 2008). In a recent review, Clark (2008) assessed the extent of illegal fishing in a number of the most vulnerable Japanese fisheries, and concluded that the most serious problem appears to lie in the illegal take of sea cucumber for which it is estimated, both in terms of catch quantity and value, that approximately 1.5% of the national production is illegal take. For hair crab and sea urchin the percentage of illegal take is about 0.7%, and for abalone it is only 0.1%. The combination of peer pressure, local government monitoring and coastguard patrol appears to be fairly effective.

There has been a reduction in the number of foreign vessels found fishing illegally in Japanese waters over the last few years, as shown below.

Table 16. Number of foreign fishing boats apprehended for illegal fishing in Japanese waters during the period 2000–2008. Source: MAFF, Japan in Clark (2008).

Year	South Korea	China	Russia	Taiwan	Others	Total
2008	4	0	0	0	0	4
2007	11	1	0	1	0	13
2006	8	1	0	1	0	10
2005	9	2	0	5	0	16
2004	14	5	2	7	1	29
2003	23	12	0	0	0	35
2002	25	12	1	0	0	38
2001	17	3	0	1	0	21
2000	16	5	0	0	0	21

Clarke (2007) while discussing trade flow of illegally caught salmon from Russian fisheries into Japan states that "imports via cargo vessels are a likely route by which this excess catch enters trade. While these cargo vessels may be flagged by the Russian Federation, Japan, China, South Korea or even another country, the pre-clearance procedures in effect for Russian cargo vessels landing in Japan may make it unlikely that Russian flagged vessels are used. Information on the flag State registration of the vessels delivering Sockeye imports from the Russian Federation, which is recorded by customs authorities (for example Japan) but is not publicly available, would be necessary to pursue this line of inquiry".

In far seas fisheries Japanese vessels are quite well regulated. However, Japan has recently admitted to serious under-reporting of tuna catches in the 1980s and 1990s (Darby, 2006). Many tuna long-liners have been sold to foreign owners and subsequently re-flagged. Many of these vessels avoid reporting and do not comply with fishery regulations. The level of Japanese involvement and share in the profits of these vessels is hard to determine, but Gianni and Simpson (2005) report that Japan comes 8th in a list of the top twenty countries involved in some way in marketing of fish illegally trans-shipped by flag of convenience (FOC) vessels. The size of this trade is exemplified by the finding that Japanese owners were identified in 63% (48 out of 77) of FOC vessels (many flagged in Panama) that were tracked in the illegal trans-shipped sashimi-grade tuna, while 12% (17 out of 132) were involved in illegal lower-grade tuna.

Discards

Kelleher (2005) states that many fisheries in Japan have high discards, and that total discards amount to almost a million tonnes, producing an average discard rate of about 15%. Fisheries with high discards include a diverse group of small coastal trawlers (small sail trawl 95% discards; small otter trawl, 69%),

the boat-seine fishery (including beach seines, 'gochi-ami'), far seas octopus fisheries (38% discards), tuna longline fisheries, and fisheries for Alaska walleye pollock (12% discards). There is no evidence that attempts to reduce discards are made in Japan.

Unreported catches in the artisanal sector

95% of fishers in Japan are small-scale, and fishing is mostly operated by households. A Fishery Census, the most comprehensive survey on fishers and fishery industry, is conducted every five years. Other statistics, such as Production of Fisheries and Aquaculture, are made available annually. Stock assessments are conducted at least annually, with shorter intervals as necessary. Many regional fisheries management organisations rely on fishers' logbooks, which are not always reliable.

For domestic fisheries, almost every fisher is a member of local Fishery Cooperative Associations, which often own and operate the landing ports and ex-vessel markets. Buyers are also restricted to those who have licences. Catch inspections are thus effective by concentrating the effort at these ports and markets. Illegal sales of catch that by-pass this route do exist but are minimal. It is hard to have effective catch-inspection schemes for high sea fisheries and/or fisheries that sell their catch to buyers directly, including trans-shipped catches.

Recreational fisheries

In Japan several species of fish like red salmon, rockfish and sea bream have been caught by recreational anglers with some fisheries like sea bream reported to catch a higher percentage of stocked fish than commercial fishermen (Masuda and Tsukamoto, 1998).

Note

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LATVIA

Summary of information concerning IUU fishing

Overview

Latvia was a part of Russia until 1991, but since then has had independent jurisdiction over its territorial seas in the Baltic Sea. Latvia also fishes outside the Baltic in the North Atlantic, but since independence has been unable to maintain its previously subsidised, large, distant-water fleets. A member of the International Baltic Sea Fishery Commission (IBSFC) (formerly through the Russian Federation), Latvia joined the EU in 2004.

Stock assessment is through ICES, which advises the Latvian government on managing its fish stocks. The decline of fish stocks in the Baltic Sea has led to decline of relative importance of fisheries in the GDP; its share has fallen from 3.4 % in 1996 to 1.1% in 2003, with export share falling from 9% to 3.2% per cent in same period (FAO, 2005). The fall in fish stocks has also resulted in a reduction of quotas allocated to Latvia.

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock. EC (2007) reports that the level of infractions in Latvia is moderate compared to the EU average.

The Marine Environmental Board under the Ministry of Environment is responsible for enforcement of fishery regulations and control of ports within Latvian waters. The Marine Control Stations in Riga, Ventspils and Liepaja perform monitoring and surveillance activities on the Baltic coastline. According to ICES (2004), Russian vessels were under-reporting cod catches caught from Estonia, Poland and Latvian waters during 2003. Very scanty information is available on effectiveness of Latvian authorities in preventing illegal fishing. Latvia is not a signatory to UN Fish Stock Agreement and hence their intention to comply with international regulations in the high seas is questionable. The EU regulation COM (2002) 180 embodies the action plan of European Union to eradicate illegal fishing in its member countries, but there is little information concerning Latvia.

Discards

Routine collection of data on discards has been in place in the Baltic Sea since the second half of 1995. All countries around the Baltic Sea are involved. At present the work is funded by the EC and national governments. For sea sampling, two different strategies are applied. Germany and Latvia select a sample of vessels, which are assumed to be representative of a larger group of vessels, and findings are extrapolated (Anon, 2001).

Information is scarce on discards in Baltic Sea fisheries. According to Baranova and Shics (1995) discards of cod are relatively lower in the cod fishery due to use of large meshed gill nets in Latvian waters. Discard numbers by age group for gill net / trawl / seine catches in the Baltic Sea are available for Latvia since 1996 when discard sampling first commenced. Discards of herring in the Gulf of Riga are assumed to be very rare as per observer recordings. Discards of sprat are low, as even undersized and lower-quality fish is used for fish meal and animal feed. However, in fisheries catching sprats destined for human consumption, in sub divisions 22–32 discarding of age 0 and age 1 recruits is unknown (ICES, 2005a). In the open-sea cod fishery, flounder is caught as by-catch, with the catch of flounder exceeding cod due to decline of cod fishery in recent years. The flounder has a very low market price hence fishermen are discarding not only undersized flounder but also specimens smaller than 25–30 cm in total length (ICES, 2005b).

Damage caused by seals is now a serious problem in the Latvian fishery. "The number of grey seals in the coastal waters of Latvia has increased, and hence the number of damaged salmon in the gill net fishery has increased since 1999. Damaged fish have to be discarded and are not reported" (ICES 2002). "In Latvia, direct catch losses of salmon by seal damage increased significantly from 2003. In the most affected area, the southern part of the Gulf of Riga, the percentage of salmon damaged by seals in the coastal fishery increased from 5% in 2002 to 40% in 2003 and 60% in 2004." (ICES, 2006).

Unreported catches in the artisanal sector

Most of the small-scale fishers are engaged in fishing within inshore waters often using smaller non-mechanised boats of less than 10 m. The decline in fish catches in the Baltic Sea must have affected these communities more than others due to their inability to venture further from the shore. The latest data from the National board of Fisheries indicates that 197 vessels are engaged in fishing in the Baltic Sea (ZM Valsts zivsaimniecibas parvalde, 2006). "In the offshore fishery, unreported catches may be 20 t and in the coastal fishery as high as 40 t. Some fishermen cannot distinguish between salmon and trout, which means that salmon catch statistics [cannot be relied upon]" (ICES, 2002). In 2005, Latvia banned the landing and selling of Baltic salmon for most of the year. "As[a] result [most] of [the] salmon landed in coastal fisheries was not declared or declared as other fish species. The amount of misreported salmon is estimated to be 20 t" (ICES, 2006).

Unreported catches in the recreational sector

"In the recreational fisheries sector, landings for salmon are not available or reported, although catches from coastal and offshore sectors are reported through logbooks" (ICES, 2002).

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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LIBERIA

Summary of information concerning IUU fishing

Illegal fishing

MRAG (2005): "Until recently, Liberia had no capacity for inspecting vessels. There are now five inspectors who sometimes go to sea on licensed vessels. A UN military surveillance plane conducted a 1 hr 40 min return flight, seven miles (11 km) out to sea and spotted 11 vessels fishing illegally. Given that the coast between Monrovia and Robertsport, the route of the flight, is less than 25% of the Liberia coast line and that 7 miles is only a third of the distance to the edge of the shelf, and also that the correspondent suggested that the southern area tends to be favoured by IUU activity compared to the north where the flight was, the total number of vessels fishing illegally in Liberian waters at that time could have been between 60 and 100.

"The general perception is that the illegal fishing is more prevalent in the south, near the boarder with Côte d'Ivoire. There is also a perception that many of the IUU vessels are based in Côte d'Ivoire. It is probably significant that the stated target for IUU activity is shrimp and tuna. …. It is probable that the vessels exploiting the Liberian tuna are part of the fleet that fishes all along the West African coast, for example Ghana, and part of which service the tuna canning plant in Cote d'Ivoire. Legitimate vessels have frequently seen non-licensed Korean, Spanish, Greek, Ivorian, Sierra Leone and Chinese vessels fishing, particularly at night. However, the illegal vessels reported by the UN plane were not flying flags.

"In pre-conflict times there was both an artisanal and industrial/commercial fishery (Ssentongo, 1987). The artisanal fishery was based upon some 200 registered canoes which caught around 1,000 t of fish annually, centred on small pelagics such as bonga, *Sardinella* species and Carangids. The total number of canoes was probably around 1,200 in 1983 and the last recorded catch was 2,140 t for the total artisanal fishery. By contrast, the recent re-instated survey for 2003/4 indicates an artisanal catch of 4,966 t. This increase could be a survey artefact although it may well be a real phenomenon. During civil wars, as has been seen in Mozambique and Angola, large numbers of people tend to be displaced from the land in the interior and find their way to the coast where they take up fishing as the only livelihood available to them, which clearly puts more pressure on the inshore stocks. Even in 1987 it was reported that there was conflict between the artisanal fisheries and the licensed commercial vessels, particularly shrimpers, all competing for the same fishing grounds. An increase in artisanal activity due to the civil unrest with complete lack of regulation on commercial vessels would almost certainly increase competition to the further detriment of the artisanal fisheries.

"The commercial vessels have typically targeted the demersal species, certainly in the pre-conflict period, relying mainly on the inshore sciaenid assemblage and, judging from the 2004 and 2005 catch records, are continuing to do this. In the pre-conflict era there were some six licensed trawlers and 12 licensed shrimp vessels, which were licensed through company agreements. Landings of fish from these companies varied between 4,000 and 9,000 to per year with a total commercial sector catch between 10,000 and 11,000 t (Ssentongo, 1987). One source gives a further breakdown of Liberian industrial fishery of 5,500 t and foreign industrial fishery of 2,330 t. In addition, the valuable shrimp fishery, which had been yielding up to 1,700 t per year in the early 1970s, was still producing around 450 t per year in 1986. There is no indication as to the extent of discarded by-catch but, since shrimp is rarely more than 25% of the actual catch, some estimate for this is possible. Our survey indicates that current commercial fish catches are recorded as 1,091 t for 2004 and 3,283 t for 2003, i.e. considerably less than in 1980s. The correspondent in Liberia actually estimates that the catches of fish were between 3,497 t and 6,840 t with an additional 187 to 250 t of tuna that was not commented on in earlier accounts.

"In addition, between 260 t and 800 t of shrimp were said to have been taken. The total number of trawlers and shrimpers licensed at the moment is 22, similar to the number before the conflict. The correspondent goes on to estimate that totals of commercial catches pre-conflict were between 12,000 and 15,000 t (broadly corresponding to the levels given by Ssentongo (1987), whilst during the war, and up to the present time, catches are around 4,000 to 8,000 t and therefore around 6,000 to 7,000 t of largely demersal species are lost to the system and almost certainly taken by IUU vessels. In addition, 70% of

catches of licensed vessels were required to be landed in Liberia; therefore there is a loss to the national fish supply. In actual fact the catches given in the official statistics for 2003 and 2004 of 1,091 t and 3,423 t are rather lower than those estimated by the correspondent so losses may be higher, perhaps around 9,000 to 10,000 t per year.

Note

This material is extracted from MRAG (2005).

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Table 17. Assessment of losses due to IUU off Liberia. Source, MRAG (2005).

	1987 catch (t)	Present catch (t)	Probable catch loss (t)	Potential catch (t)	Potential loss (t)	Price/t ($)	Probable loss ($m)
Demersal portion	7,000	4,000	3,000	15,000	11,000	1500	4.50
Small pelagic	2,100	5,000	-	41,000	36,000	450	
Tuna (national) *Tuna (ICCAT)*	?	250 *4,500*	4,250	?	?	1500	6.38
Shrimp	4	500[+]	100*	800[+]	100*	8000	0.80
Total			7,350		47,100		11.68

*token estimates; [+]MEY; *MSY

"The probable loss due to IUU fishing, which is really a minimum, is therefore equal to $12m, compared to the value of the legitimate catches which are worth about $10m, i.e. 120%

MALAYSIA

Summary of information concerning IUU fishing

Illegal fishing

There are many reports of illegal fishing in Malaysia; most tell of domestic vessels fishing inshore with unauthorised gear, and foreign vessels encroaching on Malaysian waters, the latter especially in the eastern provinces. Despite considerable effort by the authorities, there are regular accounts of illegal fishing by large trawlers, offshore vessels and foreigners in marine reserves (for example, Spait, 2001). Illegal trawling kills many turtles and patrol vessels are striving to control the problem.

Taupek and Nasir (2003) state that the Department of Fisheries Malaysia (DoFM) is determined to tackle the problem of large vessels fishing illegally in inshore waters, which causes unrest among the legitimate fishers operating within the area. Such vessels can face large fines, and if caught several times, gear and vessels may be confiscated and crew imprisoned.

Frequent encroachment into offshore waters by foreign fishing vessels, especially off Peninsular Malaysia is another area of concern and these areas are patrolled by the DoFM together with other governmental enforcement bodies. Some patrols are armed. In some areas Malaysian security has been stepped up in response to tourist kidnappings – for Lankayan, that means regular patrol boat calls and some three dozen M16-toting soldiers deployed at night on its beaches (Chalmers, 2004). This has had a knock-on effect as it is also helping to control illegal fishing activity. However, lack of resources and manpower remains an issue in many areas (Spait, 2001).

It is believed that almost all illegal fishing in Sabah waters involves foreigners, mostly Filipino youths sponsored by local fish 'towkays' who provide them with money, fuel and boats.

Malaysia has active deterrents in place to limit illegal fishing, including arrests, heavy fines and confiscation and sinking of vessels. Flewwelling and Hosch (2006) state that Malaysian legislation, which has been recently strengthened, aims to deter foreign vessels from fishing illegally in Malaysian waters. Infractions are dealt with by the "compounded administrative penalty system or court procedures that include: automatic forfeiture of vessels, gear and catches on a finding of guilt, and financial penalties for the master and each of the crew. Other recent measures include strengthened vessel identification requirements [and the implementation of] an inter-agency law enforcement mechanism (MECC), [comprising] national defence, customs, marine police, fisheries and the new coast guard, to jointly protect the EEZ.". New legislation has been introduced to deal with those found selling fish caught by bombing.

The Malaysian Maritime Enforcement Agency (MMEA) took over the task of patrolling Malaysia's waters in 2005, and by 2007 had detained 31 Vietnamese fishing boats for poaching (Anon, 2007).

Discards

Discards are reported as very low as all catches appear to be utilised (Kelleher, 2005).

Unreported catches in the artisanal sector

Catches in the artisanal sector are well documented. There is a catch inspection scheme for most vessels. Inshore catches are recorded and inspected according to a frame survey design at landing sites. Other sites such as shops and schools are monitored for unauthorised fish species; Chan (2004) mentions that local agencies "… also set up road blocks to check on vehicles carrying seafood, control the import or export of fish at the airport to see that the operators have the relevant licenses and permits. We also check on pet shops to see that they do not sell prohibited species of fish." Flewwelling and Hosch (2006) state that "monitoring of catch, effort and landing data (monitoring) for scientific analysis is secured through logbooks and landing reports".

Note

This material is based on a country synopsis, with additional material, published by Pitcher (2006).

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Table 18. Malaysia illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Finfishes nei	1991	Illegal	-	158	[1]During 1991, 158 foreign fishing vessels were arrested for illegal fishing in Malaysian waters
2.	Finfishes nei	1992	Illegal	-	96	[1]During 1992, 96 foreign fishing vessels were arrested in Malaysian waters
3.	Finfishes nei	2006	Illegal	Vietnam	15	[2]During the period January-July 2006, 15 Vietnamese fishing vessels were seized by the navy for encroaching into Malaysian waters in the west coast of Sabah
4.	Puffer fish	2006	Illegal	Vietnam	1	[2]Vessel intercepted in July near Pulau Layang-Layang, 100 kg of puffer fish seized
5.	Finfishes nei	2004	Illegal	Malaysia	1	[3]Six people, including five Indonesians, detained for suspected illegal fishing off Berhala Island; The detainees, aged between 19 and 46, were operating onboard a local fishing trawler when they were intercepted by navy patrol boat
6.	Finfishes nei	2005	Illegal	Philippines	2	[4]Forty-five fishermen, mostly Filipinos, detained for alleged illegal fishing at the Peninjau Semarang reef, near Pulau Layang-Layang, about 160 nautical miles from Kota Kinabalu; 2 kg of explosives were also seized
7.	Turtles	2007	Illegal	China	1	[5]Turtle poaching in the waters off Sabah; a second illegal Chinese vessel caught with more than 250 protected turtles; the illegal vessel was intercepted by Marine police off Mengalum island

8.	Anchovies and finfishes nei	2003	IUU	-	-	[6]Fisheries Department inspected 5 kg ikan putih, of the total 1,000 kg of high-quality bombed fish seized from the Filipino handicraft market at Sinsuran in Kota Kinabalu, Sabah; illegal catch included 300 kg of Engraulis japonicus
9.	Finfishes nei	2004	Illegal	China	1	[7]Fisher admitted to fishing using drift nets without a permit in foreign fishing boat in the waters off Pulau Malawali, Kudat; fined for illegal fishing
10	Turtles	2007	Illegal	China	1	[8] Chinese fishing vessel from Hainan detained, by Marine police at Mantanani Kecil Island, off Kota Belud; 72 dead turtles of protected species on board
11	Finfishes nei	2007	Illegal	Thailand	1	[9]Nine crew members of a Thai vessel arrested on Tuesday for fishing illegally in Malaysian waters; vessel spotted by a naval ship 85 nautical miles off Kuala Terengganu
12	Finfishes nei	2007	Illegal	Singapore	1	[10]Twelve Singapore anglers held and their boat seized by the Malaysian Maritime Enforcement Agency (MMEA) for encroaching into Malaysian waters
13	Finfishes nei and cuttlefish	2007	Illegal	Vietnam	2	[11]MMEA caught 23 Vietnamese fishermen in two boats poaching in Malaysian waters off Terengganu; fishermen were spotted catching fish and cuttlefish between 65 and 71 nautical miles offshore by a patrolling aircraft of the Royal Malaysian Air Force (RMAF)
14	Finfishes nei	2007	Illegal	Indonesia	2	[12]Thirty-five Indonesian fishermen in two boats were caught encroaching into Malaysian waters near Pulau Jarak; detained some 48.2 nautical miles from Pulau Pangkor; two boats and equipment seized
15	Finfishes nei	2007	Illegal	Vietnam	3	[13]MMEA detained 36 Vietnamese fishermen in three boats while fishing about 48 to 66.7 nautical miles from the shore in Malaysian waters
16	Finfishes nei	2007	Illegal	Philippines	1	[14] 37 Filipino fishermen arrested and held in East Sarawak in Borneo Island in Malaysia
17	Turtles	2007	Illegal	China	1	[15]Malaysian court jailed a group of 13 Chinese fishermen for 18 months each for poaching nearly 80 protected turtles; 13 Chinese were amongst 19 captured by marine police on March 26 with 47 green turtles and 29 hawksbill turtles
18	Finfishes nei	2007	Illegal	Vietnam	1	[16]Malaysian Maritime Enforcement Agency caught 11 Vietnamese fishermen poaching in Malaysian waters 80 nautical miles off Terengganu; trawler and catch seized
19	Cockles	2007	Illegal	Malaysia	1	[17]MMEA prevented an attempt to smuggle 140 sacks of spats (cockle fry) off Kuala Perlis; boat, carrying 60 kg each of 140 sacks of spats, was believed to be from Kuala Sepetang in Perak and was trying to smuggle the cockle fry to Thailand
20	Tuna and green Turtles	2007	Illegal	Malaysia	4 (Mal.) 1 (Viet)	[18,19]MMEA intercepted four Kudat-Malaysia registered trawlers laden with fish caught illegally at Usukan Bay in Kota Belud; They found two live green turtles in one boat and released the protected animals at the mouth of Sungai Mengkobang; one Vietnamese-owned vessel was caught with large tuna and live green turtles on board by Royal Malaysian Navy about 80 nautical miles northeast of Kota Kinabalu; onboard there were three containers of fish and four large tuna
21	Finfishes nei	2007	Illegal	Thailand	1	[20]MMEA seized a Thai fishing vessel and detained four crew members for encroachment; arrest was made 41 nautical miles off Tok Bali

22.	Turtles	2004	Illegal	China	1	[21]Marine police arrested 16 Chinese fishermen for suspected poaching after discovering some 160 marine turtles aboard a trawler. The suspects were arrested off the north-eastern coast of Borneo; the fishermen are to be charged for illegal fishing

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MAURITANIA

Summary of information concerning IUU fishing

Overview

Mauritania classifies its resources into two large groups: demersal resources and pelagic resources. The resources have an exploitable potential of about 1,500,000 t per year, of which 65% are pelagic fish, 20% are clams and 15% are demersal fish, tuna and crustaceans (UNEP/CNROP, 2002). Regarding pelagic resource, a dozen species out of 50 are exploitable stocks; for example sardine, horse mackerel, mackerel, anchovy and mullet. These stock evaluations indicate that tuna, horse mackerel, sardines, and mackerel have the potential to supply 1,000,000 t per year in the EEZ of Mauritania alone. (UNEP, 2005).

Only a small percentage of the foreign catch (less than 5% percent in 1980) is landed and processed in Mauritania. In 1978, foreign vessels landed about 39,000 t of fish, or between 3% and 5% of the total foreign catch in Mauritanian waters that year. The remainder was 'transshipped', that is, placed on transport vessels and transferred to foreign ports, usually Las Palmas in the Canary Islands. Fishermen prefer not to use Mauritania's main fishing port, Nouadhibou, because it lacks adequate ship maintenance, fish processing and recreational facilities. Thus, the only benefit from the foreign fishing is the payment of fees by foreign fishermen to the Mauritanian government in exchange for fishing rights. The fees were quite small – probably less than 1% of the value of the total foreign catch during the period 1973–7 – because much of the foreign catch is taken by unlicensed vessels.

The contribution of the fisheries sector to GDP increased from 8% 1980 to 12% in 2001 (Wohlers, 1980; Nguyen, 2004).

Illegal fishing

There has been a significant improvement in compliance in Mauritania over the last 10 years. Largely uncontrolled foreign fishing in the 1970s and early 1980s (Gibbs, 1984) has been followed by increasing control and regulation through access agreements, although lack of a vessel monitoring system continues to hinder effective surveillance (El Hassan, 2008).

Table 19. Comparison of results of aerial surveillance during 1995–96, 2000 and 2001. Source: AFR/010 database *Sierra Leone data unreliable for technical reasons (MRAG, 2005).

	Cape Verde	Gambia	Guinea	Guinea Bissau	Maurit-ania	Senegal	Sierra Leone	Total
Infractions as % of sightings 1995–1996	8%	19%	59%	9%	4%	1%	2%*	11%
Infractions as % of sightings 2000	#	10%	60%	17%	2%	4%	32%	13%
Infractions as % of sightings 2001	#	8%	60%	23%	1%	9%	30%	15%

No surveillance performed in Cape Verde

Licence fees amounted to just US$6–7 million dollars per year in 1973–77 (Wohlers, 1980). In the same period, the total value of the fish catch was about US$1 billion per year. Fee income was low, partly because much of the catch was taken by unlicensed vessels that were fishing illegally. Foreign vessels also often understated their catch and paid low fees (Folsom and Weidner, 1976; Wohlers, 1980; Gibbs, 1984). As all fish caught by EU and other foreign trawlers in the 1990s was frozen onboard, and inspectors were not able to check entire catches, it was suspected that significant catches went un-reported. However, in recent years, investment in MCS has been much higher in the northern part of west Africa than the south.

In Cape Verde, the Gambia, Mauritania and Senegal fewer IUU events are reported by Kelleher (2002), and in general MCS capability is moderately good, although it is noted that an integrated MCS system has still to be implemented for Mauritania (MRAG, 2005) and it is likely that foreign vessels are still illegally catching and storing species such as squids and octopus to a certain extent (El Hassan, 2008). In May

2006, the Mauritanian Fisheries Surveillance unit arrested four Spanish vessels for illegal activities within Mauritanian waters. The vessels were catching juvenile fish and had two different logbooks: one contained actual catch declarations for the boat owner and the second contained false declarations for the Mauritanian authorities (Nouakchott Info, 2006). MCS improvements are clearly demonstrated in Table 19.

Discards

Cephalopod trawlers fishing in Mauritania discard up to 72% of their catch (Balguerias, 1997). According to Kelleher (2005) discard rates range from 45% in the cephalopod trawl fisheries to 80% in the foreign deepwater shrimp fleet. According to a Mauritanian Fisheries inspector, there are very few by-catch controls particularly for foreign EU super trawlers fishing for pelagic species.

Unreported catches

In Mauritania, the level of knowledge on the state of the resources is uneven. The evaluation results for pelagic and cephalopod species, notably the octopus, are considered to be more reliable than those for other stocks, such as the crustaceans and demersal fish. Most of the demersal resources are fully exploited to overexploited. The octopus and the white grouper are overexploited. The hakes and shrimps are fully exploited, as is true for the majority of the big demersal species UNEP (2005).

Unreported catches in the artisanal sector

There is no data from this sector, but in Mauritania, the artisanal fleet comprises 3,000 canoes and 12,000 artisanal fishermen (more than three times the number working on industrial vessels) (IMROP, 2002; UNEP 2005).

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MEXICO

Summary of information concerning IUU fishing

Illegal fishing

Weidner and Hall (1993) reported that Mexico prosecuted any unlicensed foreign vessels found operating in its EEZ. However, the large extent of the EEZ on the Pacific and Atlantic coasts, coupled with other issues such as controlling drug trade and human trafficking, have limited effective enforcement to certain sections of the coastline. Despite this, the Mexican Navy regularly apprehends foreign vessels operating in its waters. In 1988 alone, the Navy took action against 434 vessels, generating fines of more than US$40 million (FNI, 1989). In later years, vessels arrested have included foreign joint venture vessels, for example the Japanese/Mexican joint venture tuna vessel *Copemapro V* in 1989. Some National Fisheries commissioners have declared that 20–30% of the catch in the Gulf of California and the Pacific Ocean has been taken illegally (Weiner, 2002).

The level of violations has declined over the years but illegal fishing is still a serious problem, especially the catching of shrimp during the closed period. In 2005, 1.5 t of illegally captured shrimp was seized from just seven fishing boats (SAGARPA, 2005). More recently, in 2007, officials from Mexico's Agriculture, Livestock and Fishing Ministry seized large quantities of illegal seafood from markets, for example 69 t was found in Mexico City's La Nueva Viga market, including octopus, shrimp, shark meat, squid, oysters and clams (Xinhua, 2007). Mexico's fishing regulatory agency (CONAPESCA) issued 2,400 permits for shrimp fishing in the Gulf of California for the 2002–3 season, but there are up to 4,000 boats fishing all year round (including in closed seasons; Velasco-Rodriguez, 2003). Up to 40% of fishing for shrimps and sharks in the Gulf of California could be illegal (Lozano and Pitcher, in press).

MRAG (2005) reports that 15% of the world's illegal catch of abalone comes from Mexico, and there are also problems with sea cucumber in the Sea of Cortez: "Despite the increasing interest of this sea product in the world markets, the only approach has been an unregulated extracting fishery, which has led only to a serious depletion of natural populations of species *Isostichopus fuscus* in the sea of Cortez (Gulf of California), Mexico"; and queen conch in Yucatan: "Illegal extraction of the queen conch (*Strombus gigas*) along the coastline of Progreso, Yucatan, are depleting the resource's population, preventing its recovery. Extractive efforts are undertaken by divers at 130 km off the coasts of Progreso, and catches are then smuggled to other cities, hidden in the shipments of other products to be traded on the black market, Diario de Yucatán reported. Sergio Chan Lugo, delegate of the Federal Bureau of Environmental Protection (PROFEPA), thinks the illegal extraction of queen conch is being controlled by a mob, with around a dozen very fast boats, equipped with high tech devices and telephone systems."

According to FAO (2003) a continuous programme of control, and inspections and observers on board some fishing fleets has been developed to guarantee that only allowed fishing practices are employed in jurisdictional waters.

Discards

There is evidently substantial discarding in Mexican fisheries. Kelleher (2005) estimates that Gulf of Mexico shrimp fisheries generate 19,000 t of discards every year (a discard rate of 42%) and Pacific shrimp fisheries approximately 114,000 t (a discard rate of 76.7%). Kelleher adds that the summed discard rate of Mexico fisheries is in the order of 137,873 t (total discard rate of 20.3%) and reports that with the implementation of fisheries management plans and by-catch reduction devices (BRDs) there has been a 40% reduction in finfish by-catch mortality compared to 1998 levels.

Shrimp by-catch in the Gulf of California includes over 100 fish species (Pérez-Mellado and Findley, 1985) and up to 114 species of invertebrates (Hendricks, 1985) and it is estimated that in 1996 alone, this fishery generated nearly 200,000 t of by-catch (García-Caudillo *et al.* 2000). BDR use allowed the exclusion of 73,000 t per year just in the Gulf of California (García-Caudillo *et al.* 2000). The ratio of shrimp to discarded fauna in the Gulf of California is 1:10; using turtle and finfish excluder devices it is 1:6, and using modern excluder devices it may possible to reduce this ratio to 1:2 (Campoy-Fabela, 2002).

Unreported catches in the artisanal sector

Mexico has one of the highest concentrations of artisanal fishers in Latin America. The doubling of its fisher population coupled with a more than 300% increase in its fishing fleet in the last decade (90% of its fleet is small-scale) means that a significant portion of catch remains unreported in its multi-species fisheries (Hernández and Kempton, 2003; FAO, 2004). According to FAO (2003), reliable statistics are collected for fisheries management but poor identification of species is a problem – about 42% of the total catch in volume is not identified to the species level (Vasconcellos and Cochrane, in press). Weiner (2002) estimated that there were 1,200 permits for boats in the Gulf of California and Pacific Ocean and that 20–30% of the catch reported was being taken illegally (Weiner, 2002).

In artisanal fisheries, "even though applicable, global quotas are difficult to control, due to the high number of fishers, the easy access to high-unit-value resources along 1,000 of km of coasts and the lack of control at landing sites because of extremely high enforcement costs where surveillance relies on government agencies" (Castilla and Defeo, 2001). There is a significant amount of fishing pressure in mangrove areas, with areas like Campeche itself supporting an artisanal fleet of 5,000 boats in the 1990s (RamosMiranda *et al.* 1991). The artisanal shark fishery has existed for more than a century in Mexico with as much 4,833 t of sharks landed in 1944, before rising to 15,000 t year^{-1} in 1970s (Castillo-Géniz *et al.* 1998). According to Bonfil (1997) there were no records on the type, number of sharks caught, trips or number of vessels actively involved in this fishery (Bonfil, 1997).

The artisanal shrimp fishery appears to have been historically well regulated in terms of fleet size until the 1990s, but it suffered a severe blow in 1990 when the Ministry of Fisheries abolished the system of allocating exclusive rights to co-operatives and replaced it with a system of transferable permits. The private companies quickly capitalised on this reform and purchased most of the co-operative vessels and their permits to replace them with modern fishing vessels that can fish more effectively and further away from the shore. This put huge pressure on shrimp stocks. The collapse of the Mexican peso in 1994–5 led to the influx of a large number of 'unregulated' fishers to the inshore shrimp fisheries, and an estimated several thousand tonnes of unreported catches from these fishers. Ongoing conflict between the commercial and artisanal shrimp fishers complicates the assessment and management of shrimp stocks (Thorpe and Ibarra, 2000).

Unreported catches in the recreational sector

Significant quantities of snappers, sharks, bill fish and dolphin fish are caught by recreational fishers along the Mexican coastline, but the actual figures are unknown.

Note

This material is based on a country synopsis, with additional material, published by Kalikoski *et al.* (2006).

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Table 20. Mexico illegal fishing incidents. (Source: Secretaria De Marina, Mexico)

	Species	Date	IUU flag state	# IUU Vessels	Action taken
1.	Shrimp & squid	2001	Unknown	2	[1]Illegal shrimp vessels arrested in Tamaulipas territorial waters and taken to the port of 'the Mezquital'; 120 kg of shrimp and 4 kg of squid confiscated.
2.	Shrimp	2004	Unknown	1	[5]The vessel trawling illegally in Spirit Santo Island, South Baja California) dumped the illegal catch on seeing the Naval patrol vessel; six crew members arrested; vessel seized; arrested
3.	Shark & golden fish	2002	Guatemala	1	[3]Vessel arrested 190 nautical miles (352 km.) to the southwest of Port Chiapas; six Guatemalan crew arrested; 1 t of shark and 50 kg of golden fish found onboard
4.	Shark	2001	Ecuador	1	[2]3 tons of fish, mainly shark and grudge etc.; 13 fishermen of

					Ecuadorian and Costa Rican nationality arrested along with the boat 180 nautical miles (333 km) to the south of Acapulco (Pacific Ocean)
5.	Unknown	2005	Unknown	1	[6]An inspection of the *DEER II* by Naval patrol vessel off Sonant Coast (Pacific Ocean) detected eight boats of similar name fishing in that area; vessels evaded arrest by fleeing from the area
6.	Shrimp	2005	Unknown	1	[7]18 kg of blue shrimp caught during shrimp prohibition period; catch confiscated; vessel seized in Horseshoe (Naval Subsector of Courteous Port, BCS)
7.	Finfishes nei	2003	Unknown	Unknown	[4]30 kg of fishes onboard seized; three crew onboard each vessel arrested for illegally fishing in the protected natural area, (Huatulco National Park)
8.	Shrimp	2006	Unknown	1	[8]Vessel intercepted by aerial patrol at Mouth Bar 'El Periguete' in Sonant (Pacific Ocean) for illegally fishing for shrimp; (action taken– unknown)
9.	Unknown	2006	Unknown	1	[9]Naval ship sighted and intercepted vessel while illegally fishing, in front of the beach of the hotel Mayan Palace of Vallarta Port; vessel seized for prosecution
10.	Unknown	2007	Unknown	Unknown	[10]Mexican Navy, through the Fourth Naval Zone based in Mazatlan, Sinaloa arrested 10 crew members; vessel and the catch seized for fishing during a closed season
11.	Dorado	2007	Unknown	Unknown	[10]Three crew members with 100 kg of Dorado fish while sport fishing; arrested for breaking regulations of sport fishing licence
12.	Shrimp	1998 – 1999	Unknown	4	[11]Park authorities arrested four commercial shrimp boats from mainland Mexico in the protected waters of the Bahia de Loreto National Park,. shrimp confiscated, fishers fined
13.	Dorado	2002	Unknown	1	[12]Incidents in Sea of Cortez - illegal commercial fishing for Dorado (legal for sport fishermen); not uncommon to see commercial fishermen unloading Dorado in the daytime (e.g., in Guaymas)

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MOROCCO

Summary of information concerning IUU fishing

Overview

Morocco has 4,500 km of coastline along the Mediterranean Sea and Atlantic Ocean. The ocean off the Atlantic is one of the richest fishing grounds in the world. Fishing has been a major industry in Morocco since the 1930s and the industry experienced tremendous growth during the 1980s. Today, the Moroccan fish industry is strongly export-oriented, and about 80% of production is supplied to EU member states. Annual catch is in the order of a million tonnes and constitutes 55% of the value of food exports and 8% of total exports. Over 100,000 people are employed in the fishing industry and it earns over US$600 million of foreign exchange.

Illegal and unreported fishing was widespread in Morocco during the 1970s and 1980s. Several Spanish fleets were fishing small pelagics, cephalopods and crustaceans, and foreign fleets from Asia, West Africa and Eastern Europe (mainly Russia) were fishing pelagic and demersal species (Stanford *et al.* 2001; Baddyr and Guénette, 2002). Extensive illegal fishing by Spanish vessels in Moroccan waters was reduced by the declaration of the 200-mile EEZ in 1981. Moreover, central to Morocco's blocking of EU boats, and its rejection of a 1995 Morocco/EU fishing agreement, was its claim that fish stocks were being depleted by both illegal Spanish and other, legal, EU boats (Afrol News, 2005; Kifani *et al.* (2005).

Afrol News (2005) claims that the Moroccan government is actually promoting illegal fishing, because "Morocco's key tactic to illegally maintain its occupation of Western Sahara is to include the Western Sahara waters within its 'fishing areas under Moroccan control' in order to involve European interests in its military illegal occupation and the permanent violation of international law."

Illegal fishing

A major problem in management of Moroccan coastal fisheries is the widespread violation of coastal closures reserved for artisanal fishers by local trawling fleets (Barreira *et al.* 1998). But the new VMS system that will be used to monitor 400 fishing vessels using transponders and INMARSAT satellites (Ministère des Pêches Maritimes [Ministry of Fisheries], 2005) will have a clear impact on illegal fishing by large commercial vessels (INFOSAMAK, 2005). However, VMS for the artisanal fleet is non-existent and the number of dories (small boats) in the small-scale fleet in Morocco is difficult to assess (Baddyr and Guénette, 2002).

Foreign vessels are often expelled from Moroccan waters (Oceanlaw, 1995). Nowadays, "Spanish fishermen are desperate to catch more fish and move into other waters. Because the stocks in their own EEZ have been severely depleted, Spanish fishing operations have spread all over the world. Their regular grounds include Canada and Morocco" (European Commission, 2005).

While European countries have prohibited drift nets because of the elevated by-catch of dolphins, sea turtles and other vulnerable species, Morocco has ratified international legislation prohibiting drift nets that are longer than 2.5 km. In practice, drift nets used by the Moroccan fleet are between 7 and 14 km long (Brown *et al.* 2005; Cornax *et al.* 2006). According to a recent WWF report a fleet of at least 177 small fishing vessels is engaged in illegal drift net fishing for swordfish (Tudela *et al.* 2005). Moroccan figures even put the number of these vessels at 370 (Writter, 2005). The use of oversized illegal drift nets in the Mediterranean and neighbouring waters by Moroccan vessels is said to represent collusion with illegal fishing boats that try different ways to get around existing regulations (Oceana, 2001).

Poverty has provided incentives for illegal fishing to increase income and quality of life. When interviewed, impoverished fishermen in northern Morocco said they, "would be favourable to a complete transition toward other fisheries, abandoning [illegal] drift nets, should public funds be available to support that" (Writter, 2005). Under the new fishing agreement signed between the EC and Morocco, 5 million Euros will be allocated to help phase out the illegal Moroccan drift net fleet (Tudela, pers. comm.).

There is widespread use of dynamite and poison fishing along the Mediterranean coast (Tudela, pers. comm.).

There are some minimum size regulations in several Moroccan fisheries, but they do not to appear to effectively enforced.

Discards

Baddyr (1989) stated that discards in Morocco were "considered non-existent, since local fishers sold or consumed the total catch", but more recent studies show that this is not the case. Kelleher (2005) gives 19% discards overall for Morocco. The Moroccan cephalopod trawl fishery discards up to 45% of the total catch (Kelleher, 2005); and there are discards of 30% in the sparid trawl fishery. The reported composition of species discarded by Spanish cephalopod trawlers is seabream (Sparidae), other unidentified demersal finfish, members of the families Chondricthyes and Triglidae, and invertebrates other than cephalopods (Balguerías, 1997). FAO (2001) observers on board a Moroccan shrimp fishing trawler in 1999 measured 75% discards; comprising marine debris 21%; hairtails (*Trichurus lepturus*) 16%; crabs 13%; shad (*Ilisha africana*) 8%; and other juvenile fish 42%. Smaller discards between 2.5% (Kelleher, 2005) and 5% (Haddad, 1994) occur in the sardine fishery, mainly caused by net damage (FAO, 2004). Sardines (*Sardina pilchardus*) comprise the majority of the pelagic catch, and discards are dumped either at sea or during net cleaning (El Mamoun, 1999). As discarding by pelagic fleets is considered to be less than 5% of the total catch, the quantity of discards of other pelagic species is probably not significant (less than 0.3% of the total catch) (Pitcher *et al.* 2002). Pitcher *et al.* (2002) report that, "In demersal fleets, coastal bottom trawlers, which landed more than 90% of the Moroccan commercial catch, discarded undersized and putrefied commercial species (cephalopods and a number of species in the families Trichiuridae, Sparidae, Merluccidae, Pleuronectiformes, Scianenidae, Haemulidae and Gadidae). A range of other species were also discarded, including boarfishes (*Macrorhamphorus scolopax* and *M. gracilis*), small-spotted catsharks (*Scyliorhinus canicula*), sabre argenté (*Lepidopus caudatus*), congers (*Conger conger*), crabs, rays and rockfishes."

Unreported catches in the commercial sector

Catch records from vessels in the commercial sector are collated by the Ministry of Fisheries and are available on a public website. However, Durand (1995) reported that up to 60% of Moroccan catch, especially valuable species like mackerel and anchovy, may be marketed through illegal channels to avoid taxes. Cephalopods and crustaceans are also very susceptible to under-reporting (El Mamoun, 1999). Illegal fishing and trading of fishery products is said to be common in the Moroccan ports of Tangier, Casablanca and Agadir (Baddyr and Guénette, 2002).

In the 1970s and 1980s, a large proportion of the Moroccan industrial fleet's catch was landed outside Morocco especially in the Canary Islands (Pitcher *et al.* 2002). Unreported landings in the 1980s were an estimated 23–47% of the total landings (Baddyr and Guénette, 2002), but more recent information suggests as much as 100% of the reported landings of sardines are not reported (Baddyr 2006, pers. comm.). However, MRAG (2005) estimates overall IUU at 8%.

Unreported artisanal catches

The number of dories (small boats) in the small-scale fleet in Morocco is difficult to assess and existing estimates are not reliable; estimates in the 1990s ranged between 8,000 and 17,000 dories (Baddyr and Guénette, 2002; Guénette, 2002; Eurofish (2003); Globefish, 2005). Figures given on different pages of the Ministry of Fisheries website (2005: http://www.mpm.gov.ma/) are 11,564 and 25,000. Reported landings of demersal species in Morocco are dominated by an unidentified mixture of species, as are a large part of the foreign catches (Baddyr and Guénette, 2002). According to Baddyr and Guénette (2002), "the average difference between reconstructed landings and FAO statistics is about 100,000 t per year or about 9% of the reported landings. The main difference is the addition of unreported landings from the artisanal fleets, which are probably heavily underestimated."

There is no specific information on the quantities of juveniles and sub-juveniles caught in Moroccan fisheries, but illegal fishing techniques practised by the fishing communities of Northern Morocco catch

many juvenile swordfish.

Note

This material is based on a country synopsis, with additional material, published by Rojo-Diaz *et al.* (2006).

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Table 21. Morocco illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Octopus	2002	Illegal	Spain	1	[1]The Cephalopod freezer vessel *Viduido* was caught illegally fishing in Moroccan waters
2.	Cephalopods	2001	Illegal	Unknown	1	[1]The Cephalopod freezer vessel *Lameiro Uno* was caught illegally fishing in November 2001; the owner was fined

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MOZAMBIQUE

Summary of information concerning IUU fishing

Overview

Mozambique is one among the most important fishing nations on the east African coast. Fisheries contributes 4% of country's GDP and accounts for 8–10 % of its total exports (Anon, 2006). Artisanal fisherfolk in this part of the world place immense socio-economic pressure on natural resources as the majority are faced with poverty and very few alternative food options. The risks associated with micro-economic impact of distant water fleets and IUU fishing on artisanal fishers need to be quantified, as decline of pelagic stocks is threatening the livelihood of coastal communities. Most countries in the East African region have been slow to draft and implement new legislation to manage their fisheries sustainably. Increasing reliance on overseas aid for fisheries development coupled with emphasis on boosting economic revenues through fisheries has meant that issues related to IUU have taken backseat.

Regional co-operation through the Southern African Development Community (SADC) has provided some benefits for monitoring, control and surveillance during certain periods of the year, especially for checking on distant water fleets operating within Mozambique waters. But for most of the year, distant water fleets remain poorly monitored. Monitoring 784,090 square km of exclusive economic zone creates immense difficulties for fisheries administrators due to lack of trained manpower and patrolling infrastructure.

Illegal fishing

Some of the principal threats identified by Kelleher *et al.* (2002) include "encroachment on the rich shallow-water shrimp fishing grounds by unauthorised vessels, in particular those licensed to fish for deep-water shrimp (gamba) and fish; encroachment on fishing grounds reserved for small-scale fishermen by industrial trawlers; deficiencies in the reporting of catches, landings and fishing activities; difficulties in controlling the artisanal fisheries spread along over 2,700 km of coastline and in Lakes Niassa and Cahora Bassa; unlicensed fishing, in particular by tuna vessels; and a range of other specific threats to particular fisheries and living aquatic resources, including corals, sport fish resources, and endangered species." The authors further state that "Mozambican authorities have little, or no ability to respond to reports of illegal fishing by large industrial vessels, as none of the agencies charged with maritime surveillance and control have a significant sea-going capability. The activities of the on-board inspectors (observers) are not considered to be sufficiently effective". There is no vessel monitoring system for the 130 foreign tuna boats fishing operating inside the EEZ (Anon, 2006).

In the industrial sector, the number of infractions between 1991 and 2000 peaked in 1995, when 55 instances of IUU were detected as shown in the table below. [REF MRAG SADC REPORT]

Table 22. Number of industrial infraction processes 1991–2000. Source: Kelleher *et al.* (2002); DAP Annual Report, 2000.

Year	No. PIPs* (cases)	Cases terminated	Sanction applied	Cases not terminated
1991	13	5	8	0
1992	16	5	11	0
1993	45	12	33	0
1994	55	7	44	4
1995	55	9	22	24
1996	43	5	37	1
1997	41	3	31	7
1998	12	7	5	0
1999	10	2	8	0
2000	13		4	9

*PIP = Processo de Infracao de pesca, or cases, in effect the number of Auto de Noticias (originating document for a case).

Table 23. Number of industrial infractions by type 1995–2000, in order of frequency.
Source: Kelleher et al (2002). Compiled from all available information in ledgers, dossiers and electronic sources DAP. The 63 records represent only 36% of the cases initiated since 1995.

Total in sample 1995–2000	63
Cases involving three or more infractions	3
Cases involving two or more infractions	6
Insufficient/false documentation (including catch log)	10
No/invalid licence	8
Unauthorised gear (incl. trawl mesh / double mesh)	7
Closed area	6
Other infraction (type unknown)	6
Non/incorrect disposal of shrimp heads	5
Closed season violation (including onshore processing)	5
Over quota	4
Ornamental fish	4
Unauthorised support vessel	3
Non cooperation with inspector	3
Inadequate/no vessel markings	2
Unauthorised or prohibited species in catch	2
Incorrect export declaration	2
Exiting EEZ without reporting	2
Unauthorised vessel purchase	1
Transhippment	1
No port inspection	1

Discards

According to Fennessy *et al.* (2003) about 20,000 to 40,000 t of by-catch is discarded every year in Mozambique (calculated from figures in Magane, Sousa and Pacule, 1998). The authors state that some semi-industrial shrimp trawlers land substantial quantities of by-catch either as frozen or sundried products along some sections of the coastline. Since the early 1960s, artisanal fishermen using dugout canoes have also collected by-catch in the high seas; however, absence of records on quantity of catch collected through these channels means that bulk of by-catch discarded by industrial boats and some portion of it collected by artisanal boats during 1950 to 1995 remains unreported. "At the moment 809 canoes are involved in the collection of by-catch from the industrial fishery. According to records from 1996, the annual volume of the by-catch collection is estimated to be in the order of 7.5–8,000 t (IDPPE, 1996). By-catch estimates in the shrimp fishery ranged from 21,000 to 29,000 t per annum for 1993 to 1996 (Schultz, 1997); 52% of total catch in 2000, 82% in 2001 and 82% in 2002 (Palha de Sousa and Baltazar, 2002). "Approximately 80% of the trawler catch consists of fish, most of which is dumped at sea by the trawlers (30,000–40,000 t of small untargeted and generally unwanted fish). Some of this by-catch is collected by artisanal fishermen, who salt, or dry the product for local sale" (Kelleher *et al.* 2002). According to Kelleher (2005) "Approximately 23% of Mozambique's shrimp trawl by-catch is landed with over 23,000 t discarded (60% discard rate)." Further Kelleher (2005) states that Mozambique has an average discard rate of 27.8% (landings:discards ratio = 100:27.8).

"By-catch comprises about 80% of the total catches. The most abundant families/groups are Sciaenidae, Trichiuridae, Brachyura (crabs), Engraulidae, Haemulidae and Synodontidae, and the most abundant species include *Otolithes ruber* (tigertooth croaker), *Johnius amblycephalus* (bellfish), *Johnius dussumieri* (bearded croaker), *Trichiurus lepturus* (largehead hairtail), *Arius dussumieri* (blacktip sea catfish), *Pellona ditchela* (Indian pellona), *Thryssa vitrirostris* (orangemouth thryssa) and *Pomadasys maculatum* (saddle grunt)." Palha de Sousa and Baltazar, (2002).

In the early 1900s some attempts were made to equip small-scale fishing vessels with motors so that they could recover some of the by-catch directly from the trawlers (SEP, 1994), but these efforts have had little effect" Jacquet and Zeller (2007).

Unreported catches in the artisanal sector

"Artisanal fishing is an important subsector in the socioeconomic life of the country for the social stability it provides amongst the coastal communities. Over the last 20 years, prawn fishing has been one of the most important national revenue resources, accounting for approximately 40% of Mozambique's total exports. Over 500,000 people in Mozambique depend on artisanal fishing activities, of whom 100,000 are directly involved" (Lopes and Gervasio, 2004). Fennessy et al *(*2003) estimated that artisanal fisheries land up to 70,000 t of catches per year. Recent estimates by Jacquet and Zeller (2007) suggest a higher estimate for small-scale landings – 87% of the total landings.

According to Charlier (1994) Mozambique under-reported the bulk of its marine fish landings from 1950–1990s as it excluded catches from the small-scale fisheries sector until its independence from Portugal in the 1970s and during the civil war years due to absence of proper monitoring infrastructure.

There is no exact record of catches landed by artisanal fishermen, but their annual catch of fish, crustaceans and cephalopods is estimated to range between 80,000 to 100,000 t (Anon, 2006). Further, according the fisheries ministry, about 65% of the country's total catch is landed by artisanal fishermen.

Subsistence small-scale catches from women and children engaged in finfish and shellfish fishing along the coast has not been quantified from national statistics until recently (IIP, 2003, 2004). According to Charlier (1994)

Unreported catches in the recreational sector

Recreational sport fishing is practised by South African tourists in the southern coast, over coral and rocky reefs in Mozambique waters (David *et al.* 1996). "Skiboat angling, speargun fishing and shore angling aim at: bottom-dwelling species such as groupers and rockcods (Serranidae), sweetlips (Haemulidae), sea breams (Sparidae), emperors Lethrinidae) and snappers (Lutjanidae) and the great pelagics such as mackerels (Scombridae), barracudas (Sphyraenidae) and kingfishes (Carangidae). This activity is also showing very high growth rates and there is some concern about overexploitation" Pereira (2000).

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Table 24. Mozambique illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Toothfish	1997	Illegal & Unreported	Belize	1	[1]The Belize flagged vessel *Magallanes I* registered in Chile is reported to have unloaded 65 t of toothfish in Beira, Mozambique
2.	Shrimps/ prawns	2001	Illegal	Unknown	1	[2]The vessel *Wang Weng*as arrested with 13 t of illegally fished prawns. Catch was to be shipped to South Africa. The vessel had been fishing off the coast of Inhambane province
3.	Prawns	2003	Illegal	Thailand	4	[3]Four Thai-flagged trawlers arrested for illegal fishing in Mozambican waters. Trawlers were seen unloading the prawns prior to reaching the port of Quelimane, as they were ordered into port via radio
4.	Toothfish	2002	Illegal	Belize	1	[4]The Belize flagged vessel *Noemi* registered in Spain had no authorisation to fish in the CCAMLR area, was seized and held in South Africa pending further investigation
5.	Toothfish	2002	Illegal	Unknown	1	[4]The vessel *Notre Dame* had no authorisation to fish in the CCAMLR area and was seized pending further investigation. Catch destined for Qindao, PR China
6.	Finfishes nei	2005	Illegal	Unknown	3	[5]SADC patrolling – one vessel fined for fishing in a prohibited area and two boats fined for infringing fishing regulations off Mozambique
7.	Guitar fishes	2004	Illegal	China	1	[6]The vessel *Nong jyl Lih* was registered to fish only with purse seine; the vessel had large demersal gillnets, and entire cargo of sharks, mostly giant guitar fish; confiscated vessel worth R7 million; vessel tried to flee east; caught 80 miles east of Beira
8.	King mackerel	2004	Illegal	Indonesia	1	[7]The Indonesia registered vessel *Sin Lu Peng* was licensed to fish with purse seine in Mozambique waters; the vessel ignored request to stop for inspection; several km of small mesh nets and Spanish mackerel seized
9.	Sharks & tuna	2005	Illegal	China	1	[8]Inside the boat, the fisheries authorities found about 290 kg of sharks' fins, 7 t of sharks (without their fins), and 5 t of tuna. The *Da Yuan Yu 309* was only licensed to fish in the Pacific Ocean, thousands of km from Mozambique; vessel was fined US$400,000
10	Prawns	2006	Illegal	Unknown	1	[9]During SADC patrolling, 50 boats were boarded and inspected by a team of South African, Mozambican and Tanzanian

						inspectors. One prawn trawler was fined for fishing in a prohibited area

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MYANMAR

Summary of information concerning IUU fishing

Illegal fishing

It is believed that illegal activities and corruption are rife in Myanmar, which is ranked 144th out of 145 countries by Transparency International (2004). Unsurprisingly, there is little specific information about illegal fishing, but information available suggests that it is widespread. The control of illegal fishing is problematic given that "the black market and border trade are often estimated to be one to two times the official economy" (CIA, 2004).

There appears to be no vessel monitoring system as such for Myanmar fisheries, although the marine Fisheries Law (1990) provides for confiscation of illegal fishing gear such as explosives, suggesting that some inspection takes place. The Myanmar Navy co-ordinates surveillance activities with the coastguard, Department of Fisheries, customs, and the police in an attempt to enforce fishing regulations within coastal waters and EEZ (FAO, 2006), but levels of monitoring and enforcement are inadequate.

Thais and Bangladeshis have been arrested and imprisoned for illegal fishing in Myanmar (Butcher 2004; Butcher 2002). In 2004, 190 Thais and Burmese nationals were jailed six months for illegally fishing in southern Bangladesh waters.

Pe (2004) reports that small shrimping vessels 'baby trawl' in shrimp nursery grounds for juvenile shrimp. This is illegal and very difficult to control, (Butcher, 2002; Butcher, 2004).

Myanmar is one of the 32 flags of convenience states according to the International Transport Workers' Federation (ITF, 2005).

Discards

FAO considers that discards are minimal in all Southeast Asian countries' artisanal fisheries as most of the catch is landed and consumed. Kelleher (2005) gives an average of 3% discards for Myanmar. However, Kelleher (2005) also states, "Myanmar's 'small trawl' fisheries discard approximately 20,000 t of juvenile fish." Kelleher (2005) quotes the Myanmar Fisheries Federation as claiming that trawl fishery discards in Myanmar have been reduced from 60% to 8% from the 1990s to the present, although it is not stated how this large reduction was achieved.

Unreported catches in the commercial sector

Catch statistics are collected and reported to FAO, but there is almost no information about their scope, accuracy, timeliness or verification. Burma is data poor, and official statistics from the country are often out of date and inaccurate (CIA, 2004). More recently, "Fleet registration, census, logbooks (for off-shore fisheries), port sampling and other indirect surveys are used to compile data on a monthly basis. What data there is covers only the landed catch, figures exclude discards fish caught by innumerable poaching vessels (Pe, 2004).

Increasing quantities of fish are being exported overland from Myanmar to feed the growing demand in southeastern China." (Kelleher, 2005)

Unreported catches in the artisanal sector

FAO (2001) estimates that there are over 500,000 fishers in Myanmar. There are serious limitations in the system of statistical collection, including temporal discontinuities, very poor identification of the species caught (about 90% of the catches are not identified to the species level) and lack of well-educated personnel to monitor fisheries catches (FAO, 2001).

Note

This material is based on a country synopsis, with additional material, published by Pitcher and Pramod (2006).

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NAMIBIA

Summary of information concerning IUU fishing

Overview

Namibia is part of the High Seas Task force and attempts to prevent IUU fishing on the high seas by actively participating and promoting conservation and sustainable exploitation of its domestic and high seas fisheries resources. Namibia has made substantial improvements in its enforcement and prevents IUU vessels from using its ports for transshipments. Further, Namibia along with Australia, Canada and Chile also has one of the highest penalties for illegal vessels caught in its jurisdiction. This, coupled with measures such as confiscation of catch and vessels, has been very effective in deterring IUU activity within Namibian waters (High Seas Task Force [HSTF], 2006).

Monitoring is given high priority, with monitoring, control and surveillance (MCS) expenditure equalling about 42% of revenue from the fishing sector in 2002 (Berg and Davis, 2004; MRAG, 2005). Namibia's MCS system ranks among the most efficient in the world, conferring full control over all fishing activities and processing plants. This, combined with the well-organised information network and improvement in regional co-operation with Angola and South Africa, has markedly reduced the level of IUU activity in Namibian waters in the last decade.

Namibia is one of the few African nations to have designated fisheries patrol vessels (three) supplemented by 500 hours of annual aerial surveillance.

All chartered foreign vessels must be fitted with an automatic location communicator (ALC) while fishing in Namibian waters (MFMR, 2006). Arrangements are also in place to ensure that licensed fleets operating in authorised areas provide regular updates on location to help strategise patrolling operations and understand fleet dynamics (Bergh and Davies, 2004). All but the smallest vessels must be licensed.

Illegal fishing

Some incidents of illegal poaching of mussels and limpets in inshore waters by Chinese nationals were reported in 2004–5 (FIS, 2005). However, the government responded quickly and strengthened monitoring of coastal areas in subsequent months.

Discards

Namibia is making effective use of trawl fishery by-catch by imposing a ban on dumping with a law that requires all caught fish to be landed for conversion to fish meal. A surcharge is levied for landed by-catch as an incentive to reduce wastage (Hampton, 2003). The ban on trawling below 200 m also reduces by-catch.

Unreported catches in the commercial sector

All the industrial fisheries operate from two harbours facilitating adequate monitoring of all fishery landings. However, SCRS scientists believe there is IUU activity in the swordfish fishery, which means that data in this fishery is incomplete (ICCAT, 2001). The size of the unreported catch is unknown.

Unreported catches in the artisanal sector

Namibia has probably one of the lowest population densities in Africa with up to 75% of population living in inland areas, so the subsistence fisheries sector is very small (FAO, 2002).

Unreported catches in the recreational sector

There are some shoreline catches from the recreational fishery sector in Namibia, and there are some catch regulations for this sector, but no data are available.

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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Table 25. Namibia illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Toothfish	1997	IUU	Argentina	1	[1]The vessel *Alida Glacial* landed 233 t of toothfish in Walvis Bay, Namibia
2.	Toothfish	1996	IUU	Panama	1	[2]The Panama-flagged vessel registered in Norway landed 150 t after its permit to land fish in South Africa ran out.
3.	Toothfish	1996	IUU	Argentina	1	[1]The Argentina-registered vessel *Cristal Marino* unloaded 146 t in Walvis Bay, Namibia; had probably been fishing in South African waters
4.	Toothfish	1996	IUU	Norway	1	[1]The Norway-registered vessel landed 90 t of toothfish
5.	Toothfish	1998	IUU	Unknown	1	[3]The Panama-flagged vessel *Lua* was seen discharging toothfish in Namibia; source of catch unknown; probably sourced from CCAMLR or Antarctic waters
6.	Toothfish	1997	IUU	Belize	1	[4]The Chile-registered vessel *Magallanes I* landed 176 t of toothfish in Walvis Bay, Namibia. Previously seen in the Australian Heard Island EEZ two months prior
7.	Toothfish	1997	IUU	Panama	1	[2]The Panama-registered vessel *Merced* reported to have landed 104 t toothfish in Walvis Bay, Namibia
8.	Toothfish	1998	IUU	Belize	1	[5]The Norway-registered vessel *Nina* was reportedly operating from Namibia
9.	Toothfish	1997	IUU	Argentina	1	[4]The vessel *Orense* registered in Chile landed 919 t of toothfish in Walvis Bay, Namibia; refrigerated freighter involved in the transshipment of toothfish from longliners *Estela* and *Fuji*
10.	Toothfish	1997	IUU	Argentina	1	[4]The Chile-registered vessel *Orense* landed 320 t of toothfish in Walvis Bay, Namibia; refrigerated freighter involved in the transshipment of toothfish from longliners *Estela* and *Fuji*. The vessel is reported to have sunk, with no loss of life
11	Toothfish	1996	IUU	Argentina	1	[4]The Argentina-registered vessel *Cristal Marino* is reported to have been in South African waters around Prince Edwards Is, and using Walvis Bay to unload toothfish; no licence for toothfish
12	Toothfish	2001	IUU	Namibia	1	[6]The South Africa-registered vessel *Mare* reported to have landed 49 t of Patagonian toothfish in Walvis Bay, Namibia; no licence for toothfish
13	Finfishes nei	1999	Illegal	USA	1	[7]The US-registered vessel *Roselyn G* charged with illegal fishing in Namibian waters; vessel fled to Mauritius
14	Toothfish	2003	IUU	Netherlands Antilles	1	[8]The Netherlands Antilles-registered vessel *Virgen of Carmen* requested to discharge 200+ t of toothfish, allegedly caught in Area 51, in Namibia
15	Finfishes nei	2004	Illegal	Spain	1	[9]The Spanish registered longliner *Maral* was fishing with licence for tuna and swordfish in South Africans but caught for illegally fishing in Namibian waters through VMS; VMS data is shared among Southern African Development Community (SADC) nations under a memorandum of understanding.
16	Hake	1990	Illegal	Spain	8	[10]The vessels were caught while catching Namibian hake illegally; vessels forfeited and catch sold; *Isla de Tambo* first Spanish ship

						arrested, operating 140 miles of Namib coast; Other vessels arrested include *Frioleiro*, *FrioPesca Dos*, *Puenta Belesar*, *Cabo Primero*, *Altaza Cuarto*, *Corteredondo*
17	Hake	1990	Illegal	Unknown	3	[10]Three trawlers were spotted by surveillance aircraft. Namibian soldiers boarded and were overpowered and locked up. The ships went into South African waters where they were confronted by South African and returned to Namibian waters

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NETHERLANDS

Summary of information concerning IUU fishing

Illegal Fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

In the North Sea, ICES reports that as much as two thirds of all catches are unreported (New Scientist, 2004) (over all the ICES countries 2004/5). Although ICES (2008) reports that the situation has improved in both the North Sea and the Baltic since 2003 at the final effective date of this report (2003) it is universally acknowledged that illegal (blackfish) catches of cod and mackerel were up to 50% of the total catch. The Netherlands overran its quotas in 2003 but had only two infringements (fishing beyond allocated quotas) (CFPCS, 2004).

MRAG (2005) mentions boundary-hopping by beam trawlers in the North Sea (the UK, Belgium, and the Netherlands). Other infractions by beam trawlers, particularly the use of illegal mesh sizes/blinders, is now being tackled by the EU Community Fisheries Control Agency (CFCA) North Sea Joint Deployment Plan (CFCA, 2008).

Discards

Kelleher (2005) reported very high discards of 13,000 t (11.8%) in the Dutch horse mackerel. North Sea fisheries for *Nephrops,* some mixed gadoids especially haddock, roundfish and flatfish are also characterised by extensive discarding (ICES, 2002). Overall, the published information presently available is still scarce; it is not available for all fleets and not directly comparable between fleets (ICES, 2004).

According to ICES (2002), moderately effective discard-monitoring programmes have operated in a few fisheries in the North Sea since the early 1980s, but it is only since the early 1990s that larger-scale, but expensive, coordinated programmes have been initiated to cover major fisheries. Limited data is now beginning to emerge, but many countries are reluctant to make their data on discards available.

Important by-catch rates are associated with the plaice fishery in the North Sea using beam trawling because this gear was designed for use on the sea bed. This fishing method was revived by the Dutch for shrimping after World War 2 and for flat fish like plaice and sole in the 1960s. In October 1996 there were about 500 Dutch, 170 Belgian, 300 German and 110 British vessels fishing in the North Sea (Greenpeace, 2002) and also smaller vessels (210 Dutch, 101 Belgian, 290 German), with beams under 4.5 m, so permitted to fish within the 12-mile zone. On average an area equivalent to 48% of the North Sea is disturbed annually by beam trawling. It is concentrated in the south, reaching 54% off the English coast, 112% in the central southern North Sea (some areas are hit more than once!), 153% off the Danish coast, and a staggering 321% off the Dutch coast (Greenpeace, 2002). Beam trawling is very unselective. In the North Sea for 1 kg of marketable fish, on average 1–2 kg of dead fish and 1–4 kg of other dead animals are dumped.

The total amount of discards and fish offal per year in the North Sea has been estimated as 785,000 t: 300,000 t of flatfish, 260,000 t of roundfish, 150,000 t of benthic invertebrates, 60,000 t of offal and 15,000 t of rays and sharks. Beam trawlers are responsible for a large part of this. The quantity of dead invertebrates, however, is grossly underestimated since many damaged animals remain dead in the fish track on the sea bed after the passage of the tickler chains (Greenpeace, 2002).

Unreported catches in the commercial sector

According to the results reported by TRAFFIC-Europe project (involving France, the UK, Ireland, Norway, Germany, Belgium, the Netherlands, Spain, Italy, Greece, Turkey and Cyprus), European shark fisheries

are virtually unregulated or unmanaged at both national and regional levels. As such, cartilaginous fishes remain available for exploitation as quotas or other restrictions are applied to other fisheries (TRAFFIC-Europe, 1997). The lack of detailed information on many shark species in Europe and their associated fisheries makes it extremely difficult if not impossible to assess the extent to which sharks are being affected by European fisheries.

Note

This material is based on a country synopsis, with additional material, published by Rojo-Diaz and Pitcher (2006), with additional information referenced below.

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NEW ZEALAND

Summary of information concerning IUU fishing

Illegal fishing

New Zealand uses patrol vessels, aircraft and satellite tracking to monitor commercial fishing vessels, but illegal fishing by foreign fleets still remains a significant problem. To combat illegal, unreported and unregulated fishing, New Zealand has also taken a leading role in addressing the issue by being a member of the High Seas Task Force. On 14 July 2005, New Zealand formally accepted the FAO Compliance Agreement – a major international agreement that will help deter the owners of fishing vessels from re-flagging their vessels to New Zealand to avoid compliance with international fishing rules.

Under the 1996 Fisheries Act, the permit holder is primarily responsible for the activities of the vessel while fishing within the New Zealand EEZ. According to Corveler (2002), some fishing companies do not exercise effective control over foreign flagged vessels fishing under their permits in New Zealand waters. Also, one of the most common loopholes used by vessels engaged in IUU fishing is the possession of a legal quota specific for a particular fishery stock but fishing outside their authorised area and making false statements.

MRAG (2005) reports a number of New Zealand IUU incidents, and estimates that 11% of the world illegal trade in abalone originates in New Zealand and there appears to be a serious problem with illegal paua shell traded into China: "The New Zealand trade commissioner based in southern China… has announced that an official government approach may be the only way to stop illegal sales of paua to China. He states that although officials have discovered large amounts of black-market paua being commercialised on the Chinese market, the current legislation allows this to continue as long as the product is legally imported."

Discards

Kelleher (2005) has reported that there is no published information on discards for New Zealand's fisheries. Livingston and Rutherford (1988) "calculated that the discarded waste from the New Zealand West Coast hoki fishery could be as much as 47,000 fish dumped in an area of 1,000 km² over 60 days". Information from fishery observer data in the New Zealand fisheries in recent years has shown that loss and discard rates are low in the tuna fishery (Murray *et al.* 2002). "Research in New Zealand in recent years has shown much lower levels of discards in most fisheries assessed than that reported from other fisheries internationally (up to 33% of the total catch). Just over 31% of total catches in the jack mackerel fishery are of non-target species. Of this non-target catch, 13.5% is discarded (approximately 82% non-Individual Transferable Quotas (ITQ), 18% ITQ)" (Anon, 2005).

"Since 1996–7 fishers have had to pay a fee for any discarded fish, and this may have led to an increase in unreported discards… Most blue sharks and porbeagles are discarded at sea after finning, whereas makos are retained for their flesh and fins, providing they do not compete for freezer space with the more valuable tuna species" (Francis, 1998). MRAG (2005) reports that, "…a fishing vessel spotted in coastal waters south of Kaikoura, was charged for not reporting the dumping of a catch (~8 t) of barracouta, gurnard, and spiny dogfish (6 t)". Dogfish can be returned to the sea as long as it is reported, but barracouta and gurnard dumping is illegal.

Unreported catches in the commercial sector

In the past, there may have been significant unreported distant water fishing by New Zealand vessels: MRAG (2005) reports, "Another important groundfish species that is caught in high seas areas is orange roughy. Fisheries for this species developed first in New Zealand in the 1980s, then in Australia in the late 1980s and in other Namibian and European waters in the 1990s. Few of the early stocks survived initial exploitation, stimulating exploration by many flag states, including Australian and New Zealand vessels, in high seas areas such as the Madagascar ridge. In addition to catches of orange roughy, these vessels also took oreos and alfonsinos. Catches from the Madagascar ridge were probably in the region of 10,000 t per year between 1999 and 2002, but have reportedly declined since then."

There may also be a small but significant portion of unreported 'take home' catches in the commercial inshore and offshore fisheries that is not reported in the national fisheries database.

Note

This material is based on a country synopsis, with additional material, published by Varkey *et al.* (2006).

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Table 26. New Zealand illegal fishing incidents.

	Species	date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1	Finfishes nei	1996	Illegal	Russia	2	[1]Two Russian-flagged vessels arrested for illegal fishing; High Court at Christchurch orders both vessels under arrest in Lyttelton and Dunedin to be sold to meet debts
2	Hoki	1996	Illegal	Russia	5	[2]Five vessels arrested for infringements of New Zealand fisheries laws; Ministry of Fisheries refused the company's offer to pay NZ$600,000 bond; captain pleaded guilty to 79 of 233 breaches of QMS of Hoki; vessels released after paying NZ$100,000 per vessel.
3	Finfishes nei	2001	Illegal	Japan	1	[3]The 58 m trawler was forefeited to the government for illegally fishing 23 times inside a closed area in 2001; vessel arrested after fisheries observers on three NZ vessels saw Japanese ship cross into the zone and trawl for 30 mins
4	Blue whiting	2002	Illegal & Un-reported	Japan	1	[4]104 m surimi ship forfeited to the government after court found she misreported catches; in addition skipper and company mgr found guilty of eight misreporting charges and fined NZ$224,000
5	Hake	2001	Illegal (Mis-reporting)	Korea Republic	2	[5]Two Korean boats accused of misreporting catch; catch confiscated; seizures made during investigation into fishing in hake grounds of Challenger Plateau (west of South island) and

						southeast Chatham Rise
6	Hake	1996	Illegal	Russia	1	[6]84 m vessel forfeited to the government; vessel logged catching hoki five miles inside a prohibited trawl zone in the Hokitika Canyon, a main spawning area off the west coast; vessel caught using VMS and surveillance
7	Finfishes nei	1996	Illegal	Russia & Ukraine	5	[6]Joint Air force-MAF operation named Dolphin resulted in five factory trawlers from Russia and Ukraine being forfeited
8	Squids	1990-2000	Illegal	China	1	[7]The vessel was catching squid off east coast of South Island. Vessel was fishing within 12 nm. skipper fined NZ$80,000 and vessel forfeited.
9	Finfishes nei	2000	Illegal	Panama	1	[8]Greek-registered vessel *Taisetsu* fish carrier arrested during Operation Switch; skipper and owners fined after pleading guilty to three counts of making false statements; failing to operate ALC while licensed and in the NZ EEZ; refuelling a trawler on S Tasman Sea
10	Orange roughy	1999	Illegal	Japan	1	[9]The vessel was seized and fined; The chartered Japanese vessel was spotted refueling a trawler found working on the South Tasman Rise off Tasmania.
11	Hake	2001	Illegal & Unreported	Korea Rep	2	[10]Vessel *Donfico 701* and her catch seized for false reporting of catches; charges included making false entries in returns, taking fish outside a permit and discarding quota species
12	Hake	2001-2002	Illegal & Un-reported	Korea Rep	3	[11]Skippers of three Korean trawlers charged with eight counts of misreporting; two vessels forfeited; skippers pleaded guilty to making false fishing returns
13	Hoki	2002	Illegal	Japan	1	[12]Japanese trawler *Anyo Maru No 8* forfeited after her owner found guilty of two charges of fishing hoki inside a 25 nautical mile exclusion zone off the west coast of the South Island
14	Hoki	2004	Illegal	Unknown	2	[13]One purse seiner allegedly fished over several months without a permit and registration certificate; investigators allege that the five companies failed to accurately record about 170 t caught against the two vessels' entitlements

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NIGERIA

Summary of information concerning IUU fishing

Overview

Fisheries is an important natural resource along with oil and natural gas sectors in Nigeria. However, most of Nigeria's viable resource was fished out by the early 1980s. Bamidele Dada ,Nigeria's Minister of State for Agriculture and Rural Development, said that to bridge the supply and demand gap the country imports 60,000 t of fish per annum (at a cost of US$3.12 million) (Nigerian Guardian, 2006).

The Monitoring Control Surveillance Unit of the Federal Department of Fisheries is responsible for enforcement of fisheries laws in collaboration with the Nigerian Navy, the Marine Police and Customs and Excise Department. Nigeria currently does not have a vessel monitoring system. The Federal Department of Fisheries has no monitoring vessels to patrol fishing activities at sea (Elliot, 2001).

The Sea Fisheries Decree of 1971 requires all industrial fishing boats operating within Nigerian waters to be licensed. Catches from industrial vessels can also be inspected by a fisheries officer before or after landing.

Illegal Fishing

A recent review of illegal fishing in Nigeria is provided by Falaye (2008).

Illegal fishing by foreign vessels, in Nigerian waters is reported frequently. This includes incursions by distant water flags of convenience vessels. Amienghine (date uncertain) reports that vessels belonging to Italy, Greece, Russia, Japan, Cameroon and Togo fish undeterred in the Nigerian EEZ. Licensed foreign vessels are also reportedly bigger than the recommended size and use unauthorised fishing gears. The annual losses from illegal fishing by poachers in Nigerian waters is estimated to be close to US$30 million. Crews of trawlers are also involved in nefarious activities such as illegal off-loading and selling substantial parts of the catch while at sea. The owners of trawlers frequently encourage crew to use the proceeds of sale of such illegal fish for bunkering and buying fuel at sea illegally. To control this, trawlers are now required to obtain a bunkering permit from the Navy before fuelling.

Vessels engaged in illegal fishing can attract a fine of up to US$250,000 fine or a 5-year jail term, or both in certain instances. Forfeiture of vessels and equipment are at the discretion of court. These penalties are comparatively low and, combined with inadequate surveillance and enforcement equipment, provide little deterrent (Ajayi and Anyanwu, 1997).

Apart from the 150 shrimp vessels licensed to operate in Nigerian waters, an unaccountable number of vessels were poaching for shrimps in coastal waters in the 1970s (Pearse and Folson, 1979). The authors also allude to a foreign fleet of 16 vessels with doubtful bilateral agreements catching as much as 1,940 t of shrimps off the Niger delta in 1973.

Fishing vessels are also known to be attacked at sea by pirates who are known to shoot the crew, demand ransom and loot catches from the vessel's hold. The pirates sink vessels that refuse to co-operate. As many as 50 vessels were attacked in 1999–2000 (Elliot, 2001).

One Seychelles flagged vessel owned by a Nigerian has been reported to engage in Flag of Convenience activities in the Atlantic Ocean (Gianni and Simpson, 2005). The canoe fleet of Nigeria is also reportedly engaged in fishing within Benin and Togo waters.

Discards

The industrial sector has failed to quantify the amount of catch lost through discards and by-catch.

According to Kelleher (2005) trawl fisheries in Nigeria have very low discards due to extensive collection

at sea. Further, he states that Nigeria pursues a 'no discards' policy with a discard rate of 1.4%, which is among the lowest in world. Restrictions exist on dumping of edible and market-worthy sea food products at sea. However, during some seasons discards at ports can be as high as 60% of trash fish landed. There is also considerable doubt as to how effectively the regulations are enforced. Earlier data on trawl discards by Tobor (1985) ranged from 45–50% of the total catch. According to Ajayi and Adetayo (1982) several commercially important species of croakers, soles and grunters constituted as much as 43% of the total shrimp trawler catches.

Akinyemi *et al.* (1986) estimated that fish and shrimp discards constituted nearly 45% of the catches in the inshore waters (7–25 m) of the Niger delta, of which 75% were croakers (*Pseudolithus spp*.) less than 35 cm in length. This is truly a worrisome trend as croakers constitute 91% of marketable fish landed in Nigeria. Elliot (1995) noted that three commercially important species *Pseudolithus spp, Chaetodipterus goreensis* and *Drepane africana* constituted 40, 11 and 9% of the smaller fish (<20 cm) landed in the inshore trawl fishery. This alludes to significant recruitment overfishing in the coastal waters. Similar studies in the inshore stake net fishery revealed overfishing of shrimp juveniles in the Lagos lagoon (Adetayo, 1996; Adetayo and Kusemiju, 1994).

"An observer programme that incorporated both fisheries-dependent and fisheries-independent surveys with fishers was conducted to identify and quantify by-catch species from artisanal and nearshore shrimp beam trawl fisheries off Lagos, Nigeria. Catches were sampled from 62 replicate landings by five boats from January to December 2002. Twenty-five species belonging to 20 families of fish targeted in other inshore/offshore commercial fisheries constituted the by-catch species. Target shrimps *Nematopalaemon hastatus* (0.5–1.5 cm carapace length) are smaller in size than important commercial species (4–30 cm total length), which occur as juveniles on their nursery grounds. The percentage by weight of commercial by-catch species are: *Pseudotolithus elongatus* (19.89%), *P senegalensis* (13.69%), *Ilisha africana* (8.85%), *Pentanemus quinquarius* (4.95%), *Callinectes amnicola* (3.27%), *Pseudotolithus typus* (2.75%), *Galeoides decadactylus* (2.26%), *Cynoglossus senegalensis* (1.43%) and *Chloroscombrus chysurus* (1.05 %). By-catch species having total length of 11–30 cm are marketable and consumed, while a length range of 4–10 cm, which constitute 75%, is discarded ashore, thus resulting in high biodiversity loss" Ambrose *et al.* (2005).

Unreported catches in the industrial sector

According to Ajayi et al (1996) the pelagic fishery sector has synchronised fishing with lunar periodicity to target pre-recruit clupeid (8–12 cm total length) yearlings that are heavily exploited in estuaries, with purse seine catches exceeding 1.8–3.5 t/canoe/day.

The decreasing catch per unit effort in during (1980–2000) appears to have forced Nigerian trawlers to redistribute effort towards shallow waters, estuaries and mangrove areas fishing for even smaller sized juveniles. Currently a few thousand tones of croakers, cephalopods and tunas are exploited but are not effectively reported in national statistics. No tuna catches are listed from *International Commission for the Conservation of Atlantic Tunas* (ICCAT) databases.

All fishing trawlers are required to request permission from the Navy before entering and leaving port. Reports suggest that vessels are demanded to stop at a specified position and give around 20–30 bags of fish before entering. This corruption results in significant loss to the vessel owners and distorts collection of correct landing statistics by the federal department of fisheries.

The NIOMR has no research vessel to conduct stock surveys. Amienghine (date uncertain) states that fishing vessel operators in the industrial sector render false landings data, which in turn leads to publication of false stock assessment data. This leads us to conclude that the industrial sector is probably under-reporting catches to an unaccountable number of tonnes each year.

Unreported catches in the artisanal sector

The artisanal fisheries sector has been the major contributor to fish landings in Nigeria for a long time, contributing as much as 97% of the total landings in 1975 (Bazigos, 1976). This decreased to 82% by 1992 before increasing to 89% in 2000.

An unaccountable amount of fish catch is also under-reported in the artisanal sector as catches from part-time fishermen are not adequately quantified.

Jinadu (2000) stated that the small-scale fisheries in Lagos state are largely under-capitalised but studies by Tobor (1985) and Kusemiju (1993) have revealed overfishing in coastal waters by both artisanal and industrial sectors. Currently the small-scale fishers, who target sardines and sciaenids, use canoes 6–13 m long, which restricts their operational range to certain extent. The narrow continental shelf further limits expansion efforts in the demersal sector, although opportunities in pelagic sector are viable to a limited extent if motorisation takes place.

Haakonsen (1992) states that there is a potential problem in the coastal fisheries sector in distinguishing professional fishermen from part-time canoe fishermen – estimates suggest that there were as many as half a million in the 1990s. These fishermen fish for subsistence or supplement existing livelihood options and landings are not adequately quantified in the national statistics. Further, there is lack of data on fish catches from brackish water areas (nearly 10,000 square km area), leading to potential under-estimation of catches ranging from 100,000 to 180,000 t annually.

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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NORTH KOREA

Summary of information concerning IUU fishing

Overview

The DPR Korea is a socialist industrial state with limited outside contact and an independent economy relying heavily on resources existing within the country. The country has 4009 km of coastline, with 92.9 % of the population located within 100 km from the coast. Fisheries1 have played a vital role in providing major source of food for nation's populace as only 15% of country's land is cultivable and restricted to several river valleys in the West coast. Limited financial support is available through international agencies like United Nations and other international donors in the food sector. Much of the infrastructure was built during 1950 to 1980s with financial assistance from Soviet Union. The fall of the Soviet Union and subsequent loss of subsidised fuel imports, coupled with higher incidence of natural calamities and lack of modern industrial infrastructure have immensely affected the economy in the past three decades. Current energy shortages have made very less fuel available for the fisheries sector as much of it is used in domestic and agriculture sectors.

Two national agencies, the State Fisheries Bureau and the Co-operatives Bureau under the Ministry of Fisheries are in charge of fisheries resources in DPR Korea. There are 77 fishing plants, 200 fishery co-operatives and 30 fishery stations, all run by the State. Further the Ministry of Fisheries also operates shipyards, fishing gear factories, processing plants, ship repair and maintenance facilities. Coastal and inshore fishing with the exception of aquaculture are the responsibility of the Cooperatives Bureau, while deep water and fisheries in EEZ and High seas are under the control of the State Fisheries Bureau. Alaska Pollock is the only species that is targeted within EEZ and the high seas including the Bering Sea and Okhotsk Seas (FAO, 1998). " ….in some coastal areas in the region there has been a shift in catches from large high-valued fish to lower-valued smaller fishes, from demersal and pelagic predator fishes to pelagic plankton-feeding fishes, from mature fish to immature fish. Reduction in fishing effort in some areas is considered an urgent priority. Other environmental problems affecting fisheries in the region include land reclamation, impacts of extensive mariculture, heavy metal pollution, oil spills and red tides (Nakmura 2004). Illegal fishing is reported to have been conducted and there are black landings, where the quotas are exceeded and catch is transferred to other vessels" (NOWPAP, 2005).

The per capita fish consumption was 18 kg / person in 1997. Total estimated FAO production was around 200,850 tons in the year 2000, with 90% of fishing activity concentrated in Sea of Japan. Agriculture including fisheries received more focus during 1960-1980 due to high industrial growth in those years. The steady rise in fuel prices coupled with withdrawal of soviet support and disruption of access to markets in Soviet Union and European countries has affected the fishery sector. Long term development of the fishery sector is highly contingent on external support to revive existing infrastructure and modernise existing fleets.

Illegal

The Maritime Administration and Ministry of Fisheries have limited enforcement capabilities due to lack of good quality boats, fuel shortages and priority for monitoring border incursions from vessels in the South Korean side. Control of illegal fishing is assumed to be less due to shortage of monitoring, control and surveillance personnel and deteriorating infrastructure in the fisheries sector. Frequent conflicts and apprehension of fishing vessels in both north and South Korean vessels is reported in the media. However, it is difficult to surmise the exact nature of incursions into each other's jurisdictions in Korean waters.

Discards

Discards are assumed to be low due to high level of demand and severe food shortages in the past decades resulting in better utilization of fish caught in domestic fisheries. Discards are less than 0.5% of the total landings (Kelleher, 2005).

Unreported artisanal catches

" ….in some coastal areas in the region there has been a shift in catches from large high-valued fish to lower-valued smaller fishes, from demersal and pelagic predator fishes to pelagic plankton-feeding fishes, from mature fish to immature fish. Reduction in fishing effort in some areas is considered an urgent priority. Other environmental problems affecting fisheries in the region include land reclamation, impacts of extensive mariculture, heavy metal pollution, oil spills and red tides (Nakmura, 2004). Illegal fishing is reported to have been conducted and there are black landings, where the quotas are exceeded and catch is transferred to other vessels" (NOWPAP, 2005).

"The majority of the mechanized fishing boats used by both the State Bureau of Fisheries and the Cooperatives Bureau in coastal water fisheries are small and medium-sized, totaling slightly more than 1,500. The majority of the medium-sized vessels with 200 HP or more are equipped with trawl nets. The smaller vessels used in coastal and inshore waters have low-power engines, on the average 30 HP, and are equipped mainly with a stationary type of gear" FAO (1998). According to WRI (2001) there were 2900 docked fishing vessels (includes trawlers, long liners, and non fishing vessels such as motherships, fish carriers etc.) in 1995.

The small-scale fishing fleet comprised of small and medium sized fishing vessels operating in inshore waters. Data from 1997 also revealed that most of the coastal vessels were old and unable to fish to their full capacity (FAO, 1998). Food and fuel shortages coupled with limited outside support are likely to have further contributed to impoverishment in this sector. According to FAO (1998) there is a huge gap in fisheries management in DPR Korea as no detailed information was available on species of fish caught and neither was economic data information available for marine fisheries.

Estimation of Illegal and Unreported catches for North Korea

It is known that in most fisheries a considerable amount of fish is landed and/or discarded but not properly reported, a problem known as Illegal, Unreported and Unmandated (IUU) fishing. Quantitative estimates were derived for Morocco and Icelandic fisheries (Pitcher *et al.* 2002). In this work we estimate IUU fishing in North Korea, using the methodology proposed by Pitcher *et al* (2002). Three to five most representative fisheries in North Korea were selected as case studies. They were chosen because they represent the bulk of fisheries landings in North Korea, both industrial i.e. in terms of landings and artisanal i.e. in terms of economic reliability for local fisheries communities. IUU fishing in North Korea were estimated based on a triangulation and examination of different data from different sources of information based on the knowledge of the history of the fishery (Information referenced in the text under illegal, discards, unreported artisanal including Food fisheries and recreational fisheries categories), and analysis of qualitative and quantitative estimates of incentives for North Korean fisheries to misreport or under-report catches between 1950 and 2004. To corroborate these qualitative estimates, informed anchor points through literature were calculated for each five year blocks, where data were available.

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006), with additional information referenced below.

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NORWAY

Summary of information concerning IUU fishing

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

The extensive control system and restricted entrance to the fisheries make illegal fishing difficult; but for the northeast Arctic cod fisheries in the Barents Sea, illegal fishing has been a concern (MRAG, 2005). It has been estimated that around 100,000 t of cod was fished outside quotas for 2002 and 2003. Russian vessels are responsible for most of the illegal fishing; catch is transshipped in the open sea and landed in EU markets although the situation has improved markedly in the last few years (DF, 2007; ICES, 2007).

It is likely that Norwegian processing firms are involved in the black market for illegally caught cod. MRAG (2005) reports, the "prosecution of a Shetland-based skipper and mate for landing more than £3.4 million worth of illegally caught herring and mackerel alerted authorities to the increasingly sophisticated nature of the international racket that is known to involve surreptitious night-time fishing in remote areas, unlawful direct consignments to nationwide processors, and the involvement of processing firms in Denmark and Norway. By the official account, black fish … go around the legitimate quayside auction system". However, the Norwegian control system makes cheating difficult and control of access is an important part of the system.

Satellite surveillance of fishing and hunting vessels was introduced in Norway in April 1999 (AGR, 2003–2004). All vessels over 24 m and fishing in territorial waters must install satellite tracking equipment. This also applies to Norwegian vessels of any size engaged in fishing and hunting activities in waters outside the fishery jurisdiction of any state, and when obligatory satellite tracking ensues from international commitments. Tracking equipment must automatically broadcast the vessel's geographical position, course and speed once an hour, 24 hours a day, and on entry into and when leaving other countries' zones. However, the areas to control are vast (~2 million km^2) and an increase in the reloading (transshipment) of fish is reported (ICES, 2004).

The Ministry of Fisheries reports that resource control in Norway is such an extensive task that it has been necessary for the Department of Fisheries to prioritise tasks. Norwegian fisheries regulations are so complex and change so frequently that both fishermen and bureaucrats have problems keeping up (Mikalsen and Jentoft , 2003). However, control of IUU fishing has definitely improved since 2004, when a Norwegian Broadcasting (NRK) documentary showed a Norwegian company (Ocean Trawlers) cooperating with several Russian shipping companies convicted of illegal fishing This sparked a drastic change in the Norwegian Government's actions towards tackling the Norwegian connection in illegal fishing off the Barent's Sea (Tisdall, 2004). Between 2005 and 2006, illegal fishing for cod decreased by 20%, and by as much as 50% for haddock (Solholm, 2007). In recent years, Norway has demonstrated its ability to tackle illegal fishing by increasing surveillance, strengthening port state **c**ontrol within its jurisdiction and beyond in co-operation with the ***North East Atlantic Fisheries Commission*** (NEAFC) and EU countries.

Discards

Discards of commercially interesting species are prohibited by law, but are still estimated to be 2–8% of total catch. Discards of 14 species (cod, haddock, saithe, redfish, mackerel, NSS-herring, Trondheim-herring, North Sea herring, greater argentine, capelin, Greenland halibut, whiting, blue whiting, monkfish) are prohibited by law and punished with fines and confiscated catch or catch value (DF, 2007), but it is hard to control and the chances of getting caught and punished are small (FKD, 2004; Valdemarsen, 2003). Unpublished data from IMR (Norway) show discard rates in the gill net fishery for ling (*Molva molva*) on the Norwegian slope in depths between 150–450 m. The results show discard rates

between 20 and 70%, with the highest rate at a soak time of three days (Hareide *et al.* 2004).

On shore, Norwegian Directorate of Fisheries (DF) inspectors perform the physical inspection of catches that are landed and stored (quayside control). Both the Directorate and coastguard also perform extensive catch inspections at sea. The inspectors check that the fishing is carried out using the correct gear, at the right time and on the right fishing grounds. They also check logbooks, catch composition and that fish is not dumped. In the last few years, the coastguard has carried out around 3,000 inspections of Norwegian and foreign vessels each year. Over 60% of the inspections were of foreign vessels. On average, an ocean-going trawler that fishes in Norwegian waters will be visited by the Norwegian coastguard three to four times a year, while the conventional part of the ocean-going fleet will be inspected once or twice a year (AGR, 2003–2004).

For 26 commercially-interesting, but non-target species there is a maximum limit for by-catch of 10% of total catch for mesh widths of less than 80 mm (http://www.fiskeridir.no, ICES, 2004). Also temporary closures are widely used if non-target species are present or if the fish is under-sized.

Unreported catches in the commercial sector

An extensive control system is in place. All vessels in the fishery are obliged to compile detailed catch diaries controlled by the DF; compulsory information includes the fishery zone where the catch is taken, type of fishing gear and by-catch of sea mammals. The six co-operative sales organisations collect sales slips to check catches against vessel quotas (Mikalsen and Jentoft, 2003).

Unreported catches in the recreational sector

Illegal fishing for lobster, including recreational fishing, is slowing the rebuilding of this depleted stock (Aftenposten, 2008).

Note

This material is based on a country synopsis, with additional material, published by Skaret and Pitcher (2006).

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Table 27. Norway illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1	Atlantic mackerel	2001	Illegal	Russia	1	[1]The Skipper of Russian trawler *Staryy Arbat* accepted a fine in lieu of prosecution of NOK55,000. Trawler company fined NOK1.2 million and court costs of NOK20,000
2	Cod	2002	Illegal	Norway	>1	[2]Norwegian customs and excise discovered fraud by some of country's cod exporters. Some Norwegian exporters have tampered with fish origin documents; exporting cod as 'Norwegian', when it is 'Russian' in origin
3	Greenland Halibut	2001	Illegal	Germany	1	[3]German trawler fined for recording incorrect position in the catch logbook, and for unlicensed fishing of Greenland halibut
4	Finfishes nei	2002	IUU	Norway	>1	[4]Norwegian fishermen in 2002 caught 25,000 t of fish more than the allowed quota. The illegal over-fishing was the biggest in several years
5	Finfishes nei	1999	Illegal	France	1	[5]The French fishing trawler *Cap Nord* arrested for failing to meet up at an inspection point; spokesman for the coastguard said crew to be charged for fishing illegally in Norwegian fishing territory; ship was docked at the NW Norway port of Aalesund until investigations into the fishing allegations carried out
6	Atlantic Herring & Atlantic Mackerel	2007	Illegal	Unknown	1	[6] Netherlands-registered trawler arrested for illegally dumping fish; coastguard vessel seized the trawler for dumping herring and mackerel off the coast; when inspectors boarded the trawlers, they found illegal equipment used in connection with the sorting machinery
7	Atlantic Herring & Atlantic Mackerel	2007	Illegal	Unknown	1	[6]German-registered trawler apprehended for illegally dumping fish; coastguard vessel seized trawler for dumping herring and mackerel off the coast
8	Finfishes nei	2005	IUU	Russia	>1	[7]Norwegian inspectors caught crews of several Russian vessels red-handed as they offloaded fish in

						the Netherlands, England and Germany; catch amounted to 3,000 t, all fished illegally in the Barents Sea
9	Finfishes nei	2004	IUU	Russia	1	[8]Norwegian coastguard presented photos and detailed information as proof of illegal fishing of the arrested Russian trawler *Kapitan Gromstev*; 22,000 t of catch was not registered in the logs during five days of fishing
10	Finfishes nei	2006	Illegal	Russia	1	[9]Russian trawler *Opon* was boarded and ordered to the Arctic port of Tromsø on Tuesday for failing to turn up for inspection; Norwegian rules require all trawlers to announce plans to leave waters claimed by Norway at least 12 hours in advance
11	Salmon	1993	IUU	Panama	1	[10]Norwegian coastguard aerial surveillance flights observed *Brodal* fishing for salmon in north eastern Atlantic between Iceland and Norway (71° 35'N, 4° 20' E) on June 3, 1993; unconfirmed reports suggested vessel owned by Danish interests
12	Finfishes nei	2007	Illegal	Russia	1	[11]Vessel arrested by Norwegian coastguard on the North Cape Banks and brought to Vadsoe harbour for falsifying catch records
13	Finfishes nei	2008	Illegal	Russia	1	[12]Norwegian Police fined the captain of Russian ship *Nemansky* US$10,000 for violating fishing rules; captain arrested for illegally taking the vessel to sea without the permission of the Russian company
14	Herring	2007	Illegal	Russia	1	[13] Russian trawler *Tynda* fined equivalent of US$100,000 for herring poaching in Norway's economic zone; Norwegian officials reported that the Russian trawler was catching herring in the closed zone for fishing; border guards found 160 t of fish onboard.
15	Cod	1994	Illegal	Iceland	2	[14]Two Icelandic-owned trawlers *Ottar Birting* (Panamanian registered) and *Bjorgulfur* (Iceland registered) arrested in the Norwegian-administered fishery protection zone around Svalbard for illegal fishing; both vessels released after Icelandic banks gave guarantees for the vessels' fines

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PAKISTAN

Summary of information concerning IUU fishing

Illegal fishing

There are many reported illegal fishing incidents in Pakistan's waters, both inshore and offshore. Small-scale fishermen from India are often arrested in Pakistan, and vice versa, for fishing in the Sir Creek estuary, a disputed border zone (Pakistan Chronicle, 2004). In the Arabian Sea, poorly demarcated border limits coupled with lack of proper navigational equipment have led to frequent arrests of Indian boats in Pakistani waters and vice versa. Illegal fishing by Indian fishermen is said to result in a US$51.72 million annual loss For example, in December 2004 41 boats were impounded and 343 Indian fishermen jailed (Pakistan Daily Times, 2004). There are also reports of considerable unreported catch and illegal fishing in some coastal areas.

After the declaration of the EEZ in 1982, Pakistan allowed joint ventures between local and foreign investors. However, the policy was modified in 1989 to allow only Pakistan-flagged vessels to fish within the EEZ. In 1995, in response to pressure from local fishermen the government created a buffer zone between 12 and 35 nautical miles to prevent incursions of foreign trawlers and large trawlers operating from Karachi. The buffer zone was abolished by the newly installed military government in 1999. This policy directive is rarely enforced in Balochistan province where frequent transgressions by trawlers from Karachi are reported in its territorial waters (Khan *et al.* 2005). "The deep sea fishing under joint ventures [has been] a source of controversy ever since its initiation. Fishing by contract vessels has created a number of problems for local inshore fishermen. The foreign vessels have been accused of fishing illegally in the shallow waters and of transferring, wholly or partially, their catch in the high seas and reporting low catches. Occasionally the Pakistan coastguards and Pakistan Navy have located unauthorised foreign fishing vessels (on contract) in the inshore areas. These vessels are known to have caused damage to the fishing gears and fishing crafts of Pakistani fishermen engaged in shallow water fishing for shrimps and inshore finfish" (Khan, 2006).

Incursions of Sindh-based trawlers into Balochistan waters have increased in the last decade mostly due to decline of fish catches in Sindh waters. Khan *et al.* (2005) also report collusion between provincial (Balochistan Fisheries Department) and federal maritime agencies (Maritime Security Agency) through informal pay-offs ranging between US$500–650 per trip. The small-scale fishermen in Sindh province are also known to use destructive gears (small meshed nets) although their use is banned.

According to Khan *et al.* (2005) fishermen are reported to fish during the breeding season leading to recruitment overfishing and decline in shrimp catches.

Discards

Discards are not banned nor are they estimated by observer programmes. Shrimp trawlers are reported to have discards in the order of 13% (Kelleher, 2005). Data collected from Karachi fish harbour indicate the by-catch of non-target species in shrimp has increased almost threefold in the past four years. The data indicate that more than 60% landings at the harbour now consist of by-catch and non-target species. This indicates that discards are minimised and almost the entire by-catch is landed. According to Khan *et al.* (2005) licensed foreign trawlers discard up to 90% of total catch to avoid paying duty for species of low commercial value.

Unreported catches in the commercial sector

Some statistics are unreliable, for example fish sold at sea is not included in the data complied by the Directorate of Fisheries. Also, in 1988 the Government of Pakistan began issuing licences to Korean trawlers. Just one of these trawlers is capable of sweeping all the fish in a 3 x 12 km area but there is no information about the quantity of fish caught in this way (District of Gwadar, Balochistan website, 2004).

Unreported catches in the artisanal sector

Monitoring of the landings is done regularly, at least for some important species like shrimp and tuna, etc. Although some stocks such as shrimp and lobster have been overfished, such information about other species is limited.

Recently, a catch-inspection programme has been initiated. With the help of local communities, inshore catches in some villages along the Sindh and Balochistan coasts are recorded and inspected by local government officials; the small offshore catches seem to be quite well recorded. A system of inspection at first sale has been introduced at Karachi fish harbour, but its effectiveness is not known.

Note

This material is based on a country synopsis, with additional material, published by Pitcher and Pramod (2006), with additional information referenced below.

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Table 28. Pakistan illegal fishing incidents

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1	Finfishes nei	1999	Illegal	India	6	[1]Pakistan Maritime Security Agency (MSA) seized six foreign trawlers for fishing illegally in Pakistan's waters.
2	Finfishes nei	2004	Illegal	India	10	[2]55 Indian fishermen from 10 boats were arrested for fishing 35 miles inside Pakistan's limit.
3	Finfishes nei	2004	Illegal	India	7	[3]Pakistan Navy arrested 44 Indian fishermen for illegal fishing in territorial waters; the fishermen were detained about 200 km east of Karachi.
4	Finfishes nei	2007	Illegal	India	5	[4]Pakistan's Maritime Security Agency ship apprehended five Indian fishing boats along with 12 crew members onboard on March 2 for fishing illegally 23 miles inside Pakistani waters
5	Finfishes nei	2007	Illegal	India	4	[5]Sixteen Indian fishermen arrested for allegedly entering Pakistani waters; received jail sentences; the four vessels were impounded about 30 nautical miles inside Pakistan's EEZ
6	Finfishes nei	2006	Illegal	India	4	[6]Pakistan's MSA arrested 22 Indian fishermen for illegal entry into the country's territorial waters in the

						Arabian Sea; the fishermen, who were in four boats, were arrested by a patrol of the Maritime Security Agency handed over to police; boats were seized
7	Finfishes nei	2008	Illegal	India	1	[7]One Indian boat with a six-member crew was seized by Pakistan's MSA for illegally fishing 55 nautical miles inside Pakistan's EEZ.
8	Finfishes nei	2008	Illegal	India	2	[8]Two Indian boats with 11 fishermen were arrested by Pakistan's MSA for fishing illegally in Pakistan's EEZ; they were handed over to docks police station in Karachi
9	Finfishes nei	2008	Illegal	India	6	[9]Pakistan's MSA apprehended six Indian fishing boats along with 24 crew members for illegal fishing in Pakistan's waters; they were handed over to docks police station in Karachi
10	Finfishes nei	2008	Illegal	India	3	[10]14 Indian fishermen arrested for illegally fishing in Pakistan's water; three Indian boats impounded; fishermen handed over to Karachi docks police station
11	Finfishes nei	2005	Illegal	India	16	[11]Pakistan held 101 Indian fishermen from 16 vessels for allegedly fishing 70 to 120 miles inside the Pakistan EEZ; vessels escorted to Karachi by Pakistani Navy and crewmen jailed; more than 633 Indian fishermen are now reported to be in Pakistani jails and 113 fishing vessels remain under arrest
12	Tunas	2005	Illegal	Taiwan	1	[12]Taiwan vessel arrested 110 miles southeast off Karachi on March 26th, 2005; Pakistan Government released two crew members as good will gesture to coincide with visit of Taiwanese prime minister
13	Tunas	2006	Illegal	Taiwan	1	[13]Pakistan's MSA arrested 36 fishermen for illegal fishing; Taiwanese trawler seized while illegally fishing 16 km inside Pakistan's Maritime limits; trawler registered in Port Victoria, Italy, and had Iranian licence; 36 crew included 5 Chinese, 6 Indonesians, 3 Taiwanese and 22 Philippinos; MSA said the trawler should have fished within Iranian boundaries. MSA gave a warning to the trawler crew, who ignored it leading to arrest
14	Finfishes nei	2008	Illegal	India	5	[14]23 fishermen from India who drifted into Pakistan's waters were arrested by Pakistan's MSA; vessels and fishermen were taken into custody

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PERU

Summary of information concerning IUU fishing

Illegal fishing

IUU fishing is recognised as a critical problem in Peru's waters (FAO, 2003). According to the Peruvian report to FAO (2003), an action plan is being formulated to deal with IUU fishing, including measures of control and inspections and joint work with the coastguard.

Peru has a satellite system for surveillance, control and monitoring of commercial fishing vessels The system is used to monitor vessels in the pelagic fishery with capacity larger than 32.6 m^3 (FAO, 2003).

MRAG (2005) cites a number of problems: for example, "…The high seas fishery for Jumbo flying squid (Dosidicus gigas) off the coasts of Peru and northern Chile has raised some concern. FAO statistics show that China is a recent entrant into this fishery, taking a reported 81,000 t of squid in 2003. This compares to 40,000 t caught by Japan and 5,000 t caught by Korea, mainly within the Peruvian EEZ under licence. Although the main fishery takes place in Peruvian waters, some of these catches are from high seas waters (up to 300 nautical miles from the coast), and are therefore unregulated (there are currently no high seas RFMOs regulating significant squid fisheries: only SEAFO and CCAMLR are capable of doing so). Recent arrests indicate that at least some of the Chinese catch, possibly about 40,000 t (our estimate), is taken in high seas waters. … Fishing News International (FNI) reported on the arrest of nine Chinese squid jiggers fishing illegally in Peruvian waters and transshipping to reefers in international waters. Recent annual catches of Jumbo flying squid in the SE Pacific have been in the region of 50,000 t to China, 70,000t to Japan, 20,000 t to Korea and more than 100,000 t to Peru (FAO, Fishstat, 2002). If these jiggers had been operating in Peruvian waters for a month, then at average catch rates of 40 t/day (a modest jigger catch rate), they may well have taken 7000 t of squid or more, worth about US$8M."

Discards

Kelleher (2005) estimates an average discard rate of 3.3% for Peru. The low value probably reflects the large fisheries for small pelagics, which are more selective. Nonetheless, Peru has other important fisheries with high discard rates, such as the hake and shrimp fisheries, the latter with discard rates of as much as 81% (Kelleher, 2005). This author also cites "a significant reduction" in discards in the hake demersal fisheries of Peru in the late 1990s because of the use of juveniles and other by-catch for surimi and fish blocks.

Unreported catches in the commercial sector

Informal estimates (J. Csirke, pers. comm.) put the amount at around 30% for the anchoveta fishery; MRAG (2005) reports at least 60,000 t unreported inshore. Pitcher *et al.* (2002) report "True catches of Peruvian anchovy in the 1970s were similarly estimated after it was realised that fishmeal plants were operating well below the stated conversion efficiency (Castillo and Mendo, 1987). Adjustments made after structured interviews with industry members resulted in estimates of catch much closer to the capacity of processing plants and with fishmeal exports. For example, the official 1970 catch figure of 12 million tonnes was revised upwards to16 million tonnes, equivalent to 33%." According to former Peruvian Fisheries Minister Juan Rebaza around 3 million tonnes (30% of Peru's anchovy catches) are caught illegally each year, which is equivalent to one third of reported annual catches (AgraNet, 2006).

Unreported catches in the artisanal sector

Although there is limited data for some resources, in general, adequate catch and effort statistics are available (FAO, 2003). There is no specific information on the quality of the system of collection of fisheries statistics. The problem of poor species identification is not as critical considering that a few species account for a substantial proportion of total catches. About 5% of the total catch volume is not identified to the species level (Vasconcellos and Cochrane, in press)

In 2001, recognising the importance of the artisanal fisheries as the main supplier of fish for human consumption in the country and the many deficiencies in data collection for the sector, the government set up a data collection programme for artisanal fisheries landings. However, the effectiveness of this system is unknown. Aguero (1992) states that Peru has faced persistent problems in quantifying the exact extent of fish landings due to lack of consistency in the way catches have been recorded over the years.

Note

This material is based on a country synopsis, with additional material, published in Kalikoski *et al.* (2006).

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Table 29. Peru illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1	Finfishes nei	2003	Illegal	Ecuador	1	[1] Vessel apprehended by Peruvian Navy and the catch seized
2	Anchovies	1996	Illegal	Peru	216	[2]Peru's Ministry of Fisheries offered amnesty to 216 boats that were caught illegally fishing in 1996; most of the boats are presumed to have unauthorised hold capacity.
3	Anchovies	1999	Illegal	Peru	72	[3]VMS used to detect licensed vessels from Peru (capacity 15,499 t) operating within 25-mile limit vessels suspended for three days and fined
4	Tuna	1999	Illegal	USA	1	[4]Peru's Fisheries ministry has authorised the company Teknofish SA to operate the US-flag tuna boat *Connie Jea*n in Peru's coastal waters after confiscating her catch; she was earlier caught for illegally fishing for tuna along Peru's north coast
5	Tuna	1998	Illegal	Ecuador	2	[4]Two tuna ships caught fishing without licences in the Peruvian EEZ
6	Finfishes nei	2007	Illegal	Ecuador	1	[5]Ecuadorian boat and six crew captured by Peruvian Naval patrol ship for fishing without authorisation in Peru's EEZ; vessel was escorted to port for further action.
7	Anchovies	2007	Illegal	Ecuador	2	[6]Two Ecuadorian trawlers arrested for entering Peru's EEZ without authorisation; both boats presumed to have engaged in fishing in Peru's EEZ; taken to port for further action.
8	Anchovies	2007	Illegal	Chile	2	[7]Two Chilean boats with several hundred tonnes of anchovies in their holds arrested by naval patrol ships for fishing in Peruvian EEZ without authorisation
9	Finfishes nei	2007	Illegal	Peru	1	[8]Peruvian coastguard vessel conducted surprise checks on vessels inside the lagoon in National Reserve of Paracas; inspection officers found 1.5 kg of explosives for use in illegal blast fishing; explosives seized and fishermen arrested
10	-	2004	Illegal	China	6	[9]Six Chinese fishing vessels detained following a massive operation off the Huarmey province coast, 280 km north of the Peruvian capital
11	Finfishes nei	2004	Illegal	South Korea	3	[9]Three Korean fishing vessels detained following a massive operation off the Huarmey province coast, 280 km north of the Peruvian capital.

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7. Marina de Guerra del Peru (2007c) Patrol Coastguard vessels capture two Chilean fishing boats, (Original text in Spanish), Peruvian Navy, Public Notices, 8 February 2007.
8. Marina de Guerra del Peru (2007d) Capitan Guardacostas Marma de Pisco took part embarcacicon explosive, (Original text in Spanish), Peruvian Navy, Public Notices, 16 July 2007.
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PHILIPPINES

Summary of information concerning IUU fishing

Illegal Fishing

The Philippines is a member of regional organizations such as ASEAN (Agreement on the Conservation of Nature and Natural Resources), the Asia Pacific Fishery Commission and the IPFC (Indo-Pacific Fishery Commission). There is, however, little effective control, and Green *et al.* (2003) state "Meanwhile, Chinese, Malaysian, Taiwanese, Japanese and other fishers from neighboring countries are making free use of the Philippine EEZ. The government's move to create commercial fishing hubs by developing new fish ports and facilities are merely encouraging more intrusion into the EEZ, by allowing international flag vessels to land fish in these ports." In theory, large trawls are banned from inshore areas, although there appear to be frequent incursions. Moreover the use of small trawl is unrestricted and so the damage may be just as great. Alava and Cantos (2004) report that, "drift nets are operational within Philippine waters…other gears that also by-catch dolphins are baby-ring net, bagnet, beach seine, set gillnet, bottom longline, castnet, crab trap, drift longline, drive-net, fish corral, flying fish net, stationary liftnet, two-boat lift net, purse seine, shark net and troll line".

FAO (2001) cites BFAR as reporting that 70% of coral reefs, covering about 34,000 km^2, have been destroyed by rampant dynamite fishing and by accumulation of silt from the watershed areas. Moreover, 67% of the 420,000 ha of mangrove forests have been lost due to illegal conversion into fishponds, or use for firewood, construction, and land reclamation. "Another institutional issue is the national government's promotion of fish aggregating devices. Such devices contribute to overfishing and encourage intrusion of commercial fishing vessels in nearshore marine waters" (Guidote, 2004).

There appears to be a wide consensus that fishing of juvenile fishes is a major problem in the Philippines. Although Philippine fishery law allows no nets with mesh sizes smaller than 3 cm, this is not well-enforced (Armada, 2004a). A neat video showing the destructive effects of fine-meshed nets can be viewed on the BFAR web site (BFAR, 2004), but enforcement is not a simple problem, as Green *et al.* (2003) state: "the destructive effect of fine-meshed nets of beach seines was raised with fishers during information campaigns and other occasions. A gear-swapping program in favor of a less destructive gear like gillnet was even attempted. In the end, however, although fishers fully understood the destructive effects of fine-meshed nets, they could not be convinced to abandon beach seine because no other gear could replace it in terms of assuring daily catch and spreading immediate benefits to many people involved in pulling the net to the shore." However, the legal mesh size for the Philippines, set at 3 cm, can catch many types of fishes (jacks, groupers, tunas) while they are still juvenile (see contributions in Silvestre and Luna 2004).

The Philippine patrol boat fleet has recently expanded (BFAR, 2004, with some photos of vessels on website), with support from overseas aid programs from Canada and Spain. "The components involve the acquisition of patrol boats equipped with communication facilities and other accessories/equipment to be used in the enforcement of existing fishery laws…thirty-seven (37) units were awarded to the LGUs (20 units 24-footer and 17 units 27-footer)…13 units 27-footer….70 units 28 footer Patrol Boats are being constructed under the UNDP Support Program on Conservation and Management of Fisheries and Aquatic Resources PHI/03/006…62-units have been delivered as of July 2004…remaining eight (8) will be delivered by the end of August 2004. *Accomplishments*: I. Deployment of MCS Patrol Vessels Five units (3 30-meters and 2 11-meters) DA-BFAR MCS Patrol Vessels were deployed in the Regions of Cagayan (MCS 3001), Palawan (3002 and 1102) and Tacloban (MCS 3003 and 1103). II. Training and Seminar Workshops Cyanide Detection Test and XRay Machines Seminar Ten (10) BFAR Vessel Staff attended the Seminar/workshop on MCS and Operation & maintenance of CDT and X-ray Machines on board the 30-meter MCS patrol Vessels. First and Second Boat Operation and Management Course Trained a total of 44 participants from the PCG, LGUs, and BFAR Law Enforcers; 26 leading to Certification as Boat Captain and 18 leading to Certification as Boat Engineer. III. Signing of MOA between the DA-BFAR and PCG…MOA marked the "beginning of the end" of poaching by illegal fishing vessels and destructive fishing activities. Held at the Conference of the BFAR."

Benavente-Villena and Pido (2004) describe a number of issues. "Significant portions of the EEZ are being

heavily exploited by poachers from surrounding countries. Geographical intrusions include those by the Taiwanese in the north, Indonesians in the south, and Chinese in the west, including Palawan. Official records indicate 15 fishing intrusions in Region 2 involving 95 foreign fishers from 1998 to 2002 and 46 incidents involving 675 foreign fishers in Palawan from 1995 to 2002 (Benavente-Villena 2003)…a sharp increase in poaching since 2000 … most Incidents occurred in the last two years….linkage of poaching with other illegal activities, such as smuggling and illegal entry … interesting but undefined linkages among foreign ministry officials, poachers, law enforcement authorities and local leaders. The majority of poachers are Taiwanese (61%), followed by Chinese (26%) and Indonesians (13%), Malaysian and Vietnamese … An interesting fact is that two of the Chinese fishing vessels and some of the crew have been apprehended several times within the last two years. The provincial jail warden attests that some of the detainees were, in fact, second timers … The recurring presence and continuous foreign intrusions in Philippine waters, despite apprehensions and confiscation of catch, is proof that foreign fishers utterly disregard Philippine laws. Such attitudes on the part of the poachers indicate two things. First, the potential revenues earned from poaching in Philippine national waters far outweigh the constant threat of apprehension. Second, this situation also reflects the weaknesses in the prosecution of cases that has emboldened the poachers to continuously
violate national integrity."

MRAG (2005) report illegal beche-de-mer fisheries, South African abalone imports to Philippine traders and the processing of illegal transhipments of tuna from Papua New Guinea: "Illegal trade in abalone has been reported for a number of countries including Australia, South Africa, New Zealand, United States, Mexico, Japan, Canada, Korea, Philippines, Taiwan and some other Indo-Pacific countries…The Philippines are one of the largest beche-de-mer exporters but reports on fishing are insubstantial and poaching in marine protected areas is suggested to be common…The foreign fleet often transship onto reefer vessels in parts of Wewak, Manus, Kavieng, Rabaul, Lae and Madang for shipment [tuna] to canneries in Thailand, Philippines and American Samoa." Some purse seine tuna vessels catching skipjack are registered in the Philippines (MRAG, 2005). There is also some evidence of illegal trans-shipment operations. Gianni and Simpson (2005) report 5 Philippine vessels from two companies (Frabelle Fishing, Red Tuna Ventures) out of a list of 132 refrigerated cargo vessels recorded as illegally transshipping fish for the Japanese market at sea.

Despite the incidents mentioned above, things are improving and recent accomplishments of the new patrol fleet mentioned on the BFAR website: "DA-BFAR MCS 3001 apprehended 13 Buli-Buli mostly with incomplete pertinent documents and BFAR license and conducting fishing operation near the Municipal Waters of Bugeny, Cagayan … a patrol operation in the vicinity of Municipal waters of Buguey, Cagayan resulted in the apprehension of eight fishing boats for illegal fishing activities. DA-BFAR MCS 3002 apprehended 2 bancas one for dynamite and the other for cyanide fishing and approximately 2 kgs of live lapu-lapu was confiscated. Sea trial operation of the two (2) units MCS Patrol Vessels along Corregidor and Manila Bay resulted in the apprehension of 18 hulbot-hulbot fishing vessels. Infractions varied from expired fishing licenses, fishing within 15 km, no fishing documents, and use of illegal fishing gears. DA-BFAR MCS 3003 apprehended last July 21, 2004 foreign vessel Chung Long I while fishing in the Pacific Ocean, particularly on the tuna route of Eastern Samar, with the use of long-line fishing method. When apprehended, the vessel had a catch of one-ton yellow-fin tuna and some high-vale fish like blue marlin. On August 2004 the HASUDA 1222 a Taiwanese fishing vessel was caught fishing approximately 27 nautical miles off Sungi Pt, Guian, Eastern Samar. Infractions of Section 87 of RA 8550 were filed against the violators.19 other fishing boats were apprehended with no fishing documents, expired license and fishing within the 15 km no fishing zone for commercial and active fishing gears."

Discards

Discards are reported as very low as all catches are utilized in the Philippines (Kelleher, 2004).

Unreported artisanal catches

Small-scale fishers receive considerable precedence in the Philippines through the inshore areas, managed by municipalities less than 15 k from the shore, being reserved for local use (Garcia,2004). Most vessels in this sector are <3 t. But catches, especially from the inshore sector under municipal management, are estimated very poorly in the Philippines (see contributions in Silvestre and Luna 2004) and the by-catch

of small fish in the many types of trawls, nearly all of which is landed for sale and local consumption (Kelleher, 2004), is not well-quantified. Offshore catches are recorded and inspected according to a frame survey design at landing sites. It is likely that BFAR uses similar methods for inshore catches, as there is extensive data.

Data on landings, effort and prices is by district offices and collated by BFAR's statistical branch. Despite the best of intentions as revealed by the BAFR web site, there are clearly a number of problems. For example, there are complaints that, since 1987, data has been confused after the transfer to a new bureau (Barut *et al.*, 2004). For small pelagics, Zaragoza *et al.* (2004a) say, "The statistical information base requires substantive improvement to support site-specific assessment and management of the country's small pelagic fisheries. Data on catch and effort and their spatial distribution need improvement. Overall, the biological information on the country's small pelagic resources is rather scant and fragmentary. Information about the population dynamics of key species/groups requires attention." For tunas and large pelagics Zaragoza *et al.* (2004b) state, "Inadequate statistical baselines - Catch and effort data are inadequate for purposes of effective fisheries management." The live fish trade is almost undocumented (Mamauag, 2004). Alesna *et al.* (2004) say, "Many commercial fishing vessels are currently operating without licenses. Many fishing boats are dubiously registered as being under 3 GT and are thus licensed as municipal fishing boats, but upon inspection are well above 3 GT. Once BFAR issues a license, it does not conduct adequate monitoring, control, and surveillance of how it is used and where the boat operates."

Estimation of Illegal and Unreported catches for Philippines

It is known that in most fisheries a considerable amount of fish is landed and/or discarded but not properly reported, a problem known as Illegal, Unreported and Unmandated (IUU) fishing. Quantitative estimates were derived for Morocco and Icelandic fisheries (Pitcher *et al.* 2002). In this work we estimate IUU fishing in Philippines, using the methodology proposed by Pitcher *et al* (2002). Three to five most representative fisheries in Philippines were selected as case studies. They were chosen because they represent the bulk of fisheries landings in Philippines, both industrial i.e. in terms of landings and artisanal i.e. in terms of economic reliability for local fisheries communities. IUU fishing in Philippines were estimated based on a triangulation and examination of different data from different sources of information based on the knowledge of the history of the fishery (Information referenced in the text under illegal, discards, unreported artisanal including Food fisheries and recreational fisheries categories), and analysis of qualitative and quantitative estimates of incentives for Philippines fisheries to misreport or under-report catches between 1950 and 2004. To corroborate these qualitative estimates, anchor points informed through the literature were calculated for each five year block, where data were available.

Note

This material is based on a country synopsis, with additional material, published by Pitcher *et al.* (2006).

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Philippines IUU incidents table.

	Species	Period	Type of IUU	IUU flag state	# IUU vessels	Action Taken
1	Finfishes nei	2003	Illegal	Unknown	26	[1]Sixto Atienza, the director park ranger, oversaw the arrest of more than 120 illegal fishers and the confiscation of 26 boats. Mr. Atienza was murdered for his courageous efforts on May 3, 2003.
2	Dorado	2003	Illegal	Taiwan	1	[2]Taiwanese poaching vessel observed around Batanes.

3	Finfishes nei	1997	Illegal	China	-	[3]21 fishermen were arrested off a shoal in the South China Sea north of Philippines
4	Finfishes nei	1999	Illegal	China	2	[4]Philippines Navy sunk two vessels within two months in the South China Sea. The latest sinking was on July 20, when the vessels were fired between the islands of Panata and Likas.
5	Finfishes nei	2002	Illegal	China	-	[5]The detained 160 fishermen pleaded guilty to illegal fishing in Philippines.
6	Finfishes nei	2003	Illegal	Malaysia	4	[6]14 Malaysian poachers were detained after being intercepted near turtle islands off the Southern Tawi-Tawi islands on Aug 26th. They were handed over to police in Taganal island on charges of illegal fishing
7	Finfishes nei	2003	Illegal	Philip-pines	1	[6]On August 26th, Six Filipino fishermen were caught aboard a motorised boat, using explosives to illegally catch fish in Turtle islands ; the Filipinos have been jailed on charges of illegal possession of explosives.
8	Hump-head Wrasse	2006	Illegal	Hong Kong	1	[7]On 21st Dec, 2006, the HK licensed fishing vessel carrying tonnes of illegally caught fish, was seized by Philippine officials off the waters strictly protected Tubbataha Reef National Marine Park in the Sulu Sea; the vessel was not licensed to fish in Philippine waters
9	Finfishes nei	1999 - 2002	Illegal	Philip-pines	-	[8]Illegal fishing with dynamite and cyanide for reef fish; probability of being convicted for illegal blast fishing as low as 0.00002 in Calamianes Island, Northern Palawan, Philippines.
10	Finfishes nei	2005	Illegal	Philip-pines	1	[9]The PNP- Maritime Group of Camp Dagohoy caught the fishing boat using active gear within municipal waters of Baclayon, between the mainland and Pamilacan island. A case was registered against captain for using active gear prohibited in municipal waters.
11	Finfishes nei	2005	Illegal	Philip-pines	1	[9] In the town of Dauis, PEDO officers along with fish wardens apprehended 2 fishers using an electric shiner in waters of Barangay Bingag. ; both Captain and boat mechanic were fined 2500 Php each for violating Sec. 4-2 of Municipal Ordiance No.2 of 1997.
12	Finfishes nei	2005	Illegal	Philip-pines	1	[9]Charged for fishing without a license; captain and boat owner incl. 17 crew were arrested for fishing using ring net (active gear) 9.5 km or 5.2 nautical miles off Barangay Doljo without fishing permit or license from the MARINA. Fishing gear & fish were seized.
13	Finfishes nei	2005	Illegal	Philip-pines	1	[10]Fish wardens on patrol in Bantayan arrested commercial fishing vessel for using a siper or Danish purse seine in municipal waters. The siper is damaging because it crushes coral reefs with its tom weights.

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POLAND

Summary of information concerning IUU fishing

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

The most serious illegal problem in the Baltic concerns the eastern cod stock and Polish vessels are heavily implicated in a high level of illegal catches - which have been about 35% of the reported catches since the early 1990s, peaking at 60% in 1994 (FISKESEKRETARIATET, 2007; ICES 2007). Even in 2005 the level of illegal fishing was very high in Poland - the difference between logbook reports when an inspector was present and when an inspector was not present, indicative of consistent misreporting, reached 48.7 % in the case of landings of cod in Poland in 2005 and 2006 (European Court of Auditors, 2007).

In Polish fisheries, inspections are focused on inspection and monitoring of fishing vessels holding cod fishing permits. Those vessels without VMS and holding more than 300 kg of cod must notify the Fisheries Monitoring Centre before leaving the area. Those vessels with VMS are required, every day at 10am, to notify the Fisheries Monitoring Centre of the quantity cod they are carrying. The weight of cod landed is recorded during in-port inspections and cross-checked with logbook entries. The authorities aim to check sufficient vessels each month to cover 20% of cod landed. Other landing sites are subject to irregular inspections, the frequency dependent on the season and the projected number of landings (MARD, 2006).

No infringements have been reported by Polish vessels outside the EEZ.

Discards

Discards are comparatively low in Baltic Sea fisheries (1.4% according to ICES [2000]) as there are fewer commercial species like cod, herring and sprat (Kelleher, 2005). However, according to Psuty-Lipska (2005), in Vistula lagoon fisheries discards of pike perch and bream are high compared to retained catch. ICES (2005) and ICES (2006) documents contain further information on discards for Polish Baltic Sea fisheries by year.

The Fyke net fishery in Vistula lagoon is a prime source of income for many traditional and subsistence fishers. Due to the nature of the gear used to target eels in this fishery, discards are high, for example common bream (discards 78%) and pikeperch (discards 73%), with the proportion of target species (eel) being low at less than 1% (Psuty-Lipska, 2005). According to Psuty-Lipska (2005) pike perches of even smaller sizes are acceptable in local markets leading to landings of undersized fish, with mortality rates for discarded species as high as 100% for smaller size groups.

Unreported catches in the commercial sector

Under reporting occurs for many commercial species in the Baltic Sea. Present estimates of cod stock are unreliable because of misreporting, discarding and age-reading problems. However, although recruitment since the late 1980s has been low, the year classes 2000 and 2003 appear to indicate an improvement (ICES, 2005).

ICES, 2006 reports that fish catch statistics in the Baltic Sea are based on logbook data. In some countries, such as Poland, these data are supplemented by data collected in regional Marine Offices. In Poland, some of the sprat catch is taken in industrial fisheries where large by-catches of other fish species (mostly herring) occur. The species composition of these catches is not accurately known, and can create errors in annual sprat catch statistics.

Unreported catches in the recreational sector

There are no data at present, but Poland is implementing surveys to obtain more information on catches in this sector.

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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PORTUGAL

Summary of information concerning IUU fishing

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

There is a certain amount of unlicensed illegal fishing. "Foreign boats from Spain, Taiwan and Japan come to seamounts north and south of the Azores and stay for a few days. They are rarely detected, but recreational fishing boats often see them. These boats often use unmarked monofilament gill nets and small drift nets, which are abandoned when the vessels are detected. A new Portuguese navy frigate has recently started fishery patrol duties, apparently improving the situation. In international waters just outside the EEZ, vessels from Taiwan, Spain, Japan and France commonly set large drift nets. They catch many species of fish, marine mammals and seabirds". Estimates of illegal and unreported fishing have not yet been made (Morato *et al.* 2001).

The High Seas Task force (HSTF) does not report of any Portuguese vessel engaged in IUU activity in the high seas (HSTF, 2006). However, the European Union reports many infringements by Portugese vessels, mainly unauthorised fishing and fishing without a licence, with the number of infringements varying over the years. Portugese vessels caught approximately 1,500 t of American plaice illegally within NAFO waters in 2003 (FIS, 2004). Most incidents involve failure to investigate alleged cases of false declarations, some which involved vulnerable stocks such as cod and hake (EU, 2005). In 2004, 1,729 serious infringements by Portuguese vessels were detected, most were for catching non-authorised species (448), fishing without a licence (366) and use or presence on board of non-regulation equipment (250) (Mercapesca, 2006).

Discards

According to OECD (1997) there are discards at auction centres when fish is of bad quality or inferior preservation. An estimated 533 t of fish was discarded this way during 1991–1994. Portugal has one of the highest discard rates among European countries – Monteiro el al (2001) report that 90% of the species caught in the crustacean trawl fishery of the Algarve is discarded. While Kelleher (2005) reports 70% discards in the Algarve *Nephrops* and deepwater shrimp fishery and a 90% discard rate in the Tagus estuary beam trawl fishery, which targets flatfish and *Crangon*

Erzini *et al.* (2002) analysed discards from crustacean trawling, fish trawling, demersal purse seining, and trammel netting in the Algarve and reported 236 species of discards where fish and cephalopods comprised 90% of discarded biomass.

Borges et al (2001) reported a mean discard rate of 13%, 20%, 27%, 62%, and 70% respectively for trammel nets, demersal purse seines, pelagic purse seines, fish trawls and crustacean trawls. High discard rates are also reported for coastal fisheries targeting sardine, mackerel and anchovy. Discards mostly comprised other non-target small pelagics like horse mackerel, *Scomber japonicus, Boops, Belone sp.*, jellyfish, juveniles of several species and small quantities of sharks.

"The level of redfish discarded by the Portuguese fleet, based on observer reports, has been very small, between 0.6 and 1.0% of the catch. In 2003 and 2004, discards amounted to 3.8% and 2.1%, respectively" (ICES, 2005a). According to ICES (2005b) Portugal does not collect information on discards for most commercial stocks as part of its fisheries stock assessment programmes along the western European coast. ICCAT (2005) reports 380 t of discards in 1995, which increased to 441 tonnes in 1997, and subsequently stabilised around 380 t until 2002. 354 t of discards were reported in 2003 in tuna and swordfish fisheries in ICCAT areas of the northeast Atlantic.

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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RUSSIA

Summary of information concerning IUU fishing

Illegal fishing

There is considerable IUU fishing activity in Russian waters, indicating that enforcement is ineffective (Spiridonov, pers. comm.).

Types of violation are numerous. During the period 1993–1998, the number of Russian vessels committing infractions was consistently more than double the number of non-Russian vessels offending (Hønneland, 2004). The most common form of offence was the use of fraudulent documents. Falsifying information in documents was often the first step in a series of other violations, such as notably exceeding catch quota limits, and unauthorised sale and undocumented export of over-quota harvest. Listed in order of descending frequency of incidence, re-sale of quotas; fishing in prohibited areas; concealment of prohibited types of catch; use of banned fishing gear; unauthorised processing of catch, usually of crabs or salmon on board vessels; pollution of the sea and fishing without a licence were other illegal activities encountered or reported."

There are few vessels fishing without permission; but excessive catch and transshipment are very common (Spiridonov, pers. comm.). It is reported that skippers and vessel owners try hard to avoid the 'irritating series of inspections' in Russian ports by many different uncoordinated government agencies (Hønneland, 2004). Stringent Russian port controls may be avoided by landings in neighboring countries, or by lining the pockets of poorly-paid minor officials (L. Shchegoleva, pers. comm.). Governmental policy, concentrated not on the resources management and conservation but on financial flows distribution, has led to the bankruptcy of the big fishing enterprises and destruction of fisheries communities. Shchegoleva (2004) suggests that there is no legal basis for the effective functioning of the industry and that this policy is forcing Russian fishermen to conduct illegal fishing.

Reorganisation of regulatory bodies following the demise of the Soviet regime at the end of the 1990s led to a temporary reduction in the effectiveness of the Russian system for fisheries enforcement and compliance with fisheries regulations. Lack of coordination between enforcement at sea and catch inspection coupled with lack of fuel for inspection vessels led to the complete absence of inspection vessels in the Russian EEZ in the Barents Sea for months on end, resulting in massive illegal fishing of undersized fish – probably over 100,000 t per year (Hønneland, 2004). Also, penalties for violators of fishery regulations were too low to have any significant deterrent effect.

Since 1993, Russian fishery authorities have engaged in a fruitful collaboration with their Norwegian counterparts on technical regulation and enforcement of fishery regulations. This partnership served to arrest the massive over fishing of the Russian quota of northeast Arctic cod that took place in the early 1990s. "In October 2004 The Joint Norwegian-Russian Fisheries Commission agreed to ban Russian and Norwegian fishing vessels from delivering catches to transport vessels flying flags of convenience. This was only one of the measures agreed upon by the two parties in an effort to limit illegal fishing activity in the Barents Sea. The ban includes all transshipment of fish to vessels not accepted as North East Atlantic Fisheries Commission (NEAFC) members, or onto vessels flying flags of NEAFC contracting parties or cooperating non contracting parties. In spite of this mutual agreement, Russian fishing vessels have continued this illegal activity at the same high level. The list also identifies which Russian fishing vessels that – according to our information – have participated in illegal transshipment of fish onto transport vessels flying flags of convenience" (Fiskeridirektoratet, 2004). WWF (2005a) reports that landing fish in both Russia and Norway is now fully controlled and the authorities of both countries exchange this kind of information. The main channel for unreported export involves vessels that reload at sea as well as the transshipment of unreported catches to third-party countries" (WWF, 2005a).

Illegal fishing remains a huge problem in the Barents Sea, (Kozlovsky *et al.* 2005). Matishov *et al.* (2004) state "Another factor affecting the unsustainable exploitation of fish is unregistered catches or poaching that leads to overexploitation. This illegal fishery amounts to 20% of cod in the Barents Sea."

"Regarding the north Atlantic, NEAFC has reported IUU fishing for redfish within its area. This was estimated at about 15000 t in 2004. In the Barents Sea there is an area similar to the Bering Sea's 'donut' hole, called the loophole, between the EEZs of Russia and Norway. There are continuing allegations about illegal cod catches, and although most of these appear to be illegal (unreported) catches taken in the Norwegian and Russian EEZs they amount to an estimated 100,000 t each year. Patrol efforts of the Russian Border Guard for the pollock fishery in the northwestern Bering Sea have included five state marine inspections. In 2004, 3,700 vessels were checked, 24 vessels were detained on infringements of state law, 333 t of illegal products have been confiscated, and fines amounted to over 67 million rubles (NEAFC)".

Vaisman (2001) reported that, "Investigators found evidence of illegal activities at virtually all levels of the fishing industry. Illegal practice in the sector proliferated during the 1990s. As the dependable state income and subsidies to those in the fishing industry dwindled in the early part of the decade, the need to find alternative sources of finance provided an incentive to make money by unauthorised means. A report focused on the Bering Sea trawl fisheries (not including salmon) estimated that illegal fishing activities in Russian waters resulted in an economic loss of between one and five billion US dollars per year (Vaisman, 2001).

In the Far East, there are large unrecorded landings by Russian vessels in Japan, China and Korea, avoiding stringent Russian port controls and condoned by corrupt officials in the host countries (Shchegoleva, pers. comm.). Clarke (2007), discussing illegal exports of salmon from Russian fisheries into foreign markets, states "Although it is commonly believed that a substantial amount of IUU fishing occurs in the waters of the Russian Far East, there are few data available to document the scope of activity. Given the high value of Russian seafood, particularly in neighbouring Japan, one would expect that a large proportion of IUU fishing products would be traded". She modelled catch and trade quantities and showed statistically significant quantities of excess catch (traded quantities in excess of reported catches) in 2005 in both models, with a strong suggestion of excess catch in 2003–2004. For these years the median quantities of annual excess catch were estimated to range from 8,000 to 15,000 t representing a value of USD40 to 76 million. These traded amounts are 150% to 190% of reported catches and compare closely with previous estimates suggesting that IUU activities in the Russian Far East represent an additional 40–60% above officially reported catch values.

In 2005, a Russian media report claimed that the illegal seafood trade between the Russian Federation and Japan was worth US$800 million in 2005 (IntraFish Media, 2006). It was also reported that in 2006, illegal seafood traded between Sakhalin and Japan amounted to 9,000 t (worth US$600,000) (ITAR-TASS, 2006). One news report stated that illegal seafood exports total about 60% of the value of Russia's legal seafood exports (IntraFish Media, 2006).

In the Russian crab fishery, when Professor Nobuo Arai of Hokkaido University compared Japan's imports of crab from the Russian Federation to Russian catch quotas for 2003, imports exceeded the quotas by 22,000 t, representing 143% of reported catches. "Professor Arai stated that illegal catches made their way to port by means of transshipment to cargo vessels, which prepared the legal documentation that allowed the crab to be traded through legal channels. In a comment on this situation, a Japan customs official from the Hakodate regional office stated that if the products were accompanied by the legally required documentation, it would not be possible for Japanese inspectors to know whether the origin of the product was actually legal or not" (Asahi Shinbun, 2006). Although these cases relate to total seafood and crab respectively, they suggest that illegal catches in the Russian Far East may comprise an additional 40–60% above catches represented in official statistics. They also indicate that large quantities of illegally caught seafood are exported. East Asian imports from the Russian Federation vary from 56% to 312% of reported Russian exports. In addition, Russian Customs statistics have also been declared unreliable for fisheries products, which are often transshipped at sea (Eurofish, 2005). While in theory fish transshipped to, and exported by, cargo vessels should be recorded in Customs statistics systems, there are administrative reasons why such products are not always recorded (Eurofish, 2005), as well as doubts about the accuracy of documentation produced by some cargo vessels (Asahi Shinbun, 2006).

MRAG (2005) reports, "Skippers have accused Russian fishermen of illegally trawling in the 60-square-mile conservation no-take fishing zone around the island of Rockall, 200 miles from the Scottish coast, which is vital to the conservation of local haddock stocks, whose breeding grounds are located in the area.

Local fishermen claim that despite being reported, the Scottish Fishery Protection Agency did absolutely nothing to prevent the illegal fleet from plundering the local grounds."

On target compliance, Hønneland (2004) comments, "Data on target compliance in Russian fisheries are not publicly available. We can assume that target compliance was generally high in the Soviet period, partly as a result of the absence of incentives to cheat (Honneland, 2004). The overall compliance level in the Russian part of the Barents Sea has decreased in the post-Soviet era. In 1992, Norwegian authorities took extra steps to calculate the total Russian catch in the Barents Sea that year; the figures indicated that Russians were overfishing at a rate of more than 100,000 t. The sudden rise in overfishing coincided with Russian fishers starting to deliver the bulk of their catches abroad, primarily in northern Norway. At the same time, exports directly to Norway gave the fishers more incentives to underreport catches (since they were better paid abroad), and reduced the opportunities for Russian authorities to keep track of the catches, as the Russian authorities only used to keep track of the catches offloaded in Russian ports. This greater motivation to violate the regulations probably led to a reduction in target compliance, although the joint enforcement regime with Norway put a stop to any chances for Russian fishers to conceal their real hauls from Russian authorities when delivering in Norway."

Russia has, however, helped to halt fishing in the international 'donut holes' in sub-polar waters. MRAG (2005) writes, "Several years ago there was concern about IUU fishing in two high seas areas surrounded by EEZ waters – the famous donut hole in the Bering Sea, bounded by the EEZs of Russia and the US, and a smaller peanut hole in the middle of Russian EEZ waters in the Sea of Okhotsk. The Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea – also known as the Donut Hole Agreement – was signed in Washington on 16 June 1994, by China, South Korea, Russia and the United States, with Japan and Poland signing later that year. Under this agreement, the Donut hole has been closed to fishing since 1997. The peanut hole was closed to fishing the following year by Russian action. US and Russian patrols are frequent and have not detected significant IUU fishing in these areas in the last few years.

Discards

Kelleher (2005) gives a figure of 47% for overall discards in Russia, with exceptionally high figures of over 80% for some fisheries. Matishov *et al.* (2004) write, "By-catch and discards in the Barents Sea are often side effects of the fishery for cod. According to expert estimates, the total excessive by-catch and discards amount to 30% of the total catch. The main causes of discards are: imperfections in the selectivity of the fishing gear, use of inappropriate or illegal fishing gear; and fishing in areas limited or banned for fishery. Trawling also has a negative impact on the fisheries (cod, catfish, perch, plaice, black halibut, American plaice) by way of destruction of bottom habitats."

A WWF (2004) report on drift net fishing for salmon in the Russian Pacific states that salmon fishing often involves discarding less-valuable species like humpback salmon. "Discards remain a serious problem. In the Barents Sea and adjacent waters, between 1993 and 2002, the Russian cod industry lost varying amounts of fish. In the 1993 to 1994 period, 1.7 to 1.8% of the catch was discarded, while in 1998, it accounted for 12.7% of the annual catch. The average over this ten-year period was 2%. The quantity of discarded fish was greatest in Russia's EEZ, where it accounts for – on average – 40% of the total annual discard, while the joint fishery area contributes up to 25% of discards. The minimum discard was recorded between 1993 and 1994. During this period, about three million specimens of cod – 1,700 to 1,800 t – were wasted. The maximum discard took place in 1998 when the quantity of discarded fish amounted to 22 million specimens of cod or 12,800 t. The bulk of discarded fish are small – typically cod aged three to four years that are very abundant in these areas. Aside from high levels of discarded fish, one negative characteristic of fisheries in the Barents Sea is illegal and unreported fishing by licence holders. They catch fish above and beyond their quotas. The Norwegian fisheries directorate and the country's coastguard were the first to calculate estimates for illegal catches of cods. They estimated the extent of over-fishing by Russian vessels in the Barents Sea between 2002 and 2003. A report, which was released at the beginning of August 2004, states that Russia had over-fished its quota by between 130 and 215,000 t during this period (WWF, 2005a).

"An assessment conducted by PINRO specialists for the first half of the 1990s showed that, owing to the process of by-catch, the real catch of redfish and wolf-fish exceeded the official data by 30–40%, the

uptake of plaice was 20–40% greater than official figures, while the catch of black halibut was 10–50% (Shevelev *et al.* 1995, cited in WWF, 2005a). Poor data on the actual by-catch means that it is rarely taken into account when TACs are proposed. The fishermen rarely have quotas and licences to utilise by-catch and are therefore motivated to discard it" (WWF, 2005a).

"Commercially highly valuable chum and reds are the main targets to pressure by salmon drift net fishing. High by-catch rates of immature species and underweight fish are observed, leading to the detriment of resources and loss of biomass. Due to the selective nature of the fish harvest (the largest, older fish age groups are harvested by drift net), the entire population structure is becoming more juvenile. More serious problem concerning drift net fishery impacts on pacific salmon populations because in order to achieve optimal commercial rates, the industry is aimed at harvesting the most valuable species such as red salmon, for instance, and less valuable species (pink salmon) are discarded" (WWF, 2004).

"The main part (above 70%) of the cod quota (Barents Sea cod) is traditionally utilised in directed trawl and long line fishery. Besides, cod makes up the main part of by-catches in long line fishery for other demersal fishes (in the Spitsbergen area and in the Grey Zone) and in trawl fishery for haddock (primarily in the Grey Zone and the REZ)" (WWF, 2005b).

Unreported catches in the commercial sector

There are reports of "Russian vessels fishing and underreporting catches from the Eastern Baltic cod stock in Estonian, Polish, and Latvian waters" (MRAG, 2005).

"Catch data is incomplete, because by-catch, discarded fish (discards) and illegal fishing are not fully accounted for in forecasts for commercial stocks – in particular cod and haddock (where virtual population analysis is used). Populations of these fish species are usually overestimated by between 15 to 30%, due to underestimating fish mortality, which includes by-catch, discards and unreported catches. For redfish, wolf-fish and halibut fisheries, the by-catch can account for as much as 40 to 50% of the official catch" (WWF, 2005a).

Note

This material is based on a country synopsis, with additional material, published by Pitcher and Pramod (2006).

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SENEGAL

Summary of information concerning IUU fishing

Illegal fishing

Both domestic and migrant fishers are engaged in illegal fishing to a small extent along Senegal's coast, although data from aerial surveillance indicates that IUU activity is less intense than in other countries in the sub-regional fisheries commission (SRFC) region. Drammeh (2000) reports that in the coastal waters off the West African sub-region, large-scale industrial vessels regularly encroach on small-scale fishing grounds. The vessels include pirate vessels and vessels operating with valid licences. Monitoring does take place through the Surveillance Operations Coordinating Unit of the SRFC in these countries, but at a low level, so IUU fishing along Senegal's coast is largely undetected and may be significant. The MRAG (2005) report on IUU fishing states that enforcement agencies report frequent border hopping by foreign vessels. The report also states that vessels flagged to Senegal, and particularly Senegalese artisanal vessels, also engage in cross-border IUU fishing in Guinea Bissau and Guinea, and that Senegalese purse seine vessels are engaged in IUU fishing for tuna. Results of aerial surveillance show that the number of infractions increased from 1% in 1995–1996 to 9% in 2001.

"In Senegal, the 6 nautical mile zone is reserved for artisanal fishers, established primarily to protect juvenile fish and to avoid conflicts between artisanal and industrial fishers. Fishing vessels over 250 t are only authorised to fish outside the 12 nautical mile zone. Apart from these regulations fishers are free to fish wherever they wish. This has caused conflict in some areas where fisher-farmers claim an exclusive right to the coastal waters adjacent to village land" (Sverdrup-Jensen and Nielsen, 1998). According to (Gueye, pers. comm.) although trawling is forbidden within the six nautical mile zone, it is not exclusively reserved for artisanal fishers, with even tuna vessels being allowed to operate within this jurisdiction. According to Abaza and Jha (2002) declining resource and competition have worsened the conflicts between industrial and small-scale sectors, with each sector scrambling to make the most of the shrinking resource.

The small-scale sector has also failed to implement mesh size regulations, leading to capture of even smaller sized fish in recent decades. In the surface gill net fishery, decline of fisheries catches has led to fishermen doubling the length of nets, sometimes increasing the length from 300 m to more than 1 km. The drop of the net has also increased considerably, allowing fishermen to catch fish at surface and bottom and has enabled fishermen to capture lobster even at depths of 200 m. Use of shrimp nets in estuaries to capture juvenile shrimp is common. Fishing of juvenile fish is also encouraged by strong demand from the fish meal factories in Dakar and traders from the Gulf of Guinea (UNEP, 2004). The demand for even smaller sized fish coupled with lack of human and logical resources has encouraged fishermen to openly use nets with 8 mm mesh size instead of the authorised 12 mm. The number of beach seine units operating through pirogues has been reduced, with boat sizes decreasing from 16 to 10 m and length of nets reduced from 1,000 to 200 m. However, this has not resulted in any improvement in fisheries as these units now undertake several trips a day instead of one trip with larger nets. The length of purse seine has doubled from 200 to 400 m over the last 20 years resulting in localised overfishing of coastal pelagic stocks in many areas (UNEP, 2004). To maximise profits, fishermen are increasingly using smaller meshed nets that catch everything in their passage. The widespread use of illegal monofilament and multi-monofilament nets has resulted in recruitment over fishing.

Along many sections of the coast, small-scale fishermen have been using explosives and poison to fish in rocky shore areas destroying breeding grounds of many commercial species. With the decline of the resource, the illegal use of explosives and poison, which was previously confined to Yoff, Ngor and Ouakam, has spread to other areas like Bargny, Ngaparou and Cayar.

The level of control on harmful fishing practices like use of dynamite, autonomous deep sea dive fishing using tanks, and the use of small-meshed monofilament and multifilament nets is poor. Sanctions and fines for illegal use of fishing nets and explosives have been inadequate in relation to the damage caused (UNEP, 2004).

SRFC helps in monitoring illegal fishing by foreign vessels in Cape Verde, Gambia, Guinea, Guinea Bissau, Mauritania and Senegal. The Regional Fisheries Commission (CSRP) also trains regional officers of fishing (air and maritime), the crews of the ships and patrol craft in these countries. MRAG (2005) reports that the states of Senegal, Mauritania and Guinea are better supported in MCS through donor contributions from Germany, France and Canada and so the situation has improved a lot in recent times with the activity moving to Guinea and Sierra Leone taking advantage of lax licensing and surveillance conditions there. "The EU is contributing €10 million in two major projects to support the SRFC in the fields of both control and surveillance, and fisheries management" (EU, 2006).

Discards

Discards are minimised to a large extent in domestic fisheries, due to consumption of most varieties of fish and demand for even smaller sized fish in the fish meal industry. In the foreign deepwater shrimp fishery along Senegal's coast, 63% of catch is discarded. The discards are reduced in shallow water trawl fisheries (approximately 34%) as the catch is increasingly directed to urban African markets. Senegal also requires shrimp trawlers to land a minimum of 15% shrimp to retain a shrimp licence, thereby creating an incentive to discard large quantities at sea. The total discard rate for Senegal is around 6.3% compared to its total landings (from 13 records of discards) (Kelleher, 2005).

No discards are reported for Atlantic yellowfin tuna fleets during 1950–1988 in the *International Commission for the Conservation of Atlantic Tunas* (ICCAT) region. However ICCAT reports both catches and discards without demarcation between landings and discards from 1989. So it is difficult to assess discards for those years. Landings including discards were approximately 2 t in 1989 increasing thereafter – in 2002, 447 t of yellowfin tuna were landed from Senegal (ICCAT, 2004).

Unreported catches

"The main problem that currently exists with this fishery is the validation of the data that have been reported. There is an incentive for the fleet to underreport catches inside the EEZ compared to those taken outside and thereby devalue the resource value of the EEZ, which will have a negative effect on the value the coastal states can obtain from future fisheries agreements" (MRAG, 2005).

FAO/CECAF conducts stock assessment of demersal fishes like hake, cephalopods and shrimps in the eastern central Atlantic zone. ICCAT also conducts stock assessment of tuna and bill fish stocks in this area. Age-based studies catch per unit of effort studies of *Merluccius polli* and *M. senegalensis* (hake) are also in place. The scientific sub-committee conducting stock assessments in the Fishery Committee for the Eastern Central Atlantic (CECAF) area concluded that *Pagellus bellottii* is fully exploited, *Pseudotolithus spp*. is over exploited, *Epinephelus aeneus* is over exploited and faces risk of extinction, *Parapenaeus longirostris* and *Penaeus notialis* shrimp stocks are over exploited, and *Sepia* spp (octopus) is over exploited. Further, there is a noticeable uncertainty in assessment of *Arius* spp, and *Octopus vulgaris* along the Senegal coast. Current assessment data for many stocks is not available because of uncertainties in the basic data making the assessments unreliable or inconclusive due to results using different data series (FAO, 2004).

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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SEYCHELLES

Summary of information concerning IUU fishing

Illegal fishing

MRAG (2005) writes that: "The Seychelles islands lie just to the south of the equator at the boundary of the southern gyre of the Indian Ocean, and which also incorporates the Nazareth and Saya de Malha Banks. As such, the most important fishery is for tuna, predominantly yellow fin, skipjack and bigeye with some albacore. Other large pelagic species are also taken such as swordfish and marlin. The combined measured catches of purse seines and longlines were 407,684 tonnes and 6,273 tonnes in the record year of 2003, giving a total of 413,957 tonnes. The total catch of the purse seine fleet in 2003 (407,684 tonnes) was said to be $407 million which amounts to $1000 per tonne of tuna. "

MRAG (2005) estimates "that when allowing for no illegal fishing from the purse seiners and only a modest amount of under reporting, around 10%, the volume of this extremely valuable commodity means losses are very sensitive to this factor. Thus, although careful checks are done in part, if purse seine vessels under report by only 10%, Seychelles looses over $17 million annually. Generally, however, the fishery is quite tightly regulated, largely because so much is landed and inspected in Victoria."

Table xxx Source MRAG (2005)

	Mean Recorded Catch (t)	Including Unreported (t)	Including Unlicensed (t)	Prob. Loss (t)	Price/t ($)	Loss Value ($m)
	74,137	81,550	81,550	7413	1000	7.41
Tuna	72.3	80	88	15.7	1,500	0.02
Shark +				169+	385	0.06
Total				7598		7.5

+ From BIOT, allow shark 3% of tuna longline catch.

Note

This materal is extracted from MRAG (2005).

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MRAG, 2005. *Review of Impacts of Illegal, Unreported and Unregulated Fishing on Developing Countries*. Available at: http://www.dfid.gov.uk/pubs/files/illegal-fishing-mrag-report.pdf [accessed July 2008].

SIERRA LEONE

Summary of information concerning IUU fishing

Illegal fishing

MRAG (2005) writes that, "Like Liberia, Sierra Leone has just emerged from a long period of civil strife lasting over a decade when the Government was unable to regulate and benefit from the fisheries. Before the conflict the fisheries were a major element of the economy. From the last statistics in 1986 there were some 79 registered vessels fishing in Sierra Leone waters, including more than 40 trawlers and 30 shrimpers, apart from purse seine and tuna vessels, many as part of a bilateral agreement with the USSR (Payne and Coutin, 1988). However, licences were cheap so this does not necessarily entirely reflect which vessels were fishing. Total recorded catch has been rising steadily since 1959, reaching 155,643 t in 1986. Of this, 40,000 t were from the artisanal sector, mainly sardine-like pelagics with the USSR taking another 87,000 t of small pelagics. Of the 28,222 t of demersals, the USSR and other foreign trawlers declared 24,245 t and local trawler companies 2,847 t. Shrimpers took 1,130 t of shrimp with a by-catch of 550 t of fish. At this time it was estimated that IUU vessels were taking another 10%. An overflight by the Lux–Development (LuxDev) Project during the time of conflict showed a high density of fishing vessels, 33% of which were illegal. Assuming that besides the artisanal fishery all the possible catch was being taken by IUU vessels due to lack of governance, estimated losses are shown below."

Table 31. Assessment of losses due to IUU fishing off Sierra Leone. Source MRAG (2005).

	1986 catch (t)	Present catch (t)	Probable catch loss (t)	Potential catch (t)	Potential loss (t)	Price/t ($)	Probable loss ($m)	Potential loss ($m)
Demersal	28,222=	14,111	14,111	45,096	30,985	1,500	21.17	46.48
Small pelagic	12,6421	40,000	86,421	133,000*	93,000	450	38.89	41.85
Tuna (ICATT)	?	2,000	2,000	?	2,000	1,500	3.00	3.00
Shrimp	1,130		565+	1,400	700+	8,000	4.52	5.60
Total			103,097		126,685		67.58	96.93

+assuming 50% since inshore and available; *based on biomass estimate of Stromme (1982); = allow 50% as commercial fishery re-emerging.

MRAG (2005) continues, "Therefore, if all recorded catches apart from the artisanal were lost to IUU, this would amount to a loss of $68 million with a potential loss of $97 million. However, it is unlikely that the small pelagics have been taken by IUU, which would reduce the probable loss to $29 million. This latter value (26% of total catch value as IUU) is comparable with the LuxDev estimate of around 30% illegal. Sierra Leone has very little capacity for MCS. It does have some aged patrol vessels but they are rarely operational, no VMS and a need for trained staff."

Note

This material is extracted from MRAG (2005).

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SOUTH AFRICA

Summary of information concerning IUU fishing

Illegal fishing

According to Hauck and Kroese (2006) the start of fisheries policy in 1995 provided incentives for informal fishers ('historically disadvantaged individuals') to engage in illegal fishing – because of apartheid they were denied legal access to resources on the grounds of race. The 'protest fishing' that ensued was intended to pressurise the government to grant legal access rights (Hauck, 1997; Tarr, 2000).

MRAG (2005) writes, "IUU fishing [apart from abalone] is probably at a low level in South Africa as a result of the high levels of MCS." Accurate catch data and control of illegal fishing are essential components of resource assessment as well as quota control (South African Government Information, 1997a). Land-based monitoring of the domestic fishery is extensive and has mostly been outsourced. Monitoring is generally good, but still inadequate in some fishery sectors. Monitoring of foreign vessel landings is thought to be inadequate (Japp, pers.comm.). Foreign tuna boats were excluded from the mid 1990s. However, foreign longliners (Japanese and Taiwanese) are thought to be actively fishing (in addition to about 120 licensed vessels) within South African waters, and many operate without permits (SADC, 2005; South African Government Information, 1997a). In 2004, illegal fishing lines were discovered 13 nautical miles off the east coast by recreational fishermen. The 150 m of floating lines were used to catch tuna or even sharks and run as long as 30 km and are suspected to have originated from a Chinese or Taiwanese boat (Anon, 2004a). But recently South Africa has introduced its own tuna and swordfish fishery with 50 permits: there are some foreign vessels fishing under joint venture agreements with South African rights holders. Ovambo fishermen from Namibia have illegally entered the local deep-sea fishing in Hout Bay, Cape Town. (Crush, 1999), but it is likely they work for South African vessels.

This 2005 assessment of the illegal fishing problem in South Africa has been recently confirmed by a new study (MRAG & CapFish, 2008), in which the illegal looses to offshore and inshore major pelagic and demersal fisheries was assessed as low but for coastal, particularly sedentary fisheries (lobster and abalone) the level of illegal fishing was assessed as being high.

Recent rights allocations as well as the ongoing allocation of rights (long term from 2006) exclude foreign rights holders through access rights. However, there are some JV agreements with foreign vessels, but this does not prevent illegal fishing (Japp, pers. comm.). The MCS system used in South Africa is highly sophisticated, but has lost some of its efficiency due to administrative and funding problems in recent years, resulting in a relatively weak monitoring of the main fisheries (SADC, 2005). Recently, an MCS programme was set up by the South African Development community (SADC) and the European Union to provide training and technical assistance to the government agencies that monitor and control fishing activity in five SADC nations: Angola, Mozambique, Namibia, South Africa and Tanzania (EJF, 2005).

Since 2002, the observer scheme has required between 15–20% observer coverage on all offshore fishing activities (but not inshore fisheries such as rock lobster and squid). All foreign boats have 100% observer coverage, and South Africa deploys observers on many vessels internationally in terms of MOUs (Japp, pers. comm.). However, monitoring, control and surveillance tend to be costly and the optimal extent of their use depends critically on the industry response (South African Government Information, 1997a). It is stated in the latest fisheries policies that industry will fund the observer programme directly from 2006. There is some discussion about having compliance observers (Japp, pers. comm.).

Application of the catch documentation scheme for toothfish – a small component of South Africa's fisheries – is fully operational and applies to all South African vessels or operators fishing for or trading in toothfish. South African authorities consider it mandatory for all toothfish landings to be accompanied by a *Dissostichus* Catch Document (DCD), regardless of whether the catch was in the Convention area or not. South Africa continued to participate in the electronic-CDC trials with its nominated vessel, the *South Princess* (South African Government Information, 2004). In 1997, an estimated 5,000 t of toothfish, valued at approximately US$12 million, were illegally removed from South Africa waters, more then twice the 2,400 t TAC set to ensure the sustainable utilisation of this resource (South African Government

Information, 1997b). In the same year, the South African Cabinet took a decision to mount a joint operation among various government departments to enforce South Africa's EEZ around the Prince Edward Islands. This operation involved the Departments of Environmental Affairs and Tourism, Foreign Affairs and Justice and the South African National Defense Force, and was in response to reports of an increase in illegal fishing in South Africa's waters (South African Government Information, 1997b). However, recently the fishery off Prince Edward Islands has decreased; only two boats are reported as being active (probably because stocks have already been depleted illegally).

Abalone poaching is the single biggest illegal fishery in South Africa in terms of value. In recent years a lucrative market in the Far East for rock lobster and abalone has stimulated an escalation in illegal fishing activity (South Africa Government Information, 1997; Hauck and Sweijd, 1999; Jordan, 1998). This is particularly serious in the case of abalone and has resulted in virtual elimination of the commercial and recreational fisheries. Gang-related (Chinese Triad) smuggling and money-racketing is associated with severe poaching. 23% of the world illegal abalone trade comes from South Africa (MRAG, 2005). MRAG (2005) reports, "Over 90% of abalone harvested in South Africa is exported, primarily to Hong Kong, but also to China, Japan, Malaysia, the Republic of Korea, Philippines, Singapore and Taiwan. Records from the Census and Statistics Department of Hong Kong show that over 200,000 kg of frozen shucked Perlemoen and over 100,000 kg of dried Perlemoen were imported into Hong Kong from Mozambique, Namibia, Tanzania, Swaziland and Zimbabwe during 2002 and the first six months of 2003. Since Perlemoen is endemic to South Africa, it is suggested that all the imported Perlemoen was harvested illegally in South Africa and smuggled into the other African countries (the exception being Namibia) and re-exported to Hong Kong." Two South African skippers convicted of overfishing west coast rock lobster quotas by 64 t during 1999–2000 were fined US$100,000 (Anon, 2002).

There are no adequate resources to deal with this issue, despite local government initiatives to set up a dedicated police squad. An attempt is being made to introduce TURFs to encourage local enforcement (Cochrane (2000). Between August 2002 and January 2003 the South African Police Service (SAPS) made 431 arrests on charges of abalone poaching during which abalone worth US$1.3 million were confiscated. Police also impounded 66 vehicles and boats; the black market price ranged between US$95–$130 per kg during this period (Anon, 2003). South Africa's Department of Environmental Affairs and Tourism estimates that as much as 1,600 t of abalone is illegally removed from South Africa's waters each year. The poachers evade capture by using rigid inflatable boats with twin outboard motors capable of reaching speed of 50 knots (Anon, 2006).

The management of many resources suffers due to inadequate measures to control catch or effort (e.g., the handline fisheries for hake and other linefish stocks). In particular, there is inadequate control of no-take zones. For example, extensive large-scale poaching of crayfish has occurred in many of the reserves along the coastline for the last 30 to 40 years (Hutton, pers. comm.). An investigation of rangers' reports (NPB Archives, Queen Elizabeth Park, Pietermaritzburg) dating back to 1947, when custodianship of the St Lucia Game Reserve was first taken over by the Natal Parks Board (NPB) revealed that illegal gill netting started in Lake St Lucia in the late 1960s (Mann, 1995). Since 1987 the NPB has kept accurate records on the length of net confiscated, the number of hours spent on anti-netting patrols and the number, mass and type of fish found in the nets (Mann, 1995). Illegal and seine netting has taken place in northern parts of the Lake St. Lucia Game Reserve since the 1960s. In the line fishery, 28 people were arrested in Mossel Bay in connection with illegal fishing in 2004. The arrested included seven fishery 'monitors' who had to ensure fish landings complied with quotas. All 28 were charged with theft, fraud, and contravening the Organised Crime Act & MLR Act (Anon, 2004b).Approximately 72 people were caught actively fishing with nets in the reserve during 1992 and their annual catch was estimated at between 91 and 135 t (Mann, 1995).

Locally within the South African EEZ there is likely to be a strong shift towards alternative fishing techniques, with a view to capacity-building and greater utilisation of available resources. A prime example is the present hake-directed fishery. If large-scale longlining is ultimately introduced, it is expected to have serious management implications even if the resource implications have been assessed. Worldwide, there is a trend to avoid increasing levels of effort and to retain catches at a sustainable level. The introduction of more vessels into the hake fleet will place a huge additional burden on the monitoring and control of the largest and most valuable fishery in South Africa. VMS will facilitate tracking of vessels into and out of zones that may be introduced for separating trawl and longline fleets. It will permit real-

time tracking and control of vessels (longline and trawl) as well as instant data capture once a suitable database support system has been introduced.

Discards

South Africa does not have an across-the-board no-discards policy (Kelleher, 2005). South Africa apparently prohibits discarding in the hake and sole fisheries (FAO, 2004), but it is known to occur (Japp, pers. comm.); for example, 14% discards were estimated in the industrial hake bottom trawl fishery (Walmsley *et al.* 2003). In the purse seine fishery for small pelagics, 44% discards are reported. Kelleher (2005) states that, "By-catch quotas in the horse mackerel fishery have resulted in pilchard and anchovy discards in the order of 30,000 t in the past and the hake trawl fishery has a similar quantity of discards."

Substantial discards occur in South Africa in the small trawl fishery (FAO, 2004). In the mid-water trawl there is very low by-catch as there is 100% observer coverage and a 3% limit on by-catch of hake in this fishery (Japp, pers. comm.). "The south coast trawl fisheries targeting hake, sole and monkfish have discard rates ranging from 4.1 to 19.2%. The highest discard rate (70%; juvenile sharks and kingclip) is recorded from the KwaZulu–Natal shallow-water prawn trawl fishery" (Kelleher, 2005).

Cochrane (2000) evaluates total catches of sardine and anchovy, including annual variability, and reports substantial increases of by-catch of juveniles of sardine in the anchovy fishery. South Africa has a specific system of by-catch quotas (FAO, 2004), which are used in the small pelagic and hake fisheries. By-catch in hake longlines is now thought to be significantly lower (Japp, pers. comm.). Most of the by-catch in gill nets and beach-seine fisheries in Western Cape consisted of immature, under-sized fish that were often injured or killed during entanglement (Hutchings and Lamberth, 2002).

During the late 1990s a programme was developed to reduce discards in the west coast rock lobster fishery, resulting in an increase of the minimum size (FAO, 2004). Squid jig and abalone (diver) fisheries in South Africa have zero discard rate (FAO, 2004).

Overall, discarding in South Africa has not been adequately quantified. Kelleher's (2005) average figure of 10%, with 45% in crustacean fisheries, is said to be a very rough estimate: the data are based on observer reports since 2002 which have not yet been fully analysed, but increased observer coverage is thought to have significantly reduced discarding (Japp, pers. comm.).

Unreported catches

In 2004, incorrect reporting of pelagic fish catches, were discovered through VMS signals. A small boat reported visiting port five times, while its VMS showed that it had actually visited six times. The larger boats recorded seven visits in a month, whereas their VMS showed that they had visited port on 10 occasions (Maritime Southern Africa, 2004).

According to Lamberth and Turpie (2003) an estimated 2,480 t of fish is landed from 255 estuaries in South Africa every year. Of this total estuarine catch, 50% comes from commercial seine and gill net fisheries, 46% from recreational angling and 4% from traditional trap and spear fisheries, with a total catch value worth R433 million per year.

The shore-based line fishery has 412,000 anglers, but only limited aspects of the ski-boat, shore and spear fisheries have been subjected to detailed investigation (Penney *et al.* 1999)

Recreational fishing is very important in South Africa, where approximately half a million rand is provided to the economy (Martin and Nielsen, 1994). There has been, however, a failure to control the growth of the recreational shore-angling fishery, where it was suspected of having a significant ecological impact (Cowley *et al.* 2002). This situation is said to have improved recently (D. Japp, pers. comm.).

Note

This material is based on a country synopsis, with additional material, published by Pramod *et al.* (2006).

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Table 32. South Africa illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	#f IUU vessels	Action taken
1	Patagonian toothfish	1996	IUU	Unknown	1	[1] Vessel *Ekuelle* was reported taking on substantial tonnages from South Africa
2	Patagonian toothfish	1997	IUU	Belize	1	[2]Chile registered vessel *Magallanes I* reported landing toothfish in South African port
3	Patagonian toothfish	2002	IUU	South Africa	1	[3]Vessel *Viola* discharged approximately 5 t of Patagonian toothfish in Cape Town harbour without a permit; vessel seized by the South African authorities for failing to have a DCD in late 2002; at the time, the vessel was flagged to Uruguay; vessel has since been sold – currently has licence for fishing on high seas excluding toothfish
4	Patagonian toothfish	2003	IUU	Uruguay	1	[4]A cargo of nine containers of Patagonian toothfish off-loaded at Cape Town harbour, after allegedly being discharged from a Uruguay-registered fishing vessel *Lugal Pesca* in Walvis Bay harbour, Namibia; cargo of 200 t seized; believed that the nine containers were due for onward carriage to Singapore from where the consignment was destined for either China, Hong Kong or LA
5	Patagonian toothfish	2001	Unreported	South Africa	3	[5]Three vessels seized in Cape Town (*Cape Flower*, *Eagle Star*, *Arctic Fox*); The company (Hout Bay Fishing Industries (Pty) Ltd.) also managed Namibian-flagged vessel *Mare*, which evaded arrest
6	Sharks and rays	2001	Illegal	Taiwan	1	[6]Taiwanese trawler *Shuen Kuoll* arrested at Port Elizabeth; catch onboard indicated fishing in warmer waters (possibly Mozambique) and included sharks, a young whale and the highly endangered Brindle bass
7	Patagonian toothfish	2001	Illegal	Unknown	1	[7]Fisheries officers seized a container containing about R3 million worth of Patagonian toothfish and rock lobster allegedly caught illegally; shipment was bound for the United States
8	Patagonian toothfish	2002	IUU	Bolivia	1	[8]Documents found onboard arrested vessels *Lena* and *Volga* suggest vessel *Eva* fishing illegally around Kerguelen Plateau
9	Lobsters	2001	Unreported	South Africa	1	[9]Vessel *Eagle Star* forfeited for over catching deep sea lobster; SA Fisheries Department purchased the vessel from Asset Forfeiture Unit of the South African Police Service for use as patrol vessel
10	Lobsters	1999–2000	Illegal	South Africa	18	[10]Vessels *Marion Dawn* and *Star of the Sea* implicated when The Hout Bay Fishing company pleaded guilty to 329 charges of overfishing and corruption and were ordered to pay fines and penalties amounting to R40 million ($4 million); both ships supplied legal and illegal catches to Hout Bay Fishing Industries
11	Rock lobster	1999–2000	Illegal	South Africa	1	[10]Vessel *Sandalene* implicated as rock lobster carrier; traders paid R75 ($7.5) per kg for legal catches and

						between R15 and R20 ($1.5 to $2) per kg for rock lobsters landed illegally; one individual ordered to pay R824,000 in fines and penalties, another fined R150,000
12	Snoek	2005	Illegal	South Africa	1	[11]Fisheries compliance officers of DEAT seized 64.5 m trawler *Sandile*; charged with targeting 300 t snoek as by-catch when vessel was licensed to catch hake and horse mackerel
13	Finfishes nei	2005	Illegal	China	1	[12]Vessel *Da Yuan Yu # 139* arrested after ignoring inspection calls; vessel had a permit to be in possession of fishing gear but no authorisation to fish in South African waters
14	Abalone	2005	Illegal	South Africa	1	[12]Two DEAT vessels intercepted a vessel suspected of abalone poaching; high speed inshore craft together with diving gear and other equipment seized and nine persons onboard arrested
15	Hake	2000	Illegal	South Africa	1	[13]27.6 m stern trawler *Cobelo* confiscated for exceeding hake quota of Hout Bay Fishing Company by 912,818 kg in 2000; vessel auctioned in South Africa for R2.9 million ($346,000)
16	Toothfish	2004	Illegal	Japan	1	[14]MCM's enforcement staff suspect vessel *Shinsei Maru* fishing illegally in South Africa's EEZ around sub-Antarctic Marion Island
17	Rock lobster	2004	Illegal	South Africa	1	[15]Master of trawler *African Queen*, owned by Bay-King Fishing, arrested for illegal fishing
18	Hake	1995	Illegal	South Africa	1	[16]Marine inspectors seized 22 km gill net from Spanish 40-metre deep sea trawler *Sistro* in Cape Town; captain arrested, granted $5,500 bail pending court appearance
19	Finfishes nei	2007	Illegal	North Korea	1	[17]North Korean flagged, Panama-owned vessel arrested in Durban Harbour after she was found to have drift nets on board; officers discovered 60 km of nets and fined the owners R400,000; owners (Meteora Developments Inc. of Panama) pleaded guilty in Durban Magistrates Court
20	Finfishes nei	2006	Illegal	Mozambique	1	[18]Skipper and owner of the Mozambique-registered vessel *Twanano* pleaded guilty to illegal fishing charges; conviction followed 2006 arrest of the vessel and her 15 crew off Kosi Bay in South African waters allegedly within the sanctuary area of the Maputaland Marine Protected Area
21	Rock lobster	2003	Illegal	South Africa	6	[19]DEAT officials, using VMS signals, seized six vessels for breach of permit conditions; vessels alleged to have fished in a prohibited area off Cape Hangklip in shallow waters frequented by berried female lobsters
22	Rock lobster	2003	Illegal	South Africa	16	[20]Using VMS signals DEAT officials seized another 16 vessels for breach of permit conditions; he vessels alleged to have fished in a prohibited area off Cape Hangklip in shallow waters frequented by berried female lobsters
23	Squids	2003	Illegal	South Africa	1	[21]Skipper of squid vessel *Loise Marie* fined R440,000 for hiring excess crew, additional fine of R20,000 for not submitting catch returns and R20,000 for not having updated logbook onboard
24	Geelbek *Atractoscion aequidens*	2003	Illegal	South Africa	1	[22]Skipper, owner and seven fishermen arrested after 115 Geelbek (423 kg) found on vessel *Young Guns* (only 10 per person allowed as per recreational licence); only three of the seven boat licence; boat and jeep were
25	Pelagic fish	2003	Illegal	South Africa	1	[22]Pelagic boat detained for fishing in a closed area; 110 t of pelagic fish confiscated
26	Rock lobster	2003	Illegal	-	-	[23]Six rock lobsters seized and ten poachers arrested

27	Rock lobster	2004	Illegal	-	-	[24]390 west coast rock lobster were seized during 'Operation Neptune'
28	Shark fins	2004	Illegal	-	-	[25]3 t of shark fins seized from four different premises in Cape Town harbour when operators failed to produce valid fish processing permits
29	Rock lobster	2004	Illegal	South Africa	1	[25]100 kg of rock lobster tails seized from a vessel; tails packed between ice and hake
30	Rock lobster	2004	Illegal	South Africa	1	[26]14 people arrested for illegal possession of more than 1,000 west coast rock lobsters; boat seized
31	Rock lobster	2006	Illegal	South Africa	1	[27]Two men arrested poaching for west coast rock lobster; boat, nets and 60 rock lobsters confiscated
32	Tuna and Slinger	2006	Illegal	South Africa	1	[28]Fishing vessel arrested for illegal fishing inside the Pondoland MPA. Four tuna and one slinger found on the vessel
33	Rock lobster	2006	Illegal	-	-	[29]Two men arrested after police found them in possession of 833 west coast rock lobster tails
34	Rock lobster	2006	Illegal	-	-	[30]Southwest coast arrest; 2,166 rock lobsters seized
35	Rock lobster	2006	Illegal	-	-	[30]West coast arrests; 2,170 rock lobsters seized
36	Shark fins	2006	Illegal	-	-	[30]292 shark fins seized on the east coast during DEAT enforcement operations
37	Rock lobster	2006	Illegal	-	-	[31]233 rock lobsters seized during enforcement operation
38	Rock lobster	2007	Illegal	-	-	[32]During enforcement operation by DEAT and SAPS 560 west coast rock lobsters confiscated; two people arrested and rock lobster returned to the ocean
39	Rock lobster	2007	Illegal	South Africa	1	[33]10 west coast rock lobsters seized; 9 m boat seized
40	Red steenbras	2007	Illegal	South Africa	1	[34] Vessel *Atlantic Blessing* caught fishing illegally for red steenbras; license only valid for tuna pole line fishery; 70 red steenbras fish (717 kg) seized also geelbek, roman, red stumpnose, and yellowtail most of which are threatened and/or collapsed line fish species
41	Rock lobster	2008	Illegal	-	-	[35]Abalone rights holder arrested for illegal possession of more than 30 west coast rock lobster tails
42	*Polystegan us undulosus*	2008	Illegal	-	-	[36]Three poachers arrested for catching seven *Polysteganus undulosus* – prohibited species in recreational and commercial fisheries; poachers fined R1,000 each
43	Rock lobster	2008	Illegal	South Africa	1	[37]Line fish right holder and five crew arrested for illegal catch of undersized west coast rock lobster; vessel *Wille Hans*; only 300 of the 1,703 confiscated lobsters were of legal size

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Table 33. South Africa illegal fishing incidents (abalone).

No.	Date	Quantity of illegal catch confiscated	Action taken (Source)
1	2001	370,000 specimens	Catch seized (Anon, 2002a)
2	1998	100,000 specimens	Catch seized (Anon, 2002a)
3	22 August 2001 – 9 January 2002	191,649 specimens	Catch seized (Anon, 2002a)
4	10 September 2002	16,000 specimens	Catch seized (Anon, 2002b)
5	January–November 2002	11 t	Catch seized (Anon, 2002c)
6	17 November 2002	500 kg	Catch seized (Anon, 2002c)
7	2001	228 specimens	Two men arrested and sent to jail for six months (Anon, 2003a)
8	2003	916 (17 bags)	Ten poacher s arrested (Tau, 2003)
9	December 2002	950 kg	Quantity of abalones confiscated in the month of December (Tau, 2003)
10	September 2001 – February 2003	188 t	Catch seized (Anon, 2003b)
11	December 2003	1.5 t	Poacher fined R35,000 (Moses, 2003)
12	13 January 2004	2,307 shucked abalone	Two people arrested (Makwakwa, 2004)
13	15 January 2004	11,963 specimens	Nine people arrested (Makwakwa, 2004)
14	17 January 2004	438 specimens	Three people arrested (Makwakwa, 2004)
15	18 January 2004	2,260 shucked abalone	12 poachers arrested and a 7.5 metre boat with two 115 HP engines seized (Makwakwa, 2004)
16	23 September 2004	239 specimens	Five people were arrested for illegally fishing inside MPA, near Miller's point in False Bay (Moses, 2004)
17	5 February 2005	1,500 specimens	Nine people were arrested (Louw, 2005a)
18	26 August 2005	82,000 specimens	36 convictions for three months from June to August 2005 (Louw, 2005b)
19	11 January 2005	176 specimens	120 poachers stopped (Louw, 2005c)
20	October 2005 – December 2005	59,262 specimens	1,200 poachers were prevented from diving (Moses, 2006)
21	January 2006	3216 specimens	Catch seized (Moses, 2006)
22	8 March 2006	3 t	Five men arrested (Louw, 2006a)
23	8 March 2006	1,600 specimens	One woman arrested (Louw, 2006b)
24	24 April 2006	1 t shucked abalone (25 boxes each weighing 40 kg)	The driver and passenger of the vehicle fled the scene (Louw, 2006b)
25	18 May 2006	185 large abalone	The fishing vessel dumped the bags at sea before fleeing the place (Scott, 2006a)
26	18 May 2006	50,000 wet and dry abalone	Confiscated from an illegal abalone processing farm on land (Scott, 2006b)
27	19 May 2006	14,000 (1 t)	Confiscated at Cape Town Intl. Airport (Scott, 2006b)
28	21 May, 2006	1,200 specimens	DEAT officials found the abalone at a diving site near Cape Receife, near Port Elizabeth; 20 divers fled the scene (Louw, 2006c)
29	26 May, 2006	9,974 shucked abalone (815 kg)	SAPS Organised Crime and Departmental inspectors arrested one person (Louw, 2006c)
30	April 2006	24,770 specimens	Three accused face imprisonment (Louw, 2006d)
31	June 2006	10,035 specimens	29 people arrested, two vessels seized (Louw, 2006d)
32	June 2006	60,126 specimens	329 arrests in Overberg (Louw, 2006d)

33	June 2006	86,866 specimens	Southwest coast (99 arrests) (Louw, 2006d)
34	June 2006	73, 258 specimens	East coast (118 arrests) (Louw, 2006d)
35	16 October 2006	3,058 specimens	Two people arrested in two separate cases (Manale, 2006a)
36	July–September 2006	65,752 specimens	13 people arrested and fined (Manale, 2006a)
37	23 October 2006	3800 (29 bags)	Four people arrested (Manale, 2006b)
38	23 October 2006	20,600 specimens	11 people arrested at a farm (Manale, 2006b)
39	23rd October, 2006	10,780 specimens	Two people arrested at a house (Manale, 2006b)
40	23 October 2006	5,600 specimens	Six suspects arrested (Manale, 2006b)
41	2 February 2007	18 chest freezers with shucked abalone	Three people arrested (Manale, 2007a)
42	2 February 2007	700 specimens	One person arrested (Manale, 2007a)
43	11 April 2007	6 t	Six suspects arrested (Manale, 2007b)
44	24 April 2007	289 specimens	Nine people arrested (Manale, 2007c)
45	25 July 2007	18,500 specimens	Four men and one woman arrested (Scott, 2007a)
46	15 August 2007	2,067 specimens	Three people arrested (Scott, 2007b)
47	19t December 2007	35,000 specimens	Five men arrested. The department busted an illegal abalone processing warehouse near Hopefields, along the West coast (Moses, 2007)
48	25 January 2008	1,162 specimens	Three people arrested (Moses, 2008a)
49	14 February 2008	77 specimens	15 suspects arrested (Moses, 2008b)

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SOUTH KOREA

Summary of information concerning IUU fishing

Illegal fishing

Illegal fishing has been a major obstacle to the growth of South Korea's fishing industry. "Major fishery policies employed traditionally in Korea for fishery management include input control (a licence system and gear and vessel restrictions) and technical measures (closed seasons and areas and controls of mesh sizes). In particular, a licence system to limit entry into fisheries has been the main tool for fishery management for the last 50 years. However, the licence system has exposed the difficulty of adjusting excessive fishing efforts and accelerated the depletion of fishery resources by continued illegal and excessive fishing. As a result, Korean fishery policy has become more resource management oriented to harmonise the efficient management and exploitation of fishery resources. For example, in order to enhance the fisheries resources within the Exclusive Economic Zone (EEZ), a variety of measures were adopted, such as improvement of the natural environment of fishery resources, cleansing of fish farming, resources buildup and production of an environmentally friendly aquaculture fishery. In addition, a TAC system based on output control was adopted in 1999 for the first time on a trial basis for four species. In 2004, nine fish species were applied to the TAC. The TAC system aims to ensure an optimal management system for sustainable fisheries and to control fishing capacity" (MOMAF, 2005) .

In a statement made in 2004, the government set the eradication of illegal fisheries as a top priority to recover fish stocks in Korea's coastal and offshore areas. The government pledged a scale up of control and surveillance activities; stricter control of illegal aquaculture fisheries, sales and transport of fishery products caught illegally, and loading of illegal fishing gear; strengthening of punishments and fines for ongoing illegal fishing; and seizure of illegal fishing vessels, fishing gear and fishery products. The government also announced that US$42,000 would be provided to each fishing vessel involved in illegal fisheries to help fishermen convert to legal activities. The Ministry of Maritime Affairs and Fisheries (MOMAF) has since pushed forward strict regulations via monitoring, control, and surveillance activities, and undertaken projects to purchase and discard fishing ships engaged in the illegal fishery. A VMS has operated since 2005.

Patrolling is effective in preventing illegal fishing by foreign vessels because there is a strong military presence in the EEZ and nearby international waters, particularly along the maritime boundary with North Korea. However, some illegal fishing problems are reported in Ryu et al (2006) and in OECD reports (OECD, 2001; OECD, 2003; OECD, 2005; OECD, 2006). Specifically, the number of foreign vessels arrested for fishing violations rose year-on-year from 80 to 450 between 1999 and 2004, and the number of domestic vessels arrested for fisheries violations over the same time period was about 2500 per year (OECD, 2005). The South Korean government has also initiated patrolling measures with China to prevent illegal fishing in the South China Sea. MOMAF is principally responsible for management of offshore and distant water fisheries, while the management of coastal stocks is delegated to local governments at provincial and district levels.

In coastal waters the management of nine principal fisheries has been regulated through TACs since 1999. Fisheries resources are managed through a range of measures from mesh size regulations, fishing seasons and control of fishing grounds through co-management. Since 2001, co-management has been implemented in 122 fishing villages to prevent illegal fishing and enhance fishers' incomes (OECD, 2005). MOMAF has also taken several steps to control illegal fishing by expanding TAC to more species, initiation of a National Plan of Action to control illegal fishing, control of purchase of unregistered small-scale fishing boats and further decentralisation of power to local communities via a strategic management plan SMP (Shin, 2006).

The incentive-based SMP is seen as a viable tool in preventing illegal fishing at regional and local levels. Even with strong and continuous enforcement by federal government, illegal fishing persisted because of the influx of fishers who fished illegally for subsistence rather than to make profits. The economic crisis and low fish prices caused income to fall and compounded the situation. The government sees the implementation of SMP as a viable alternative – sustainable management at local level can lead to

increased production, decreasing incentives for illegal fishing. Further, communities are capable of providing better enforcement for tackling illegal fishing originating from within their own and other communities, allowing central government to tackle foreign illegal fishing for large offshore fisheries (Lee *et al.* 2006).

Discards

According to Ryu *et al.* (2006) most of the commercial TAC stocks exploited within Korean EEZ have by-catch problems. Although the by-catch rate of most TAC species in the large purse seine and offshore trap fishery has been low in recent years, the by-catch rate of diver-based fisheries in villages has increased. The authors further state that the output control systems (OCSs) within TACs, through transferability of rights, can decrease by-catch problems as fishers can buy quota or sell their by-catch to those who have the quota for the species concerned. However, the absence of transferability has left little choice for fishers but to discard non-quota species.

Unreported catches in the commercial sector

According to Ryu *et al.* (2006) the Korean TAC has failed to give the desired outcomes, with majority of TAC stocks in poor condition. The reason for this decline is resistance by fishers and fisheries industry for lower TACs, which was further compounded by government setting higher TAC levels to obtain leverage for fisheries agreements with adjacent nations exploiting the transboundary stocks in this region. Another problem with TAC allocation in Korea is that at present the quota is equally allocated by vessel, but it fails to check the catching ability of fishers and vessels involved in quota allocations resulting in under-reporting and quota busting. Further, according to Ryu *et al.* (2006) "the current reporting requirements of the TAC system depend upon an upward one-line system in which fishers report their catches to distributors or sellers and then the distributors or sellers report the information to their upper organisations (Fishery and Agriculture Wholesale Marketing Center, MOMAF, etc.). As a result, it is difficult to assess the accuracy of their reports, because the system does not allow for crosscheck of data reported by fishers and sellers."

Unreported catches in the artisanal sector

Domestic fishery catch data are reported for the total group as fishes and not for different fish species separately. Hence it is likely that there are no records of removals of stock over the whole life cycle. Along the Korean coast, more than 2,000 grass-roots fishing village organisations and hamlets with small ports are dependent on small-scale coastal fishing activities. Some 85% subsist mainly with small-scale coastal fisheries, in which people use engine-powered vessels of less than five tons to engage in various pursuits. They have been major targets of government financial aid. Small-scale fisheries comprise a large part of the Korean fisheries, and are a cornerstone of fisheries cooperatives (Shin, 1999). Information on the inshore vessels is limited. While catch is recorded, the level of effort expended by each gear type is not uniformly collected. Further, catch information is not available on an individual boat basis. MOMAF records monthly landings for 38 fishing gears relating to 105 marine fishery species. Data on days fished, produced by the National Federation of Fisheries Cooperatives (NFFC) are not recorded for eight of the gear types participating in coastal fisheries. For these reasons, it is difficult to choose one gear type for calculating average catch per unit effort (Chae and Pascoe, 2005).

Recreational fish catches

Recreational fishing is very popular in Korea. Boats of less than 10 gross tonnage are reported to engage in angling during off seasons for commercial fishing. Recreational boats are required to be registered with local government. In 2004 there were 5,191 boats and 1,880,000 registered recreational fishers (OECD, 2005).

Note

This material is based on a country synopsis, with additional material, published by Varkey *et al.* (2006).

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Table 34. South Korea illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Finfishes nei	2001	Illegal	China	121	[1]121 Chinese vessels arrested for illegal fishing in Korean waters during 2001
2.	Finfishes nei	2002	Illegal	China	81	[1]Between January and June 2002, 81 Chinese fishing vessels captured for illegal fishing
3.	Blue crabs	2001	Illegal	China	8	[2]During a five-day period 87 Chinese fishermen from eight vessels detained for illegal fishing in South Korea's EEZ. Most problems occurred in Korea's West Sea where Chinese vessels were fishing for blue crabs
4.	Finfishes nei	2007	Illegal and unreported	China	510	[3]In 2007, 510 Chinese vessels arrested by Korean coastguard for fisheries violations within the Korean EEZ; of these, 26 vessels were caught within territorial waters, most violations related to unreported catches and failing to keep fishing records
5.	Finfishes nei	2005	Illegal	China	3	[4]35 fishermen onboard three trawlers charged with illegally fishing 1.5 miles into the South Korean EEZ in the Yellow Sea; fined a total of US$120,000.

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SPAIN

Summary of information concerning IUU fishing

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

Spanish vessels and companies are frequently implicated in conducting illegal and unreported fishing. On May 30, 2005, the EC issued a report on the serious infringements to the CFP that occurred in 2003. Out of 9,500 infringements, 88% were caused by five Member States, including Spain (MRAG, 2005). These serious infringements included unauthorised fishing, fishing without a licence or permit; using prohibited methods or keeping on board prohibited fishing gear; and landing, storing, processing and placing on sale fishery products while not complying with the rules (EC, 2005). In 2004 Spain purchased two patrol boats for fishery law enforcement in Spanish waters, but recent attempts to reduce illegal fishing have been unsuccessful. Some Spanish individuals and companies continue to operate vessels engaged in illegal fishing outside the Spanish EEZ, the most celebrated being Vidal Armadores S.A., owners of the blacklisted Viarsa 1 and the recently de-registered Paloma V, both of which were involved in illegal fishing for toothfish (Fishupdate, 2008; Anon, 2008).

In 1998, researchers commissioned by TRAFFIC monitored the landings of 13,895 swordfish and 18,225 bluefin tuna in Spain. They found that percentages of fish under the ICCAT-specified size in landings sampled were well in excess of the 15% allowed for swordfish in the North Atlantic (37% of 254 fish) and bluefin tuna from the Atlantic (51% of 17,971 fish) and the Mediterranean (83% of 254 fish) (Raymakers and Lynham, 1999). Spain is just one member of the ICCAT that has had difficulty catching swordfish within the size limits established by ICCAT, affecting the recruitment of this population by these non-selective gears (Raymakers and Lynham, 1999). For example, published data indicated that in 1997 a vast majority (>75%) of the swordfish landed by the Spanish longliner fleet was smaller than the minimum size allowed by ICCAT. For this reason, Spain was chosen for pilot investigations on compliance with minimum sizes for swordfish and bluefin tuna, two species under ICCAT jurisdiction (Raymakers and Lynham, 1999).

Spain has consistently exceeded permitted tolerance for undersized bluefin tuna caught from the eastern Atlantic since 1994. Spain's compliance with ICCAT's minimum size requirements for bluefin tuna taken from the Mediterranean has been slightly better, exceeding specified limits in only two years in the period from 1993–1997 affecting the assessment for these stocks (Raymakers and Lynham, 1999). Fishing with rod but without bait, a gear known in Spanish as 'saltillo', is no longer being used for bluefin tuna because it catches large numbers of immature tuna, but the practice flourished several years ago (Raymakers and Lynham, 1999).

The reduction in the minimum landing size (MLS) in the hake fishery could have a negative impact on stocks because Spain consumes and has a market for very small hake (Kelleher, 2005). In fact, infringement procedures have been instituted by the EU because of unsatisfactory control by the national authorities of technical conservation measures in Spain and consequent catching and/or marketing of under-sized fish (CFPCS, 2002).

The port of Las Palmas in the Canary Islands is a well-known centre of IUU fishing activities and an entry point to the EU market for illegally caught fish products (EC, 2005).

Discards

Kelleher (2005) considers discard rates in Spain too diverse to be grouped: they fall within the range 1%–45%, with trawl fisheries at the top end. Fisheries with the highest discard rates in European waters include those in Portugal, Spain and France targeting sardine, mackerel and anchovy. Discards in these

fisheries are primarily of other non-target small pelagics, including horse mackerel, *Scomber japonicus, Boops, Belone* spp., jellyfish, juveniles of other species and small quantities of sharks (Kelleher, 2005). In the case of the cephalopod fishery, the discard monitoring programmes in 1996 were carried out by France, the UK and Spain using observers on board commercial fishing vessels. The overall conclusion is that the amount of commercial squid discarded is negligible compared with the landings (Graham *et al.* 1996).

Spain has applied a Minimum Landing Size (MLS) regulation in the hake fishery which clearly promotes discarding (Kelleher, 2005). Spanish longline fisheries for hake have discard rates in excess of 10% (Kelleher, 2005). Of all Spanish catches of flounder, 45% are said to be discarded at sea and not reported (Harris, 1998).

The sampling of the commercial landings has recently improved with the introduction of the EU Data Collection Regulation (EC 1543/2001) that includes landing statistics and length composition (ICES, 2004). In 2004, ICES reported that in recent years data quality for the Iberian region (notably in the Gulf of Cadiz) has improved, including landing and discard statistics (ICES, 2004). For most of the stocks in this region, the sampling level of the landings is considered adequate for assessment purposes; however, there are only few samples of discards, particularly of under-sized hake (ICES, 2004).

There are many negative records about the lack of control of Spanish by-catch. For example, a large volume of uncontrolled by-catch is associated with the North Atlantic swordfish fishery, where more than 17,000 blue sharks and almost 8,000 mako sharks were observed landed in Algeciras. White marlin and thresher sharks are also common by-catch species in these fisheries. In the swordfish fishery in the Mediterranean waters, blue sharks are killed by the gears used (Raymakers and Lynham, 1999). Also, mackerels (and their juveniles) are taken as by-catch by the trawl fleets in Iberian waters (ICES, 2004).Based on data collected from trawlers operating in ten different ports in the Bay of Biscay, Lema *et al.* (2006) estimated that discards for Baka trawl, pair trawl and VHVO trawl stratums vary from 18–94% for blue whiting, 8–30% for Atlantic mackerel, 2–8% for European hake and 2–20% for horse mackerel. In the Mediterranean Sea, estimates from discards in commercial trawl fisheries ranged from 20 to 50% of the biomass caught (Moranta *et al.* 2000; Sanchez *et al.* 2007; Sanchez *et al.* 2004). In the deep-sea decapod crustacean fisheries off the Balearic Islands conducted on continental slope at 800 m depth targeting European hake, blue whiting, Norway lobster and rose shrimps an average of 42–66 % of the catch was discarded (Moranta *et al.* 2000). In the bottom trawl fisheries in the northwestern Mediterranean, for a total sampled catch of 7,803 t, nearly 2,067 t were discarded (Sanchez *et al.* 2004).

Unreported catches in the artisanal sector

The 1995 international project for the evaluation of cephalopod stocks fished by the UK, France and Spain concluded, from the evaluation of the accuracy of official fishery statistics, that in most cases they presented a relatively accurate picture of landings. An important exception was the Spanish artisanal fishery, where it was estimated that around 40% of *Octopus vulgaris* and up to 90% of *Loligo vulgaris* landings went unregistered (Graham *et al.* 1996). A study by Otero *et al.* (2005) on artisanal fisheries of Galicia for *Octopus vulgaris* found that the small-scale artisanal fleet landed approximately 4,000 t with an ex-vessel value of €13 million every year. Further, the same authors state that in the artisanal octopus fishery (0.3–43.3 GRT vessels) a total of 1,440 vessels were registered to fish for octopus using creels, 98% of the fishers illegally used different gears for
targeting other species. The official estimate of landings for the octopus fishery off Galicia was 4,000 t. Estimates from Otero *et al.* (2005) show the catches to be around 5,200 t showing unreported catches of 1,200 t just in the octopus fishery of Galicia. Catches and fishery information employed in the stock management of Spain was very restricted until 1986, when Spain joined the EU (Anon, 2004). Now, catch statistics of species subject to TACs must be recorded in logbooks and responsibility for inspection of fishing vessels, inspection of landing activities, selling, transporting and storing fish, and recording landings and sales lies with the Spanish authorities (Raymakers and Lynham, 1999).

Unreported catches in the recreational sector

According to EU (2004) recreational fishing constitutes an important leisure activity, representing more than 10% of total fisheries production in the Mediterranean Sea. Recreational fisheries activity off Majorca

generated catches of at least 1,209–2,000 t per year with as many as 615,000 fishing outings per year (Morales-Nin, 2005). Spear fishing is practised in the littoral zones of Balearic Islands, with the fleet made up of 450 vessels ranging in length from 6–12 m. Although the Fisheries Department of Balearic islands has established a rule limiting the catches to 5 kg per day plus one fish per spear fisherman per day, fishermen are reported as illegally selling their catches (Coll *et al.* 2004).

Recreational fishing is permitted in the Marine Protected Area of Cap de Creus, with sport fishers constituting 60% of the total, followed by spear fishing (17%), shellfish collection on the rocks (13%) and fishing from the shore the remaining 10% (DMAH, 2004). Current regulations allow recreational fisheries in marine parks and park reserves with the exception of spear fishing, which is not allowed in the partial reserves. Recreational fishing regulations are in place through minimum hook size, a maximum daily catch and minimum landing size for certain species (Lloret *et al.* 2008). Interviews conducted by Lloret *et al.* (2008) on fisheries compliance of recreational fishers within the Cap de Creus MPA found that 30% of the interviewed boat fishers did not have a recreational fishing licence. Excluding catches from spear fishing, shellfish collection and angling from the rocks, it is estimated that recreational fishers from Cape de Creus catch 50 t per year (Lloret *et al.* 2008; Gomez *et al.* 2006).

Note

This material is based on a country synopsis, with additional material, published by Pramod *et al.* (2006).

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Table 35. Spain illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	European hake	2002	Illegal	-	-	[1]Over 1.4 to of immature European hake seized from transport trucks in Seville
2.	European anchovy	2002	Illegal	-	-	[1]126 kg of European anchovy was seized from transport trucks in Seville
3.	Murex	2002	Illegal	-	-	[1]26 kg of Murex seized from transport trucks in Seville
4.	Finfishes nei	2003	Illegal	-	-	[2]Spain (MAPA) seized 220 t of immature fish stemming from more than 2,000 illegal trade incidents; mostly anchovy, hake, horse mackerel (jurel), and round clams (chirla)
5.	Swordfish	2007	Illegal	-	-	[3]30 swordfish (1,500 kg), 40 ocean sunfish, and 2 stingrays confiscated along with illegal fishing gear; vessel intercepted while fishing eight miles off Southeast Island of Alboran
6.	Swordfish	2005	Illegal	Spain	9	[4]9 infringement proceedings against Moroccan drift netters for illegally fishing in Spanish territorial waters
7.	Finfishes nei	2003	Illegal	-	-	[5]In Seville market 2,080 kg of small hake and 15 kg of small sole that did not meet the regulatory sizes were confiscated; valued at €20,000
8.	Venus clams and European hake	2005	Illegal	-	-	[6] 1.2 t of juvenile clam and 10 kg of juvenile fish discovered in two stands of Mercagranada and a truck from a fish distribution company; the clams, *Venus gallina*, also known as 'chirla', did not measure more than two cm
9.	Scallops	2003	Illegal	-	-	[7]4,390 kg of scallops with ASP toxin seized in Galicia since 2003; illegal to extract, possess, transport, and sell marine species such as scallops caught in closed zones

10	Finfishes nei	2003	Illegal	-	-	[8]Close to 5 t of juveniles valued at €21,000 seized in Seville market
11	Clams	2004	Illegal	-	-	[9]More than one t juvenile clams from Italy valued at €14,544 seized at the crossing point of La Jonquera (Girona); goods were to be sold in Alicante and Madrid
12	Finfishes nei	2004	Illegal	-	-	[10]Seizures at Andalusia markets of striped venus clam, hake, 2,893 kg juvenile fresh anchovies, 792 kg swordfish, 365 kg blue whiting, 200 kg sole, 171 donax clams (171) and 135 kg red tuna
13	Shellfish	2005	Illegal	-	-	[11]Over 97 t illegal catch confiscated, mostly baby clam, octopus and immature fish
14	Finfishes nei	2003	Illegal	-	-	[12]More than 41 t juvenile fish confiscated in Andalusia in first nine months of 2003; more than 70% was venus and hake; juvenile fish confiscations in Andalusia markets and ports reached over 57 t in 2003, 15.4% more than in 2002
15	Finfishes nei	2004	Illegal	-	-	[13]40 t juvenile fish confiscated in Andalusian fish markets and harbours during the first ten months of 2004; clam (14,275 kg) hake (10,625 kg); anchovy (5,942 kilos), purple dry murex (2,715 kg); clam (1,210) and common sole (1,105 kg)
16	Finfishes nei	2003	Illegal	Unknown	1	[14] Trawler arrested near Tabarca islands; accompanied to the Alicante; five boxes (39 kg) of juvenile hake and 22 pieces of juvenile red tuna (21 kg) found in the hold.
17	Clams	2003	Illegal	-	-	[15]156 kg juvenile hake confiscated en route from Alicante to Córdoba
18	Scallops	2005	Illegal	-	-	[16]Coastguard confiscated 105 pieces of scallop containing ASP toxin during a control operation in the Firth of Pontevedra
19	Striped venus clams	2003	Illegal	-	-	[17]While carrying out controls to verify fish in the entrances and exits of Valencia, agents of Seprona confiscated 150 kg of *Venus gallina* and 15 kg of Red Mullet (*Mullus* spp)
20	Octopus	2003	Illegal	Unknown	1	[18]230 kg of undersized octopus seized from a ship
21	European hake and striped venus clams	2004	Illegal	-	-	[19]Seprona agents seized 1,094 kg of juvenile fish valued at almost €10,000; fish was sourced from Italy and was in two freezer lorries; catch included 368 kg of hake and 726 kg of striped venus clams
22	Red tuna	2003	Illegal	-	-	[20]1,200 kg of juvenile red tuna confiscated; fish were not labelled and did not meet the regulatory minimum size
23	Finfishes nei	2006	Illegal	-	-	[21]Seprona confiscated 5,735 kg of immature, non-eating fish, cold meats and 168,400 kg of fresh meat with incomplete labelling.
24	Venus clams	2005	Illegal	-	-	[22]1,200 kg of clam *Venus gallina* confiscated because it did not comply with regulatory size
25	Finfishes nei	2004	Illegal	-	-	[23]1,623 kg of juvenile fish coming from Italy confiscated at the border checkpoint of La Jonquera, in the district of Girona
26	European hake	2003	Illegal	-	-	[24]1,482 kg of juvenile fish being transported by lorry Italian to Seville confiscated on the border at La Jonquera (Girona); market value approximately €13,000
27	Mollusks and juvenile fish	2004	Illegal	-	-	[25]2,156 kg of molluscs and 620 kg of other juvenile fish from Italy confiscated on the border at La Jonquera (Girona); market value approximately €25,000
28	Clams, anchovies and	2003	Illegal	-	-	[26]Seprona and civil police officials seized 680 kg of striped venus clams, 249 kg of donax clams, 231 kg of fresh anchovies and 50 kg of hake entering Seville

	European hake					
29	Sardines	2004	Illegal	-	-	[27]Coastguard seized a package containing twelve detonators with fuses, ten and a half cartridges of diluted nitroglycerine explosives, and two fuses destined for illegal sardine fishing
30	Finfishes nei and molluscs	2004	Illegal	-	-	[28]Seprona agents confiscated 7,026 kg of fish and molluscs valued at €63,234 on the border at La Jonquera (Girona)
31	Finfishes nei	2004	Illegal	-	-	[29]Nature Protection Service seized 2,152 kg of juvenile fish from Italy on the border at La Jonquera (Girona); destined for Madrid and Jaén; market value over €19,000
32	Scabbard fish, squids and Finfishes nei	2005	Illegal	-	-	[30]3,500 kg of scabbardfish; 2,592 kg of squid; 790 kg of sole fish,and 790 kg of diverse fish all undersized seized
33	Finfishes nei	2003	Illegal	-	-	[31]1,900 kg of juvenile fish seized on the border at La Jonquera (Girona); market value €17,118; agents of Seprona also confiscated 1,200 kg of sea spider at a water treatment plant in Monteverdi
34	Finfishes nei	2004	Illegal	-	-	[32]5,936 kg of juvenile fish seized on the border at La Jonquera (Girona); Seprona agents confiscated 5,936 kg of undersized fish from a freezer lorry coming from Italy
35	European hake anchovy, horse mackerel and clams	2005	Illegal	-	-	[33]2,366 kg of hake, 2,262 kg of baby clam, 1,100 kg of anchovy, 224 kg of horse mackerel, 42 kg of blue whiting and 7 kg of mackerel confiscated
36	Molluscs	2003	Illegal	-	-	[34]More than 2 t of juvenile molluscs coming from Italy seized in La Jonquera (Girona);
37	Venus clams	2003	Illegal	-	-	[35]Seprona agents seized 6 t of undersized striped venus; market value €53,803
38	European hake and clams	2004	Illegal	-	-	[36]3,228 kilos of juvenile clams and 158 kg of juvenile hake from Italy confiscated on the border at La Jonquera; market value €30,474
39	European hake and clams	2005	Illegal	-	-	[37]3,000 kg of juvenile clams and hake, market value €27,000, confiscated at La Jonquera (Girona)
40	Finfishes nei	2005	Illegal	-	-	[38]61,000 kg of immature fish confiscated in Andalusia
41	Finfishes nei	2005	Illegal	-	-	[39]Seprona and Fisheries Administration of Andalucía confiscated 111,727 kg of immature fish in vessels, wholesale markets, roads and distribution centre during 2005.
42	Goose barnacle	2003	Illegal	-	-	[40]Seprona reported 19 poachers and intercepted almost 160 kg of goose barnacle on several points of the coast of a Coruña; catch and 15 cask scrapers confiscated
43	Littleneck clams	2003	Illegal	-	-	[41]233 kg of undersized littleneck clams seized in Carril market
44	Anchovy	2003	Illegal	-	-	[42]Juvenile anchovy confiscated in the waterways of Mercamálaga, bringing total quantity of fish seized in the province of Málaga in 2003 to 5,500 kg
45	Finfishes nei	2003	Illegal	-	-	[43]Seprona officers and fishing inspectors seized 675 kg of juveniles in the surrounding areas of Seville
46	Anchovies , hake and red mullet	2004	Illegal	-	-	[44]81 boxes of juvenile fresh anchovies, 12 of small hake, and 5 of red mullet confiscated; juvenile fish were hidden behind other boxes on display
47	Prawns and clams	2005	Illegal	-	-	[45]Seprona and the command in Algeciras (Cádiz), confiscated 903 kg of fishery products, including

						mantis prawns, clams and baby clams, from a truck parked in the industrial area 'La Menacha', in Algeciras
48	European hake and red mullet	2004	Illegal	-	-	[46]Seprona agents (Granada) confiscated 17 kg of juvenile fish when inspecting of truck on the A-92 motorway; agents found 9 kg hake and more than 8 kg of juvenile red mullet.
49	Molluscs	2004	Illegal	-	-	[47]1,616 kg of juvenile mollusc en route from Italy to Alicante and Madrid on the border at La Jonquera (Girona); market value of €14,544
50	Swordfish	2003	Illegal	-	-	[48]1,308 kg of juvenile fish seized in the village of Ayamonte (Huelva); total of 109 pieces of swordfish that did not reach the official minimum size (1.25 m)
51	Anchovies and clams	2004	Illegal	-	-	[49]160 kg of striped venus worth €8000 seized from a businessman's vehicle in Punta Umbria (Huelva) on A-92 highway. Also, 1,105 kg of striped venus, 25 kg of donax clams, and 48 kg of fresh anchovies confiscated at Seville market
52	Molluscs	2003	Illegal	-	-	[50]1,762 kg of juvenile mollusc from Italy seized in La Jonquera (Girona); market value €16,000
53	European hake	2004	Illegal	-	-	[51]2,544 kg of juvenile hake en route from Italy to Madrid, Seville and Ubeda confiscated on the border at La Jonquera (Girona), market value €22,896
54	Molluscs	2004	Illegal	-	-	[52]Almost 2,500 kg of juvenile molluscs en route from Italy to Barcelona and Almeria confiscated on the border at La Jonquera (Girona); market value €22,000
55	Anchovies	2004	Illegal	Unknown	1	[53]Seprona agents confiscated a box of juvenile fish at the fishermen´s guild of Roses; fishermen threw the fresh anchovies, which were below minimum size of 9 cm, into the sea
56	Venus clams, red mullet and swordfish	2004	Illegal	-	-	[54]2,100 kg of striped venus and 330 kg of red mullet below the regulatory size were confiscated in the market of Seville; 600 kg of sword fish also seized; market value €20,000
57	Finfishes nei	2005	Illegal	-	15	[55]Department of Fisheries confiscated 16,156 units corresponding to material or equipment, of which 15 were vessels, 8 were vehicles, 15,864 were shellfish-fishing nets, and 269 were fishing and tackle nets; most seizures because catch was undersized
58	Finfishes nei	2004	Illegal	-	-	[56]The Guild of Ferrol calculates the number of people poaching on a daily basis to be close to 200 in different zones of the Ferrol estuary; the 200% increase in poaching is due to inefficient patrols
59	Clams	2006	Illegal	-	-	[57]More than 1,600 kg of immature clams confiscated from a resident of the Christine Island (Huelva) for not complying with the corresponding regulatory measure; the clams were seized from a truck going to Seville

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25. Mercapesca (2004f) Molluscs and juvenile fish valued at more than €25,000 confiscated in La Jonquera (Girona), 29/07/2004. (www.mercapesca.net).
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27. Mercapesca (2004g) Package of explosives for illegal fishing seized on the coast of Pontevedra, 06/08/2004. (www.mercapesca.net).
28. Mercapesca (2004h) More than 7,000 kilos of juvenile fish valued at €63,000 seized from two trucks in Girona. 02/09/ 2004.
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35. Mercapesca (2003m) Nearly 6,000 kilos of Striped Venus Seized in Route from Italy to Girona, 23/10/2003. (www.mercapesca.net).
36. Mercapesca (2004k) 3,386 Kilos of Juvenile Fish Were Confiscated on the Border of La Jonquera Valued at €30,474. 05/02/2004. (www.mercapesca.net)
37. Mercapesca (2005g) 3,000 kilograms of juvenile fish with a value of €27,000 confiscated in La Jonquera (Girona), 27/01/2005. (www.mercapesca.net).
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SRI LANKA

Summary of information concerning IUU fishing

Illegal fishing

"A large foreign fishing fleet is reported to be illegally fishing in Sri Lankan waters, but due to a lack of surveillance activity this remains unconfirmed" (Flewwelling and Hosch, 2006). Surveillance is effective to a limited extent in northern areas due to the huge presence of Sri Lankan Navy but mostly ineffective along other sections of coastline. However, there have been some recent changes: "The compliance component of fisheries management includes graduated financial penalties, compounding of offences, suspension or revocation of licences, refusal for re-issuance, and full removal from the fishery as deterrent mechanisms to achieve optimum compliance with the law. Other compliance monitoring tools in use include: dockside inspections, landing site inspections, and on occasion – at-sea boarding by the Navy. VMS and observer systems have not yet been used for these fisheries. Infractions are reported as increasing over the past ten years, offshore fisheries are not perceived as overexploited, consequently, there are no preventative measures being taken regarding capacity at this time" (Flewwelling and Hosch, 2006).

According to Joseph (1999) poor enforcement of national and international fishing laws and regulations has meant that distant-water industrial fishing vessels from other nations can fish and operate illegally in the EEZs of Sri Lanka (Joseph, 1999).

Lack of enforcement and widespread use of dynamite fishing targeting pelagic fish schools has become a threat along the southwest coast (Dayaratne, 1996). There is also substantial illegal fishing within national fleets both in coastal and marine protected areas. Vessels engage in dynamite fishing and capture of juvenile fish from coral reefs and mangrove areas. According to Anon (2006) there has been a spike in blast fishing and illegal commercial fishing using dynamite. Although the government has increased penalties for destructive fishing practices, dive tourism operators report that the activity is on the rise, as very few of the illegal poachers get caught and even those who are taken to court are fined only 5,000 Sri Lankan rupees (about US$50)

Discards

According to Kelleher (2005) discards are negligible in coastal and offshore fisheries targeting tuna because of high demand for even small fish. Discards comprise less than 0.5% in proportion to landed catch.

Unreported catches in the commercial sector

"By general agreement, coastal resource and fisheries data are weak and patchy. Fishery statistics are based on incomplete original surveys of vessels, gear, and fishermen, and on sometimes doubtful estimates of fish landings at different sites. Over fifteen fishery resources surveys have been conducted in Sri Lanka since 1920, mostly on demersal resources. However, whether the maximum sustainable yield has already been attained or not cannot be sufficiently determined since the surveys were not followed by reliable data collection" (Sri Lanka, 2000; Wijayaratne and Maldeniya, 2003).

Further, existing information suggests that there are huge gaps in collection of fisheries statistics from northeastern provinces controlled by Tamil Eelam. This might contribute to significant under-reporting of fisheries landings for this area.

In Sri Lanka gillnets and longlines are tied together to target sharks. It might also be expected that significant numbers of sharks are being caught by industrial purse seiners, especially those fishing under fish aggregating devices (FADs) at certain times of the year. Sharks are an important catch for some industrial longliners; however, little data on numbers and weights are currently available. The shark catches recorded in the IOTC databases are, for this reason, likely to be greatly underestimated. Information on the catches of other non-tuna species is patchy at this stage (Anon, 2005).

Unreported catches in the artisanal sector

The fishing fleet at the end of 2005 comprised 29,312 boats, of which 14,150 were non-mechanised traditional boats (MFAR, 2006). There is no data available, but catch is thought to be significant.

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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Table 36. Sri Lanka illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	#IUU vessels	Action taken
1.	Finfishes nei	2002	Illegal	India	-	[1]137 Indian fishermen detained by Sri Lankan officials for trespassing into Sri Lanka's EEZ
2.	Finfishes nei	2000	Illegal	Unknown	1	[2]Sri Lanka Navy apprehends two trawlers operating 15 miles offshore; crew fined US$5,000 for poaching and the catch of 20 t confiscated
3.	Finfishes nei	1995	Illegal	-	-	[3]Illegal collection of ornamental fish within MPA for the aquarium industry, as well as shell collecting, reported within the Hikkaduwa Nature Reserve
4.	Finfishes nei	2007	Illegal	-	-	[4]Based on information from civil sources, Naval forces found hidden explosives intended for illegal fishing
5.	Finfishes nei	2005	Illegal	India	1	[5]Three fishermen detained by the Sri Lankan Navy for trespassing in the International Maritime Boundary; imprisoned for 12 months
6.	Finfishes nei	2008	Illegal	India	3	[6]Sri Lankan navy detained three of six Indian mechanised fishing boats seized by them for allegedly fishing in Sri Lankan waters and entering the high security zone
7.	Finfishes nei	2008	Illegal	India	400	[7]Sri Lankan Navy's radars detected approximately 400 Indian fishing trawlers in Sri Lankan territorial waters

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SWEDEN

Summary of information concerning IUU fishing

Illegal fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock. In this case the major fishery of concern is Baltic cod.

According to Regeringkansliet (2006) illegal fishing is widespread in the Baltic Sea. Estimates suggest that up to 45% per cent of cod is caught and landed illegally (FISKESEKRETARIATET, 2007; ICES 2007). Although Polish vessels are frequently named as the main culprits, the Fiskesekretariatet report names all three major quota holders (Denmark, Sweden and Poland) as major culprits. Until recently the Swedish coastguard was responsible for inspections at sea and monitored landings at fishing ports to check accuracy of logbooks and sales records. However, in 2001, for example, the coastguard only checked about 10% of all landings, and in 2003 only 24% of the 97 serious fisheries infringements cases were penalised (Sporrong, 2007; Eggert and Ellegard, 2003).

However, responsibility for land-based or port-based inspections for all landed fish has been transferred to the National Board of Fisheries (Fisheries Control Department), freeing up the coastguard to carry out a more effective programme of inspections at sea. The Fisheries Control Department is responsible for enforcing catch limits through inspection of logbooks, landing declarations, sales notes and satellite-transmitted position reports. All commercial vessels above 24m length are continuously monitored by VMS to check for misreported catch area.
The Fisheries Control Department, in close collaboration with the coastguard, carries out checks and inspections both at sea and in ports and checks approximately 140,000 documents every year (Fiskeriverket, 2008).

The passage of fisheries infringements through the Swedish legal system can be a very lengthy process, there are few prosecutions and penalties are lenient (Eggert and Ellegard 2003; Fiskeriverket, 2002).

The government has appointed a commission to review the Fisheries Act with a view to empowering enforcement authorities to temporarily revoke fishing licences directly at sea when a crime is suspected (Regeringkansliet, 2006).

Table 37. Baltic Sea Joint Inspection and Surveillance Scheme 2007–2008.

Number of Swedish vessels inspected		Number of infringements detected		Source
On land	*At sea*	*On land*	*At sea*	
10	5	0	0	CFCA (2007a)
32	9	6	0	CFCA (2007b)
8	0	0	0	CFCA (2007c)
18	6	4	0	CFCA (2008a)
16	4	3	0	CFCA (2008b)

In 2004, the European Commission initiated six infringement procedures against Sweden for exceeding EU member state quota and one infringement procedure for failure to provide catch/fishing effort data (Sporrong, 2007).

There are few reports of Swedish vessels being implicated in court cases for illegal fishing outside the Swedish EEZ. In December 2002 masters of two Swedish vessels were convicted for illegal fishing in the NEAFC Commission area for failing to have a permit while fishing in the high seas. The two masters' were fined SEK87,000 plus the value of illegal catch worth SEK179,000. In a second case (May 2003), masters of four Swedish fishing vessels were convicted for illegally fishing in the North Sea and intentionally

tampering with their VMS – which showed their vessels fishing in the Baltic Sea while they were fishing for herring in the North Sea. The four masters were fined a total of SEK912,000 plus the value of illegal catch worth SEK1,068,000 (OECD, 2005).

Although enforcement for the majority of commercial fisheries has yielded good results, some fish stocks like cod are still not adequately monitored. In this regard Sporrong (2007) states "Measures designed to reduce the likelihood of unreported landings, such as designated ports, were considered to be limited – large ports can provide for many landing sites and so make it difficult for inspectors to cover all possible options. Specific points and times for landing were recommended as possible improvements. In Denmark and Sweden (and quite likely in other countries too), avoiding inspection results in a 'cat and mouse' game between skippers and inspectors. Some fishermen have their own counter measures and tactics to ensure their landings are less likely to be inspected. It is relatively easy to have look-outs in ports and harbours, outside offices and even the homes of inspectors to forewarn of any likely inspection activity. Mobile phone scanners may also be used to monitor conversations between inspectors.

Discards

Sweden has undertaken substantial research to minimise discards within Baltic and North Sea fisheries. According to Tingley et al (2000), discards of undersized cod are relatively low in Swedish waters because larger meshed gill nets are used to target cod in the Baltic Sea. In 2000 there were 13 shrimp vessels using grids to reduce discards in finfish trawl fisheries. However, the use of grids has been entirely voluntary until now, with no specific legislation requiring their use in industrial fisheries (ICES, 1998). In the cod fishery, Sporrong (2007) states that "Individuals involved in discard sampling in Sweden reported that landing of undersized cod was more prevalent in some inshore areas where cod stocks have declined or become less common. Apparently some fishermen have the attitude that they cannot afford to wait for the cod to grow any bigger and/or be left for others to catch."

According to Regeringkansliet (2002) there may be significant discards and by-catch of several species in the Baltic Sea fisheries due to 'high grading'. This might put several stocks at risk as fishermen tend to throw away smaller fish, which fetch a lower price in the markets. Sweden has banned high grading but there is no effective monitoring mechanism. "Between 5 and 20% of all cod, 50% of all Norway lobster, 85% of all whiting and 50% of all plaice, sole and haddock catches are thrown overboard. Most of these are thrown back because they are too small and will fetch too low a price or because the national quota has already been exhausted. A national ban on discarding fish that may be landed under EU law, i.e., when a quota exists for the species, will be incorporated into the Swedish Board of Fisheries' regulations later on this year" Regeringkansliet (2006).

Sweden's trawling vessels are required to use flexible grids in the trawl gears to minimise by-catch and discards in marine finfish fisheries (Kelleher, 2005; Valentinsson and Tschernij, 2003).

Significant threats have also been identified in the Baltic Sea, with up to 50% of catch comprising by-catch of porpoises. This is due to widespread usage of drift nets for cod and gill nets for salmon in Swedish and Polish waters, (Berggren *et al.* 2002).

According to Regeringkansliet (2002), ICES has persistently advocated a ban on cod fishing in the eastern Baltic Sea as the stocks in this area are at historic lows. This coupled with up to 45% under-reporting for cod catches have necessitated up to 30% reduction in fishing effort. However, in 2001 EU countries decided not to follow the scientific advice and increased the quota instead of decreasing it leading to serious repercussions for the remaining stocks. Sweden has advocated a system of days at sea, instead of TACs and quotas, to regulate the amount of fish caught and landed, which will lead to reduced discarding and facilitate much more effective inspections and enforcement.

Unreported catches

Catches of both commercial and non-ICES fish species are monitored by the National Board of Fisheries. There are nearly 50 species of fish, of which ICES monitors only a few commercial species, with other non-ICES fish stocks like Syngnathidae, Cottidae, pike, pike-perch, smelt, whitefish, vendace etc. in the Baltic Sea studied by national authorities in respective countries. However, catch information is not monitored

or recorded adequately for these fish stocks (Lindquist, 2001). The status of coastal fish stocks not regulated by quotas has been studied to a limited extent by the National Board of Fisheries. The studies have included catch statistics for recreational fisheries from standardised monitoring programmes and surveys of small-scale fisheries (Gardmark *et al.* 2004).

According to Neumand and Piriz (2000) the Swedish fishery sector has undergone major transformation since World War II; there are now more recreational and fewer professional fishermen. (Bruckmeier and Neuman, 2005). Almost 1.1 million Swedes (30% of the population) fish for leisure along Swedish coasts (Anon, 2000; Toivonen *et al.* 1999). Sandström (2000) states that recreational fishermen fish for coastal fish like pike (*Esox lucius*), perch (*Perca fluviatilis*), pikeperch (*Sander lucioperca*), sea trout, sea running brown trout (*Salmo trutta*) and lobster (*Homarus gammarus*) and that recreational catch exceeds that of professional fishermen. According to Bogelius (1998) recreational fishers catch, on average. 22 kg per person per year. The economic value of Swedish recreational fisheries has been studied by Karås et al (2001); Paulrud (2004) and Soderqvist *et al.* (2005).

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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TAIWAN

Summary of information concerning IUU fishing

Illegal fishing

In Taiwan, currently the numbers of fishing vessels for use in coastal fisheries are not strictly regulated. Likewise, the mesh size, fishing ground and fishing season are also not controlled effectively. Illegal fishing methods, such as the use of electricity, poison and dynamite, have not yet been totally eliminated. There is no national vessel monitoring scheme to control or regulate fishing. Strict measures have been initiated in coastal Taiwanese fisheries to limit illegal fishing, but for overseas Taiwanese fisheries, however, there is a different story.

Some measures that have been initiated in coastal Taiwanese fisheries to limit illegal fishing include establishment of Joint Enforcement Unit on Illegal Fishing "To prevent fishermen from using illegal fishing methods such as use of electricity, explosives and poisons for fishing in coastal areas, under the supervision of Taiwan Provincial Government. The Unit has been established by coastal prefectures and townships, and fisheries surveillance purposes have been dispatched to reinforce coastal surveillance in order to eliminate fishing by illegal methods" (Council of Agriculture, 1993).

"Some illegal fishing methods are still practised in the waters around Taiwan, such as the use of three layer drift nets, use of cyanide to catch fingerlings of grouper, use of electricity to catch prawns, use of dynamite to catch scombers. Illegal fishing must be strictly controlled and eliminated for the conservation and management of coastal fisheries resources and environments" (Kuo, 2001).

Since February 2000, the Coast Guard Administration (CGA) has been responsible for the safety and security of Taiwan's coastline and its territorial waters. In 2003 the CGA registered 285 cases of fisheries violations arrested 636 suspects within its territorial waters. 141 of these cases, involving 403 individuals, related to the use of illegal poisons, bombs and electronics during fishing. 46% of incidents occurred at sea and 36% near the coast. In cases of illegal trading of fish trade, 50% involved Taiwanese individuals and 47% involved Chinese citizens (CGA, 2005). Almost 50% of all smuggling-related case in Taiwan involve fishery products (valued at around NT$73.87 million – almost US$2.5 million). In 2003 alone the authorities seized 1,498 kg of fishery products (CGA, 2005).

Fishing is banned within three nautical miles of the shore and dragnet fishing boats over 50 tons are banned from operating within 12 nautical miles from shore. Violations of the dragnet fishing ban are punishable a fines ranging from NT$30,000 to NT$150,000. In 2005 patrol vessels discovered 168 vessels fishing illegally (involving 914 fishermen). 110 of the vessels were repeat offenders, and 18 vessels were dragnet fishing within three nautical miles of the shore (Hus, 2005).

Trespassing by vessels from mainland China is a problem and Taiwanese vessels fishing in the north are often provided with escorts for their safety. Wu (2005) reports of incursions by mainland Chinese vessels into Taiwanese territorial waters to fish for calamari and finfish resources, although the number is falling as coastguard patrols are stepped up: 745 Chinese boats were expelled and 43 detained in 2003, but in 2004 the number fell to 456 expelled and 15 detained.

Discards

Kelleher, 2005, reports that there is no information available on discards in Taiwan.

Wu *et al.* (2004) report, "Trash fishes accounted for 40.1% of the total trawl landings in Tungkang. Trash species could be divided into the two main categories of economic and non-economic fish species. The catch rate of finfish species in trash fishes was 77.3%. Trash species were identified as 327 species belonging to 106 families for fish, 45 species of 14 families for shrimp, 5 species of 1 family for anomurans, 24 species of 5 families for crabs, and 6 species of 5 families for squid. The dominant organisms among the trash fish were of the Scorpaenidae and Bothidae (18 species) for teleosts, Penaeidae (9 species) for shrimp, Portunidae (13 species) for crab, and Loliginidae (2 species) for squid. *Trichiurus lepturus* was

annually caught by small trawlers in Tungkang. Most of the fish comprising the trash fishes were caught in waters shallower than 100 m and deeper than 250 m in depth. From an analysis of body sizes of some important species in this study, it was concluded that most of these trash fishes are too small for exploitation. This phenomenon can be explained by the small mesh sizes of trawl nets used by the trawlers".

Unreported catches in the artisanal sector

The catch inspection scheme is limited to some studies on fish landings in ports and fishing harbors. However, the time frame or method of collection of data is meager and inconclusive. For overseas fisheries, logbooks and landings data from observers might be used to calculate catches.

Note

This material is based on a country synopsis, with additional material, published by Pramod *et al.* (2006).

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Table 38. Taiwan illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Finfishes nei	2000	Illegal	China Mainland	10	[1]Ten Chinese fishing boats seized by maritime police off the coast of Putai in western Chiayi County; vessels spotted fishing illegally around 10 nautical miles off the coast; maritime police confiscated fishing gear and catch; vessels and 22 crew members expelled
2.	Whale Meat	2005	Illegal	-	-	[2]Store manager and importer were each fined TWD50 000 (US$1,520) for the illegal sale of 96 cans of whale meat
3.	Dolphins	1999	Illegal	Taiwan	2	[3]Hharbour police confiscated two mullet fishing boats with 350 kg of dolphin meat aboard; vessels manned by more than 20 fishermen who admitted to catching a total of five dolphins; boat owners arrested

1. Anon (2000) Chinese fishing boats nabbed for smuggling, poaching, Taipei Times, 11 January 2000, Page 2.
2. Traffic (2005) TRAFFIC Bulletin Vol. 21 No. 1 (2006), page 37. www.traffic.org/25/network9/ASEAN/index.html
3. Traffic (1999) East Asia-Taiwan, Seizures and prosecutions, TRAFFIC Bulletin Vol. 18 No. 1 (1999) page 33; TRAFFIC East Asia; The China Post (Taiwan), 18 March 1999.

TANZANIA

Summary of information concerning IUU fishing

Illegal fishing

A recent report identifies only low levels of IUU fishing in Tanzanian waters. Infringements in the offshore pelagic sector are low, and reached a peak in 2005 (MRAG & CapFish, 2008) although it also notes that there is a limited capacity to undertake patrols. The maximum number of foreign vessels intercepted fishing without a licence (for tuna) appears to have been 25 in 2004.

Fishing with dynamite is a serious problem in Tanzania. "Dynamite fishing has maimed people, killed others and driven away tourist from marine attractions. The Ministry of Natural Resources and Tourism puts the number of people who die from dynamite fishing at 110 annually. Some observers have shed some light on the extent of the illegal dynamite fishing in the country, saying that there are areas which experience at least ten blasts a day. Whereas the government managed to bring the crime to an almost negligible level in the late 1990s, the crime resurfaced due to interference from politicians who wanted to further their personal interests at the expense of the environment and the country`s economy. Consequently, patrols by the police and the army were withdrawn, giving the criminals leeway to operate with a heavy hand" (Philemon, 2008).

Some innovative approaches introduced in Tanzania to tackle illegal fishing include community-based patrolling: a cost-effective way of controlling illegal fishing using peer pressure. "To address the problem of destructive fishing in the area, the Menai programme has established a system of local patrolling where fishermen from participating villages take handheld radios on their boats to report incidences of illegal fishing. Five radios were distributed amongst the villages, and two patrol boats are stationed in Kizimkazi Dimbani on the east end of the Bay. The patrol sometimes works together with the local coastguard (KMKM) to intercept illegal fishermen; between 1997 and 1999, 12 cases of illegal fishing involving 167 fishermen were brought to court (Ngaga *et al.* 1999). Although fishermen continue to complain that fishermen who are prosecuted are rarely punished in any substantial way (only 40 fishermen involved in the above cases were actually fined), most villagers have reported a significant reduction in dynamite fishing in the Bay since the programme was initiated, particularly in the area around Pungume island in the South" Levine (2004).

Use of destructive gears is reported in Zanzibar – beach seine use occurs within the Chwaka Bay. Boat seines are allowed in non-coral areas; however, illegal use of this gear also occurs in coral reef areas of Chwaka Bay (DEIMS, 2002).

Discards

"In the United Republic of Tanzania's shrimp fishery, fishing is permitted only during daylight hours. A discard ban is poorly enforced and about 78% of the catch is discarded." (Kelleher, 2005). Tanzania also has an average discard rate of 10.4% (Kelleher, 2005).

"The amount of fish being discarded varies according to fishing areas and there are fluctuations from year to year. In 1989 and 1990, larger quantities of by-catch were discarded in the north, whereas in 1991 there was more discarding in the central area (Kisiju). The major by-catch species: *Trichiurus lepturus, Hilsa kelee, Pellona ditchela, Thrissa vitrirostris* and *Leiognathus leuciscus* are all discarded. Generally all the small pelagic species are discarded, as well as the fishes of the family *Leiognathidae.* On the other side, *Otolithes ruber, Johnieops sina, Terapon theraps, Sphyraena obtusata* and *Gerres filamentosus* are kept. Rarer species, which are normally kept, are *Carangidae, Haemulidae, Serranidae, Nemipteridae, Lethrinidae, Lobotidae, Scombridae, Sillaginidae, Arridae* and *Muraenesocidae,* sharks and rays. Large volume of discards observed in Bagamoyo area is possibly due to this relatively higher proportion of by-catch than in Kisiju area. Because of low shrimp catch rates in the north (Bagamoyo area) one would expect that more fish is kept. This is not what is observed. Even when some space is available in the fish hold, most of the by-catch is being discarded. This is done purposely so that the vessel can sail to another fishing zone (Kisiju) without coming to the port for landing fish and thus saving time, fuel and port

charges." (Haule, 2001).

"The shrimp to by-catch ratio varies widely from one haul to the other, between areas and season… there is more by-catch in the north and, consequently, the shrimp to by-catch ratios are much higher in the Kisiju area than in the Bagamoyo area, with averages of 1:3 to 1:4 in the former against averages of 1:9 to 1:14 in the latter. In both areas there is a general decrease in ratio towards the end of the year." (Haule, 2001).

Surveys have indicated that a high percentage of prawns caught by prawn trawlers are juveniles. These have a low market value and are always discarded. The crew keep some fish by-catch for personal consumption, but onboard space is limited so further by-catch is thrown overboard (Haule, 2001).

Unreported catches

According to the Fisheries Division (2005), although small-scale fisheries contribute up to 96% of total catches from the marine sector, historically, the bulk of catches from the sector were under-reported. Similarly, in the commercial sector data collection relied on inconsistent reports from the fisheries companies, and for foreign vessels catch was entirely unreported (Nhwani, 1981).

Tuna, swordfish, sea cucumber, and prawn fisheries greatly misrepresent their catch (Anderson and Ngatunga, 2005). Jiddawi and Öhman (2002) point out that shark fin traders give a figure that is more than double what is reported officially. "Middlemen, particularly those in the Pemba octopus fishery, also provide misinformation (Othman, 1999)" (Jacquet and Zeller, 2007). Data from the small-scale fishery are particularly inadequate (Guard *et al.* 2000) as they omit the catch by collectors (often women and children) and data relating to the many transfers at sea (Jacquet and Zeller, 2007).

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Table 39. Tanzania illegal fishing incidents.

	Species	Date	Type of IUU	IUU flag state	# IUU vessels	Action taken
1.	Finfishes nei	2004	Illegal	European Union	22	[1]IUU fishing around Mafia Island in July 2004; 22 large EU-registered purse seiners sighted illegally fishing in 12-mile zone reserved for traditional boats; when patrol ship closed in, all hauled their nets and steamed into EEZ
2.	Finfishes nei	2002	Illegal	Unknown	80	[2]Trawlers from Japan and China were said to be fishing illegally in Tanzanian waters during this period; French Navy chased away 80 illegal trawlers from Tanzanian waters in 2002 (source: Minister for Natural Resources and Tourism)
3.	Sea corals and turtles	2003	Illegal	-	-	[3]Coastal law enforcement officials made a random inspection at the Kivukoni market; seized parts of five sea turtle shells and approximately 150 kg of illegal sea coral
4.	Turtles and finfishes nei	2000	Illegal`	-	-	[4]Destructive fishing in coral reefs; blast fishing with dynamite; turtles illegally exploited for meat and eggs and, in the case of the hawksbill, for the carapace, which is used for ornamental purposes
5.	Finfishes nei	2002	Illegal	Tanzania	1	[5]Illegal fishing in Menai Bay Conservation Areas – patrol system has significantly reduced dynamite fishing in the area (Ngaga et. Al, 1999), and although illegal fishing still occurs, fishermen using illegal nets are increasingly being prosecuted in court
6.	Finfishes nei	1997-99	Illegal	Tanzania	12	[6]Menai Bay Conservation Area – to control destructive fishing, patrol sometimes works together with the local coastguard (KMKM) to intercept illegal fishermen; between 1997 and 1999, 12 cases of illegal fishing involving 167 fishermen were brought to court

1. FNI (2004) Project spots poachers and counts fish take – Tanzania's surprise riches in tuna, Fishing News International, October 2004. Page 47.
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THAILAND

Summary of information concerning IUU fishing

Illegal fishing

There are a few reports of foreign vessels encroaching on Thai waters, but there are evidently large numbers of Thai vessels fishing illegally in both foreign and domestic waters. There is a considerable mismatch for a range of fishery statistics (fishers, vessels, registered vessels, catches) between the FAO synopsis (FAO, 2000a) (as supplied by the country) and independent consultants working in Thailand. Hines (2004, pers. comm.) reports that illegal fishing is not controlled well and that there are many problems with conflicts between artisanal and corrupt commercial fishers. Existing studies allude to very few controls exercised by the Thai government on fishing vessels operating both within and outside its jurisdiction (Butcher, 2004). Szuster (2004, pers. comm.) confirms this view. In 1996, the Foreign Ministry of Thailand estimated that a total of 3,889 Thai fishing vessels were operating in the waters of other countries (mainly in Myanmar, Indonesia, Malaysia, Vietnam, Bangladesh Cambodia, Brunei and India) but that only an estimated 1,079 of these were operating legally; the other 2,810 were operating illegally (Butcher, 2002; Lundgren *et al.* 2006).

The catch inspection scheme is currently in a rudimentary stage, with no VMS and no onboard observers for most of the commercial vessels operating both within and outside Thai waters. Further, no dockside or landing site inspections are undertaken for Thai fisheries in the Andaman Sea (De Young, 2006).

Flewwelling (2001) reports that, "Thailand has its own fisheries enforcement fleet with both a coastal and offshore capability. The Thailand fleet (approximately 100 vessels with part-time air surveillance) covers boundary and closed areas and general prohibitions for trawlers and seiners." But adds that there is a need for more proactive fisheries management planning and revised legislation and that the overall priority for employment and food security often takes precedence for the offshore fleet evidenced by the current minimal controls on this fleet

De Young (2006) states that Thai patrol vessels have both coastal and offshore patrol capabilities. However, most of the vessels are old and poorly maintained, which undermines their capacity to effectively monitor the fishing fleets.

McDorman (2000) reports, "enforcement has not been effective due mainly to misconduct at the operative level of the Government; poor coordination among the various government agencies concerned; and lack of understanding and interest in enforcement participation by the majority of the fishermen, many of whom have poor moral judgment and concentrate only on immediate economic gain…1997 enforcement statistics show that there were 751 reported marine fishery violations [equivalent to approximately two per day]."

Futhermore, McDorman (2000) reports that, "Thai fishing vessels are generally unwelcome in the waters of all of Thailand's neighbours and the last 20 years have been ones of neighborly tensions regarding seizure of Thai vessels and imprisonment of Thai fishermen. The Department of Fisheries, charged with the responsibility of seeking overseas opportunities for the Thai fishing fleet, have found it increasingly difficult to secure bilateral arrangements because of the poor reputation of the Thai fleet in complying with access conditions imposed by foreign states. Nevertheless, it remains profitable to outfit a vessel and send it into foreign waters and return the catch to Thailand – the risk of losing the vessel (and abandoning the crew in a foreign jail) is simply outweighed by the profit…Given the significant difficulties in international relations that have resulted from illicit Thai fishing practices in non-Thai waters, it is appropriate to point to Section 74 of the 1997 Constitution which directs the government of Thailand is to promote friendly relations with other countries and one way of accomplishing this would be through effective control over Thai fishing vessel activity in foreign waters." In recent years, a few steps have been initiated by the Thai government striving to establish better relations especially with Indonesia and Myanmar, where formal fisheries access agreements have been in place for some years.

Discards

Discards are reported as very low as all catches are utilised (Kelleher, 2005). However, the ecosystem damage from landed by-catch of juveniles and small species is very high. Discards for Thai trawlers operating on the High Seas is said to be very high, especially in the Bay of Bengal. In fact, large quantities of small 'trash' fish are the foundation of the large fishmeal industry (FAO, 2000b), so there is little incentive to reduce the catch of such fishes.

Nickerson (1998) reports that catch by trawlers in 1969 was 250 kg/hr – 49% was the target species, and 50% was by-catch composed of non-target species. Eighteen years later, trawlers were able to catch only 38 kg/hr on the average – 33% was the target species, and 67% was by-catch, which was largely composed of juveniles of the target species.

Unreported catches artisanal

Data are collated by the Department of Fisheries' statistical bureau, but many reports suggest there are serious problems with it. Flewwelling (2001) states, "Further, on questioning officials in the countries visited, there was recognition that the statistics may not be as accurate as they should, or possibly could be, due to several internal and extraneous pressures including, but not limited to: lack of personnel to accurately collect, cross check or verify statistics, and hence these come from fishers themselves whose other agenda, e.g., taxes, benefits for increased production, etc., may result in deliberate or unintentional errors; bonuses for officials for demonstrations of increased fisheries/food production that promote misreporting; lack of any collection system; etc."

Catch statistics are poorly reported and estimated in Thailand, for example for the anchovy fishery there are "no real statistics on number of fishers / number of boats / number of gears fishery" (FAO/FISHCODE, 2000). There are special problems with catches made outside Thai waters. McDorman (2000) states, "Thai marine harvest statistics do not provide numbers regarding the amount of the harvest that comes from non-Thai waters such as from neighbouring states' waters (Cambodia, Vietnam, Malaysia, Indonesia and Myanmar) or further afield… One report noted that as many as 4,000 vessels could be engaged in fishing activities outside Thai waters… it would mean that one million tonnes. was either being directly harvested by Thai fishermen from non-Thai waters or being purchased by Thai vessels and shipped into Thailand… an undisclosed, but significant, amount of the harvest is coming from non-Thai waters."

The survey area unit catch estimation algorithms do not yet include values for unreported catches, but a simple calculation based on figures published in the FAO synopsis provides one estimate of unreported catch in Thailand (FAO, 2000a). According to FAO (2000b), 277,750 t of fishmeal (1996) represents 27% of the total Thai catch. Raising this amount of fishmeal to the quantity of fish that produced it at 20% efficiency (18–23% for Chilean plants) gives 1,111,000 t. So if this is 27% of the total, the total Thai catch would be estimated as 4,114,814 t, or 57% more than the figure reported to FAO. This is a minimum figure, since not all of the 27% goes to fishmeal and, if the conversion efficiency of the fishmeal plants is poorer than 20%, the figure would be even higher.

Note

This material is based on a country synopsis, with additional material, published by Pitcher and Pramod (2006).

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Table 40. Thailand illegal fishing incidents

.	Species	Date	Type of IUU	IUU flag state	#IUU vessels	Action taken
1.	Finfishes nei	2005	Illegal	Taiwan	1	[1]Phuket marine police arrested a Taiwanese fisherman in possession of 115 shark fins weighing 80 kg
2.	Finfishes nei	2006	Illegal	Vietnam	3	[2]Marine police patrol team spotted three Vietnamese fishing vessels fishing in Thai waters; two trawlers escaped, but vessel *Hoang Minh* and 11 crew arrested and charged with illegal entry and fishing in Thai waters without permission
3.	Finfishes nei	2007	Illegal	Thailand	2	[3]Two boats found fishing during closed season and in prohibited waters; one boat was sent away from the area and a second, *Sor Pechalern,* seized by the naval officers as also found to be using nets designed to capture smaller fish
4.	Finfishes nei	2006	Illegal	Thailand	1	[4]Two fishermen killed and one injured while illegally blasting fish near the Samersarn Islands;
5.	Finfishes nei	2007	Illegal	Thailand	Unknown	[5]Fishing is banned in Similan and Surin national parks, however fishing boats are constantly seen in and around the park; many illegal fishing traps have been found outside the most common dive sites

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TURKEY

Summary of Information on IUU fishing

Illegal fishing

There are reports of considerable unreported catches and illegal fishing in both the Mediterranean (WWF, 2004) and Black Sea (Birkun, 2002). "Industrial fleets also fish in Turkey's Mediterranean waters. Trawlers are not supposed to come closer than 1.5–2 miles from shore, and purse seine vessels…are not supposed to fish in water shallower than 18 m" (WWF, 2004). However, these restrictions are often ignored. MRAG (2005) identifies Turkey as having considerable illegal fishing fleets operating in the Black Sea and the Aegean, with widespread "illegal bottom trawling aimed at the most valuable Black Sea fish – sturgeons and turbot" (Birkun, 2002)

"Overfishing is a major problem [in Turkey], affecting both wildlife and local artisanal fishermen. The main culprits are industrial trawlers and purse seine vessels, which form the largest fishing fleet in Turkey. The huge trawling and purse seine nets… have fished out deeper waters. Over the past 20 years the boats have – often illegally – come closer and closer to shore, and have now fished out inshore areas as well" (WWF, 2004). No explicit plans to restore stocks could be found. Turkey is also said to be using considerable quantities of illegal drift nets banned by the UN and EU. Oceana (2005) states that, "At present, there are about 500 drift net boats fishing in the Mediterranean and neighbouring waters (French 76, Italian more than 100, Moroccan 177, Turkish 50–110); over 60% of these belong to EU member countries, or prospective members." Tudela (2004) reports 45–100 illegal Turkish drift net vessels operating in the Aegean Sea. Wilson (2003) and Tudela (2004) report that the Turkish authorities are failing to control illegal drift nets.

WWF (2004) mentions patrols to combat illegal fishing in Aydincik, where a local marine patrolling system was first established in 1993 with the support of the Turkish Ministry for the Environment. Today in several areas (Aydincik and Foça) local fishery cooperatives, in association with the coastguard, the Ministry of Agriculture and the local Governors, control illegal activities at sea. Funding from the Turkish conservation organisation Underwater Research Society-Mediterranean Seal Research Group (SAD-AFAG) and WWF has helped in the purchase of patrol boats. However, effective enforcement is not the norm in Turkey and in Aydincik has only been achieved with considerable outside help. Indeed, Gücü (1999) in documenting an appeal to government against a local trawl ban in the region, points out that such arrangements are quite fragile.

There are almost no distant water vessels, and so re-flagging has not generally been reported as a problem with Turkey. However, However, Turkish companies have been blacklisted by the International Maritime Organization for using Flags of Convenience, and in 2002, 26/66 vessels banned by the EU ports were Turkish.

Turkey has introduced several laws over the years to ensure sustainable fisheries production including 'Fishery Law No. 1380', which limits catch in certain locations and regions for certain periods of the year, limits size of gear and equipment that can be used etc. (OECD, 1987). Fishery regulations, such as they are, are well-intentioned, but compliance is low because of lack of enforcement and vaguely stated tolerance levels. "Mesh sizes of nets are regulated. Minimum landing sizes for species of economic importance are regulated. It should be noted that proportions of undersized individuals, amounting to no more than 15% of the total catch for anchovy and to no more than 5% of the total catch for other species mentioned above, are tolerated." (Cacaud, 1997)

There are considerable concerns in Turkey about fishing juveniles "[trawling]…in the shelf area seems to be practically uncontrolled today. In other words, at present pelagic trawling obviously plays a role of legal 'umbrella' for illegal bottom trawling aimed at the most valuable Black Sea fish – sturgeons and turbot. Pelagic trawls are non-selective fishing gear due to their very small mesh (about 8–10 mm). Thus, their use along the bottom results in the elimination of not only adult, but also young fish of the mentioned long-living species." (Birkun, 2002).

Discards

Discards are estimated at up to 12% in some fisheries (Kelleher, 2005); "The anchovy purse seine fishery has negligible discards as most fish is used for fishmeal while mid-water trawlers targeting sprat, slip (i.e. discard) anchovy and other species (discard rate 5.1%). The sea snail dredge fishery has a discard rate of 11.5 %, while coastal encircling nets have a discard rate of 7.4%". There are few observer programmes. In theory, discards are strictly regulated "Procedures to be followed in respect of incidental catch are the following: (i) live incidental catch must be immediately returned to sea; (ii) dead incidental catch is kept on board and submitted to the competent authorities, which determine whether or not it can be sold" (Cacaud, 1997), yet it is unlikely that this procedure is widely adhered to. Tudela (2004) reports that, "devil fish (*Mobula mobular*), [an elasmobranch] species listed in Annex II of the Barcelona Convention… has been reported as a regular by-catch of Turkish drift nets in the Aegean Sea."

Note

This material is based on a country synopsis, with additional material, published by Pitcher (2006).

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UKRAINE

Summary of Information on IUU fishing

Illegal fishing

Domestic Ukrainian vessels do not carry vessel monitoring systems, but there are plans to equip fishing vessels with VMS devices in the coming years. All vessels fishing within the CCAMLR convention area have observers. Ukraine also has plans to ensure scientific monitoring of its fisheries through observers in national as well as in all international regional fishery organisation areas.

Discards

No reports are available on discards within the Ukrainian EEZ. Kelleher (2005) reports that estimated discards in the Black Sea large marine ecosystem are only 715 t, surprisingly low compared to discards in other such ecosystems worldwide. The study also reports at least one fishery in Ukraine where there are substantial discards.

Unreported catches in the artisanal sector

Statistics are collected to a limited extent in domestic fisheries. "Coastal fishing successfully preserves its long-standing traditions and is the oldest source of employment and income for the local population, as well as the most important source of food. This kind of fishing is primarily focused on valuable commercial objects. Until recently those were sturgeons. [When the ban on sturgeon fishing was imposed in 2000], grey mullet became the main target. The catch, with fixed traps and nets, comprises about 40 fish species, primarily European anchovy, tyulka, flatfishes, silversides, and Pacific mullet (*Mugil soiuy*) introduced in 1980s. Dogfish, skates and rays, turbot and Pacific mullet are fished with gill nets and longlines. In the coastal zone, cases of violation of fishing rules are not infrequent, so the state fishery protection is very active here."

Unreported recreational catches

"Between 1 and 3 million people, mostly men, engage in subsistence, amateur and sports fishing. Subsistence fishermen generally use hand lining and collect shellfish (mussels and clams) on the sea shelf. They widely use small motor boats, including inflatables. The main catch comprises common carp, crucian carp, perch, chub, roach, bream, catfish, pike, pike-perch, ide, asp, mullets, bullhead, clam and mussels. Subsistence fishing prevails in rural areas, while amateur and sports fishing are popular in reservoirs situated near big cities (Kiev, Kharkov, Dnepropetrovsk, Donetsk and Odessa – all with populations in excess of 1 million). The annual catch in subsistence, amateur and sports fisheries is estimated as about 8,000–10,000 t, but there are no official statistics" (Eurofish, 2004).

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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UNITED KINGDOM

Summary of Information on IUU fishing

Illegal Fishing

For most NE Atlantic fisheries ICES (2007) makes estimates of unreported catches and discards, the former of which are considered in this report to be illegal fishing. For many stocks these estimates are available for the past 10-20 years. We have made use of these estimates wherever possible, and have allocated them to fishing states in proportion to their catch of a particular stock.

There are persistent reports of serious illegal and unreported fishing in the UK. Patterson (1998) concluded that west Scotland cod stocks had been under-reported since 1991 by a factor of 30–60%. Unreported catch is said to equal reported catch for Humberside fisheries, and higher figures applied to historical periods of distant water fleets before the establishment of EEZs (Pitcher *et al.* 2002). Scottish purse seiners were estimated to have unreported catches as high as 100% in the early 2000s (Pitcher *et al.* 2002). MRAG (2005) reports "up to half of the cod landed in the United Kingdom is landed as 'black fish' – i.e., misreported."

The EU (2004) censured the UK for failing to control illegal fishing. "Two censures were initiated against Spain and the UK for serious failings in their enforcement obligations". When anonymous inspections were carried out by EU officers in 2003, 10/81 detected infringements concerned the UK, more than any other country except Spain. Moreover, only 5% of infringements reported by the UK received a significant penalty in 2004. UK vessels were involved in illegal/unreported landings of cod and mackerel in the mid-2000s, although recent actions by the Scottish Sea Fisheries Authority have considerably reduced these illegal activities (SFPA 2007).

Discards

There is insufficient observer coverage to accurately report on discarding, high grading and by-catch levels. Therefore accurate stock assessments are severely hindered. A suggestion for more onboard observers has been supported by the Scottish Parliament (WWF Scotland, 2005). Since 2000, the UK has conducted observer monitoring to estimate the level of by-catch in UK pelagic fisheries (RCEP, 2004). The only area where by-catch of common dolphins and other cetaceans has been observed regularly in UK waters is in the western English Channel (RCEP, 2004). In some cases observers are combined with satellite monitoring under the new scheme adopted in 2005 (RCEP, 2004).

UK does not have a good track record on discards. Kelleher (2005) gives an estimated 37% discards overall for United Kingdom and the figure approaches 100% in some fisheries. Many quota regulations increase incentives for fishermen to discard. Some new regulations now attempt to limit the amount of non-target species that have to be discarded (DEFRA, 2002). The CFP framework mentions a possible ban on discarding commercial species (Paterson, 2005) and indeed the Royal Commission is emphatic on the discards issue, mentioning that a discard ban should be introduced and that, under this scheme, all fish caught should be landed (RECP, 2004). However, many UK fishermen are evidently opposed to a 'no discards' regime, regarding it as unworkable, and claiming that discards are unavoidable (Agricultural Economics Research Institute, 2000).

One of the most detailed studies on the estimated costs of actual discards was carried out in the North Sea. The study estimated that approximately 15,000 t of landings of plaice, sole, cod and whiting were foregone as a result of discards in the North Sea Crangon fishery (Revill *et al.* 1999). These foregone landings were valued at €25.7 million. The estimated annual cost of discarding in three EU case studies varied from approximately 70% of total annual landed value in the Dutch case to 42% in UK whitefish and 43% in French *Nephrops* (Nautilus, 2001). Overall, in the North Sea fishery, an estimated total of almost 800,000 t of fish, invertebrates and offal were discarded, compared with total landings estimated at about 2.7 million tonnes. More than 70% of discards were demersal roundfish (for example cod and haddock) and flatfish. Approximately half of the discards occurred during beam-trawling, with demersal otter trawlers also being implicated in high discard rates (except during industrial fishing) (Stratoudakis *et al.* 1999).

A disturbing report on deepwater gill net fisheries set by Spanish, UK, German and Panamanian vessels off the west coast of Scotland identifies serious ghost fishing and by-catch issues (Hareide *et al.* 2005). These fisheries are not well documented or understood and they seem to be largely unregulated, with little or no information on catch composition or discards and a high degree of suspected misreporting. Up to 30 km of gear are routinely discarded per vessel per trip. The percentage of the catch that was discarded varied between 54% and 71%.

Unreported catches in the artisanal sector

In the past, small-scale, mostly inshore, fisheries have been almost invisible in the UK. Indeed, according to the twenty-fifth report of the Royal Commission on Environmental Pollution (RCEP), *Turning the Tide*, the UK government is recommended to review and consider the activities and environmental impact of smaller vessels that have not been included in the past (RCEP, 2004). A very few small-scale inshore fisheries in England have seen detailed management plans and research activities set up in close consultation with fishers: one example is the Thames herring fishery (Roel *et al.* 2004) that has been certified by the Marine Stewardship Council. Most small-scale fishers (vessels less than 10 m) are not censused, their catches are not reported and they are certainly not consulted over any management plans. "My catch was never recorded by anyone, not once in a life time fishing out of this port," (Esseen, pers. comm.).

As indicated in the official statistics publication (Fisheries Statistics Department, 2005), most small-scale UK fishers catches are not reported and where there are reports compiled by the Fisheries Inspectorate there is almost complete reliance on using fishers logbooks, which are often incomplete, inaccurate or deliberately misleading (Hart, pers. comm.). The situation is said to be better in Scotland, where inshore UK-managed fisheries extend out to 12 miles.

Assessments based on local knowledge are used to estimate uptake of some fishing activity by vessels under 10 m and for some shell fishing. For vessels under 10 m overall length, there is no statutory requirement under either EU or national legislation for fishermen to declare their catches. Information for this sector has been collected with the co-operation of the industry: it comprises log sheets and landing declarations voluntarily supplied by fishermen and assessments of landings derived from market sources and by correspondents located in the ports. Full documentation is not required for most fishing for non-TAC species, including shellfish, and summary records are compiled using information supplied voluntarily by the industry, from a variety of local sources and surveys run by local Sea Fisheries Committees.

Unreported recreational catches

No catch data are reported for over one million unrecorded recreational fishermen who generate US$ 1.7 billion dollars worth of economic activity and it is suggested that commercial fishing activities may have been restricted in their favour if necessary (Paterson, 2005).

Note

This material is based on a country synopsis, with additional material, published in Pramod *et al.* (2006).

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USA

Summary of Information on IUU fishing

Illegal fishing

FAO (2003) reports that for the USA, "IUU fishing has not been identified as a problem". However, there are reported cases of suspected vessels fishing illegally off Alaska. For instance, in 1999 a vessel was seized for illegal use of high seas drift nets to catch salmon in the western North Pacific. A report of the enforcement agency for the year 2003 indicates the following cases of illegal fishing (NMFS, 2003), "cases were initiated against five US crab vessels for fishing in Russian waters; observers have written 164 affidavits. This is nearly double the number of affidavits compared to the same time period last year. This increase is primarily due to enhanced regulatory awareness of Observer Program staff. The most significant increase has been in safety, marine pollution, and marine casualty affidavits (69 in 2002 versus 54 to date in 2003); cases of Steller sea lions harassment and suspected illegal takes; rockery incursions; interference with observer sampling procedures; fraudulent IFQ reports; no foreign fishing vessels have been seized in 2003."

MRAG (2005) reports, "The Seattle-based Unimak Fisheries company, pleaded guilty to having concealed and discarded halibut by-catch while fishing for sole and other species in the Gulf of Alaska and Bering Sea in the year 2000." MRAG (2005) also describes vastly over-quota catches of brown king crab, with one seafood company exceeding its 221,000 lb annual quota. This was done by using subsidiary companies (not subject to the same processing limits) to process 4.4 million pounds of crab, about a third of the fishery's total annual limit. MRAG (2005) also identifies the USA as being involved in about 7% of the world illegal abalone trade and reports that illegal US tuna purse seiners have been arrested in Papua New Guinea; Canadian border officials are reported as trying to reduce cross-border illegal fishing by US vessels, both for salmon on the west coast and swordfish on the east coast.

American fisheries companies have also been reported to be involved in IUU activities in the toothfish fishery. The US is listed 10th on a list of the top 20 nations with serious fishery-related FOC issues by Gianni and Simpson (2005), and owned 2 of 26 named toothfish IUU vessels.

To try to ensure that only authorised fishing operations are conducted, the recommended fisheries management plans are applied, fisheries law enforcement procedures are conducted by USA coastguard and the NMFS (National Marine Fisheries Service) (NFMS, 2008), and offenders are prosecuted (FAO, 2003). In addition to a comprehensive observer programme (NPMC, 2008a) and a vessel monitoring system for a portion of the fleet, FAO (2003) identifies that, "a plan of action to combat IUU fishing is being elaborated. Measures already taken to combat IUU fishing include: the implementation of RFMO (Regional Fisheries Management Organisation) measures to combat IUU fishing, the use of US authority to support the conservation and management regimes of foreign countries and the implementation of the Compliance Agreement."

There are also significant problems with reflagging of former IUU vessels to the USA. "To ensure that American-flagged vessels fish in a responsible manner in international waters or waters of another state and are reported and monitored, the US has implemented the Compliance Agreement, implemented the South Pacific Treaty, developed VMS programmes, implemented the CCAMLR Toothfish Catch Documentation Scheme and implemented ICCAT obligations" (FAO, 2003). Reflagged American-owned fishing vessels are thought to be a decreasing, small, but finite issue.

Discards

Kelleher (2005) cites examples of fisheries that previously made significant contributions to the global volume of discards but have introduced measures that have reduced unwanted by-catch. These include the US Northwest Pacific groundfish fisheries, especially those under the management of the North Pacific Fisheries Management Council, that introduced measures such as area and seasonal closures, by-catch quotas and TACs and economic measures (NPMC, 2008b); the US Gulf of Mexico and Atlantic shrimp fisheries where by-catch reduction devices and TEDs are obligatory in certain areas; and the US Atlantic

pelagic longline fisheries, which experienced a reduction in discards of sharks with the implementation of area and time closures.

According to Kelleher (in press) one important positive aspect of the management of by-catch and discards in US fisheries is the existence of Fisheries Management Plans for most of the Federal fisheries. Alverson (1998) states that "in general, discard levels in the US have declined over the past several years due to…new technologies and management measures… decline in stocks… increased retention of fish previously discarded".

However, the US has still many fisheries with undesirably high discard rates, including the trawl and dredge fisheries of the Gulf of Maine and the Northeastern USA, the shrimp trawl fishery in the South Atlantic and reef fish fishery in the Gulf of Mexico. In the Pacific very high discard rates have occurred in the multispecies groundfish trawl fishery off Washington, Oregon and California. To some extent high discards have been caused by the introduction of restrictive quota systems. This has been mitigated partially by complex area and species quota regulations, but it is still a significant problem in the Pacific fisheries.

Kelleher (2005) gives an average US discards figure of 21.7%, or about 930,000 t. A more recent study (Harrington *et al.* 2005) makes a more accurate assessment of about 28%, or about 1.1 million tonnes.

Unreported catches

Sutinen estimates that the overall percentage of unreported catch in the US is about 10% (pers. comm., 2005).

Note

This material is based on a country synopsis, with additional material, published by Vasconcellos *et al.* (2006).

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VIETNAM

Summary of Information on IUU fishing

Illegal fishing

MRAG (2005) identifies Vietnam as one of 37 countries known to be involved in IUU fishing, and a number of statements suggest that illegal fishing is widespread.

There are frequent newspaper reports of Thai vessels fishing illegally in Vietnamese waters (Iyer, 2008). Saigontourist Travel Service Co. (2004) states that Hon Mun (Black Island) Ocean Preserve in Nha Trang Bay "…is coming under increasing pressure as anchor damage and illegal fishing continues".

Nguyen Chu Hoi (2003) reports that the use of destructive fishing methods such as dynamite, toxic chemicals, small mesh size net and fishing in closed seasons are destroying important coastal and marine habitats such as coral reefs, seagrass beds and mangroves and that the marine available resources in the EEZ of the country may not meet the demands of gradually increasing exploitation production.

Recent improved surveillance and greater penalties may be reducing illegal fishing in Vietnam. In 2004 the Vietnamese Government announced that foreign vessels fishing illegally in Vietnam's territorial waters would be fined and materials confiscated."

Discards

There are no reports of the use of by-catch reduction devices, and moreover in Vietnam there is little evidence of any kind of a fishery management plan.

Discards are reported as very low as all catches are said to be utilised in Vietnam (Kelleher, 2004).

Unreported artisanal catches

There are many reports of the artisanal fishery using a wide range of small-mesh and destructive gears. FAO (1999) says, "The most popular fishing gears are gill net, longline, lift net, push net and traps. Statistics covering these gears are approximate since landings can take place nearly anywhere along the coast." The small-scale sector lands on beaches (FAO, 1999) and not at fixed landing sites.

Fishery catches, especially from the inshore sector, do not appear to be well reported in Vietnam. Independent assessments suggest that marine catches are substantially higher than the official statistics. Van Zwieten *et al.* (2002) criticise the frame survey method used to estimate catches and write that, "The effective usage of the present fisheries information of Vietnam is constrained by (1) its low categorical resolution and (2) the non-transparent aggregation of data, some of which are secret and never examined for trends and warning signs". The Research Institute of Marine Products (RIFM) through its Assessment of Marine Living Resources program, with technical and financial assistance through Danish aid (Anon, 2001) recently estimated marine capture to be 4 million tonnes. A slightly earlier estimate, also from RIFM, of uncertainty relating to the accuracy of fisheries statistics gave a figure of 3.2 million tonnes (Houng and Christensen, 2001). Compared to the figures from FAO, these values represent under-reporting by 2.3 and 2.8-fold in 2001 and 2002 respectively.

Note

This material is based on a country synopsis, with additional material, published by Pitcher (2006).

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YEMEN

Summary of Information on IUU fishing

Illegal fishing

Many vessels are reportedly engaged in illegal fishing leading to overfishing especially in the coastal sector. Hariri *et al.* (2002) and MEP (1994) report that there are particular problems associated with the cuttlefish fishery off Yemen's southern coast. "Even the regulations that do exist to control industrial fleets are unfortunately very often violated. Trawlers operating off Yemen's coast fish, at times, in very shallow waters, close to the coast where there are large concentrations of spawning cuttlefish. This practice is destructive to the cuttlefish resources and results in serious conflicts with artisanal fishermen as the trawlers damage their gear. There are reports from artisanal fishermen that large quantities of dead fish have been observed floating or washed ashore on the beaches and are said to have come from the trawlers. Violations of the by-catch regulation might therefore be another problem… the level of fines for this offence are too low to act as a deterrent."

"Adding to the lack of reliable landings statistics is the capture of significant quantities of fish by illegally operating industrial fisheries and their direct transfer to other countries. These direct transfers were estimated in 1999 at up to 40,000 t per annum… illegal fishing practices in the lobster fishery are very common because of its remote and small-scale nature and include fishing with bottom-set nets, taking of undersize lobsters and egg-bearing lobsters and fishing during the closed season" (Morgan, 2006).

"The reefs around Kamaran Island are severely degraded. Collecting of aquarium fish is increasing in Yemen, especially near Kamaran and there are reports of destructive fishing at some sites. Public awareness about coral reef conservation is low in Yemen and the legal framework for reef protection is weak. The exception is Socotra Island, which is a National Park and receives international funding and research attention" Hassan et al (2002).

"In the Red Sea there are widespread reports of large foreign trawlers operating illegally in Yemen waters in direct competition for shrimp and demersal fish, causing a reduction in catch rates for the artisanal fleet. Discards of juvenile demersal fish by these trawlers are high, causing a decline in the stocks. The trawlers also cause damage to or loss of local fishermen's nets, destruction of habitat by indiscriminate use of heavy trawl gear, and fish for shrimp during the closed season under the pretext of fishing for demersal fish" (Hariri *et al.* 2002).

"In Yemen, under the terms of industrial fishing licences, fishing vessels must carry two observers whose salaries are paid by the vessel owner. The observers are in daily radio contact with the Department of Marine Inspection and Control in Aden and provide summarised information on vessel location, activity and catch. All vessels are required to undergo an unloading inspection during which the details of the landings are recorded. However penalties for violations of agreements and laws are very low and do not act as an effective deterrent. In addition to the low penalties, enforcement and prosecution procedures are not properly specified" (Hariri *et al.* 2002).

"In 2003 and 2004, the Ministry of Fisheries Wealth acted to curtail the activities of the industrial fishery sector, including increased surveillance of territorial waters to deter illegal fishing. This illegal fishing, particularly by Egyptian and other vessels has been a particular problem in the past for Yemen. In addition, the Ministry began law suits to recover an estimated five million US$ in past licence fees owing from a number of industrial fishing companies" Morgan (2006).

Discards

Kelleher (2005) states that discards in Yemen's shrimp trawl fisheries are comparatively low. According to FAO (2002) there are serious weaknesses in the gathering of fisheries information and the processing and utilisation of collected data, which is further compounded by lack of ability to enforce existing fisheries regulations.

Sharks are also caught in coastal waters and along the Socotra Archipelago leading to local depletion of several species (Hariri *et al.* 2002). "This is attributed to a lack of control over national shark fisheries and also an increase in illegal fishing for the southeast Asia sharkfin market by fishermen working outside their normal territorial boundaries. Sharks are caught with gill nets and longline which also damage reefs. Carcasses are habitually discarded once the fins are removed. The shark-net fishery and shrimp trawl fisheries have very high by-catch rates of fish, turtles and dolphins, which are discarded. The large but unrecorded by-catch of non-target species taken by shrimp trawlers, which is dominated by juveniles, is having an unknown impact on the recruitment of other living marine resources. Non-fish resources including marine turtles, mammals and sea birds are important species in the biodiversity of the region and also require proper management measures. Trawling is usually conducted in shallow waters of 5–10 m depth but may extend to 20 m. Most of the by-catch is discarded at sea and only the larger fishes are brought ashore for sale or for consumption by the crew." (Hariri *et al.* 2002).

Unreported catches

Yemen's fisheries statistics are unreliable because of serious shortcomings in the system of data collection and processing. Landed fish are rarely weighed anywhere in Yemen; nearly all landed figures are therefore estimates made by eye only. This has been the case since at least 1990 when state control of landing centres diminished. Morgan (2006) states that reliable and routine catch and fishing effort data were collected up to 1990 from the industrial fleet and to a limited extent from the artisanal sector. However, since 1991 no reliable resource surveys or stock assessments have been undertaken in the marine fisheries. Although production records from cooperatives are available, these records represent only a portion of the total fish landed by artisanal fishermen. Landings take place elsewhere, outside the jurisdiction of the cooperatives, especially when fishermen are migrating along the coast over the course of the season. Even when landed at cooperative or market sites, the quantity sold is often underreported to avoid or reduce marketing charges. The portion accurately recorded varies from one area to another" Hariri *et al.* (2002).

According to (Bayliff *et al.* 2004; Hamba, 1998) there are several gaps in information on small-scale tuna fishing for fish caught in Yemen's waters. For example there are many reports in the IOTC database that indicate a high level of underreporting for tuna caught in Yemen's waters. According to Feidi (1998) "many foreign fishing vessels operate legally or illegally, in Arab fish-rich waters such as those off Morocco, Mauritania, Somalia, and Yemen, and the catches made are not recorded as catches from these waters. These catches are estimated to be about 1–2 mt".

Note

This material is based on a country synopsis, with additional material, published by Pramod and Pitcher (2006).

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