PART III

ECONOMIC AND SOCIAL DRIVERS OF IUU FISHING

The objectives of this session were to identify and discuss the main economic and social reasons behind IUU fishing activities, i.e., the costs and benefits. The session focused on the economic and social drivers of IUU fishing and assessed their relative importance. The discussion also helped identify possible measures that could target individual drivers for an effective and feasible integrated response to the problem of IUU fishing.

CHAPTER 11

ECONOMIC ASPECTS AND DRIVERS OF IUU FISHING: BUILDING A FRAMEWORK

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Executive summary

This report examines the economic and social drivers that influence the development of Illegal, Unregulated and Unreported (IUU) fishing. It does this primarily from the point of view of high seas fishing, especially by vessels flying Flags of Convenience (FOC). These vessels undermine conservation measures agreed by Regional Fisheries Management Organisations, and thus we prefer the term Flags of Non-Compliance with such conservation measures (FONC).

It is difficult to obtain sound information on the historical and existing levels of IUU fishing activity, as a solution applied in one area may simply move the problem to another. In order to determine the effectiveness of measures to combat IUU fishing, it is important to develop good quantitative statistics on the levels of IUU fishing in the entire world's oceans, both those under national jurisdiction and those in high seas waters.

IUU vessels appear to be relatively inexpensive to buy (probably less than USD 1.2 M for a longliner) and running costs are lower since crew wages and conditions are inferior to those on legitimate vessels (with the exception of those pertaining to officers, especially fishing masters). Although some additional costs might accrue with the requirement that these vessels re-supply and tranship at sea, they do not have to pay for licences and expensive safety checks, so on balance they are likely to have lower running costs than legitimate vessels. The additional cost they do have to face, however, is the cost of arrest (forfeit of catch and punitive fines), but against this must be set the probability of being caught. Thus the opportunity cost of engaging in IUU fishing is probably quite low.

The bulk of this report is an analysis of the various incentives to engage in IUU fishing. Our analytical framework is based around the very basic equation,

IUU incentive ~ Profit from IUU fishing = Benefit from IUU fishing – Cost of IUU fishing.

In the analysis, we examine economic and social drivers, including market control, price distortion, effect of the global economy and world fishing opportunities, international regulations, fishing agreements, re-flagging, national fisheries management policy including subsidies and excess

capacity and surveillance activities. We also consider the geographical features of IUU fishing areas, the health of other fish stocks, and the financial and operating structure of companies operating IUU vessels.

The analysis points to a number of factors which can create incentives for IUU fishing. More detailed examination of these factors (outside the scope of this report) should make it possible to identify which of them are likely to be most important in creating an economic incentive for vessels to engage in IUU fishing. The ultimate aim of this work should be to eliminate IUU fishing, which would require more detailed analysis to identify how the economics could be manipulated so that the opportunity cost of illegal fishing becomes too high to be sustained. Several solutions are discussed within the analysis. Often, however, the cost of a solution to a particular incentive would also be high for legitimate vessels. We believe that it will be difficult, but not impossible, to find solutions that do not penalise legitimate operators who are following the rules.

Finally, we identify a number of economic and social parameters that are likely to be impacted by IUU fishing. These parameters might be monitored, to complement the quantitative estimates of IUU fishing identified in the second paragraph above, to judge the effectiveness of measures taken to combat IUU fishing.

List of Acronyms

ABC	Australian Broadcasting Commission
ACFM	Advisory Committee on Fisheries Management
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources/ Convention for the Conservation of Antarctic Marine Living Resources
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
DWFN	Distant Water Fishing Nation
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FOC	Flag of Convenience
FONC	Flag of Non Compliance
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IOTC	Indian Ocean Tuna Commission
IPOA	International Plan of Action
ITLOS	International Tribunal for the Law of the Sea
IUU	Illegal, Unregulated and Unreported fishing
LSTLV	Large-Scale Tuna Longline Vessels
MAGPS	EU Multi Annual Guidance Programme
MCS	Monitoring, Control and Surveillance
NAFO	Northwest Atlantic Fisheries Organisation
NEAFC	North-East Atlantic Fisheries Commission
OECD	Organisation for Economic Co-operation and Development
RFMO	Regional Fisheries Management Organisation
UNCLOS	United Nations Convention on the Law of the Sea
VMS	Vessel Monitoring System

Introduction

This report addresses the OECD project on the economic and social issues and effects of IUU/FOC fishing operations. The project aims to develop a framework for analysing the economic and social effects of IUU/FOC fishing, including:

- review literature on the economic and social effects of IUU/FOC fishing;
- identify key factors affecting incentives for IUU vessels;
- develop an analytical framework to evaluate economic and social effects of IUU/FOC fishing;
- develop a checklist of economic characteristics that should be monitored to understand the key economic features that encourage IUU fishing and to assess its impacts.

We approach this problem by first defining IUU fishing and the scope of the project. IUU fishing covers an extremely broad category of behaviour, and needs some refining in the context of this project. Next, we consider the key economic drivers behind IUU fishing and suggest a framework within which they can be studied and their relative importance evaluated. Finally, we review the economic and social impacts of IUU fishing, and how they might be monitored.

Definitions of IUU fishing

As an activity, illegal, unreported and unregulated (IUU) fishing has been with us ever since fisheries management first started. As an acronym, however, it is much more recent. First used informally during the early 1990s by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)[1] in relation to Southern Ocean fishing, it began life as "IU" (illegal and unreported). Formal use of the term IUU can be found in the report of the Commission's 16th Meeting in 1997 and in a letter to the Food and Agriculture Organization (FAO) that same year, in which the nature and seriousness of these problems were described.[2] IUU fishing is now commonly understood to refer to fishing activities that are inconsistent with or in contravention of the management or conservation measures in force for a particular fishery.

A number of international instruments contain provisions that are relevant to controlling IUU fishing. These include the 1982 United Nations Law of the Sea Convention[3] (the 1982 Agreement), the 1993 FAO Compliance Agreement, the 1995 United Nations Straddling Stocks Agreement[4] (the 1995 Agreement), and the 1995 FAO Code of Conduct for Responsible Fisheries.[5] None of these was set up

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1 The Commission established under Article VII of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), 1980. Reprinted in International Legal Materials 19 (1980): 827.

2 Executive Secretary, CCAMLR to FAO [REF: 4.2.1. (l), 18 December 1997], as cited in G. Lugten, "A review of Measures taken by Regional Marine Fishery Bodies to address contemporary Fishery Issues," FAO Fisheries Circular No. 940. (Rome: FAO, 1999): Footnote 130 at 35. .

3 United Nations Convention on the Law of the Sea, Montego Bay, 10 December, 1982.

4 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. New York, 4 December, 1995.

5 See Edeson, W. M. 1966. "The Code of Conduct for Responsible Fisheries: An introduction". Int. J. Mar. Coast. Law 233.

to deal directly with IUU fishing. Concern over the growth of IUU fishing worldwide increased rapidly during the late 1990s. An initiative taken by the FAO Committee on Fisheries in 1999 culminated in the adoption of an IPOA on IUU fishing in March 2001.[6] The IPOA is a voluntary agreement, elaborated within the overall framework of the FAO Code of Conduct for Responsible Fishing.

IUU fishing is defined in paragraph 3 of the IPOA as follows:

> *Not all unregulated fishing is necessarily conducted in contravention of applicable international law. This is because many high seas waters and/or fisheries are still unregulated by regional fishery management organisations (RFMOs). Examples of these include the orange roughy/alfonsino fishery in the southern Indian Ocean, and the toothfish fishery on the northern Patagonian shelf edge. While IPOA appears to exempt this aspect of fishing from the definition "IUU", we consider it part of the problem. This is because even in the absence of regulations, states have an obligation under UNCLOS and (after its entry into force in December 2001) the Straddling Stocks Agreement (not to mention the Code of Conduct) to make efforts to ensure such stocks are managed. Thus, while there is no doubt that the orange roughy/alfonsino fishery is currently legitimately unregulated, it certainly should become regulated, and the negotiations for the South-West Indian Ocean Convention address this concern. In fact, it has been argued that there are no areas of high seas fishing that may be considered legitimately unregulated in terms of states' obligations under that Agreement and under Part VII of the1982 Agreement. However, this appears to be an area of international law about which differences of opinion remain.*[7]

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6 See "Implementation of the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing". *FAO Technical Guidelines for Responsible Fisheries*. No. 9, Rome, FAO. 2002, 122 pp. See also Report of the Twenty-Fourth Session of the Committee on Fisheries, Rome, 26 February–2 March, 2001. Document COFI/2001/7, and Kirkwood & Agnew 2002 [G. P. Kirkwood and D. J. Agnew. 2002. "Deterring IUU fishing. Proceedings of the Symposium on International Approaches to Management of Shared Stocks – problems and future directions". Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Lowestoft 10-12 July 2002.].

7 See, for example, Freestone, D and Makuch, Z. 1996. "The new International environmental law of fisheries: The 1995 United Nations Straddling Stocks Agreement". *Yearbook of International Environmental Law*. 7: 3-51.

Box 11.1. Definitions of the FAO IPOA to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing

3.1 **Illegal** fishing refers to activities:

3.1.1 conducted by national or foreign vessels in waters under the jurisdiction of a State, without the permission of that State, or in contravention of its laws and regulations;

3.1.2 conducted by vessels flying the flag of States that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which the States are bound, or relevant provisions of the applicable international law; or

3.1.3 in violation of national laws or international obligations, including those undertaken by cooperating States to a relevant regional fisheries management organization.

3.2 **Unreported** fishing refers to fishing activities:

3.2.1 which have not been reported, or have been misreported, to the relevant national authority, in contravention of national laws and regulations; or

3.2.2 undertaken in the area of competence of a relevant regional fisheries management organization which have not been reported or have been misreported, in contravention of the reporting procedures of that organization.

3.3 **Unregulated** fishing refers to fishing activities:

3.3.1 in the area of application of a relevant regional fisheries management organization that are conducted by vessels without nationality, or by those flying the flag of a State not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization; or

3.3.2 in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law.

3.4 Notwithstanding paragraph 3.3, certain unregulated fishing may take place in a manner which is not in violation of applicable international law, and may not require the application of measures envisaged under the International Plan of Action (IPOA).

Scope of this report

The objective of this report is to review information on the economic incentives for IUU fishing, and the economic and social impacts of such fishing. In order to do so, it is necessary to define the scope of our review because the areas covered by the FAO definition go beyond the remit of this project.

What we are ultimately interested in is the unauthorised or unrecorded removal of fish from a fisheries ecosystem. Such unauthorised removals damage both fish stock and the ecosystem because they are not accounted for within the fisheries assessment and management system. Indeed, these actions undermine conservation measures promulgated to ensure the rational use of those stocks.

Collateral to this resource damage is economic damage to legitimate, law-abiding fishers. Economic damage may be direct (an IUU vessel may trawl over the gear set by a legitimate vessel) or

indirect. Indirect effects are of two kinds. The first is associated with the depletion of the stock that is caused by IUU fishing. Because they are not accounted for, IUU catches usually deplete a resource, leaving less of it for legitimate fishers. The result is the gradual erosion of the fishery's ability to provide a sustainable long-term basis for the use of fisheries and associated environmental resources by fishermen and other stakeholders. Legitimate fishers might therefore suffer a declining allowable catch (as the stock declines) and a declining catch rate. This declining catch rate directly affects the economics of fishing vessels. The second economic effect is bad publicity arising from high levels of IUU fishing, which could make consumers cautious of purchasing even legitimate products from companies engaged in fishing in areas where IUU fishing is widespread, no matter how legitimate their fishing operations may be.

Thus there is a clear cause – the taking of fish beyond what is defined by a management body, or at unsustainable levels – and a clear effect – damage to the ecosystem, which is passed on to legitimate resource users, as well as an economic and social cost. Of course, there are many examples where such damage is being or has been directly caused by management setting quotas that are higher than scientific advice indicates are sustainable (ref: ICES ACFM reports on cod, hake etc. over the past 2 years), but this is not within the scope of our review. Similarly, there are instances where there is no management in high seas waters (the Southern Indian Ocean alfonsino/roughy fishery, for instance). While, as argued above, fishing in these areas is strictly IUU fishing under the definition of 3.3.2, and under the obligations of States Parties to UNCLOS and Straddling Stocks Agreements, it must also be pointed out that there are some states that are not party to these agreements. Hence, this is a problem of international management that is also beyond the scope of this review; it requires action by States with interests in the region, and with obligations under UNCLOS or the Straddling Stocks Agreement.

The remaining IUU fishing problem can be divided into two categories: fishing that takes place *inside* or *outside* areas of national jurisdiction. In the IUU literature, there are two clearly different cases of IUU fishing that take place inside areas of national jurisdiction, *i.e.*, misreporting and poaching (covered by FAO definitions 3.1.1 and 3.2.1). Misreporting is carried out by otherwise legitimate vessels, and while it is likely to be illegal under FAO definition 3.1.1, this will depend on the strength of national laws. It is a well-documented and widespread problem, known to most fisheries management authorities, involving a number of areas such as discarding, high-grading, domestic-use non-reporting, misreporting, and "black fish".[8] Pitcher *et al.* (2002) categorise these catches as unreported discards (which may not be illegal but are not reported by observers), unmandated catches (catches that an agency is not mandated to record) and illegal catches (catches that contravene a regulation: poached fish from closed areas, transhipments at sea, under- or misreported catches including those whose identity is deliberately concealed). Amongst a host of examples from around the world they focus on two, Iceland and Morocco. Using an analytical method they estimate that catches of Icelandic cod may have been underestimated by between 1 and 14% at different times, and haddock by between 1 and 28%. Catches in Moroccan waters may have been underestimated by as much as 50%. Obviously, these levels of IUU fishing in national waters have very serious consequences for domestic fisheries, especially as the level of IUU extractions is not constant from year to year but varies depending on circumstance. For instance, a quota system will inevitably lead to greater incentives for misreporting than management based on effort limitation (Agnew, 2001: sustainability of squid fisheries; Pitcher *et al.* 2002).

This aspect of the IUU problem is very large, and can only be solved by clear management and MCS (Monitoring, Control and Surveillance) action. It is outside the scope of this review.

[8] Valatin, G 2000 "Fisheries management institutions and solutions to the 'black fish' problem". CEMARE Misc. Publ. no. 48, pp. 101-118. *Management institutions and governance systems in European Fisheries*. Univ. of Portsmouth, Portsmouth (UK).

Furthermore, to a large extent the activities covered by definition 3.2.2 are similar to those of 3.2.1 – *i.e.* misreporting, discarding, high-grading, etc. Although these problems are exacerbated by the activities of Illegal/FOC vessels, their solutions are not dissimilar to those applied within waters under national jurisdiction, and will not be covered here.

Flags of Convenience (FOC)

As generally used, the term Flag of Convenience refers to a state that is willing to have a vessel on its national register without undertaking fully its obligations under UNCLOS Article 94 to exert Flag State jurisdiction and control. FOC countries are usually those which have established open registers, accepting vessels from other countries without having a genuine link between the flag state and the vessel or company owning the vessel. Initially, vessels were registered with these countries for reasons more to do with licensing fees, tax evasion, reduced safety requirements etc.[9] While these are all still valid economic reasons for vessels to flag with these countries, an additional incentive is that no effective control is exercised. Under the terminology of the Compliance Agreement the flag state must be able to exert effective control over the vessel, but States referred to as FOC usually fail to do so.[10] It further says that States should ensure that their vessels do not engage in activity that undermines the effectiveness of international conservation measures. Since FOC states are generally not members of RFMOs or other agreements, their flag vessels are not bound by the management regulations enforced by these organisations. Furthermore, while they would normally then be bound *generically* by the provisions of the Compliance or Straddling Stocks agreements, they have usually not signed up to these agreements either. They are therefore effectively beyond the reach of international law.

IUU vessels often fly flags of convenience, or employ re-flagging, as a means of deliberately avoiding fisheries conservation and management measures based on regional arrangements applicable on the high seas. Re-flagging is relatively easy, and IUU vessels may re-flag several times in a fishing season to confuse management and surveillance authorities. One classic example is San Rafael 1, flagged to Belize, which - following an encounter with a fisheries patrol vessel in December 1999 around South Georgia - changed its name to the Sil, then the Anyo Maru 22 and finally the Amur, flagged to Saõ Tome e Principe before sinking around Kerguelen on 9 October 2000.[11] Another is the Camouco, arrested by France in 1999 around the Crozet Islands, and released on bail following a case which was taken to the International Tribunal for the Law of the Sea.[12] After its release the vessel changed its name to Arvisa 1 and subsequently Eternal, only to be arrested again by France on 3 July 2002 for illegal fishing in Kerguelen waters. We mention these cases only to illustrate that IUU vessels often use re-flagging to confuse surveillance, and we do not suggest that any of the above-mentioned flag states should be classified as a Flag of Convenience or Flag of Non Compliance.

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9 European Parliament. Working Document 1 on the role of flags of convenience in the fisheries sector. Committee on Fisheries, 11 April 2001.

10 Vukas and Vidas discuss this point in detail, and show how the concept of requiring a genuine link between Flag State and vessel was repeatedly watered down in the negotiations leading up the 1982 UNCLOS agreement. B. Vukas and D. Vidas, "Flags of Convenience and High Seas Fishing: the emergence of a legal framework". In *Governing high seas fisheries: the interplay of global and regional regimes* (Ed. O. S. Stokke) pp 53-91, OUP.

11 D.J. Agnew and G.P. Kirkwood 2002. "A statistical method for analysing the extent of IUU fishing in CCAMLR waters: application to Sub-area 48.3". CCAMLR WG-FSA-02/4

12 ITLOS press release 35, 7 February 2000. Case of the Camouco, Panama vs. France. For later information on the movements of the Camouco, see ITLOS Transcripts of the Volga case (Russia vs. Australia), statement of Mr Campbell, ITLOS/PV.02/02, 12 December 2002.

However, there are differences between merchant vessel and fishing vessel use of flags of convenience, and between the behaviour of vessels flying flags of convenience in different regions of the world, that have led to the emergence of a new term to describe FOC vessels. For instance, vessels under the Panamanian flag would be regarded as FOC in Antarctic waters, because, as a non-party to CCAMLR, Panama would not be exerting effective control on its vessels in the waters of that RFMO. However, Panamanian-flagged vessels are not FOC vessels in waters administered by ICCAT, as Panama is a member of ICCAT. For these reasons CCAMLR has moved away from the term "Flags of Convenience" and now uses the term "Flags of Non Compliance". In the preamble to Resolution 19, the definition of this term is clear (Box 11.2.):

This clearly indicates the cause of the problem (*i.e.* the lack of State control over vessels which are conducting activities that undermine the effectiveness of conservation measures), but allows States and RFMOs to take action against FONC/FOC States and their vessels only in respect of the violations of specific regional agreements. This maintains consistency with the intent of the FAO compliance agreement and WTO requirements where trade measures are contemplated.

Box 11.2. Preamble to CCAMLR RESOLUTION 19/XXI, Entitled "Flags of Non-Compliance"*

The Commission,

Concerned that some Flag States, particularly certain non-Contracting Parties, do not comply with their obligations regarding jurisdiction and control according to international law in respect of fishing vessels entitled to fly their flag that carry out their activities in the Convention Area, and that as a result these vessels are not under the effective control of such Flag States,

Aware that the lack of effective control facilitates fishing by these vessels in the Convention Area in a manner that undermines the effectiveness of CCAMLR's conservation measures, leading to illegal, unreported and unregulated (IUU) catches of fish and unacceptable levels of incidental mortality of seabirds,

Considering therefore such fishing vessels to be flying Flags of Non-Compliance (FONC) in the context of CCAMLR (FONC vessels),

Noting that the FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas emphasizes that the practice of flagging or re-flagging fishing vessels as a means of avoiding compliance with international conservation and management measures for living marine resources and the failure of the States to fulfil their responsibilities with respect of fishing vessels entitled to fly their flag, are among the factors that seriously undermine the effectiveness of such measures,

* Many of the flags hereby called FONC are commonly referred to as "flags of convenience".

Conclusion

In conclusion, the areas that we will address are FAO definitions 3.1.2, 3.1.3 and 3.3.1. These cover the activities of IUU and FONC vessels in high seas waters covered by RFMOs. However, of necessity we will need to consider that aspect of definition 3.1.1 that relates to piracy by foreign vessels within an EEZ, because the activity of these vessels in high seas waters is intimately linked with their activities in waters under national jurisdiction. Much of the following discussion will therefore focus in the first instance on the drivers for IUU fishing within and outside EEZs, followed by an assessment of its impact.

Review of relevant information

Estimating the extent of IUU/FONC fishing

The problem of IUU fishing has been encountered by most regional fisheries organisations since the 1980s. For instance, in the period between 1985 and 1993 an annual average of 30 – 40 fishing vessels from non-contracting parties were sighted in the regulatory areas of the Northwest Atlantic Fisheries Organisation (NAFO), primarily flagged to Panama and Honduras. Following diplomatic demarches to these countries, some of the vessels were re-flagged to Belize.[13]

NEAFC has also recorded a number of more recent experiences of IUU/FONC fishing. In 2001 non-member Lithuania declared that 14 000 t of redfish had been taken from NEAFC waters. This was taken outside of agreed NAFO quotas of about 100 000 t. Vessels from Sierra Leone have also been sighted in NEAFC waters (Joao, pers. Comm.).

ICCAT has of course experienced the activities of FONC vessels for a number of years. In 1994, a Bluefin Tuna Action Plan was adopted by ICCAT that linked information gathered by the Bluefin Tuna Statistical Document Programme[14] with Contracting Party compliance and non-Contracting Party co-operation with ICCAT's conservation and management regime. After identifying in 1995 that Belize, Honduras, and Panama had vessels that were fishing in a manner which diminished the effectiveness of ICCAT's conservation measures, in 1996 ICCAT prohibited imports by its Members of bluefin tuna products from these three countries (effective from 1997 for Belize and Honduras and 1998 for Panama). This was successful in terms of Panama, which became a contracting party in 1998. Similar sanctions were extended to cover bigeye tuna taken by vessels flagged by Belize, Cambodia, Honduras, Equatorial Guinea and St. Vincent and the Grenadines in 2000. Once again, this move seems to have been effective, and in 2001 ICCAT lifted the import ban on bigeye tuna from St. Vincent and the Grenadines and the bluefin tuna ban from Honduras. ICCAT has estimated that the IUU catch of big eye tuna reached a maximum of 25 000 t in 1998 but has since declined to about 7 200 t (2001). In 1998, the IUU catch was about 25% of the total catch.

The IUU tuna vessels problem is widespread. At the Santiago de Compostella meeting on IUU fishing, Japan presented a paper which suggested that despite various incentives to scrap vessels and move them onto national fleets there are still some 100 IUU large-scale tuna longline vessels (LSTLV) catching an estimated 25 000 t of tuna each year. ICCAT has for some time been concerned about the activities of these vessels, particularly since most of them have crew from ICCAT Contracting Parties and there is considerable evidence of laundering of IUU catch either through links with legitimate vessels or through forging documentation.[15] In response to this concern, at its December 2002 meeting

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13 Reported in Vukas and Vidas, *op. cit.* Citing Joyner and the NAFO annual reports 1994, 1995. Other sighted flags included Cayman Islands, Sierra Leone, St Vincent and the Grenadines, New Zealand, the USA and Venezuela.

14 ICCAT resolutions 92-1 and 92-3, implemented in 1993.

15 See: Japanese submission at FAO-IPOA meeting; Japanese paper delivered to the Santiago de Compostella meeting. The preambular paragraphs in ICCAT Resolution 01-19 make these concerns very clear: "RECALLING that the Commission makes yearly reviews of various trade and sighting data and based on that information prepares a list of IUU fishing vessels, RECOGNIZING that since IUU fishing vessels change their names and flags frequently to evade the sanction measures against them and that the lists of IUU fishing vessels based on the past trade data are still useful but should not be the sole tool to eliminate the IUU fishing vessels; EXPRESSING GRAVE CONCERN that a significant amount of catches by the IUU fishing vessels are believed to be transferred under the names of duly licensed fishing vessels; BEING AWARE that the majority of crew onboard the IUU tuna longline vessels are residents of the Contracting Parties, Cooperative Non-Contracting Parties, Entities or Fishing Entities; STRESSING THE NEEDS for Chinese Taipei, Japan and Parties concerned to investigate the relation between licensed vessel owners and IUU fishing activities and take necessary actions to prevent licensed vessel owners from being engaged in and associated with IUU fishing activities."

ICCAT enacted a series of resolutions[16] which create both "white" and "black" lists of vessels. Any vessel not on the white list that fishes, tranships or otherwise engages in unregulated fishing is placed, following a series of review procedures, on the blacklist, and there are a number of punitive measures that are activated once a vessel is on this list. IOTC is similarly concerned, but as far as we know has not yet been able to estimate the size of IUU catch in the Indian Ocean.

Since 1992 CCAMLR has experienced large amounts of IUU/FONC fishing, with levels reaching up to 80% of the total catch in some areas of the Indian Ocean.[17] Agnew (2000) for instance, estimates that IUU catches in 1996/97 were restricted to the Indian Ocean and reached 43 000 t. FONC States have been Belize, Panama, Vanuatu, Portugal, Namibia, Vanuatu, Seychelles, Faeroe Islands, South Tomi, St Vincent and the Grenadines, and the Netherlands Antilles. Although many of these states have now acted to stop their vessels fishing in CCAMLR waters, there are also vessels from CCAMLR Members that are engaged in illegal fishing in CCAMLR waters, in particular Russia and Uruguay.[18] Since bringing in a Catch Document Scheme for toothfish, CCAMLR has been able to curtail some of the IUU activity on toothfish, although catches in the Indian Ocean sector are still thought to be very high. The latest estimates from CCAMLR are that IUU-caught toothfish amounted to 11 000 t in 2002, about 45% of the total catch from CCAMLR waters, 99% of this coming from the Indian Ocean.[19] However, examination of trade data by TRAFFIC Oceania suggested that the CCAMLR estimates may have been underestimated in 1999/00, when the Catch Document Scheme came into force.[20] Like ICCAT, CCAMLR brought in two important Conservation Measures regarding lists of vessels engaged in IUU fishing[21] at its October 2002 meeting, although both are "black" lists (CCAMLR chose not to create a "white" list other than its already existing list of vessels licensed by Members to fish in the Convention Area).

Monitoring the effects of IUU fishing

The level of IUU fishing is notoriously difficult to assess. Methods to assess it can be divided roughly into direct and indirect. The direct method relies on statistical methods and actual observations to derive estimates of the level of IUU fishing (*e.g.* Agnew & Kirkwood 2002; Pitcher *et al.* 2002). However, even these methods rely on certain assumptions, such as the value of certain input parameters. The value of these parameters can be treated as uncertain, and in this sense Bayesian approaches may have considerable value. Indirect methods, on the other hand, are based on deductive assumptions. They can be based on occasional sightings of vessels, or on trade data. The use of indirect methods is more widespread.

16 02-22, "Recommendation by ICCAT concerning the establishment of an ICCAT record of vessels over 24 meters authorized to operate in the Convention Area", and 02-23, "Recommendation by ICCAT to establish a list of vessels presumed to have carried out illegal, unreported and unregulated fishing activities in the ICCAT Convention Area".

17 Agnew, D J, 2000. "The illegal and unregulated fishery for toothfish in the Southern Ocean, and the CCAMLR Catch Documentation Scheme". Marine Policy 24: 361 – 374.

18 CCAMLR Report, 2002.

19 CCAMLR Scientific Committee Report, 2002, Annex 4, Table 3.2.

20 M. Lack & G. Sant, 2001. "Patagonian toothfish: are conservation and trade measures working?" TRAFFIC Bulletin, Vol. 19, No 1. TRAFFIC Oceania. See Agnew, 2000 op. cit and Green, J. and D.J. Agnew. 2002, ["Catch document schemes to combat Illegal Unregulated and Unreported fishing: CCAMLR's experience with southern ocean toothfish". *Ocean Yearbook 2000*, 16, (in press)] for a discussion of the CCAMLR CDS.

21 CCAMLR Conservation Measures 10-06 (2002) "Scheme to promote compliance by Contracting Party vessels with CCAMLR conservation measures" and 10-07 (2002) "Scheme to promote compliance by non-Contracting Party vessels with CCAMLR conservation measures".

Both methods suffer from the problem that they each require data. As IUU fishing is revealed through the use of one method of assessment, IUU fishers become aware of the danger of allowing such data to be released and therefore move to disguise the data source. One advantage of direct methods is that much of the data are generated by management and surveillance authorities. They are therefore less subject to bias than indirect methods.

It is often thought that the only way to achieve effective control of IUU fishing is through surveillance, and it well known that increasing surveillance leads to increasing avoidance.[22] While it may play a large part, a host of other economic and social considerations also come into play, as shown in the next section. Indeed, some of the economic models currently developed take this into account,[23] and more needs to be done in terms of applying such models for the various IUU situations identified above. In particular see Charles *et al.*

Conclusion

One factor that emerges when examining IUU fishing in a global sense is that it has been widespread over the last 30 years. This time span coincides with the period when international (and national) management regulations were considerably tightened up, being primarily dependent upon closure of the commons as EEZs were declared and codified into international law in the 1982 UNCLOS agreement. However, IUU fishing has not been uniform in its development across the globe. The earliest records appear to come from NAFO, then from ICCAT and finally from CCAMLR. Unfortunately it is not currently possible to really assess the changes in the extent of IUU fishing because much of it is only documented by national or international agencies, and there is no simple global picture. Fighting IUU fishing has been likened to trying to squash a balloon full of air, in that as the problem is solved in one area it pops up in another.

It will never be possible to assess the effectiveness of attempts to eliminate IUU fishing unless there is a global IUU monitoring programme that can show whether the measures taken are having any effect. That global view is currently not available. We would conclude that a necessary precursor to the many current initiatives on IUU fishing would be to monitor IUU fishing (or define methods for its monitoring). As far as we are able to ascertain, although FAO has stated that it will "monitor, to the extent that it is possible, global developments in IUU fishing and report on these developments at UN and FAO fora"[24] this will not necessarily include producing annual statistics on the level of IUU fishing. As we have seen these are difficult to obtain, so considerable effort will have to be exerted to acquire these data.

Analytical framework

In this section the focus is on understanding the economic and social drivers behind IUU fishing activities.

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22 Charles *et al.*, 1999; Milliman, SR 1986 "Optimal fishery management in the presence of illegal activity" J. Envir. Econ. Manage.13, 363-381.

23 See Charles, A.T, R.L. Mazany, M. L. Cross, 1999 "The economics of illegal fishing: a behavioural model". Mar. Resource Economics, 14, 95-110; Sutinen, JG; Kuperan, K, 1995, "A socio-economic theory of regulatory compliance in fisheries", Int. Coop. Fish. Aquaculture. Dev: Proc 7th Biennial Conf. of the Int. Inst. Fish. Econ. Trade, National Chinese Taipei Ocean Univ, 1995, vol. 1, pp. 189-203.

24 FAO Observers report to CCAMLR, 2002: CCAMLR-XXI/BG/36.

Understanding the economics of IUU vessels

The economics of IUU vessels centre on the vessel operating costs of IUU activities compared to non IUU activities. In addition, factored into IUU fishing activities there will be a **risk factor**, namely the costs of being apprehended, catch confiscation and the potential costs of a fine. In the absence of a competitive fishing environment and with limited regulatory control, IUU fishers will be able to extract a higher level of **economic rent** than transparent non IUU fishing activities. However, the issue of rent extraction as between fishing fleets is one issue. The other issue is the distribution of economic rent as between foreign fishing vessels (IUU and non IUU) and the coastal states in whose waters these vessels are fishing. Several studies show that in many cases local coastal states only receive a fraction of the value of the resource which is taken from their waters.

There appear to be two groups of vessels that are currently engaged in widespread IUU fishing in high seas waters (*i.e.* IUU fishing falling under the scope of this study). The first of these are LSTLV vessels, of which there appear to be about 100, fishing for tuna in ICCAT and IOTC waters. The authors have little knowledge about the economics of these vessels.

Secondly, there are the IUU vessels undertaking longline fishing for toothfish in CCAMLR waters. These vessels may be relatively inexpensive to buy, probably less than GBP 1 million. Information is hard to come by, but there have been a number of cases of contested bonds of arrested IUU vessels brought to the International Tribunal of the Law of the Sea[25] which are relevant. Valuations of vessels in court cases are likely to be lower than the market price, since they are the subject of negotiations on damages. Nevertheless, they do give us some clues. In this regard the Camuoco was originally valued at about USD 3 million (GBP 2 million) by the French authorities which arrested it, but this was contested at the ITLOS court by the applicant (Panama) and it was decided that the value for bond purposes was USD 345 000 (GBP 220 000). Again, in the Monte Confurco case (Seychelles v France) the vessel was originally valued at USD 1.5 million by the respondent (France) and USD 500 000 by the Applicant, and the Court upheld the value of USD 500 000. In the case of the Grand Prince (Belize v France) the respondent (France) valued the vessel at USD 2 million (FF 13 million) and the respondent at USD 360 000, although the court does not seem to have made a judgement between these two figures.

In all these cases there are strong vested interests, for the respondent in having a high valuation (to increase the bail amount) and the applicant having a low valuation (to reduce the amount of bail). The true value of the ship is therefore likely to lie somewhere in between, at an average of about USD 1.2 million. In the more recent Volga case, the value of the vessel was uncontested at about USD 1.1 million (AUD 1.8 million, GBP 720 000). This tends to support a nominal value for an IUU longliner of about USD 1.2 million or GBP 780 000.

Longliners are usually 500-1000 GRT. They are usually staffed with captains from a variety of fishing states, often with Russian engineers.[26] The staff costs for officers will usually be higher than for legitimate vessels, since they are taking certain risks, and will as usual be linked to the value of the catch. Crew costs, however, are much lower, since very cheap labour from Indonesia, China and other developing countries is used, and the crew are paid very poor wages (in the region of

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25 Copies of the court proceedings and judgements in the ITLOS cases can be found on the ITLOS website, http://www.itlos.org/

26 The information in this section comes from a variety of confidential sources, but also the Australian Broadcasting Corporations' 4 Corners programme, "The toothfish pirates", broadcast on 30 September 2002 and "The Alphabet Boats: a case study of toothfish poaching in the Southern Ocean", a publication by Austral Fisheries Pty, PO Box 280, Mt Hawthorn, Western Australia 6916.

USD 100/month). As a result, total staff costs are likely to be 25-30% of total catch value. Routine running costs for an IUU vessel will be somewhat similar to those for a legitimate vessel, around GBP 800 000 per year.[27] Vessel operating costs will be lower, however, as in many cases the vessel may not be fully insured and the crew may not be operating under the health and safety and insurance norms that apply to non IUU fishing vessels.

A few years ago most IUU vessels fishing for toothfish were thought to be acting relatively independently, although several would have been owned by a single fishing company. That fishing company would often be operating several legitimate vessels as well as a vessel engaged in IUU fishing. CCAMLR reported that a large number of vessels with a great many flags were engaged in IUU fishing in 1996–1999, and, as exemplified by the case of the San Rafael 1, the activities of these IUU vessels can best be described as opportunistic.

Set against these costs will be the profit from IUU activities. In terms of toothfish these are likely to be between GBP 3 million and GBP 4 million per year (USD 4.5–6 million), based on a fishing year of about 200 days, currently likely catch rates and market prices of toothfish. It can be readily seen that the likely profit far exceeds the costs, even if a vessel was to be arrested and confiscated once a year.

More recently, however, a disturbing development has been the engagement of an organised IUU fleet of vessels with common ownership and control links to two major companies based in the Far East – Pacific Andes and P. T. Sun Hope Investments (Jakarta), although Pacific Andes officially denies this. The Austral Fisheries press release states that "the 'alphabet' boats are, of course, technically operated and controlled by their skippers while being owned by dummy companies in (at various times) the British Virgin Islands, Russia, Belize, Bolivia and elsewhere".[28] We would emphasise that at the moment these are simply allegations from Austral Fisheries.

The development of highly complex company ownership structures has several effects which skew the economic balance sheet for these vessels. Firstly, laundering IUU catch along with legitimately obtained catch (Pacific Andes is a major purchaser of fish caught by legitimate vessels) will allow the price of IUU fish to be higher than would otherwise be the case. There is considerable evidence of fraud in the documentation accompanying toothfish catch documents, as there is in the certificates of registry that are now required by Japan for tuna imports. Secondly, it is not sufficient to simply examine the economics of a single vessel (as we have done above), when a company runs a series of legitimate and IUU vessels, because single vessels can quite easily be sacrificed to the overall benefit of the fishery. There are certainly allegations that the two vessels arrested by the Australian navy in February 2002 (the Volga and the Lena) were the oldest and most dispensable in the IUU fleet fishing around Heard Island. Thus, the actual disincentive of arrest may be much less (for the company) than would be assumed for a fleet. Finally, of course, it is much easier for a fleet and large company operation to afford the administration required for rapid re-flagging, re-configuring and other disguising tactics.

The authors have no direct information on the economic operations of the LSTLVs, but we would assume that their operations are developing the same level of co-ordination as the toothfish vessels, given the increased sophistication of the fraud reported by Japan.

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27 These are figures obtained from discussions with the toothfish industry. A more comprehensive analysis of licensed vessel operation is given in "Évaluation des accords de pêche conclus par la Communauté européenne". Ifremer/Cemare/CEP. Contrat Européen no. 97/S 240-152919, 1999.

28 Page 3 of the Austral Fisheries document.

The above summary of the economics of the operations of IUU vessels sets the scene for a discussion of the major economic drivers behind IUU fishing, discussed in the next section.

Economic incentives to engaging in IUU activities

Before embarking on this section, a distinction should be made between economic incentives for companies and vessels on the one hand, and individuals on the other. The drivers for entities and individuals may not be the same, and these differences will be recognised where they occur. However, it may be more useful to present an analytical framework for investigating the economic drivers for IUU activities by reference to generalised categories. Thus the category "world economic outlook" would affect both companies and individuals, as would "disparity between developed and developing world economies".

Our analytical framework is based around the very basic equation,

(1) IUU incentive ~ Profit from IUU fishing = Benefit from IUU fishing – Cost of IUU fishing

Each of the economic drivers will act differently on this equation. For instance, one might reduce costs, thereby increasing the incentive, while another might increase the value of the catch, thereby achieving the same result.

It is not sufficient simply to analyse the effect on IUU fishing of certain drivers. The objective of undertaking such an analysis is to identify areas where further research would be best directed, and ultimately to find ways in which equation 1 can be tipped into negative profit, thereby reducing any incentive for IUU fishing and assisting its elimination. However, account also needs to be taken of the effect each driver has on legitimate fishers. There is no point in adopting a solution such as a total moratorium on exploiting a particular species if it adversely affects legitimate fishermen more than IUU fishermen. Therefore, our analysis also takes into account how the various drivers affect legitimate fishermen.

At this point, our analysis is simply qualitative. There is very little information on which to make quantitative analyses. However, we think that such information could be acquired, and useful economic models developed, to investigate the relative importance of each of the drivers in influencing the general equation above.

Social drivers

There are a number of social drivers behind IUU fishing. Closer control over the EEZs of coastal states will mean that distant water fishing nations (DWFNs) may have problems in employing fishing crews. In the case of countries such as Chinese Taipei/China and Korea there is therefore an incentive to take the risk of IUU fishing because the relative risks and costs of arraignment may be low. In some of the fishing nations, over-exploitation of their own fishing grounds causes a displacement effect to the EEZs of coastal states and the high seas. Fishing operators may also engage in IUU fishing because of the more limited health and safety controls and other controls over working conditions and workers' rights.

In the case of low-income countries with semi-industrial fishing fleets, IUU fishing may be considered as a relatively low-risk, cost-effective way of maintaining fish supplies for the country. IUU fishing may therefore have a number of social drivers in the case of these countries, including employment, protein supply and food security. Because it evades controls, payment of access rights and social security, IUU fishing is therefore an attractive option.

Markets and trade

Market control/access and the regulatory environment

It is often thought that increasing restrictions on market access will have a deterrent effect on IUU fishing. This may be the case, but we need to understand exactly how such deterrence might take effect. Firstly, it should be noted that trade-based measures have so far only been adopted in respect of tuna and swordfish (ICCAT, CCSBT, and recently IOTC) and toothfish (CCAMLR). The toothfish scheme is fundamentally different from tuna schemes, which are directed on species falling wholly under the control of the RFMO, and are primarily trade documentation schemes, in which documents are issued in respect of products entering trade. Following the success of the ICCAT Bluefin Tuna Statistical Document Programme, a linkage was made in the Bluefin Tuna Action Plan to prohibit imports from non-members whose vessels diminish the effectiveness of ICCAT conservation measures. In 1996, this was extended to allow the prohibition of imports from ICCAT Members who exceed their catch limits.[29] However, a statistical document scheme is not an essential precursor to the imposition of trade measures; sufficient information may already be in existence to provide evidence of the undermining of conservation measures. Thus ICCAT maintains a Swordfish Action Plan, which together with its resolution 96-14 can be used to prohibit imports of swordfish from Members or non-Members. Similarly, ICCAT Resolution 98-18 is aimed at catches of tuna by large-scale longline vessels, and has been used to prohibit the importation of bigeye tuna from one ICCAT Member and four non-Members (FAO, 2002).[30] This is in the (then) absence of specific Statistical Document Schemes for these species.

The toothfish scheme operated by CCAMLR, on the other hand, is a catch certification scheme, with documents being issued at the point of capture or landing. A second major difference is that not all toothfish come under the control of the RFMO, as significant high seas stocks of toothfish fall outside the CCAMLR Area.[31]

There is evidence from the CCAMLR situation that fish certified using a catch document or other trade tracing document may command higher prices than uncertified fish, but that this premium may not be particularly high and therefore it may not act as a sufficient incentive to switch to certified sales (yet). Evidence from CCAMLR suggests that the current premium on fish carrying CCAMLR Catch Documents is only 20-30%. This is encouraging because it was always acknowledged that one of the aims of the scheme would be to create a price differential which would act as an economic disincentive for IUU vessels. Unfortunately, the level of economic penalty associated with IUU catches does not seem to be high enough, on its own, to dissuade IUU fishers.

Another area of potential economic leverage is the cost of fraud. Certainly fraud is taking place, and gaining in sophistication, as evidenced by the Japanese experience with the difficulty of ensuring that tuna from ICCAT IUU-listed vessels is not imported. However, what is important in the balance of equation 1 is the cost of this fraud, which must be increasing. This cost will also include the cost of financing corruption where state officials are involved in either tacitly or actively assisting fraud. Another avenue open to IUU companies would be to disguise their fish through re-packaging and re-labelling. Although there are genetic methods of identifying the species from fish products, these

29 ICCAT Resolution 96-14.

30 Implementation of the international plan of action to prevent, deter and eliminate illegal, unreported and unregulated fishing. *FAO Technical Guidelines for Responsible Fisheries No 9*. Rome, FAO, 122 pp.

31 See Agnew, 2000 *op. cit*., and Kirkwood & Agnew, 2002 *op. cit*. Definitions of the differences between trade and catch documents are given in the Report of the Expert Consultation of Regional Fishery Management Bodies on Harmonisation of Catch Certification, La Jolla, 9-12 January 2002. FAO.

methods are usually expensive and not routinely available for customs authorities. Therefore, attempts to disguise fish products may go unnoticed. On the other hand, such disguising would have to be followed by mixing IUU and legitimate fish for sale within a country to prevent the value of the fish from being considerably reduced.

Increased market control has costs for legitimate vessels as well as for IUU vessels. They have to structure their company activities so as to obtain all the relevant documentation and ensure that their fish are appropriately dealt with by landing and import authorities (including those in states which may not be party to a particular RFMO and/or the scheme operated by that RFMO). For instance, the new ICCAT measures to combat fraud are based on turning the Statistical Document into a Catch Document,[32] and require more rigour in applying the catch document. Such rigour is also required by vessels using the CCAMLR catch document. Vessels may have to carry additional costs associated with verification, such as on-board observers, regular inspections, VMS, etc. For instance, the cost of a VMS unit is about USD 3 000, of an observer is USD 300-500 a day. Finally, there are costs associated with the import action since many instances of IUU fraud involve the use of a false name. Where this name is the same as a legitimate vessel, costly delays in importing products may occur while potential fraud cases are eliminated, once more adding a burden on legitimate vessels.

Species value, price distortion

Obviously, the higher the price of fish, the higher the benefit to both IUU and legitimate fishers will be. In the short term, market forces can be expected to increase the value of fish as volumes decrease due to declining stock sizes and quotas. This will disproportionately advantage IUU fishers at the expense of legitimate fishers, because the latter will be constrained by quotas or limitations on effort, whereas IUU fishers will not. This is a dangerous feedback, because as the resource becomes scarcer, the legitimate quota declines still further, creating greater market pressure for increases in value.

The imbalance that is apparent in this equation is the fact that in such a feedback system market forces are likely to be unconstrained, whereas the deterrent effect of arrests will be severely constrained. We will discuss the relationship between the extent of IUU fishing and the cost of MCS activities later, but it is important to realise here what effect declining stocks have on MCS activities.

The first is financial. Reducing stock sizes leads to reduced revenue to government from a fishery (either in the form of licence sales or tax receipts). This in turn leads to decreased MCS budgets at a time when costs are increasing. Unless additional funds are made available by increasing fines for IUU activity, this can lead to the inability of a management body to adequately police its waters.

The second effect has to do with presence. There is some evidence from CCAMLR that the presence of legitimate vessels can have a deterrent effect on IUU vessels. Legitimate vessels may have observers on board who have a statutory obligation to report all vessel sightings. Legitimate vessels also find their interests coinciding with those of management authorities when it comes to informing

[32] Resolution 02-25 by ICCAT concerning the measures to prevent the laundering of catches by IUU large-scale tuna longline vessels, paragraph 1 of which reads: “Contracting Parties, Cooperating non Contracting Parties, Entities or Fishing Entities (hereinafter referred to as the ‘CPCs’) should ensure that their duly licensed large-scale tuna longline fishing vessels have a prior authorization of at sea or in port transshipment and obtain the validated Statistical Document, whenever possible, prior to the transshipment of their tuna and tuna-like species subject to the Statistical Document Programs. They should also ensure that transshipments are consistent with the reported catch amount of each vessel in validating the Statistical Document and require the reporting of transshipment."

on poachers.[33] As stocks are depleted, however, the fishing opportunities of legitimate vessels also decrease, with the effect that they cease to be effective as a deterrent.

In the long term, of course, continued IUU fishing will have a negative effect on both IUU and legitimate fishers, in that catch rates will decline and consequently profits will decline.

General market trends and the global economy

While the demand for marine fish products continues to rise steadily, overall supply has been at best static for a number of years and, given the state of the world's marine fish stocks, it is unlikely to increase much above current levels in the near future. Buoyant and increasing fish prices are therefore to be expected. This is an overriding, global driver for IUU fishing because it will clearly lead to increasing benefits (sales). It should, however, have similar effects on legitimate vessels, albeit within the constraints noted above. By contributing to a reduction in the availability of certain species, IUU fishing has a negative impact on food security for coastal states where fish consumption is relatively high.

Like everything else, fishing is heavily influenced by the global economy and by local economy imbalances. Local economy collapses, for instance, are likely to increase the incentive for corruption, decreasing its cost, thus decreasing the cost of this part of the IUU fishing vessel's equation. Large disparities in incomes/economies of developed and developing countries will create a ready and cheap labour pool for IUU fishers (many crew are Indonesian, Chinese or Philippine), once again decreasing their costs. For instance, the illegal trochus fishery in Australian waters in the early 1990s was mostly due to the extreme poverty of Indonesian fishermen,[34] who ran the risk of facing heavy penalties and imprisonment. Illegal fishing in Somali waters is largely due to the ineffective patrolling and enforcement of its EEZ, itself a function of the economic and political situation in the country.[35] A poor economic outlook will also force states to make cuts in surveillance coverage, often an early casualty of worsening economic conditions. Thus, one should look for increasing incentives (support) to control IUU fishing in areas adjacent to states or continents which have severe economic difficulties. The coastal states of West Africa are good examples of where there is a need for such support.

International regulation/management

International regulations

In the normal course of events RFMOs will develop regulations to manage their fisheries. There are also a large number of regulatory issues which are being developed by RFMOs, especially to do with inspection, increased scientific observation, avoidance of by-catch of fish species, avoidance of incidental mortality of birds, avoidance of interactions with marine mammals, etc. These regulations inevitably lead to higher costs for legitimate vessels, and no costs for IUU vessels. Their imposition therefore erodes the profitability of legitimate operations, and increases incentives to engage in IUU fishing.

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33 For instance, a licensed Australian trawler spotted a notorious IUU vessel, the Eternal (previously the Arvisa 1, Kambott or Camouco, using several FOC) in French waters around Kerguelen, and after calling the French authorities took up hot pursuit until the Eternal was intercepted by the French naval vessel the Albatross on 3 July 2002, arrested and taken to Réunion. *La Voz de Galicia*, 9 July 2002.

34 Peachey, G, 1991. "Illegal trochus fishing-what can we do?" Aust. Fish., Canberra, Vol. 50, 8-9.

35 Hassan, M.G., "Marine resources in Somali waters: opportunities & challenges", *6th Asian Fisheries Forum Book of Abstracts.* p. 93. Asian Fisheries Society.

RFMOs face the difficult question of how to account for IUU fishing. If estimates of IUU catch and reported legitimate catch exceed the total allowable catch, should next year's catch be reduced by that amount to ensure that the fishery is sustainable? It might seem obvious that it should, but this would mean that the cost of IUU fishing was disproportionately higher on legitimate fishers than on the management authorities. IUU fishing is a failure of management, not of the legitimate fishery to behave responsibly. Furthermore, acting in such a way would be somewhat equivalent to acknowledging that IUU fishing was going to be as large next year as it was this. However, the lesson from other areas where total extractions continually exceed the allowable sustainable stock (for instance, most demersal fisheries in Europe) is that such patterns inevitably lead to the collapse of fisheries. This also has economic consequences for legitimate fishers, but it happens in the medium to long term rather than the short term, and is therefore easier to accept.

Externalities

There are a number of externalities that affect IUU and legitimate vessels differently. In addition to having to implement all the above-mentioned international regulations, legitimate vessels must implement general safety and pollution requirements of the IMS/MARPOL, etc. These added costs are not borne by IUU vessels.

The consequences of IUU fishing are discussed in the next section. However, the long-term degradation of resources that result from overfishing, itself a consequence of IUU fishing activity, will lead to fishery closures with consequences on both IUU and legitimate vessels.

Vessel flag transfers

Vessel flag transfers reduce the traceability of vessels and compromise MCS attempts to control IUU fishing, since the legitimacy of hot pursuit ceases if a vessel changes its flag. The costs of re-flagging[36] to various FONC parties is minimal (USD 1 000-5 000, mainly legal costs); it is relatively simple and fast, can often be done at sea, and the benefits are great. Interestingly, however, re-flagging problems seem to have acted against the Grand Prince, in that between the time that she was arrested by the French authorities (12 December 2000) and when the court in La Réunion set the bond of FF 11.4 million, her registration with Belize lapsed. Accordingly, *The Tribunal observed that, in the light of the expiration of the provisional patent of navigation issued by the Marine Registry of Belize or of the de-registration of the Grand Prince, referred to in the note verbale dated 4 January 2001 of the Ministry of Foreign Affairs of Belize, and on the basis of an overall assessment of the material placed before it, the assertion made on behalf of Belize that the Grand Prince was still considered as registered in Belize did not provide sufficient basis for holding that Belize was the flag State of the vessel for the purposes of making an application under article 292 of the Convention.*[37]

For legitimate vessels which need to maintain registration with reputable countries (*i.e.* not FONC parties), transfers of flag are much more costly, and may involve protracted administrative procedures. They are only undertaken when access to a particular fishery is closed to one particular flag.

36 See for instance www.flagsofconvenience.com.

37 ITLOS press release 48.

Fishing agreements

Two types of fisheries agreements are considered here: first, multinational agreements relating to high seas fisheries, elsewhere called RFMOs (Regional Fisheries Management Organisations), and second, agreements between a coastal state or states for access by a third party to fish in their waters.

Membership of fisheries agreements brings benefits to legitimate vessels, as Panama has discovered by becoming a party to ICCAT. However, increased membership brings considerable costs to legitimate vessels of the existing Members of RFMOs, because limited allowable catches have to be divided up between more Members and therefore quota sizes are reduced. This is a very serious problem faced not just by ICCAT, but by all RFMOs, as they attempt to deal with IUU fishing. Various actions by these RFMOs can force the cessation of IUU fishing by certain Non-Contracting Parties, but transferring IUU vessels to legitimate fleets (either by straight transfers or by accession and membership of previously Non-Contracting Parties) increases the capacity of the legitimate fleet. This has direct costs for legitimate fishers. This situation is analogous to that faced by national management authorities; in the end, it is overcapacity which is the largest problem, not necessarily the behaviour of various groups of fishers.

Coastal state fishing agreements may be multilateral, bilateral or private. The largest number of multilateral fishing agreements are those signed by the European Union with African, Caribbean and Pacific (ACP) countries. These agreements support fishing activities in the Atlantic, Indian and Pacific Oceans. Other types of fishing agreements may be bilateral (*e.g.* Chinese Taipei agreements with Mauritius; Japanese agreements with Mauritania) or private, *i.e.*, agreements between fishing companies and third-party states for fishing access. Other options may include joint venture agreements for fishing rights between external fishing companies and local partners (the case of French and Spanish agreements with Namibia and Spanish and Moroccan companies). These types of agreements confer rights of fishing access subject to the provisions of the agreements (fish quotas; types of gear and equipment and vessel size). In the case of EU fishing agreements they may also increase (to a certain extent) the degree of transparency with respect to the number and types of vessels. Agreements in themselves do not necessarily avoid the issues of IUU fishing and even fishing vessels operating under transparent agreements may be operating within one of the constituent elements of IUU fishing (*e.g.* illegal or unregulated).

In addition, in some cases multilateral fishing agreements may bring a displacement effect. For example, the extension of fishing rights to EU vessels within the waters of a number of West African countries may have the effect of pushing IUU fishing into other waters. Furthermore the non-agreement of fishing agreements, for example the non-completion of a fishing agreement between the EU and Morocco in 2001, may have had the effect of promoting IUU fishing within Moroccan waters. A number of studies and consultancy reports have looked at the issue of the economic and social impacts of fishing agreements. These include a study that was carried out for the EU on issues of coherence and complementarity between EU fisheries and development policy with respect to EU fishing agreements and development policy (ADE: 2002).

World fishing opportunities

Although this has already been mentioned in a previous section, it is worth reiterating that the lack of many alternative world fishery resources leads to high opportunity costs for IUU fishing. At the same time, the competition for legitimate fishing opportunities is increasing so the costs associated with those opportunities (such as licensing and other costs such as tonnage payments for certain species which may be defined in fishing agreements *e.g.* the EU fishing agreements with various third-party states) is also increasing.

National fisheries management policy

National management policy

Different countries have very different national management policies. They may adopt input or output controls, have or not have regulations on fishing capacity (by vessel or by GRT/power or by other measures), have heavily detailed or almost non-existent domestic regulations for fishing in inshore and offshore waters. For countries that are very tightly controlled, it is usually also the case that they have very strict regulations concerning the use of their flags by vessels engaged in IUU fishing. Norway, for instance, is particularly strict, being one of the first countries to enact laws denying Norwegian flags and domestic fishing opportunities to vessels with any past involvement with IUU fishing. Others may have very lax laws regarding the use of their flags by vessels engaging in IUU fishing.

Economically, the combination of domestic laws acts as an entry barrier to vessels wishing to engage in IUU fishing. If domestic fishing opportunities are denied to vessels on IUU lists [such as the list created by CCAMLR Conservation Measure 10-07 (2002)] this will be a significant economic cost to those vessels. If that denial is extended to other economic areas, such as the denial of re-flagging opportunities to any vessels associated with a FONC state or the prohibition of landings or exports from FONC states (CCAMLR Resolution 19/XXI) this is a further strengthening of economic cost.

Thus, it is clear that – all things being equal – strong domestic legislation will act to combat IUU fishing in the EEZ of a country and will, additionally, force IUU vessels to seek an alternative flag under which to carry out their activities. This strong management policy would of course extend to such areas as the control of fishing capacity. If fishing capacity is not controlled rigorously by national management policy to be equal to the resources that can be exploited by the national (flag) fleet, there will be an economic incentive for those vessels not making enough money in national fisheries to engage in IUU fishing. Thus, those countries with weak domestic regulations and national management policy are likely to be the source of vessels engaging in IUU fishing. An extreme example of this is, of course, FONC states.

Subsidies

Subsidies benefit legitimate operations because they depress the operating cost curve and change its shape. In effect, the operating costs of a vessel are reduced. This benefit is not available to IUU operators, except when beneficial ownership of an IUU vessel is held by a company receiving subsidies for legitimate vessels. Subsidies also tend to encourage overcapacity by hiding the real economic cost of fishing, and therefore act to exacerbate the situation discussed in the section on the "Health of other stocks" below.

Subsidies may also be given to companies to sell vessels (*e.g.* EU payments for the decommissioning of fishing fleets). If these vessels subsequently become available to the IUU market, the subsidies will act to artificially depress the cost equation for IUU companies, sometimes by as much as 30%. Most of the IUU fleet currently consists of old vessels no longer capable of competing with the modern fleets operating in regulated fisheries. This is especially the case for the LSTLVs transferred off the Chinese Taipei and Japanese flags since 2000. However, there are some signs that new longliners are being purpose-built for the IUU fishery on toothfish. The number of such vessels available is increased and to some extent their purchase costs are further decreased by the continued practice of some countries to provide subsidies for building new and more efficient fishing vessels.

Excess capacity/idle capacity

Excess or idle capacity will, as shown in the section on the "Health of other stocks", lead to lower costs of vessels and crews to IUU vessels. While the EU has paid subsidies under the MAGP schemes in an attempt to decommission vessels, in other cases subsidies paid by the EU (regional development, vessel refitting) have encouraged the transfer of excess/idle capacity from EU waters to the fishing waters of the Eastern Atlantic and the Indian Ocean. In other cases, fishing vessels which are excess to need may be re-flagged, sometimes on numerous occasions, and may end up in IUU fishing activities.

Excess capacity has the potential to be an extremely powerful driver for IUU fishing, because it will act on every scale, from the individual to the vessel to the company. Vessels not offered scrapping incentives will face large costs which can only be mitigated through engaging in IUU fishing. Even when scrapping funds are made available, fishermen are likely to face much reduced employment prospects, through two mechanisms. Firstly, even if they re-train, an experienced fisherman will become an inexperienced other professional. Secondly, fishing communities are likely to face multiple job losses through the multiplier effects of loss of fishing opportunities, so the job market in these areas will be depressed. Vessels engaged in IUU fishing will therefore find that their costs are doubly reduced, firstly by not having to remain idle at the dockside and secondly because the labour market will be very cheap.

There is now considerable and growing concern, especially in the southern hemisphere, that the northern hemisphere's overcapacity problem will increasingly become a very strong driver behind the growth of IUU fishing.

Corruption

Corruption is a significant factor in gaining IUU access to EEZ waters in various parts of the world. The pressure for corruption will also grow when complex or expensive tracing or certification schemes are in place to try to curtail IUU fishing, since the level of sophistication in fraud will increase accordingly. Corruption is a direct cost to IUU vessels, not being relevant to legitimate vessels. In other cases even where countries may have fishing agreements there may be close relationships between the government and business interests in the third-party country and business and local bureaucracies in the countries seeking access to those waters. There is some evidence of these trends in a number of countries which have fishing agreements with the EU. Corruption is a reflection of lack of transparency, absence of good governance and market imperfections. It is in effect a payment for fishing access and rights.

Monitoring, control and surveillance (MCS)

Increased MCS leads to increased costs of IUU fishing. In Charles *et al.*'s model of illegal activity, they found that at low levels of enforcement fishers respond to increases in enforcement by increasing avoidance, but at higher levels of enforcement it becomes uneconomical to continue to do so. Thus the cost of avoidance eventually becomes greater than the benefit from fishing (the greater the time and effort spent avoiding detection, the less time can be spent actually fishing).

Increased MCS may also have an effect on legitimate fishers, but this is usually low, especially where they have VMS on board and so inspection authorities know where they are all the time. In fact, it should be the case that increased surveillance considerably benefits legitimate fishers, since it not only protects the long-term sustainability of their resource but it reduces the supply of their product and any undermining that this might have on product value.

MCS is, unfortunately, of little use in true high seas/RFMO situations, especially with regard to FONC. Although under UNCLOS these vessels and states have an obligation to act in ways which do not undermine conservation measures, there is no right of arrest of such vessels on the high seas by third parties. Arrests and prosecutions can only be brought by the flag state.[38] Thus, in these situations, increased MCS only acts to increase the costs of IUU vessels in so far as an RFMO has an agreement to deny port, landing or transhipment facilities to vessels sighted engaging IUU fishing; or in prohibiting trade in their landings or undertaking other actions in conjunction with IUU lists.

This may not increase the costs of the IUU vessels very much, and it comes at such a high cost to the MCS vessel that it is often not seen as viable to undertake high seas MCS activities. There is also a serious problem with the distribution of MCS costs within RFMOs. Some, such as NEAFC, share costs and inspection duties, but others, such as CCAMLR, have no arrangements for this – in which case costs are borne completely by the MCS vessel.

Fishing activities

Areas of fishing geographical constraints: the juxtaposition of EEZ and high seas

Since there is no third-party power of arrest on the high seas, all such arrests of IUU vessels take place either in EEZ waters or in waters adjacent to an EEZ under hot pursuit rules. The juxtaposition of EEZ and high seas areas is thus a vital economic driver for IUU vessels, and it manifests itself in several ways.

First, let us take the example of a resource that occurs in both an EEZ and in high seas adjacent to that EEZ, but over which no RFMO has authority. Any vessel can then use the high seas area as a refuge, undertaking excursions into the EEZ. Unless a patrol vessel actively engages with an IUU vessel while it is inside the EEZ it cannot undertake hot pursuit and arrest in the adjacent high seas. The risk to the IUU vessel is therefore much lower than if the resource was only available in the EEZ. Some such refuges are notorious in providing a refuge to poachers, for instance the donut hole in the Bering Sea or the waters of the South-West Atlantic which provide a refuge for squid poachers.[39]

Once again the benefit equation is skewed in favour of IUU vessels, because they cannot be arrested once in high seas waters, whereas a national vessel can be. Such an arrest would be dependent upon other evidence a state may have that its flag vessel was engaging in IUU fishing in EEZ waters or on the high seas. This would include any fishing that is contrary to its licence – for instance, continuing to fish in the EEZ after a fishery has been closed – then moving into high seas waters.

On the other hand, other aspects of this issue can economically favour legitimate vessels. For example, because port states can prohibit access to IUU vessels, legitimate vessels can be expected to have lower market access costs than IUU vessels when they fish legitimately in high seas waters adjacent to an EEZ. IUU vessels will generally have to pay higher costs for transhipment, or travel to and from high seas fishing areas, if ports in the immediate vicinity of the fishery are closed to them. By expanding the definition of FOC to FONC it is possible to include vessels that are currently

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38 Freedom of the high seas is enshrined in Article 87 of the 1982 Agreement. Third parties may only arrest vessels through hot pursuit (Article 111) or which are stateless (unflagged).

39 See A.J. Barton, D.J. Agnew & L. Purchase 2002. "The Southwest Atlantic: achievements of bilateral management and the case for a multilateral arrangement." *Proceedings of the Symposium on International Approaches to Management of Shared Stocks – problems and future directions*. Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Lowestoft 10-12 July 2002.

flagged to Members of a RFMO. Both CCAMLR and ICCAT have measures that impose costly sanctions on Members' vessels as well as Non-Members' vessels if they appear on the IUU lists.

Quality of MCS

IUU vessels can fish up to EEZ boundaries, and where there is insufficient MCS they may well enter into those parts of the EEZ which are farthest away from the coastline without fear of arrest, and therefore without penalty, and in these circumstances the cost-benefit of IUU fishing in EEZs can be modelled on both macro- and micro-economic levels.[40] It will clearly be strongly influenced by the probability of arrest and the size of the fine in the event of arrest (*i.e.* illegal fishing will occur if the marginal value of the catch, net of the expected marginal fine, exceeds the marginal factor cost – see Charles *et al.* 1999). The strength of MCS activities is of critical importance in deterring IUU activities. However it should also be noted that it is not merely the quality of MCS that is important but also the commitment by national states to the implementation of MCS and the accompanying laws on fisheries and the marine environment. This is not restricted to third-party flag IUU vessels, which may be FONC vessels, but should extend most strongly to licensed vessels. Strengthening national laws and the use of new technologies such as VMS or onboard monitoring of vessel activities will considerably assist MCS authorities, and should increase the cost of doing business as an IUU vessel.

One of the problems facing MCS authorities is the level of penalty that can be applied when an IUU vessel is arrested. In response to large-scale IUU fishing around Kerguelen for toothfish, France has arrested a number of vessels and has fined them with large bonds. In three of these cases, the flag state of the IUU vessel has taken France to the International Tribunal on the Law of the Sea (ITLOS), seeking immediate release of the vessel and considerable reductions in the level of the bond set. In the first case, regarding the Camuoco (Panama *vs*. France), France had set a bond of FF 20 million (USD 3.1 million). Despite drawing attention to the seriousness of IUU fishing around Kerguelen (estimated by France to be in excess of USD 56 million to that date) on 7 February 2000 the Tribunal found that the bond set by France was too high, and reduced it to FF 8 million (USD 1.2 million). The following factors were cited by the Tribunal in reaching its decision that the original bond was unreasonable:[41]

> *The Tribunal, in a previous judgment in the 1997 M/V "Saiga" (Prompt Release) case, had determined that: "the criterion of reasonableness encompasses the amount, the nature and the form of the bond or financial security" and that the "overall balance of the amount, form and nature of the bond or financial security must be reasonable".*
>
> *The Tribunal, in today's Judgment, reiterated that conclusion and elaborated on a number of factors that are relevant in an assessment of the reasonableness of the bond or financial security. The Tribunal considers the following to be of relevance:*
>
> *The gravity of the alleged offences;*
> *The penalties imposed or imposable under the laws of the detaining State;*
> *The value of the detained vessel and of the cargo seized; and*
> *The amount of the bond imposed by the detaining State and its form.*

40 See, for example, P.J.B. Hart, "Controlling Illegal Fishing in closed Areas: The case of mackerel off Norway". Proc. 2nd World Fisheries Congress, Brisbane, 1998; and A. T. Charles, R. L. Mazany & M. L, Cross, "The economics of Illegal Fishing: a behavioural model." *Mar. Resource Economics* 14, 95-10, 1999.

41 ITLOS press release 35; also see ITLOS press release 42 and 48 in this section.

In a second test case (18 December 2000), the Tribunal again decided that a FF 56.4 million (USD 8.7 million) bond set by France on the Seychelles-flagged Monte Confurco was not reasonable, and reduced it to FF 18 million (USD 2.8 million). However, in the final French case (regarding the Belize registered Grand Prince, 20 April 2001), the Tribunal found "that it had no jurisdiction under article 292 of the Convention to entertain the Application". The Tribunal stated that the "documentary evidence submitted by the Applicant fails to establish that Belize was the flag State of the vessel when the Application was made". France's bond of EUR 1.7 million (USD 1.7 million) was therefore upheld (Belize had asked for it to be reduced to EUR 206 149).[42]

A similar case has recently been brought by the Russian Federation against Australia. This stems from the arrest on 7 February 2002 of the Volga, which was boarded by Australian military personnel from a military helicopter on the high seas in the Southern Ocean for alleged illegal fishing in the Australian fishing zone. The vessel was directed by an Australian warship to proceed to Perth, where it was still detained. The crew of the vessel were repatriated to their respective home countries after a period of detention, with the exception of three officers who remain in Perth under court orders. The catch which had been on board the vessel at the time of boarding was sold by the Australian authorities for the amount of AUD 1 932 579.28. The Australian authorities set the amount of the security for the release of the vessel and the crew in the amount of AUD 4 177 500. The Russian Federation requested the Tribunal to order the Respondent to release the Volga and the officers upon the posting of a bond or security in an amount not exceeding AUD 500 000. What is particularly interesting about this case is that Australia actually made the arrest in high seas waters adjacent to its EEZ around Heard Island.

In making its judgement, the ITLOS tribunal has obviously learned from its previous experiences. It set a bond consisting of the value of the vessel, fuel/lubricants and fishing gear (AUD 1.9 million). Significantly, they did not consider that the proceeds of the sale of fish and bait from the vessel, which is being held in trust by the Australian authorities pending the outcome of domestic proceedings, should form part of the bond. This departs from their previous judgements, and is an important principle because it means that the company must find an *additional* AUD 1.9 million for a bond guarantee. However, they disallowed an application by Australia to include within the bond AUD 1 million for a VMS system on board the vessel. This would have been a "good behaviour" guarantee pending full trial in Australia, because – as was pointed out during the ITLOS hearing – IUU vessels are usually repeat offenders. For instance the Camuoco – which following the January 2000 ITLOS hearing of Panama *vs.* France was released on bail – was arrested on 3 July 2002 by French authorities around Kerguelen Island (again), this time under the name 'Eternal' (previously 'Arvisa 1', previously Camuoco). However, at least one judge disagreed with the court finding, and opined that such a good behaviour mechanism would be appropriate, given the high level of re-offending of such vessels.

It will be clear from the above that the level of bond considered appropriate by the Tribunal is lower than the likely annual profit of an IUU vessel (estimated in section, "Understanding the economics of IUU vessels", as USD 4.5–6 million/year). However, it is also clear that what is most important to ITLOS is the value of the vessel and its cargo, not the overall damage that the vessel can do to the resource. This is an important factor influencing the benefit side of equation 1.

[42] *La Voz de Galicia*, 13 April 2002. Ultimately, the fine was not paid, and France sank the vessel off Réunion in early 2002.

Transhipment/steaming costs

As mentioned in the section, "Market control/access and the regulatory environment" above, closure of ports to IUU vessels increases their cost and can therefore reduce their profits. Several RFMOs are now developing lists of IUU vessels, with the intention of prohibiting a range of benefits being given to those vessels, including port access, flagging, access to licences for legitimate fishing in their EEZ, imports, chartering etc.[43] These should all have the effect of increasing IUU vessel costs of steaming, transhipment, hiring of crew, etc. In principle there will be a radius of action within which it will still be profitable for IUU vessels to fish. Once deterrent measures are reinforced – such as improved implementation of MCS and the control of landings – transhipment and operating costs will eventually increase to the point where IUU fishing becomes considerably less profitable or even unprofitable.

Health of other stocks

If we ignore the (probably remote) possibility that some vessel owners and crew may simply prefer to fish illegally, we could conclude that vessels engage in IUU fishing solely for financial and regulatory reasons. This also immediately implies that vessel owners would prefer to engage their vessels legally in regulated fisheries rather than in IUU fishing, as long as the opportunity to do so exists and legal fishing is sufficiently profitable. However, for a substantial and increasing number of vessels, the conditions of this proviso are not met. As estimated by FAO,[44] nearly 70% of the world's fisheries are either fully exploited, over-exploited, or in various stages of recovery from over-exploitation. Management responses to this have led in many cases to substantially reduced allowable catches, and at last action is also being taken to reduce the over-capacity that exists in most of the world's major fishing fleets. In the absence of heavily subsidised decommissioning schemes, and with ageing vessels being replaced in regulated fleets by (heavily subsidised) newer and more efficient vessels, inevitably owners of vessels unable to maintain past levels of profit will look for other options.

In previous eras, pressures such as these led to vessels looking offshore for new fishing opportunities. For example, the establishment of Exclusive Economic Zones (EEZs) led to many distant water fleets being excluded from fisheries in waters of coastal state jurisdiction, and the response was the development of then-unregulated fisheries on the high seas. This legitimate avenue is now no longer open to many of these vessels, since most of these resources are now regulated by RFMOs and many are also subject to substantial levels of exploitation.

Becoming IUU is thus sometimes the only way that a vessel or company can gain access to very limited resources. This is a very strong benefit that is not shared by legitimate vessels, because in order to remain legitimate they must refrain from IUU activities. These strong benefits (incentives) apply as much to individuals as to companies. Unemployment in the fisheries sector is likely to become considerably worse in the medium and short term in some OECD countries (especially Europe), as the true environmental and economic cost of past poor management policies becomes evident. This unemployment is (and will be) an important driver of IUU fishing, as there is simply no benefit to be gained from being a legitimate fisher as the opportunities for such fishing are not present.

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43 See for example CCAMLR Conservation Measures 10-6 and 10-7, ICCAT measures 02-22 to 02-24.

44 FAO. 2000. *The State of World Fisheries and Aquaculture 2000*.

For this reason, there continues to be a strong emphasis on state control over nationals involved in IUU fishing (either as crew or as company beneficial owners) under UNCLOS Article 94.[45]

Company/vessel operations

Vessel economics

The financial operating costs of IUU vessels are likely to be lower than for legitimate vessels. We have attempted to estimate operating costs in the section "Market control/access and the regulatory environment", and IUU vessels will undoubtedly have lower insurance (or no insurance) costs, low compliance costs, low registration/flagging costs – especially if they are FONC flagged – as well as lower crew costs, including social security. In addition IUU vessels will not be paying the taxes and port dues which legitimate fishing vessels may incur nor will they be paying the vessel charges and tonnage charges which may be set in fishing agreements.[46] It may be that in some theatres the purchase of IUU fishing vessels is used as a means of disposing of money from other illegal operations, such as drugs. Indeed, although wildlife crime (including IUU fishing) was until recently thought to be opportunistic rather than organised, there is evidence that it is now much more organised and may have links to other aspects of organised crime such as drug and armament smuggling.[47]

It is possible to assess the cost function for IUU fishing, which would be considerably lower than non-IUU fishing. Capital costs in terms of replacement costs would be reduced as replacement values and depreciation would not be included. It is likely that there would be lower levels of capital investment. Recurrent costs (crew, maintenance) and other maintenance costs are also likely to be lower, and if fuel is obtained through informal channels, this may be cheaper through the avoidance of tax. In addition, IUU vessels will bear the costs of tonnage levies and in many cases where there are private agreements they may well pay lower costs than vessels operating in a transparent fashion under fishing agreements.

Size of company/global companies

We have previously made reference to this factor in reference to the Austral Fisheries publication on “the alphabet boats” and their links to the large multinational company Pacific Andes. Large companies have several advantages over small ones, including:

- The ability to launder IUU catch with legitimate catch.
- Access to worldwide markets, so that they can split consignments and confuse customs authorities.
- Access to bulk processing facilities, with further opportunities for disguising/hiding IUU catch.

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45 For example, “IUU fishing and state control over nationals”, presented by D. A. Balton at the Santiago de Compostella conference on IUU fishing, November 2002, and the EU Plan of Action for the Eradication of Illegal, Unreported and Unregulated fishing.

46 Such payments are set for different sizes of vessels and for species in the EU fishing agreements. These do not necessarily mean that the levels of such payments are correct. There may well be under-reporting or misreporting of catches by quantity and species.

47 *International Environmental Crime: The nature and control of black markets*. Royal Institute of International Affairs, 2002, workshop report. G. Hayman & D. Brack. Sustainable Development Programme, Royal Institute of International Affairs 10 St James’s Square, London SW1Y 4LE, UK.

- Complex company ownership structures, which are costly for MCS authorities to trace and easy to change.
- The ability to disguise fleet movements through rapid re-flagging, name changing, and modification of vessels which may thwart legal cases (*e.g.* in the case when two vessels are identical but carry different flags, it is practically impossible to prove unless a vessel is boarded when sighted in a particular area).
- Large fleets can indulge in "sacrifice games" where a fleet of efficient vessels is augmented by one or two slow inefficient vessels which are used as decoys. After their arrest the efficient fleet is practically assured of a period of fishing uninterrupted by a patrol vessel.
- Access to sophisticated communications and early warning systems.

These factors all tend to reduce the costs that an IUU vessel would usually expect to pay.

It should be borne in mind that for legitimate vessels some of the same advantages might apply when they are owned by a large company.

Dual-flag operations

In addition to these factors concerning company size, the make-up of the fleet in a company is particularly important. Companies attempting to operate fleets of both IUU and legitimate vessels can expect to experience lower operating costs (through paying less in licence fees and other access requirements) than companies operating only legitimate vessels. For this reason, a number of companies are suspected of operating this strategy. However, an added risk factor should be taken into account when considering the costs of companies that adopt this strategy, *i.e.*, the increasing propensity of licensing authorities to take into account the overall beneficial ownership of vessels when considering their applications for licences. This trend, which is likely to strengthen, could well redress the balance of the equation and make this a costly rather than a beneficial strategy.

Conclusions

The preceding discussion has identified the various economic drivers behind IUU fishing. These include the factors that are likely to affect the economics of IUU vessels and companies, as well as the factors that are likely to increase the incentive for legitimate vessels to engage in IUU fishing.

In an analytical framework we would anticipate that each of these factors would be examined in detail, through a combination of case studies and models, as appropriate. This should make it possible to identify which of them are likely to be the most important drivers of IUU fishing in various circumstances, for instance for different species, areas, socio-economic classes, high seas and EEZ fisheries. Judgements could then be made about what actions, addressing which drivers, would be most likely to yield results in the fight against IUU fishing.

Economic and social impacts of IUU fishing

The biological and ecological impacts of IUU fishing are well known, and fairly self-evident. Large-scale IUU fishing undermines conservation measures directed at conserving stocks and ensuring the long-term sustainability of fisheries. It is doubly insidious as, because it is extremely difficult to monitor, its effects are also very difficult to predict because reliable estimates of total extractions cannot be used in stock assessment models. Thus, a management authority may not even know that the stock is in danger until it is in a poor state. IUU fishing is, effectively, over-fishing and will ultimately

lead to stock collapses, the result being that the resource is of no value to either legitimate or IUU fishermen.

IUU fishing also damages the ecosystem and associated species. As we have pointed out above, IUU fishermen do not respect the various control measures put in place to ensure responsible fishing by legitimate fishers, with the result that they may kill large numbers of other fish as by-catch, with birds, seals and whales as incidental mortality. These deaths also go unreported. There are, for instance, significant problems with by-catch of sharks in tropical tuna fisheries, and with interactions between sharks, orcas and longline fisheries. These are barely reported by legitimate fisheries, let alone IUU fisheries (ref: recent workshop in Apia). Indeed, there are anecdotal reports of IUU vessels shooting orcas in an attempt to protect fish from them.

These biological effects create significant economic and social impacts, which are explored below.

The economic impacts of IUU fishing

The macroeconomic impacts of IUU fishing

The macroeconomic impacts of IUU fishing agreements are those that will affect the level of a national or regional economy. It is fair to say that in terms of loss of economic rent and other revenues to the national economy, the major macroeconomic impacts of IUU fishing will be on low and middle-income countries that have EEZs with important fish resources and whose EEZs lie adjacent to important high sea fishing zones. It is also in the middle- and low-income countries that there are resource constraints in terms of financing and implementing adequate MCS and fisheries law. A number of publications have looked at the economic impacts of the activities of distant water fishing fleets, including IUU activities.[48] One of the problems in assessing the impacts of IUU fishing is that in the absence of adequate MCS, many countries have no idea of the extent of IUU fishing within their EEZs and in adjacent waters. It is only when it is brought to their attention – often by industry groups – that they recognise it and act to curb it.[49]

The development of IUU fishing within a country's EEZ and in adjacent high seas areas may have a number of specific impacts. These are summarised in Table 11.1.

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48 Acheampong, A. (1997). "Coherence between EU Fisheries Agreements and EU Development Cooperation: The Case of West Africa". ECDPM Working Paper No. 52, Maastricht: ECDPM; Brandt, H. (1999). "The EU's Policy on Fisheries Agreements and Development Cooperation. The State of the Coherence Debate. German Development Institute", Report and Working Paper 1/1999; Milazzo, M. (1998). "Subsidies in World Fisheries – A Reexamination". World Bank Technical Paper 406; MRAG (1998). "The Impact of Fisheries Subsidies on Developing Countries". Report to DfID, Contract No. CNTR 98 6509. In association with Cambridge Resource Economics and IIED; Tsamenyi, M. and Mfodwo, K. (undated). "The Fisheries Agreements of the African Atlantic Region, an Analysis of Possibilities for WWF Intervention". Draft; WWF (undated). "The Footprint of Distant Water Fleets on World Fisheries". WWF Endangered Seas Campaign.

49 See, for example, "Authorities reassert fight against illegal fishing". Fisheries Information Service, 18 December 2002.

Table 11.1. The Macroeconomic and Social Impacts of IUU Fishing

PARAMETER	INDICATORS	IMPACTS
Contribution of fishing to GDP/GNP	Value added; value of landings	IUU fishing will reduce the contribution of EEZ or high seas fisheries to the national economy and lead to a loss of potential resource rent.
Employment	Employment in the fishing, fish processing and related sectors	IUU fishing will reduce the potential employment that local and locally based fleets may make to employment creation and the potential for employment creation. This is likely to be a major factor only in respect of EEZ IUU fishing.
Export revenues	Annual export earnings	By reducing local landings and not paying access dues, IUU fishing will reduce actual and potential export earnings. This, of course, will have potentially serious implications for surveillance activities, where these are supported wholly or partly by export revenues (or port revenues, see below).
Port revenues	Transhipment fees; port dues; vessel maintenance; bunkering	IUU fishing will reduce the potential for local landings and value added.
Service revenues and taxes from legitimate operations	Licence fees, revenue of companies providing VMS, observer facilities etc., and exchequer revenue from company taxes.	IUU fishing will reduce the resource which in turn will reduce the other revenues that would accrue from companies providing legitimate fishing services. This includes company taxes
Multiplier effects	Multiplier impacts on investment and employment	IUU fishing will reduce the direct and indirect multipliers linked to fishing and fishing associated activities, with the loss of potential activities.
Expenditure on MCS	Annual expenditure on MCS linked to IUU fishing.	The existence of IUU fishing will put budget pressures on MCS/fisheries management.[50]
Destruction of ecosystems	Reduction in catches and biodiversity of coastal areas	Loss of value from coastal areas *e.g.* inshore prawn fishing areas and from mangrove areas that might be damaged by IUU fishing. Reduction in income for coastal fishing communities.
Conflicts with local artisanal fleets	Incidences recorded of conflict between IUU fishing vessels and local fishing fleets.	Reduction in the value of catches for local fishing fleets. Possible increased health and safety risks because of conflicts between artisanal and industrial fleets.
Food security	Availability of fish for local consumption (food and protein balance sheets)	The reduction in fish availability on local markets may reduce protein availability and national food security. This may increase the risk of malnutrition in some communities.

The actual impact of IUU fishing on low- and middle-income countries will depend on a number of different factors. These include:

- The dependence on the fisheries sector for government revenue, export earnings, employment etc.
- The efficacy of MCS and the commitment to the control of IUU fishing.
- The size of a country's EEZ and the importance of high value fish stocks with ready markets.

[50] Costs of fisheries management are often high but unquantified. A useful discussion is given in "The cost of fisheries management", W.E. Schrank, R. Arnason & R. Hanneson, Ashgate, Aldershot, UK, 2003.

Countries such as the Seychelles, which are highly dependent on fisheries (notably tuna fisheries) for export earnings, licence fees, transhipment and port duties and which have a large EEZ would therefore suffer more from IUU fishing than, say, Tanzania. While Tanzania has a relatively large coastline and EEZ, fish production from marine resources at present plays a much smaller role in the national economy.

The effects of IUU fishing are often a vicious circle. Lack of resources for surveillance and enforcement at the market place or at sea will enable IUU fishing to develop, which itself will lead to lower revenues from fishing licences or other linked activities, which then feeds back to lower government resources. For instance a large proportion of fish caught in the Russian sector of the Bering Sea is reported to be caught and sold without passing through state-approved channels, which means that little income from fisheries is being harnessed by the government for re-investment in the industry or for enforcement. It also means that billions of US dollars are being lost to IUU operators annually.[51]

The microeconomic impacts of IUU fishing

The macroeconomic impacts of IUU fishing will not simply remain at the levels of the national and regional economies but will filter down to the microeconomic level, *i.e.*, to the level of villages, communities and households. In developing countries these impacts may be significant. In terms of the economic activities of fishing communities and villages, IUU fishing may have negative impacts on the revenues for fisheries, on operating costs as well as on biological stocks. There is evidence that in some cases, *e.g.* off West Africa and Mozambique, the activities of DWFNs and IUU fishing may have a direct impact on the livelihoods of fishing communities by reducing stocks or damaging gear and equipment, as well as posing a threat to the activities of artisanal fishermen, with the risk of collisions and health and safety issues. Furthermore, if IUU fishing damages biological stocks, it can reduce the availability of certain species of fish (*e.g.* small pelagics).

The social impacts of IUU fishing

The social impacts of IUU fishing are inextricably linked to the economic impacts. Where IUU fishing has a negative impact on biological stocks and marine resources, fishing revenues, licence fees, port income and associated value added, it will also have negative social impacts, particularly for middle- and low-income countries where in many cases social support and safety nets are not well established and no alternative to fishing exists. At the national economy level, negative economic impacts of IUU fishing will translate into a number of social impacts, summarised in Table 11.2. below.

It may also be thought that IUU fishing suffers from social feedback akin to the "moral hazard" described in relation to IMF funding.[52] In the case of the IMF, critics argue that the knowledge that IMF financing will be made available in the event of a financial crisis makes the crisis more likely to occur. In the case of IUU fishing, a similar social effect might take place in that the knowledge that IUU fishing is taking place might make fishermen less keen to participate in responsible fisheries. The moral hazard in IUU fisheries relates to the problem of asymmetric information where one party, *e.g.* the coastal state, does not have information on landings, catches and other data relating to fisheries exploitation by IUU fishing vessels.

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51 Vaisman, A., "Trawling in the mist. Industrial fisheries in the Russian part of the Bering Sea" TRAFFIC International, Cambridge (UK), 2001.

52 T. Lane and S. Phillips. IMF Financing and Moral Hazard. Finance & Development, June 2001, Volume 38, Number 2. Also at http://www.imf.org/external/pubs/ft/fandd/2001/06/lane.htm.

This might, in extreme cases, lead to a classic race to fish (*i.a.* the *'tragedy of the commons*)'[53] in which a certain level of IUU fishing encourages more IUU fishing in a race to get all the fish before the stocks are depleted. Although this is only likely to occur for species with very low carrying capacities (*e.g.* orange roughy), it could nevertheless be a significant social and economic driver for IUU fishing. Similarly, it may be seen to be an undesirable but unavoidable consequence of publicity about IUU fishing, its effects, and attempts to eliminate it.

Table 11.2. Possible Negative Social Impacts of IUU Fishing at the National Level

PARAMETER	INDICATORS	IMPACTS
Employment	Employment rates in marine fishing communities	IUU fishing may lead to lower employment if it has a negative impact on stocks and the activities of artisanal and local coastal fishing activities. Less opportunity for new generations of fishers to participate in fishing
Household incomes	Gross and net household incomes	Conflicts with local fishing fleets and over-exploitation of certain species may lead to reduction in household incomes and therefore exacerbate poverty. Possible negative impacts on income distribution.
Gender issues	Employment of women in fishing and fish marketing	IUU fishing may have a negative impact on shore fishing by women and on marketing opportunities for women who in many societies have an important role in basic fish processing and marketing.
Nutrition and food security	Availability of fish on local markets at affordable prices.	In some cases, IUU fishing's negative impact on fish stocks and availability may have a detrimental impact on the availability of fish, an important source of protein in some countries.

Summary and conclusions

We have identified above:

- Ways of monitoring the extent of IUU fishing – essential for monitoring the effectiveness of measures taken to eliminate it. It is not clear that any organisation is currently doing this.
- Factors acting as the economic drivers of IUU fishing.
- An analytical approach, involving analysis of these factors through case studies and/or models, showing which of them is most important and pinpointing where, in the economic equation, IUU operations are most vulnerable.
- A system of indicators of the economic and social effects of IUU fishing which could be monitored to assess the damage caused by IUU fishing.

We have not been able to assess, in this brief study, the global extent of IUU fishing, although we have been able to give some recent estimates for various RFMOs and from other case studies. We would suggest that getting a more global picture is essential for future progress in this field.

[53] Hardin, G. 1968. "Tragedy of the Commons", *Science,* 162: 1243-1248.

Neither have we made any attempt to identify which of these factors are most important. It is probable that different factors are important in different situations. For instance, in situations where a whole fleet is idle because of collapsed fish stocks, the cost of re-flagging or penalties on arrest may be a very small part of the economic equation compared to the high personal cost of scrapping.

CHAPTER 12

THE COST OF BEING APPREHENDED FOR FISHING ILLEGALLY: EMPIRICAL EVIDENCE AND POLICY IMPLICATIONS

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Abstract

We first present a conceptual model for the analysis of the costs and benefit aspects of the risk inherent in IUU activity, then proceed to develop and present a map of IUU incidences as reported in the Fisheries Centre's *Sea Around Us project* IUU global database. This map shows that IUU activities are quite widespread geographically. We next present an analysis of the cost and benefit aspects of risks of IUU fishing, which reveals a number of interesting results, including the fact that for the cases analysed as a group even the high probability of being apprehended does not change the current favourable calculation of the potential net benefits of IUU fishing activities. Finally, we discuss three case studies using our conceptual framework, which allowed us to make some valuable deductions.

Introduction

Illegal fishing is conducted by vessels of countries that are parties to a fisheries organisation but which operate in violation of its rules, or operate in a country's waters without permission, or on the high seas without showing a flag or other markings (FAO 2001). Unreported catches are not reported to the relevant authorities by the fishing vessels or flag state, whether or not they are parties of the relevant fisheries organisation. This category includes misreported and underreported catches (FAO 2001). Unregulated fishing is normally conducted by vessels flying the flag of countries that are not parties of or participants in relevant fisheries organisations and therefore consider themselves not bound by their rules (FAO 2001).

Illegal, unregulated, unreported (IUU) fishing occurs not only on the high seas, but also within exclusive economic zones (EEZ) that are not 'properly regulated'. IUU fishing leads to the non-achievement of management goals and sustainability of fisheries (Pitcher *et al.* 2002; Corveler 2002). When stock assessments are performed on fisheries, reported catch and effort data is used. However, the underreporting of illegal catches results in the absence of a significant part of the annual catch that is not included in the assessment (Pauly *et al.* 2002; FAO 2000a). The depletion of many stocks, for example, of Patagonian toothfish (*Dissostichus eleginoides*) has occurred partly because of the

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inaccuracy of the catch data. Significant decreases in some fish stocks have become an increasing concern, especially because further restrictions on legal fishing can also exacerbate illegal fishing.

The issue of IUU fishing has therefore been receiving increasing attention among scholars and fisheries managers, as well as governmental, intergovernmental and non-governmental organisations. For instance, the FAO has begun the implementation of an International Plan of Action (IPOA) where all states and regional fisheries organisations are introducing effective and transparent actions to prevent, deter and eliminate IUU fishing and related activities (FAO 2003). A good understanding of the economics of IUU fishing is important in order to design appropriate measures. What are the cost and benefit aspects of risks inherent in IUU activity? This paper explores these questions. It discusses the possible drivers of risk and the costs associated with fraud, avoidance and apprehension in relation to IUU fishing activities. A model is presented and substantiated using case studies to help establish how IUU fishing vessels take such costs and benefits (monetary and social) into account when deciding on whether to engage in IUU fishing or not.

The rest of this paper is organised as follows. The first section conceptualises a model for fishers' decisions on IUU fishing. The literature is briefly reviewed, followed by a presentation of the key drivers of IUU fishing from the point of view of the violator. The formal model is detailed in Appendix 1. The third section, IUU Incidence and Case Studies", presents a global picture of IUU incidence, along with a presentation of three case studies to illustrate the scope and diversity of IUU fishing. In the last section we conclude with a discussion of the points presented.

Conceptualising a model for fishers' decisions on IUU fishing

Since the first formal economic model developed by Becker (1968) on the subject of criminal activity, the economic literature has advanced several reasons to explain why people engage in such activities. Becker (1968) and the papers immediately following him argued that criminals behave essentially like other individuals in that they attempt to maximise utility subject to a budget constraint. The economic argument was very strong in this explanation of illegal activity, embodied in what has come to be known as deterrence models (Kuperan and Sutinen 1999; Charles *et al.* 1999). These models argue that an individual commits a crime if the expected benefits or utility from doing so exceeds the benefits from engaging in legal activity. The models focus on the probability and severity of sanctions as the key determinants of compliance. More recent literature has come to recognise additional motivations, namely, that moral and social considerations play a crucial role in determining whether an individual engages in illegal activity or not (Tyler 1990; Sutinen and Kuperan 1999). With regard to IUU fishing there is evidence to support the hypothesis that moral and social considerations, as well as economics, play a role in the degree of IUU fishing that an individual decides to engage in (Kuperan and Sutinen 1999; Bergh and Davies 2004). However, the case studies discussed later in this paper indicate that moral and social considerations are weak in the case of distant water fleets, which are the predominant operators on the high seas.

Following Becker (1968), Kuperan and Sutinen (1999), Sutinen and Kuperan (1999), and Charles *et al.* (1999), we assume more explicitly that the following direct drivers and motivators play a role in whether or not fishers decide to engage in IUU fishing:

1. Benefits that can be realised by engaging in the illegal activity.

2. The probability that the illegal activity is detected or the "detection likelihood driver". This depends mainly on the level of enforcement or the set of regulations in place.

3. The penalty the fisher faces if caught.

4. The cost to the fisher in engaging in avoidance activities. This depends on the set of regulations in place and the size of the budget allocated by the fisher to this activity.

5. The degree of the fishers' moral and social standing in society and how it is likely to be affected by engaging in IUU fishing.[2]

Benefits from IUU fishing as a driver

For many fishers, the potential benefits of IUU fishing motivate them to engage in the illegal activity. To some extent the higher the economic return in a 'legal' fishery, the lower is the tendency to engage in IUU fishing. In other words, if a fisher is doing well financially, *i.e.*, making a sizeable profit from fishing 'legally', then the probability of cheating is low, whereas if the fisher is losing money and there is the potential to derive benefits from 'illegal' fishing, then the probability of cheating increases. There is also the factor of greed, *i.e.*, the fisher may be making a profit but still engages in IUU fishing because of the desire to increase profits. The following factors are important in determining the potential benefit to the fisher if they cheat:

- Catches – other things being equal, the more catch that can be realised by engaging in IUU fishing the higher the probability that a fisher will engage in IUU fishing.
- Catch per unit effort or the time it takes to catch the fish is also a consideration, since the more time spent searching for fish to and from the fishing grounds, the higher the cost as well as the increase in the probability of getting caught.
- Price – this is related to catch and if prices are too low then in most cases there will not be a financial incentive to cheat. This logic breaks down when food security is a driving factor. However, for the purposes of this study food security is not the focus.
- Cost of fishing, which includes consideration of the cost of labour, capital, fuel, licence and royalty payments, etc.

The expected penalty drivers

Detection likelihood driver: Other things being equal, the higher the probability of getting caught the lower the incentive to cheat, and hence, the higher the risk that the violator will be caught. The major factors that contribute to this driver are, *i)* the effectiveness and efficiency of the enforcement system; *ii)* social acceptance of cheating in society; *iii)* awareness of the regulations; and *iv)* the level of non-governmental or private organisation involvement in detecting infringements.

The avoidance driver: A rational fisher engaging in IUU fishing in a situation where there is some degree of enforcement will take measures (such as engaging in transhipment of catch) to reduce the chances of being detected; this is denoted avoidance activity.

The penalty driver: The severity of the penalty when caught is also an important driver in the decision of a fisher to cheat. Other things being equal, the more severe the penalty the lower the likelihood of cheating; this driver is related to the detection likelihood driver in that if there is no enforcement then the severity of the penalty is meaningless. For example, when a net ban was instituted in Florida, the county with the highest level of NON-compliance was also the county that either dismissed the most cases or imposed the minimal economic penalty to net fishers (Kely 2002).

[2] It is worth noting that here we are not dealing with small-scale fisheries, where community cohesiveness allows for social control (see example, Ruddle, 1989).

The types of penalties that are applied include: *i)* the amount of the fine; *ii)* confiscation of the boat; *iii)* confiscation of the catch; *iv)* exclusion from the fishery; and *v)* history of prosecutions/application of the penalty. For example, in Senegal the fines are doubled for foreign fishing vessels that repeatedly operate outside of the fishing access arrangements.[3] In the state of Victoria in Australia, first time offenders are served with a Penalty Infringement Notice (PIN), however, the penalty for repeat offenders can include seizure of the catch and vessel, imprisonment and other penalties (Parliament of Victoria 2000).

Moral and social drivers

Many have observed that the deterrence model alone does not adequately explain why people engage or choose not to engage in illegal activities such as IUU fishing; rather moral and social factors also play a crucial role (Tyler 1990; Sutinen and Kuperan 1999). It has been observed that a given population of fishers, for example, can be classified into *i)* chronic violators, *ii)* moderate violators and *iii)* non-violators (Kuperan and Sutinen 1999). Chronic and non-violators generally make up a small portion of a given population. The former have the tendency to undertake IUU activities no matter what, while non-violators will not engage in IUU fishing under any condition. Moderate violators, on the other hand, will only bypass regulations if the potential economic gain is high enough to cover the potential penalty they may face, given the size of the penalty when caught and the probability of being caught. Secondary influences that may affect the decision of moderate violators to engage in IUU fishing are the legitimacy of the regulation (and fishery management organisation), and the norms of behaviour, including both the general behaviour of the fishers and the moral code of the individual fisher (Tyler 1990; Kuperan and Sutinen 1999). Gauvin (1988) and Bean (1990) have estimated that about 10% of fishers in the Massachusetts lobster and Rhode Island clam fisheries flagrantly violate major regulations. The other 90% of fishers normally comply with regulations. These estimates are not just relevant to these two fisheries: Feldman (1993) presents a number of estimates for other fisheries that are similar to these numbers.

A formal model

From the above conceptual framework, we developed a formal model of the economics of IUU in line with the literature (see Appendix 1). According to this model, the objective of the fisher is the maximisation of the potential gains from engaging in IUU fishing moderated by moral and social considerations. If the fisher engages in IUU activities in a fishery in which there is almost no regulation, then the fisher faces close to zero probability of being caught – implying that the expected penalty the fisher faces is also close to zero. In this situation there will be very little need, if any, to undertake avoidance activities. Moreover, the IUU fisher will choose the level of IUU activity such that the marginal revenue from the activity is greater or equal to the marginal cost of engaging in the activity, which in this study equates to the sum of the marginal cost of fishing and the marginal moral and social cost of engaging in IUU fishing. If the fisher undertakes IUU fishing when there is enforcement, then the fisher will choose the level of IUU fishing such that marginal revenue is equal to or greater than the sum of marginal cost of engaging in IUU fishing, and the potential marginal fine if caught.

IUU incidence and case studies

First, we present a general picture of IUU fishing based on the Sea Around Us project (SAUP: www.seaaroundus.org/) IUU database, and then we present and analyse three case studies using the conceptual framework and model developed in this paper.

[3] See http://www.fao.org/docrep/V9982E/v9982e3n.htm.

The three case studies are selected to give a varied coverage of the different situations under which IUU fishing takes place. The Namibia case study gives us the opportunity to describe the level of IUU fishing in waters that went from virtually zero regulation to a situation with a relatively good level of regulation. The Patagonian toothfish example is presented to illustrate how high market prices can be the key driver for IUU fishing.[4] The Northwest Australia case study is presented to illustrate how fishers will shift to illegal practices if there are more abundant and well managed resources in other national waters despite the risk of detection and apprehension.

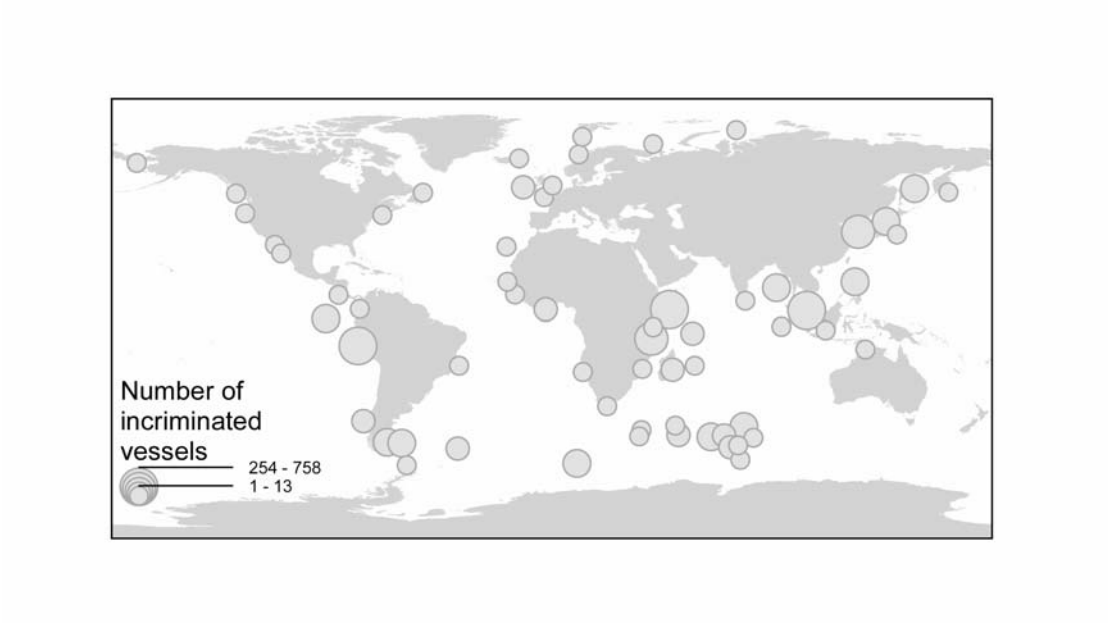
General picture of IUU fishing in the world

Figure 12.1. below summarises IUU incidence in the world. This is a map developed from the SAUP database on global IUU fishing at the UBC Fisheries Centre. It contains data on discards and unregulated fishing activities that have been extracted from government fisheries department publications (such as annual reports and media releases) and databases, and data on illegal fishing activities that have been described in the media (*e.g.* Intrafish, FIS), fisheries management reports and peer-reviewed literature (see Pitcher *et al.* 2002). The data is spatially referenced by FAO area or sub-areas depending on the level of detail provided. The analyses (Figure 12.1. and Table 12.1.) presented here are based on incidences that are published and are therefore possibly biased to those cases where a large fine is handed down or the offence had a significant impact on the environment or fishers. It is worth noting that both the database and the map are 'living' research products as they are constantly being improved as more data is accumulated (see www.seaaroundus.org for updates).

Figure 12.1. represents the spatial distribution of vessels incriminated in IUU activities. Most of these observed/reported IUU activities are in the EEZ of the country detecting the infringement. Our data indicates that fewer IUU activities are reported in the northern hemisphere. This may be a reflection of the resources expended on monitoring, control and surveillance. Nevertheless, the map does indicate that even with the limited information we currently have, IUU fishing is widespread spatially.

[4] We find this point to be interesting and important to make, even though the current paper focuses on risk issues.

Figure 12.1. Number of Incriminated Vessels for Fishing Illegally Between 1980 and 2003



Source: Based on *Sea Around Us* IUU database; www.seaaroundus.org.

Cost and benefit aspects of risks inherent in IUU activity

Table 12.1. is a representation of the model presented in Appendix 1, except that the moral and social components are not included. This is because for the cases presented in the table, these drivers of IUU fishing are at best very weak. We have also implicitly assumed that the cost of any avoidance activity by a given vessel is included in the vessel's variable cost (see below), and the benefit of such action to the vessel is to reduce the effectiveness of monitoring, control and surveillance (MCS) activities (that is, reduce θ) for the vessel. The table lists a number of IUU fishing vessels that have been apprehended while illegally catching fish in different parts of the world. The first entry for instance, is a Spanish vessel apprehended by Australian authorities. The vessel, at the time it was apprehended, contained 116 tonnes of Patagonian toothfish with an estimated market value of USD 630 000. This vessel was fined USD 435 000. The 'Catch' and 'Fines' Columns are completed with actual data. The numbers in italics in the 'Value' Column are calculated using the reported IUU catch and the global price of the fish in question. US prices (computed using data at http://www.st.nmfs.gov/commercial/landings/gc_runc.html) are used as proxies for global fish prices. This is reasonable given that recent studies have demonstrated that prices for many fish species tend to be co-integrated (Asche *et al*. 1999). The variable cost of fishing as a percentage of landed value was calculated using information in Lery *et al*. (1999).

Recall that θ denotes the probability of detection of IUU fishing – it is therefore crucial in the calculation of the cost and benefits of the risk inherent in IUU fishing. The current lack of data does not allow us to say what the value of θ is for the cases in Table 12.1., but it is probably safe to say that many of them will have probabilities of detection that are well below 0.2 or a 1 in 5 chance of being detected. More work to determine prevailing detection probabilities for IUU activities in different fisheries around the world will be very useful in furthering the current analysis. This will also increase the utility of this work to fisheries managers in their effort to tackle the problem of IUU fishing.

Given the data situation, we explore the question of whether the potential benefits of engaging in IUU will be greater than the potential costs when $\theta = 0.2$, given the fines imposed, the value of the catches, and the variable cost of fishing (assuming fixed costs to be sunk). In other words, will the ratio of potential total costs to expected revenue from IUU fishing be greater than or equal to 1? Table 12.1. shows that only four of the 16 cases proved to be uneconomical, with a 1 in 5 chance of being detected. Similar calculations when θ=0.05 and 0.1 showed that the total potential cost exceeds the expected revenue only for Case 15.

Another interesting question explored is, what fines should have been imposed on each of the cases in Table 12.1. to make the costs aspects of risk at least equal to the benefits aspects for an MCS system when the probability of detection, $\theta = 0.2$. The calculations show that on average, for the cases studied, current penalty levels will have to be increased 24 times to ensure that IUU fishing is uneconomic. The equivalent numbers when θ=0.05, and 0.1 are 173 and 74, respectively.

Table 12.1. Cost and Benefit Aspects of Risks of IUU Fishing when there is a 1 in 5 Chance of being Apprehended (*i.e.* $\theta = 0.2$)

Cases	Vessel/ Gear	Arresting country	Fishery	Catch (t)	Catch value (USD)	Expected revenue[1] (USD)	Variable cost[2] (USD)	Fine[3] (USD)	Expected Penalty[4] (USD)	Total cost[5] (USD)	Total cost /expected revenue[6]	New Fine [7]
1	Longline	Australia	Patagonian toothfish	116	630 000	504 000	(0.70%) 439 091	435 000	87 000	526 091	1.04	0.75
2	Trawler	Not reported	Cod & haddock	24	1 138	916	(0.66%) 747	22	4	752	0.83	38
3	Boat/dive gear	Australia	Abalone	11 000	75 000	60 000	(0.70%) 52 500	26 250	5 250	57 750	0.96	1.40
4	Longline	Chile	Patagonian toothfish	33	610	488	(0.45%) 273	420	84	357	0.73	2.55
5	Trawler	Not reported	Finfish	Not reported	6 250	5 000	(0.70%) 4 375	2 250	450	4 825	0.97	1.4
6	Trawler	Russia	Cod and haddock	48	1 138	910	(0.66%) 747	22	4	752	0.83	38
7	Trawler	Argentina	Fish including anchoveta	2 685	485 985	388 788	(0.62%) 300 399	24 138	4 828	305 227	0.79	18
8	Pots	Japan	Crab	60	47 820	38 256	(0.62%) 29 648	7 414	1 483	31 131	0.81	5.8
9	Longline	Not reported	Patagonian toothfish	200	2 200 000	1 760 000	(0.70%) 1 533 333	100 000	20 000	1 553 333	0.88	11
10	Bottom trawler	Mexico	Shrimp	5	27 575	22 060	(0.56%) 15 337	5 455	1 091	16 428	0.74	6.2
11	Pots	Russia	King crab meat	0.214	2 456	1 965	(0.66%) 1 621	34	7	1 628	0.83	50
12	Bottom trawler	Russia	Alaska Pollock	6	11 022	8 818	(0.39%) 4 304	1 171	234	4 539	0.51	19.4

Table 12.1. Cost and Benefit Aspects of Risks of IUU Fishing when there is a 1 in 5 Chance of being Apprehended (*i.e.* $\theta = 0.2$) (cont.)

Cases	Vessel/ Gear	Arresting country	Fishery	Catch (t)	Catch value (USD)	Expected revenue[1] (USD)	Variable cost[2] (USD)	Fine[3] (USD)	Expected Penalty[4] (USD)	Total cost[5] (USD)	Total cost /expected revenue[6]	New Fine [7]
13	Gillnet	Russia	Greenland halibut	132	119 328	95 462	(0.59%) 69 833	690	138	69 971	0.73	185
14	Longline	Canada	Sablefish	2.72	12 063.2	9 651	(0.70%) 8 408	15 385	3 077	11 485	1.19	0.40
15	Longline	Mauritius	Patagonian toothfish	200	440 000	352 000	(0.70%) 306 667	2 400 000	480 000	786 667	2.23	0.38
16	Longline	Uruguay	Patagonian toothfish	201	2 122 560	1 689 600	(0.70%) 1 472 000	1 632 000	326 400	1 798 400	1.06	2.60

Notes:

1 Expected revenue = θ*0 + (1-θ)*catch value. This captures the fact that when apprehended catch from IUU fishing is usually confiscated.

2 Variable costs are the cost of operating the vessel as distinct from the fixed costs of acquiring the vessel.

3 Reported fine imposed, assumed to be the total fine including the confiscation of catch/vessel, flag state's fine, where applicable.

4 The product of the probability of detection (in this example 0.2) and the fine imposed.

5 The sum of variable cost and the expected penalty.

6 The ratio of the potential total cost of IUU to the potential value of engaging in IUU. A value of 1 and above implies engaging in IUU activity is not a profitable proposition.

7 The number of times the reported fines need to be multiplied by in order to make the potential gain equal to the potential cost of engaging in IUU when θ=0.2. This gives an average multiple of about 24. Similar calculations for θ=0.05 and 0.1, shows that multiples of 173 and 74 are needed. From the results presented above one can make the following observations:

- Given the current combination of fish price, IUU catch levels, variable fishing cost levels, and the level of fines imposed in vessels caught engaging in IUU fishing, the current fine levels will not serve as a deterrent for two-thirds or more of the cases reported in Table 12.1 when the probability of detection is equal or less than 0.2.
- For most of the cases, the probability of detection must be well above 0.2 for it to serve as a deterrent.
- The reported fines for the cases analyzed will have to be increased many-fold, even for fisheries that are monitored, to ensure that there is a 1 in 5 chance of being detected, for the fines to serve as serious deterrents to IUU fishing.

The Namibian EEZ

Background

Namibia has an extensive coastline bordering the highly productive northern Benguela current ecosystem, which is dominated by pelagic fish, mainly sardine, anchovy and horse mackerel. The demersal ecosystem is dominated by valuable stocks of hake. The food web off the Namibian coast is mainly represented by seals as the top predators, hake, squid, snoek, and chub mackerel as the piscivorous species, and horse mackerel, round herring, saury, sardine and anchovy as the main pelagic prey, and lightfish, lanternfish and goby as the main demersal prey (Shelton 1992; Palomares and Pauly 2004).

IUU fishing before independence

Before independence in 1990, the Namibian EEZ suffered illegal, unreported and unregulated fishing because it was virtually a free-for-all fishing zone. There was little or no surveillance of most fishing operations in Namibian waters, hence there was a massive race for the fishery resources of Namibia mainly by distant water fishing fleets (DWFs) beginning in the 1960s (Anon. 1994). Fleets from the former USSR and Spain arrived in 1964; followed by Japan, Bulgaria and Israel in 1965; Belgium and Germany in 1966; France in 1967; Cuba in 1969; Romania and Portugal in 1970; Poland in 1972; Italy in 1974; Iraq in 1979; Chinese Taipei in 1981; and South Korea in 1982 (FAO Yearbooks of Fishery Statistics for hake). Sumaila and Vasconcellos (2000) demonstrate that the impacts of this were huge and negative, resulting in the over-exploitation by distant water fleets with the consequence that the newly independent Namibia inherited an altered ecosystem whose productive potential was severely reduced (Willemse and Pauly, 2004). In addition, the country suffered huge socio-economic losses during this period due to the activities of DWFs.[1]

Fishing activities in Namibian waters were not regulated so reporting of catches was very poor, and also many who would normally not fish there without permission, fished there illegally anyway. This 'free for all' situation implied that all the direct drivers of IUU fishing were skewed in favour of fishers who want to undertake IUU fishing activities – what we call 'the IUU Fisher's Paradise'. The potential of gaining additional revenue from IUU fishing without any risk of being caught is high. Penalties are non-existent, and the violators enjoyed zero cost of engaging in avoidance activities. In terms of our model, the situation in Namibia's EEZ during this period is captured by the optimality condition expressed by equation (3).

The revenue side of this equation was quite high due to the huge quantities of fish caught by distant water fleets in the years prior to independence. The official statistics, which are suspected of being underestimates, shows that 1.4 million tonnes of sardines were caught in 1968. Before these large catches, pre-1968 catches were reported to have been between 100 000 to 600 000 tonnes, most of it taken by distant water fleets. The race for Namibian hake started in 1964 and reached a peak in 1972 when 800 000 tonnes of hake were reported to have been caught. The catches were lower between 1972 and 1980 at about 150 000 tonnes. Catches increased again to around 400 000 tons in 1985, then declined again until 1991 when Namibia took full control of its resources for the first time. Again most of these catches were taken by DWFs. It is reported that up until 1985, 99% of hake catch was landed by DWFs. After 1985, approximately 90% was still landed by DWFs (Anon. 1994;

[1] It is probably not possible to discuss DWFs in the legal context before UNCLOS and the establishment of the 200-mile EEZ in 1977, as it cannot be claimed that the fleets were fishing illegally.

Sumaila and Vasconcellos 2000). Horse mackerel was also heavily targeted by DWFs active in Namibia's exclusive economic zone (EEZ) before independence. Annual catches were seldom below 300 000 tonnes, with the peak of 570 000 tonnes landed in 1982, according to the statistics.

It could be argued that the cost side of equation (3) was relatively low compared to the revenue side, implying that the amount of IUU fishing inputs will have to be very high before equation (3) is satisfied. Essentially, under the circumstances prevailing in Namibia's EEZ before independence, and the fact that most of the fishing was by DWFs, it could be argued that moral and social considerations were virtually non-existent. Hence, the only cost that mattered was the fishing cost, which from all indications must have been well below the revenue from IUU fishing. This scenario is in effect the IUU fisher's paradise – zero risk of being caught and penalised, and zero risk of losing moral or social standing in the societies they come from. It should be noted that this result could easily be extended to most high seas IUU fishing situations.

IUU fishing after independence

The new Namibian government that took office in 1990 put fisheries at the centre of its agenda. It made the return of full control (to Namibia) of fishing in its EEZ a primary goal of the government. Just before independence in 1990, more than 100 foreign vessels were fishing illegally in Namibian waters. During 1990 and 1991, eleven Spanish trawlers and one Congolese trawler were arrested for illegal fishing and successfully prosecuted; most of them were forfeited to Namibia by the Namibian courts. It has recently been reported by WWF (1998) that with the announcement of the EEZ regime by the independent government, there was a drop of more than 90% in the number of unlicensed foreign vessels fishing in the area. Namibia achieved this feat by quickly putting in place a fisheries management system with a strong monitoring, control and surveillance component, the primary goal of which was to restrict fishing to only those entitled to do so, and ensure that fishing activities are carried out within legal and administrative guidelines (MFMR 1999). By so doing the government of Namibia quickly moved the IUU fishing environment from an IUU Fisher's Paradise to an IUU fisher's Hell: Suddenly θ and F turned positive, immediately impacting on fishers' risk calculations and decisions on whether or not to engage in IUU fishing. Indeed, the regulators increased θ to close to 1, and F significantly in the beginning to serve as a signal to all IUU fishers that it meant business. To achieve this, Bergh and Davies (2004) report that in 2001 and 2002, 41% and 42% of the fishing industry revenue has been used to pay for monitoring, control and surveillance activities, respectively. More concretely, the annual running cost of the Fisheries Observer Agency (FOA), the organisation responsible for providing observer services to the MFMR, is about NAD 20 million[2] (Per. Comm. Mr. Hafeni Mungungu, CEO of FOA).

The other components of the optimality condition, namely, avoidance, moral and social issues also became elements that carried weight in the risk analysis of a potential IUU fisher. In the first place, because of the now significant value of θ and F, those who planned to engage in IUU fishing would most probably have to engage in avoidance activities too. This increases the total cost to them of engaging in IUU fishing, and therefore has a dampening effect on their incentive for engaging in the illegal activity. Secondly, because DWF fishing was eliminated, restricting fishing to only Namibian-based fishing companies, the moral and social standing considerations became relevant. All of these together resulted in a significant drop in IUU fishing. According to Bergh and Davies (2004), the goal of restricting fishing activity to only those entitled has been fully achieved, while more work is needed with respect to the goal of ensuring that fishing activities are carried out within administrative and legal guidelines, because this goal has only been partially achieved so far.

[2] USD 1 equal to NAD 7.07 (Namibian dollars) in March 2004.

There are many reasons for the success of Namibia in tackling its huge IUU fishing problem after it gained independence. Some of these are specific to the country while others can be generalised to other countries. A key positive factor for Namibian fisheries is the fact that it is a major contributor to the country's national wealth. It is estimated that fisheries contribute over 10% of the country's national income (Lange 2003). This prominence accords the fishing sector high national priority, which allows the Ministry of Fisheries and Marine Resources (MFMR) to get the resources it needs to put in place an effective MCS system. A second point is the fact that Namibia had a number of negative examples from around the world on how not to manage its fisheries because it attained nationhood only recently. This opportunity appears to have been used effectively – to the extent that the Namibian Constitution has sustainability requirements stipulated in it. The legal system was also designed to give the courts the power to deal with illegal fishing activities. The geography of Namibia also played a part. The coast of Namibia is shielded from the population by a strip of harsh desert land resulting in only two major fishing ports along its coast. This meant that coastal fishing communities never really developed along the coast. This had a positive socio-cultural consequence on the management of the resources in that there was no coastal community with long-term claims to fishing rights on the marine resources. Finally, the country took drastic and dramatic initial enforcement of fisheries regulation in its EEZs, which sent a clear signal to potential violators, with a huge positive effect on keeping IUU fishers out of the country's EEZ.

Patagonian toothfish

Background

The Patagonian toothfish is a long-lived, slow growing species. It matures at the age of more than 10 years, lives up to 50 years, can reach lengths of up to 2 metres and weighs up to 130 kg (TRAFFIC 2001). Larger fish normally inhabit greater depths while younger toothfish live in shallower waters (depths ranging from 400 to 3 500 m). It preys on fish, crab, squid and prawns and is preyed upon by sperm whales and elephant seals. Due to its slow growth and late maturity, this species is extremely vulnerable to overfishing. Other Patagonian toothfish market names are Bacalao de profundidad (Chile), Butterfish (Mauritius), Chilean Sea Bass (USA, Canada), Robalo (Spain) and Mero (Japan) (TRAFFIC 2001). It is worth noting that until the late 1980s, the then Soviet Union caught the largest quantities of toothfish (CCAMLR Article XXIV). At present the main catch countries are Chile, Argentina, France, Australia, UK and South Africa (TRAFFIC 2001). Most IUU catch is landed in Mauritius, as the catch documentation scheme has effectively eliminated IUU catch landings in CCAMLR member countries (TRAFFIC 2001). Toothfish catch is exported primarily to Japan and the US, as well as Canada and the EU (TRAFFIC 2001).[3]

The Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) was established in 1982 with headquarters in Hobart, Australia. Its aim was to deal with the depletion of krill and other fish stocks in the Southern Ocean, in particular the Patagonian toothfish stocks. There are 39 participating countries on the Convention, of which 24 are member countries. CCAMLR governs most of the waters in the Antarctic region. Although there are regulations set by CCAMLR as conservation measures, large quantities of toothfish are still caught illegally in the EEZs of the Sub-Antarctic Island territories and in the Southern Ocean area managed by CCAMLR. Unregulated and unreported catches occur inside and outside of the CCAMLR area (TRAFFIC 2001). Any country within the CCAMLR area governs its own EEZs but operates under regulations (catch limits, gear restrictions) set by CCAMLR.

[3] It should be noted that the IUU trade follows the legal market to the importing countries once it has been landed at a port.

Patagonian toothfish is caught in the Antarctic Southern Ocean, which is divided into three statistical areas defined by FAO and governed by CCAMLR. Area 48 covers the Atlantic Ocean Sector; Area 58 covers the Indian Ocean Sector and Area 88 covers the Pacific Ocean Sector. The Southern part of Area 58 and the southern part of Area 88 are prime target areas for catching Patagonian toothfish. Within the CCAMLR area, toothfish fishing hot spots are located near Prince Edward Islands, South Africa (Sub Area 58.7); Crozet Islands and Kerguelen Islands, France (Sub Area 58.6); and Heard and Macdonald Island, Australia (Sub Area 58.5).

The evolution of the toothfish fishery

The Soviet Union started fishing for toothfish in the mid-1980s after the decline of the icefish fishery (Kock 1991; 1992). The development of the legal toothfish fishery followed the collapse of the Austral hake, *Merluccius australis*, and Golden Kingclip, *Genypterus blacodes*, fisheries in Chilean waters and of some of the Northern fish stocks (TRAFFIC 2001). Until 1997, there were virtually no regulations on the amount of toothfish catch, implying that the relevant optimality condition is that expressed in equation (3), with zero probability of being caught. There were catch limits placed on the longline toothfish fishery in 1990 but these were not actively enforced. The incentive to engage in IUU fishing was consequently high since the probability of being caught was zero even within the EEZs in the CCAMLR area. However, in 1997, it was reported that 80-90% of current total toothfish catch was illegal, constituting 2-3 times the legal catch limits for the fish stock. This information forced all countries with EEZs in the CCAMLR area to establish regulations and limits on the fishery, and begin to manage their waters more effectively. F and θ then assumed positive values within most countries' EEZs. θ is likely to be greater than 0.2 in Australian waters where the amount of patrol vessels is extremely high. F was at first very low as most vessels considered the small fines simply an additional operating cost and the resulting fines issued by courts were very small. However, as will be discussed below, new penalty measures issued by Australia, for example, have rendered an F value that is very high, sometimes 1, when vessels are sunk. Other CCAMLR region countries are following Australia's example.

Management schemes

More enforcement and regulation measures were brought to bear on the fishery in 1998 when all toothfish vessels operating within the CCAMLR area were required to carry a vessel monitoring system (VMS) – a satellite-tracking device to trace the co-ordinates of each vessel. Also, all vessels operating in the CCAMLR were required to mark their gear appropriately to decrease the amount of longlines cut when inspectors approached. More rigorous measures were taken in further attempts to decrease the amount of IUU fishing of Patagonian toothfish. In May 2002, CCAMLR implemented the Catch Documentation Scheme (CDS) for all CCAMLR member countries, in all areas and fisheries with vessels catching toothfish. Before the CDS was implemented, South Africa, Uruguay, Spain and Namibia, all of which are members or acceding states of CCAMLR, accepted IUU toothfish at their ports. After the CDS was implemented, Mauritius remained the only country to accept IUU toothfish, as it is not a member country (TRAFFIC 2001). The CDS tracks the trade of Patagonian toothfish at all CCAMLR members' ports (TRAFFIC 2001). The Catch Documentation Scheme aims to identify the origin of all toothfish landed or imported into countries of contracting parties. It was recommended that all toothfish landings be denied if there was no documentation to show that the toothfish had been caught within the convention area and conforming to the conservation measures issued by CCAMLR. Non-contracting parties can be issued a CDS to be accompanied and verified with all landed toothfish. As these new management schemes have been developed since 1997-2002, they have helped reduce the attractiveness of IUU fishing of Patagonian toothfish.

Benefits drivers

There is a strong economic incentive to engage in IUU activities in the Patagonian toothfish fishery because of the strong demand for the fish and the consequent high market price it commands, and the fact that stocks of the fish have been declining over time (TRAFFIC 2001). Toothfish is considered "white gold" by the commercial longline fleets (ISOFISH 1999). The market price of toothfish has increased from approximately USD 6/kg in 1996 to over USD 11/kg in 2000, an increase of almost 100% in just three years (Statistics Canada 2001), and there are still other reports that toothfish sells for even higher prices.

The variable cost estimates from Table 12.1. for toothfish longline are approximately 70% of the total catch value (Lery *et al*. 1999).[4] By using this percentage even on an annual scale, the net value of illegal catch is still very high. As indicated in the next two sections, the level of detection is very low in this fishery making these profits substantial and attractive to fishermen.

Table 12.2. Estimated Annual Legal and Illegal Catches (Values) of Patagonian Toothfish in the CCAMLR Area

(all values in USD million, except price per kg which is in USD)

Year	Legal catch (t)	Illegal catch (t)	Price per kg	Illegal catch Value	Variable costs [1]	Net Value
1996/97	32 736	68 234				
1997/98	27 868	26 829	6.05	162	113	48
1998/99	37 319	16 636	9.11	151	105	45
1999/00	25 242	8 418	11.19	94	65	28

[1]. Variable costs estimated from Lery *et al*. (1999) used from Table 12.1. for longline vessels catching Patagonian toothfish.

Detection drivers

The development of governance over the Patagonian toothfish fishery has increased significantly since the fishery was first established. This case study can be divided into two time periods: before there were any regulations on the fishery and after the regulations were set to conserve the much depleted stocks. There are certainly numerous organisations and countries working together to stop IUU fishing of toothfish. Although many conservation measures have been implemented, due to the large fishing area and the high level of co-operation needed to combat illegal fishing, the detection of IUU fishing in this fishery is still relatively low, which probably implies that little of such activity is currently captured in the SAUP database.

The likelihood of being caught is fairly low outside the CCAMLR area since surveillance is very costly (TRAFFIC 2001). The Australian government apprehended a vessel at a cost of AUD 1 million and 80 days of pursuit (COLTO 2003). CCAMLR does not carry out any enforcement activities itself, but rather each country within the area is responsible for its own waters. Some countries – such as Australia, South Africa and France – are taking rigorous enforcement actions. For example, Australia has prohibited all toothfish longline fishing in its EEZ and patrol with armed vessels (COLTO 2003). The Catch Documentation Scheme and the Vessel Monitoring System are designed to make it difficult for vessels to land illegal toothfish or fish in illegal areas. The main obstacle to decreasing the amount of toothfish catch is the lack of co-operation from all member countries. This case is more complex

[4] These estimates should be treated with caution as costs may differ between "legal" vessels and IUU/FOC vessels.

than the Namibian case because there are so many countries involved. Non-contracting countries who are invited to CCAMLR meetings and who are aware of the concerns about IUU fishing activities for toothfish are still known to issue Flags of Convenience (FOC), for example, Belize and Panama (TRAFFIC 2001).

Since the implementation of the CDS and VMS as well as port inspections, illegal catches have decreased from about 68 200 tonnes in 1996 to 8 400 tonnes in 2000 (CCAMLR 1998; 1999; 2000). The estimated legal reported catch of toothfish was 51% of the total catch in the CCAMLR area and IUU landings were 49% from 1996-1999. After the CDS was implemented in 2000, IUU landings decreased to 25% of the total catch (CCAMLR 1998; 1999; 2000). The decrease in illegal catch could be due to the increased port inspections and the CDS and VMS projects, but unfortunately are more likely due to the underestimation of the catch due to transhipment activities, underreporting and misreporting, as Japan and the US have not observed a decrease in imported catch (TRAFFIC 2001).

The VMS costs are borne by individual CCAMLR member countries. Each country needs one base station to monitor its own vessels at a cost of approximately USD 30-50 000, paid for by the member country.

On-board instrumentation has a capital cost of approximately USD 20 000, which is very small compared to the high prices received for even just one trip catch [see the "Volga" price below (in Penalty driver section)-AUD 1.9 million for one trip catch. (D. Miller, Executive Secretary CCAMLR. Hobart, Tasmania, Pers. Comm. 2003)]. FAO has reported that the operating costs of the FFA VMS are approximately 0.3% of all operating costs or 0.05% of the total value of production per year per vessel (2003).

Penalty driver

The maximum penalty under Australian jurisdiction when caught with illegal toothfish catch is AUD 550 000[5] along with the confiscation of the entire catch on board (Wimmer, Manager – IUU Fishing Fisheries and Aquaculture Department of Agriculture, Fisheries and Forestry Australian Government, Pers Comm. 2003). More recently a new law has been passed that increased the maximum penalty to AUD 825 000 for vessels longer then 24 metres (COLTO 2003) as well as recovering the cost to pursue the vessel. However, in the court system in Australia, it is very rare that a vessel will actually be fined the maximum penalty. As Australia is the leading enforcement country with regard to IUU toothfish fishing, they have managed to apprehend several known pirate vessels. Some penalties that have been enforced are as follows:

- Confiscation of catch, for example, the "Volga" had 136 tonnes of toothfish seized worth AUD 1.9 million. The International Tribunal for the Law of the Sea (ITLOS) delivered its decision on December 23, 2002, which set a bond of AUD 1.92 million to have the vessel released (equivalent to the assessed value of the boat, fuel and fishing equipment) (Rothwell and Stephens, 2004).
- Fines imposed on captain and crew of vessel, for example, an Uruguay vessel the "Viarsa 1" was fined AUD 20 000 to each crew member (crew of five men); the captain of the "South Tomi" a longliner was issued a fine of AUD 136 000 (the highest fine ever issued by Australia);

[5] AUD 1=USD 0.773 in February 2004.

- Sinking of vessel, for example, the "South Tomi" was the first boat to be sunk; the "Lena" has also been ordered to be sunk.

These more extreme measures enforced by Australia are taking into account that previous fines or penalties were not substantial enough to deter the operators from continuing to fish illegally after paying their penalty. Other countries (*e.g.*, Chile, South Africa, France, etc.) have also increased their penalty fines for the conviction of IUU fishing (TRAFFIC 2001). However, although these seem like severe penalties to deter fishers from IUU activities, it is noted that one of the crewmembers on the "South Tomi" was caught again fishing illegally aboard the "Viarsa 1" two years after his boat was sunk (COLTO 2003).

Avoidance measures

Outside of member countries' EEZs, the risk of being detected and prosecuted is zero as there are no enforcement measures in the high seas. The only reported case (that we are aware of) where apprehension occurred outside a country's EEZ was when Australian patrols pursued an IUU vessel from within Australian waters into the high seas before finally seizing the vessel. In order to decrease the risk of apprehension within the EEZs, the avoidance measures taken by the vessels have been primarily in the loopholes of the management schemes enforced, *i.e.*, CDS and VMS (TRAFFIC 2001). The most frequently used avoidance measures that have worked very effectively are:

- Flags of Convenience: operators can buy a flag from a country with the assurance that the issuing country will turn a blind eye to any of the operator's activities. By flying such a flag, the vessel can move through the high seas without complying with any regulations.
- Transhipping catch and landing it under different species names, trans-fuelling and even changing crews at sea to avoid detection at ports (TRAFFIC 2001). A group of boats (the "Alphabet" boats) organised by one country, put the older, less valuable longliners in the path of patrol vessels so that the newer more valuable boats can continue fishing without being caught. The loss of older boats is considered a worthwhile business risk.
- False co-ordinates under the VMS so that the vessel country cannot identify the exact location of the boat (COLTO 2003).

Moral and social drivers

The toothfish fishery is an international fishery where most vessels are operating outside of their national waters. Since this is the case, the moral obligations or social considerations of cheating and fishing illegally are non-existent. The economic incentives of high prices are so enticing that the threat of being "blacklisted" is not enough to deter illegal fishers. However, there are many non-governmental organisations that labour to detect and publicise vessels catching toothfish illegally. TRAFFIC, a wildlife trade monitoring network, and Greenpeace Oceans-Stop Pirate Fishing are currently working to publicise illegal operators and the names of the companies and vessels involved in IUU fishing of toothfish. The Coalition of Legal Toothfish Operators, COLTO, works with these agencies to identify illegal operators. The coalition is also offering monetary rewards of up to USD 100 000 to anyone with information regarding illegal vessels (COLTO 2003). This may seem like a large amount, but the seriousness of the situation means that COLTO is willing to offer this money in the hope of minimising illegal toothfish catch. This has proven quite successful in obtaining valuable information for the apprehension of illegal vessels. ISOFISH, the International Southern Oceans Fishing Industry Clearing House, was developed as a project in 1997 to report on IUU activity over a 3-year period. This data was distributed to appropriate agencies and governments and resulted in a decrease of IUU catch, and promoted the schemes now used by COLTO and several other NGOs.

These actions are likely to improve the risk of violators losing their moral and social standing, thereby influencing the level of IUU fishing they choose to engage in.

Northwest Australia

The discussion here draws heavily on Wallner and McLoughlin (2000) and Fox *et al*. (2002). In the waters off Northwestern Australia there is a long tradition of fishing by Indonesian fishers. In 1974 a Memorandum of Understanding (MOU) between Indonesia and Australia was signed which included the area of the Australian Fishing Zone (AFZ) in which Indonesian fishers (specifically within the 12-mile territorial limit around Ashmore reefs, Cartier Island, Seringapatam reef, Scott reef and Browse Island – MOU Box) primarily exploit resources using small to medium-sized sailing craft. In 1989 the area accessible to Indonesian fishers (MOU Box) was extended to include the waters between the reefs negotiated in the 1974 MOU. While the early 1990s saw an increase in the number of apprehensions in this box, more recently apprehensions in the box declined (Table 12.3). However, overall in the AFZ off Northwest Australia, apprehensions have increased, with over 138 apprehensions in 2003 up from 111 in 2002 (www.fis.com)

Table 12.3. Vessel Apprehensions in the MOU Box 1988-1999

Year	Number of vessels
1988	1
1989	2
1990	2
1993	2
1994	63
1995	21
1996	6
1997	1
1998	7
1999	2

Source: Fox *et al*., 2002.

The decline in apprehensions may be due to several factors: increased awareness of the MOU Box and its rules, decreasing fish stocks (and therefore less interest in the area), and enforcement activities acting as a deterrent.

The Australian government undertakes regular aircraft and vessel surveillance patrols in the area. These patrols have a multitude of purposes – including detection of vessel fishing illegally in the AFZ. Between July 1992 and November 1994, 38% of the often motorized and large Indonesian vessels sighted by air surveillance were fishing illegally in the AFZ. Research by Campbell and Wilson (in

Wallner and McLoughlin 2000) identified five Indonesian fisheries in the AFZ, including *i)* shark line and longline fishery, *ii)* sedentary species (trochus/trepang) fishery, and *iii)* demersal finfish fishery, while the remaining two fisheries lacked sufficient detail for further analysis. We will structure the rest of the discussion in this section around these fisheries.

Shark line and longline fishery

This fishery is primarily based outside of the MOU Box and fishers are often detected and directed to the MOU Box or apprehended. Recently this fishery has been focusing more on the MOU Box. Although the fishery has been established for a long time, the recent rise in the price of shark fin from IDR 150 000/kg (USD 60)[6] for quality cuts in the early 1990s to IDR 600 000 (USD 75) for first class fin in 2002 has resulted in a surge in fishing activities. The increased value of shark fin has generated an increase in effort and catches in this fishery, and an increase in illegal vessels (motorized) fishing in the MOU Box as well as areas outside of the MOU Box since 1988. A fishing trip for shark fin catches 5 to 6 kg/vessel worth approximately IDR 3.6 million (USD 432).

Benefits drivers

The fishing effort in this fishery in the early 1990s is estimated at about 5 000 boat-days and shark catch at 800 tonnes, with approximately 200 tonnes taken illegally (Wallner and McLoughlin 2000). The apprehension rate for illegal fishers (primarily motorized vessels) is 25% (this equates to 80 vessel incursions per year) and they spend 3-4 days in the AFZ before being apprehended. It is estimated that boats that are not detected spend approximately 7 days in the AFZ. Wallner and McLoughlin (2000) caution that a number of assumptions have been made in deriving these estimates. Some shark fishers earn IDR 400 000 (USD 100) per year fishing primarily in the AFZ. Indeed fishing in Australian waters is an important source of income for many Indonesian fishers (Fox *et al*. 2002).

Table 12.4. Estimates of Shark Fishing Effort and Catch by Boat Type 1992-1994

Boat Type	No. of boat trips	No. of shark fishing days	Mean fin catch per boat (kg)	Wet fin catch per trip (kg)	Wet shark catch per trip (kg)	Annual shark catch (t)
Sailing	160	3 200	30	130	2 600	416
Motorized (illegal)	80	420	26	113	2 260	158

Source: Based on Wallner and McLoughlin, 2000.

Although the catch per illegal boat is less than for legal boats, the number of days fishing per trip is also much lower, 5.4 days/trip compared to legal boats which is approximately 20 days/trip (avoidance behaviour). Shark fin export prices are as high as USD 120/kg. If a vessel goes undetected the value of the catch is (USD 26 x 120) USD 3 120, which makes the trip quite profitable. Fishers can therefore gain nearly the same economic benefit but in much less time.

Sea cucumber (Trochus /Mollusk (Trepang) fishery

Trepang is the principal target species of this fishery, which is focused on the reefs in the MOU Box. There is a nature reserve surrounding Ashmore Reef, which extends to the 50 m isobar and

[6] 1 USD = IDR 8 726.50 (Indonesian Rupiah) in April 2004.

therefore attempts to protect sedentary species. Although a vessel is present 9 months of the year, it is thought that during the other 3 months compliance is low. Over the last few years, effort has increased on reefs and shoals to the north of the MOU Box. Trepang catches are quite variable, ranging from less than 100 kg to 1000 kg/vessel trip (median catch 100 kg) with declining catches over time expressed by many Indonesian fishers (Fox *et al*. 2002). Catches of Trochus are also variable, ranging from less than 10 kg to 1000 kg/vessel trip (median catch 14 kg). Again, most illegal activities in the fishery are undertaken by motorized vessels targeting trepang. The average catch of trepang for an illegal vessel is 157 kg.

Table 12.5. Catch and Effort Estimates by Boat Type for Trepang taken from Reefs within and near the MOU Box 1992-1994

Boat Type	No. of boat trips	No. of trepang fishing days	Mean trepang catch per boat (kg)	Wet trepang catch per trip (kg)	Annual trepang catch (t)
Sail	144	4 320	196	2 156	310
Motorized	100	450	157	408	31

Source: Wallner and McLoughlin 2000.

Benefits drivers

The market price of trepang varies from USD 1.80 to USD 35.10/kg dry weight depending on the species. It is estimated that each 'legal' trip generates approximately USD 1 240 per vessel per trip, while for illegal vessels a trip is worth approximately USD 1 100. Illegal boats spend much less time fishing, approximately 4.5 days per trip compared to sail powered vessels which spend about 30 days per trip. While the catch per boat is less for illegal fishers, the daily catch rate is much higher. Many fishers consider the trip worthwhile if they return with a profit of more than IDR 2.5 million (USD 2 500), less than IDR 2.5 million is considered just a success and less than IDR 1.0 million (USD 1 000) is a significant loss and increasing debt.

Demersal finfish fishery

In this fishery, three types of vessel fish illegally in the AFZ:

- Well equipped Chinese Taipei pair trawlers with Indonesian fishing licenses or under a joint venture with an Indonesian company target red snappers and other demersal fish.
- Highly efficient Indonesian longline vessels or "ice boats" which are well equipped, including hydraulic line haulers. They carry ice so that the product is fresh when it lands in the Singapore market. Although the capacity of these vessels is 20t, most detained vessels had caught 3 to 5 t of fish after one week of fishing. Nine boats were apprehended between November 1992 and November 1994.
- Artisanal fishers from Indonesia who use 'low tech' methods. They are the most numerous group and they undertake the longest trips (average of 35 days/trip).

Benefits drivers

The data on illegal vessels in this fishery is uncertain; however, for this study we assume that most vessels fish for a maximum of 7 days in the AFZ before steaming to Singapore to sell their

catches in the fresh fish markets. In this study a price of USD 25/kg for the fish is used based on Erdman and Pet-Sode (1996). Therefore the value of the catch when landed in Singapore is approximately (4 t/trip * 25/kg) USD 100 000.

Legal fishers catch approximately 175 kg per trip; most of this is dried and therefore of much reduced value. Assuming a price of approximately USD 5/kg of dried fish gives approximately USD 1 000. However, rarely is a trip just for fish, other more valuable species such as shark and trepang are included. Nevertheless, the total value is much less for legal fishers compared to illegal. Compared to the artisanal fleet, the illegal fleet of trawler and longline vessels take a relatively small tonnage of the demersal reef fish but in a very short time.

Detection Drivers

Australia has an active air and sea surveillance programme and Wallner and McLoughlin (2000) consider the detection rate to be relatively high (25%). The Indonesians also consider the probability of detection to be high (Fox *et al*. 2002).

Penalty Driver

If the vessel is apprehended, it is escorted to an Australian port and the crew detained until the case is heard in the courts. If the captain and crew are found or plead guilty, the vessel is often confiscated and destroyed, which means further hardship for the captain and crew who are in complex financial/debt arrangements with financiers in Indonesia.

According to Fox *et al.* (2002) a typical shark fishing vessel with its gear including fishing lines, hooks and nets is valued at approximately IDR 18 million (USD 1 800 to 2000). If the boat is a single owner-operator venture then the risk is concentrated in a single vessel and spread among the captain and crew. The owner's ability to generate an income is lost if the boat is confiscated and destroyed. If they are not in debt to finance the purchase of the vessel then their only recourse is to work for another vessel as either captain or crew. Their incomes drop from 30-50% of the profits to 10% or less depending on the number of crew. The debt for the cost of the hooks and other supplies (IDR 5 to 6 million) is spread among the crew. If the owner has borrowed funds to finance the vessel then the loan remains and to repay it they often become a captain or crew for the financier who dictates when and where they fish. An indebted captain is often required to sail more frequently and in riskier weather conditions by the financier to pay off the debt. Access to money lenders is costly: 5% per month compare to the bank rate of 18% per annum (Fox *et al*. 2002).

If the vessel is part of a larger fleet under a single ownership the risk of losing the vessel is spread over the fleet and the risk related to the gear is spread over the captain and crew. The impact of confiscating the vessel is much less for these operations since they can purchase a used replacement vessel at a very low price. Often the profit from two or three trips pays for the cost of the vessel for these large fleets.

Avoidance measures

Illegal vessels use faster boats as well as superior communication and navigation technology than legal sailing craft. Many vessels also use hydraulic lines. Vessel owners also stop off at the last Indonesian port, the island of Rote, to remove the engine from the boat so that they are not apprehended in the MOU Box. Much of the avoidance costs are therefore tied up in the technology. Vessels also avoid staying for long periods in the AFZ, usually spending about 25% of the time that legal vessels spend in the MOU waters. Larger vessels will dash into the AFZ, fish for a short period

before dashing back into Indonesian or international waters. Other larger vessels act as mother ships and anchor just outside of the AFZ, while smaller vessels take the risk of fishing illegally for short periods of time, returning with their illegal catches to the mother ship (Wallner and McLoughlin 2000).

Moral and social drivers

For many Indonesians, the decision to fish illegally in the AFZ (using motorized vessels in the MOU Box or fishing outside of the MOU Box regardless of the vessel type) is based on the relatively abundant marine resources found in the AFZ compared to the severely over-exploited marine ecosystems in Indonesia, and the consequent prospect of good catches. Fox *et al*. (2002) also noted that "they made a conscious decision to fish there, just as their elders and ancestors had done". They felt they had no alternative, as resources in other areas were no longer available. Some fishers also said that if Australians did not utilise the resources then they thought it was not wrong to fish it (Fox *et al.* 2002)[7].

Unless they are caught, for many Indonesians a single trip can provide the same economic return as a year of fishing in Indonesian waters. In relative terms, the economic return is small compared to the fisheries listed in Table 1, but for the Indonesian fishers it is high enough to motivate them into action. For example, at Taka Bone Rate in South Sulawesi many fishers who remain in Indonesia have annual per capita incomes of less than USD 300 (Sawyer 1992). However, many fishers from Taka Bone Rate join on as crew on vessels going to Australia to fish and there they earn substantially more from a single trip. Many of the fishers on these illegal vessels are deeply in debt and desperate to reduce their debt or to provide funds needed to meet social and family obligations. Indonesia lacks a social safety net for its economically disadvantaged, and therefore the need to meet family obligations is high among fishers. For some fishers there is an additional social driver due to the long history of Indonesians fishing in the area and therefore a sense of moral right to fish irrespective of vessel restrictions. Fox *et al*. (2002) interviewed Indonesian fishers and many expressed the view that Australia has accommodated traditional fishers through a MOU, but only if they fish using traditional vessels, which are usually sail-powered and therefore less efficient and more time consuming than motorized vessels.

Discussion

The economic gains from IUU fishing are often significant enough to motivate fishers to engage in these activities. In some cases, for example, the high valued Atlantic tuna fishery where high prices have lead to an increased amount of IUU fishing, ICCAT has estimated that Flag of Convenience (FOC) vessels take 10% of all tuna catches by IUU fishing, which is unaccounted for in stock assessments. Another case, of course, is the Patagonian toothfish fishery discussed above that has been fished down quite severely because of IUU fishing, to the extent that it is now endangered. In this case, the incentive is very high as Chilean seabass sells on the illegal market for approximately USD 24 per kilo (BBC 2003). As the demand for fish in the market increases and effort limits are being placed, there are more incentives to fish illegally (FAO 2000a). As the restrictions on legal fishing become greater, with quotas set, gear regulations enforced, and stock sizes managed, there is an increase in the motivation to participate in IUU fishing. More attention therefore needs to be paid to this problem, as otherwise the current mismanagement of the world's fishery resources because of inaccurate stock assessment will only intensify.

[7] See also Butcher (2002) for a similar story from Thailand.

In the case of Indonesians fishing in Australia's AFZ, the monetary stakes are relatively low. The high level of apprehensions and consequential loss of vessels, gear and catch is not a deterrent. Some fishers have had more than 22 vessels confiscated and destroyed (Fox *et al*. 2002), and yet the number of apprehensions in northern waters continues to increase. The risk of increasing their debt to financiers does not limit owner-operators and labourers from fishing illegally, and the owners of large fleets can spread the risk over the entire fleet. The lack of marine resources in their own waters, combined with few alternative income-generating activities and the returns of fishing relative to the alternatives still make IUU fishing a better choice.

It is also important to take into account the fact that there are many ways in which fishers can bypass regulations to engage in illegal fishing. Fishers can easily underreport catches and discard many low-value fish. They can also engage in transhipment at sea which is difficult to detect (Angel *et al*. 1994). There are some cases where vessels report catches of one species for another in order to avoid quota non-compliance (Angel *et al*. 1994). Some IUU fishing occurs in the high seas, which, due to its large area, is very difficult to monitor and survey (Bours *et al*. 2003). Most of the illegal fishing (breaches against national fisheries statutes) is detected in the EEZ of countries, especially where there is an aggressive surveillance and enforcement programme. However, this does not necessarily reflect the total IUU situation for two reasons:

1. Regional fish bodies have passed relatively few fishing regulations to control who has access to the resources on the high seas. The North Atlantic and the waters managed by ICCAT are the exceptions where quotas and joint regional enforcement or national enforcement initiatives encourage compliance among member states. However, if a non-member country fishes in the high seas contrary to the regulations, as seen in non-ICCAT countries fishing for tuna in the Atlantic, mechanisms for penalizing offenders are limited.

2. Similarly, regulations regarding by-catch and other non-target species caught on the high seas are generally not covered in regional fishing regulations or in required trip reporting and therefore not well captured in many databases.

In the face of these big challenges, monitoring, control and surveillance activities are still very limited in scope in many fishing areas. From 1979-1993, the estimated observer and aerial surveillance coverage of the high seas was 5%, which is not enough to catch all illegal practices. What is more, with vessels that have been caught, operators cover the fine as operational expenses, and simply purchase another vessel and start all over again (Agnew 2000). Since the net profits of each vessel usually exceed the price of the vessel, abandoning that vessel once apprehension occurs is not a major problem for most operators (Agnew 2000). Many vessels use fake operating companies to avoid having to pay fines when caught. The true identity of the vessel is never detected and the company name changes many times (ISOFISH 2000). Surveillance and enforcement on the high seas will be very expensive, making monitoring systems difficult to implement on a regular basis, especially in developing countries (Agnew 2000).

A number of lessons can be drawn from the case studies. First, learning from the Namibian experience, the incidence of IUU fishing in an area can be reduced significantly by sending strong signals from time to time to potential violators that swift action will be taken against them. Second, when NGOs and non-governmental agencies take action in an IUU related case, the probability of being apprehended increases and the significance of moral and social considerations for the fishers can be enhanced, as demonstrated by the Patagonian toothfish case study. NGOs make it a primary objective to publicise the operators or companies engaging in IUU activity. Although the social obligations are non-existent if the fishers are outside their national waters, information about their illegal activities being made public in the vessels' country of origin could provide an incentive to

decrease IUU fishing. Third, the use of vessel monitoring systems is highly effective in tracking vessels, and for the operators themselves is an inexpensive tool. From the surveillance side, the implementation of VMS reduces the amount of surveillance required and therefore more time can be spent on inspections rather than finding the vessel. From the fishers' perspective, VMS increases the probability of being caught, and if they choose to continue to fish illegally, avoidance measures must be increased. IUU fishing therefore becomes less attractive. Lastly, from the Northwest Australian example we learn that measures to deal with IUU fishing when the violators suffer extreme poverty can be very challenging. Under these circumstances fines and other penalties may not act as a disincentive to IUU fishing.

Finally, we can suggest three ways in which this contribution can be extended to make it even more relevant to policy makers and managers. First, the map presented here needs more data to be fed into it. This means that more effort at building the SAUP IUU database is necessary. Second, the improved database can then be used to improve and extend the model calculations presented in Table 12.1. To further enhance the table, more effort at estimating the value of θ for different fisheries is warranted. Lastly, our observation in the last line of the preceding paragraph on how extreme poverty can pose a problem for current measures at reducing IUU fishing demands that this model needs to be extended to make it flexible in tackling IUU fishing.

APPENDIX 12.A. The Formal Model

In this section, we formalize the discussion above into a model. Following on the earlier discussion, we assume that the decision to engage or not to engage in IUU fishing depends on the potential net benefits (*NB*) from illegal fishing moderated by moral and social considerations. Let *NB* be defined in a broad sense by the following function:

$$NB = f(h(A,e,x),\theta(e,A,R),F,m(e),s(e)) \qquad (1)$$

$$\mathrm{NB_h} > 0;\ \mathrm{NB}_\theta < 0;\ \mathrm{NB_F} < 0;\ \mathrm{NB_m} < 0, \text{and } \mathrm{NB_s} < 0.$$

Where *h* is the catch from IUU fishing by a given fisher; *e* stands for IUU fishing inputs; *x* is the biomass of fish available; *A* denotes the level of avoidance activity undertaken by the fisher; the variable *R* is the set of regulations in place; θ is the probability of detection; *F* is the penalty a violator faces when caught; *m* denotes the individual's moral standing, which is assumed to be inversely related to the IUU fishing inputs; and *s* represents the fishers social standing in society. This variable also depends inversely on the degree of IUU fishing undertaken by the fisher.

To be more specific, equation (1) is rewritten as:

$$NB = [ph(A,e,x) - T(e,A)] - \theta(e,A,R,)F - m(e) - s(e) \qquad (2)$$

Where *p* is the unit price of fish caught; $h_x>0$, $h_e>0$; $h_A<0$; *T(e,A)* denotes the total cost of IUU fishing; $\theta_e > 0\ \theta_A < 0$; $\theta_R > 0$. The first and second terms in equation (2) denote the total revenue and total cost of IUU fishing, respectively; $0 \le \theta \le 1$ is the probability of the fisher being caught and convicted if found engaging in IUU fishing. When there is only partially successful regulation and enforcement, the value of θ lies between 0 and 1. *F* denotes the penalty the violator faces if caught, and to obtain the total expected penalty to be paid by violators, the probability of detection is multiplied by *F*.

The optimality conditions [no 3.2]

The objective of the fisher is assumed to be the maximisation of the potential gains from engaging in IUU fishing moderated by moral and social considerations, that is, the maximisation of equation (2).

If the fisher chooses not to engage in IUU fishing, then *NB* as described in equation (2) is zero. And that is the end of the story.

If, on the other hand, the fisher chooses to engage in IUU fishing in a situation where there is close to no regulation, then the fisher faces close to zero probability of being caught, that is, $\theta \approx 0$, implying that θF is also close to zero. In this situation there will be little if any need for undertaking

avoidance activities, *A*, hence *T(e,A)* is reduced to *T(e)* and *h(A,e,x)* reduces to *h(e,x).* The first order condition under no enforcement is therefore simply:

$$ph_e = T_e + m_e + s_e \qquad (3)$$

That is, at the optimum solution, the IUU fisher will choose the level of IUU activity as represented by the decision variable, *e*, such that the marginal revenue from the activity exactly matches the marginal cost of engaging in the activity, which here means the sum of the marginal cost of fishing and the marginal moral and social cost of engaging in IUU fishing. Equation (3) states that it is not enough for the fisher contemplating whether or not to engage in IUU fishing to seek to make the marginal cost of IUU fishing equal to the marginal revenue – the marginal revenue has to be more than the marginal cost to cover the loss of moral and social standing that the fisher suffers as a result of engaging in IUU fishing. In fact, it is possible that for a given fisher, the loss in moral and social standing is high enough to make engaging in IUU fishing not worth it under all possible marginal revenue scenarios. From equation (3) one can conclude that for non-violators, m_e and s_e are high enough for them to outweigh the marginal revenue from IUU fishing under all possible scenarios.

If the fisher undertakes IUU fishing when there is enforcement, that is, when θ>0, F>0 and by implication A>0, the optimality conditions become:

$$ph_e = \theta_e F + T_e + m_e + s_e, \qquad (4)$$

and

$$-\theta_A F = T_A - ph_A \qquad (5)$$

Equation (4) says that in the optimum, the fisher will choose the level of IUU fishing such that marginal revenue is equal to the sum of marginal cost of engaging in IUU fishing, and the potential marginal fine if caught. Equation (5) stipulates that the marginal gain to the fisher from engaging in avoidance activity must be equal to the marginal cost of avoidance plus the marginal loss in revenues from catch due to avoidance activity. In other words, the fisher weighs the risk of being caught and penalized ($\theta_e F$), the risk of losing moral (m_e) and social (s_e) standing in society, against the expected gain (ph_e) from engaging in the activity. Note that in the case of equation (3) the risk of being caught and penalized is not present.

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CHAPTER 13

THE SOCIAL DIMENSION OF IUU FISHING

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Introduction

We all accept that the concept of sustainable development is built on three integral pillars: environmental, economic and social. However, in all the analyses of IUU fishing little consideration is given to the social dimension. The overwhelming concentration is on the environmental impact and on the economic or trade related areas. If the social dimension is addressed, it is generally only to examine the impact of artisanal fishing and food security. While these aspects are important, the failure to address the social aspect has led to a fixation on short-term piecemeal initiatives and a series of sticking plaster type solutions being put forward. Let's be frank — this approach has not solved the problem and is, in our opinion, unlikely to do so. The concentration on issues related to monitoring, control and surveillance may mitigate the problem, but it will not provide a complete solution, which can, in our opinion, only be achieved through the adoption of a holistic approach, which will require addressing the social dimension.

Another limitation is the refusal to look at the interrelationship between merchant shipping and IUU fishing. The vested interests of certain countries and questions of departmental jurisdiction meant that a valuable opportunity to address the issue at the last session of the United Nations Informal Consultative Process on Oceans and the Law of the Sea was lost. Instead of looking at the central problems of lack of flag State control, vessel registration and the issue of a "genuine link" in their totality, attempts were made to seek a separate approach. This is regrettable as the synergies between IUU fishing and the flag of convenience system in merchant shipping mean that such an approach will severely limit the progress that can be made in the area of IUU fishing. The merchant shipping industry is much more regulated than the fishing industry, where many of the key international instruments are poorly ratified or have yet to enter into force. However, despite the comprehensive set of widely ratified international regulations, there are still many problems in the shipping industry. The OECD Maritime Transport Committee has produced a number of documents that may also be relevant to the work on IUU fishing and we would suggest that many of the conclusions are equally applicable. A 2001 *"Report on the Competitive Advantages Obtained by Some Shipowners as a Result of Non-observance of Applicable International Rules and Standards"* showed that there was a positive economic incentive not to comply with international minimum technical standards. A related 2001 study on the *"The Cost to Users of Substandard Shipping"* found that the various costs associated with non-compliance with international standards are borne by numerous parties within the shipping

industry, but not by those who use the services of such ships. A 2003 report on *"Costs Saving from Non-Compliance with International Environmental Regulations in the Maritime Sector"* examines the unfair commercial advantage afforded to sub-standard shipowners who fail to comply with international environmental regulations that apply to their ships.

While these OECD studies may be of indirect relevance in demonstrating the fundamental flaws in the regulatory system in which IUU fishing also operates, the 2003 Report on *"Ownership and Control of Ships"*, which examines mechanisms in both ship registers and corporate instruments that can facilitate the cloaking of beneficial ownership, is of direct relevance, as is the current *"Discussion paper on Ownership and Control of Ships: Options to Improve Transparency"*. These reports apply the disciplines of the Financial Action Task Force and the OECD work on the use of corporate vehicles for illicit purposes and on unfair tax competition to the maritime industry.

The social dimension

There are a wide variety of types of fishing. These range from small-scale artisanal fishers fishing on or near the coasts and returning home each day, to more sophisticated sea-going vessels operating well off the coast, to large factory fleets comprised of a variety of vessels operating for extended periods (including as much as one year) in harsh, distant waters. In distant water fisheries many fishers are employed on vessels registered in countries other than their own and the crew may be of mixed nationality. In order to examine the social dimension, it needs to be understood that many fishers are marginal or casual workers.

The independent International Commission on Shipping (ICONS) 2001 report entitled *"Ships, Slaves and Competition"*, although primarily addressing maritime transport, noted that:

> "Fishing vessels are mostly unregulated and are a particular problem for safety of life, environmental pollution and crew abuse. There was a strong call for more international regulation of fishing vessels, particularly to combat the disregard of safety standards and the abuse of crews." (para 2.18)
>
> "A major problem is the lack of any widely accepted global conventions on safety and personnel requirements for fishing vessels, as well as the lack of enforcement of ILO instruments on labour conditions." (para 2.20)
>
> "The Commission also heard of the frequent recruitment of passport holders as fishing vessel crews and of the sub-standard living and working conditions imposed on those recruited under such circumstances." (para 2.21)

The ILO Decent Work Programme focuses on four strategic objectives to:

- promote and realise fundamental principles and rights at work;
- create greater opportunities for women and men to secure decent employment and income;
- enhance the coverage and effectiveness of social protection for all; and
- strengthen tripartism and social dialogue.

It is self-evident that there is a substantial decent work deficit in the fishing industry and that this is related to the social dimension of IUU fishing. During the proceedings at the International Tribunal for the Law of the Sea in the CAMOUCO case, the Agent for the government of France:

> "mentioned the deplorable conditions of crew members on board the ships that had been arrested, with crew members often ill, badly nourished and living in unhygienic conditions close to slavery." (ITLOS/Press 34).

Occupational safety and health

Fishing is among the most dangerous of all professions and the Conclusions of a 1999 ILO *Tripartite Meeting on Safety and Health in the Fishing Industry* led to fishing being formally designated as an exceptionally hazardous industry. The international instruments that address vessel construction and the training of crews (the 1993 Torremolinos Protocol to the Torremolinos International Convention for the Safety of Fishing Vessels and the 1995 International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F)) have not entered into force. As a result, there are no agreed international minimum standards in force for larger vessels (over 24 metres) that would enable a port State to exercise control over a foreign flagged vessel.

The lack of an internationally agreed regime for the enforcement of international minimum standards by port States over large distant water fishing vessels is in itself a problem. However, this is exacerbated in the case of IUU fishing operations, given that many of the vessels are old and badly maintained. The fact that IUU operations can lead to forfeiture of the vessel means that there are sound economic reasons for using old and unsafe vessels. This has considerable implications for those who serve on such vessels, both in terms of the facilities and amenities that are not available on such vessels, and also in terms of the safety of life at sea.

Employment on IUU vessels

Fishers may be employed through licensed or unlicensed recruitment and placement services or through other methods that are not consistent with the requirements of the law of the State of nationality or residence. For many years the Philippines has been requesting assistance to prevent its nationals from being employed on foreign flagged fishing vessels through informal networks which are outside the control of the Philippine Overseas Employment Administration (POEA). In these cases the fishers fly out of the Philippines on tourist visas and join the fishing vessel at a foreign port. Singapore has for many years been the first port of call.

There are many documented instances of the fisher having to pay a fee for the job, being responsible for the costs of joining the vessels and the costs of repatriation, and having the contract of employment changed when joining the vessel. The employment may be for up to two or three years, with few opportunities to leave the vessel, and with the fishers being required to transfer to another vessel while at sea. The employment of many of these fishers is a form of bonded labour.

In other cases the fishers may be migrant workers or political refugees, whose status prevents them from being able to exercise what rights they may otherwise have had.

Examples of unfair contractual terms

In this section we provide a number of examples of what we consider to be grossly unfair contractual terms. While we suspect that the vessels were engaged in IUU operations, that may not be the case. However, they are illustrative of how the social dimension affects IUU fishing operations.

The following clauses were found in a contract for 2 years which paid USD 250 per month, with no guaranteed leave or rest periods, no additional overtime pay and a no strike clause:

> "I understand fully that due to limited water supply, drinking water is supplied by ration. Therefore, sea water is to be used in bathing, washing clothes and tooth brushing."
>
> "Breakfast, lunch and dinner is provided for free. However, things for personal use is not given free. Snack foods such as bread, biscuit, coffee, milk, sugar, soft drinks, beer, liquor, cigarettes, soap etc. should be shouldered by the fisherman."
>
> "I also understand that the amount of USD 50 will be deducted by my captain to my salary every month. This will serve as my air ticket deposit in case I was not able to finish my contract but this amount should be refunded the moment I finish my contract."

A fisher was paid USD 255 basic salary per month, with no additional payments for any overtime performed, or any additional leave pay, or a share of the catch. The contract stated that the fisher was employed on board for 24 months with no entitlement to shore leave, nor any guaranteed rest periods per day, and was obliged to perform whatever work and whenever it was so decided by the Master. In addition, the employer had the right to terminate the contract at any moment, for whatever reason, with no compensation payment. The fisher was, however, entitled to free repatriation at the end of the contract or if declared unfit for work due to injury and/or illness by a doctor.

We have come across a contract for up to 3 years, where the fishers are to be paid only when on board for a specific season and were not entitled to leave payment. There was a clause providing that if the fisher obtained other employment, the crew manning agent could claim the salary for breach of contract. The agent reserved the right to withhold the last 2 months' salary and only return the money to the fisher if the fisher showed up for the next season. There was nothing in the contract regarding hours of work, rest, holidays, etc. There were a number of other clauses:

> "Every employee is required to cooperate with the company and owners/operators in their efforts to be "innocent owners".
>
> "The Company assures employment for up to three (3) years… If employee accepts employment from a competitor company during said 3 years while company continues to offer employment, the company will claim Employee's pay from that company and the last 2 months (discussed in another clause) will be forfeited."

In another contract the period of employment is 13-15 months, subject to an extension or reduction at the discretion of the fishing master, with the amount of the monthly bonus payable also subject to the fishing master's discretion. There is a clause which provides:

> "The crew must work hard and obey the instructions given by the fishing master or the officers onboard."

Another contract provided that the fisher was entitled to receive a lump sum overtime payment of USD 15 per month. There were no clauses on how many hours the fisher was expected to work, nor any provision concerning rest periods, nor any entitlement to shore leave during the duration of the contract. The amount payable for death or incapacity was left to the discretion of the owner. However, there was a provision which provided that:

> "In case of death of crew, the corpse shall be cremated or shall be disposed of in the place where it occurred."

There was also a provision that if the fisher decided to leave the vessel for whatsoever reason any accumulated salary or fish catch bonuses was forfeited, as was also the case if the fisher began to think about striking to defend his rights.

Examples of abuse of fishers

In this section we provide a number of illustrative examples of gross abuse of fishers. For example, removal of the appendix as a condition of employment for Chinese fishers from Yongchuan County (Sichuan province) employed to work on foreign fishing vessels through a manning agency. In one case the fisher had to pay USD 470 in order to secure a place, then USD 49 for the operation, while wages vary between USD 130 and 180 per month.

There are cases where Philippine fishers had to pay approximately USD 450 each to be hired on 3-year contracts, with no right to enjoy any leave, for USD 200 per month and were expected to work 18 to 22 hours per day.

In some cases the alleged abuses are extreme. A Philippine fisher states:

> "I was chained for thirty days, that is for two periods of fifteen days, in a two square meter storeroom. I was not only chained but also beaten up with a baseball bat."

The reason for this treatment was that the fisher was so tired after working twenty hours per day, with just two hours sleep, that he was no longer able to work. The fisher also comments that:

> "Very often we ache all over. To take a bath or wash our clothes, we use sea water. When we ask for little water to drink, it's more likely to invite more maltreatment."

Another Philippine fisher reports:

> "We often had to sleep with our work clothes and sometimes wet working clothes. …. We were denied medical treatment and medicine… We were only permitted to eat what was left after the *** crew had eaten and were left with half finished cups of coffee to drink and food left over… We were required to massage *** officers and crew on a daily basis after our long hours of work. We were punched, kicked and beaten on the head with closed fists by the *** personnel regularly. The *** crew often grabbed our sensitive parts, applied pressure to the extent that we cry in pain. They also squeezed our necks until we fall to our knees."

Another fisher notes:

> "We were taken by force to work even we were sick. We were denied access to medication and treatment… We were given very little food and water. Most often we drink dirty water, so that some of us constantly suffer from severe stomach ache and diarrhoea. We work 20 to

> 22 hours daily but were only allowed some two-hours night sleep… We were hit like animals every time we commit errors in our work…"

Share system

Traditionally the income of fishers has often been directly linked to the catch and the revenue derived from the sale of the catch. However, we consider that this system leads to unsafe fishing practices and inefficient utilisation of available fish resources. In the context of IUU fishing operations it facilitates cheating the crew, who may be unaware that they are engaged in IUU fishing operations.

We consider that in the long term such "share" systems should be replaced by fixed wage systems that may, as the result of a collective bargaining agreement, possibly be supplemented by bonus systems. There should also be in place a guaranteed minimum wage system that should, in all instances, provide fishers with an income equivalent to that of comparable shore-based workers. Share-based remuneration systems, where they continue to exist, should be fair and transparent, ensure the best possible prices for the catch and enable fishers to verify the basis on which their income is calculated.

Flags of convenience

It is generally accepted that flags of convenience (FOCs) are integral to the problem of IUU fishing, and that the inability of the FOC system to exercise effective control over vessels which fly its flags is central to the problem. The 2003 G8 Action Plan on the Marine Environment and Tanker Safety stresses the need to address the lack of effective flag State control of fishing vessels, in particular those flying flags of convenience. Fishers live and work on the vessel and as international law establishes that a ship has the nationality of the flag it flies it has important ramifications for the crew, with regard to both civil and criminal jurisdiction and for their ability to exercise their human and trade union rights. Article 94 of the United Nations Convention on the Law of the Sea (UNCLOS) sets out the duties of a flag State and requires that the flag State shall effectively exercise jurisdiction and control in administrative, technical, social and labour matters over ships flying its flag. In doing so the flag State is required to conform to generally accepted international regulations, procedures and practices and to take any steps which may be necessary to secure their observance.

The flag State is fundamental to ensuring that fishers enjoy decent work and are not subject to abuse and exploitation. Fishers do not only need protection from violations of international labour standards: all basic human rights and protection from crimes against the person must also be guaranteed on board vessels, even when they are in international waters. In such cases there can be conflicting claims from different States. UNCLOS clearly places the responsibility with the flag State. However, those concerned with the application of international law view FOCs as being likely to undermine the system. The International Law Commission has expressed its concern, stating that:

> "If the ship flew a flag of convenience, the State of registration would have no interest in exercising diplomatic protection should the crew's national Governments fail to do so." (Report of the 54th Session of the United Nations General Assembly).

In view of the fact that only the flag State is entitled to make an application for the prompt release of the vessel and crew under Article 292 of UNCLOS, this is an area of concern.

Transparency of ownership is also important to fishers as this information may be vital if they try to enforce their rights and recover outstanding entitlements. The OECD Maritime Transport Committee Report on *"Ownership and Control of Ships"* (March 2003) states:

> "Open registers [FOCs], which by definition do not have any nationality requirements, are the easiest jurisdictions in which to register vessels that are covered by complex legal and corporate arrangements. The arrangements will almost certainly cover a number of international jurisdictions which would be much more difficult to untangle."

While the OECD report was looking at the issue in terms of maritime security, the conclusions are just as relevant for the use of a vessel for illicit purposes, including IUU fishing. The report notes that a number of FOC registers advertise anonymity as a desirable attribute of their register and states:

> "However, in many instances, such as in the case of a known terrorist wishing to remain hidden, the normal procedure would be to use a multi-layered approach, employing a variety of methods, spread over a number of different jurisdictions. Such corporate arrangements are common in the off-shore sector, and any investigators, be they from taxation authorities, law enforcement agencies, security forces or others will find the cloaking processes almost impenetrable. Like peeling an onion, isolating and removing one layer simply reveals another, and another, and because these cloaking devices are relatively cheap and easy to create, those who have a need or a desire to do so can hide themselves very deeply indeed."

The issue of the 'genuine link' is critical because it ought to mean that a shipowner has some form of substantive presence in the flag State in terms of assets and resources that can be subject to fines and penalties in the event of serious breaches of regulatory standards. The United Nations General Assembly Resolution on Sustainable Fisheries (A/RES/58/14):

> "Invites the International Maritime Organization and other relevant competent international organizations to study, examine and clarify the role of the "genuine link" in relation to the duty of flag States to exercise effective control over ships flying their flag, including fishing vessels." (para 22).

An identical clause is provided in The United Nations General Assembly Resolution on Oceans and the Law of the Sea (A/RES/58/240). This Resolution also:

> "Requests the Secretary-General, in cooperation and consultation with relevant agencies, organizations and programmes of the United Nations system, to prepare and disseminate to States a comprehensive elaboration of the duties and obligations of flag States, including the potential consequences for non-compliance prescribed in the relevant international instruments." (para 29).

Conclusions

It is hoped that this paper has demonstrated the need to address the decent work deficit which exists in the fishing industry and that the social dimension is an integral component of IUU fishing. While the elaboration of a new ILO instrument for the fishing sector is important and merits the support of the OECD, the issue of the social dimension cannot be ignored and needs to be integrated into a holistic approach to the elimination of IUU fishing. In addition there is a pressing need to promote the ratification of the IMO fisheries-specific instruments.

The synergies between FOC operations in the fishing industry and in the maritime sector point to the need for an integrated approach. It is regrettable that the issue of the "genuine link" was referred to the IMO, as it logically belongs to the United Nations Division for Ocean Affairs and the Law of the Sea. It is nevertheless suggested that the OECD and its member economies should support the IMO in elaborating the "genuine link" and that this should later be adopted as an implementing agreement,

which would complement UNCLOS and secure the effective implementation by flag States of their obligations under both UNCLOS and applicable international law.

The work of the United Nations in preparing a comprehensive elaboration of the duties and obligations of flag States could provide a useful additional tool to combat IUU fishing and in addressing the social dimension. The OECD and its member economies should support this work and ensure that, once it is adopted, it is given a suitable status, perhaps as an integral annex to a General Assembly Resolution.

The link between concealment of the beneficial ownership and control of IUU fishing vessels and the link to vessel registration clearly demonstrate the need to support the work on improving the transparency of ownership and control, which is currently underway within the OECD Maritime Transport Committee. It is suggested that the OECD could promote the negotiation of an agreement or policy statement, which member states could apply to companies which own or operate vessels established in or operating from their jurisdiction. This could be extended to non-OECD economies by securing commitments from them, as has been done in the case of the FATF and tax havens. It is essential that information is readily available on the ownership of IUU fishing vessels and who buys their catch. In many cases it will be multinational corporations, which are subject to OECD and other applicable instruments, and many of them will have adopted voluntary codes and initiatives with regard to the social dimension.

CHAPTER 14

INCENTIVES FOR INVESTMENT IN IUU FISHING CAPACITY

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Summary

Considering investments in IUU fishing as "normal" investment decisions, this paper utilises a simple investment model in order to examine the concern that levels of investment in IUU fishing might be driven by a "spillover" of excess capacity from regulated fisheries. The available evidence suggests that this is rather unlikely. If IUU fishing is relatively profitable, as seems to be the case, most of the investment in IUU capacity will occur whether or not "cheap" capacity is available as a result of the subsidised removal of excess capacity from regulated fisheries. It appears that IUU fishing will only be of marginal profitability if costs are significantly increased or revenues significantly reduced as a result of enforcement efforts to deny vessels access to the fishery and/or to lucrative product markets.

Introduction

This paper presents an economic analysis of the fishery investment decision in the context of investments in IUU fishing. The aim is to understand how incentives to invest in IUU fishing may differ from incentives to invest in legal fishing and, in particular, to consider the importance of the cost of *capacity* in such investment decisions. Given the widely acknowledged existence of excess capacity in many regulated fisheries, and the efforts of policy makers to encourage the removal of this excess capacity, we might question whether there is likely to be an associated "spillover" effect on the supply of investments in IUU fishing. The paper attempts to address this issue. To begin with, however, it is useful to review exactly what is meant by IUU fishing and to briefly consider, in economic terms, why it is a problem. It is also necessary at the outset to clarify what we mean by fishing capacity, and then to narrow the focus of the paper in order to facilitate discussion.

IUU means "Illegal, Unreported and Unregulated". The term was first used by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), but is now widely employed, in particular by the UN/FAO. The definition of IUU fishing set out in Paragraph 3 of the 2001 International Plan of Action (IPOA) on IUU fishing (FAO 2001), adopted within the framework of the FAO Code of Conduct for Responsible Fisheries, is included here in Appendix 14.A. It is apparent from this definition that IUU covers a rather wide variety of undesirable fishing operations and

practices, from legitimate operations cheating at the margins (for example, exceeding catch quotas or retaining and landing a proportion of under-sized fish) to entirely illegal operations with no entitlements to take fish in any regulated area. The term "unregulated" also includes vessels fishing in areas subject to international regulation but which are flagged to States not party to the relevant Convention. In addition, the FAO definition covers vessels fishing in areas where no national or international regulations apply, but excludes cases in which the relevant flag State nevertheless fulfils all its obligations under international law.

The reason why IUU fishing is a problem might appear straightforward, although, strictly speaking, the direct impact of IUU fishing is undesirable in economic terms only if it imposes a net social cost. This will certainly be the case if the costs imposed, for example in the form of reduced benefits in the future from exploitation of a depleted fish stock, exceed the current benefits to producers and consumers from IUU fishing (which, it should be appreciated, are very likely to be positive). Almost by definition, however, IUU fishing will impose such costs as a result of stock damage since, as a rule, fishery regulations exist in order to restrict fishing mortality to levels which, if not socially optimal, are at least sustainable. We may then assume that if regulations are not complied with, fishing mortality will be excessive. The main problem with IUU fishing, therefore, whether it takes the form of individual vessels exceeding their legal exploitation limits at the margins or vessels having no legal right to fish at all, is that in most situations fishing mortality is increased to a level which is economically damaging. It is arguable that IUU fishing, according to its broadest definition, is as much of a problem in this regard in many regulated fisheries within EEZs as it is in the high seas fisheries of the Antarctic or the Indian Ocean. IUU fishing may also impose economic costs on society in the form of damage to non-target species, in particular highly "environmentally-valued" species such as seabirds and cetaceans. However, while IUU fishing vessels might be especially guilty of such incidental damage (see, for example, Agnew 2000), the problem is by no means confined to this sector.

The indirect economic impacts of IUU fishing could be at least as serious. The visible presence of vessels fishing illegally may encourage other vessels to violate regulations, since it signals weak enforcement and may undermine the perceived stock-related benefits from regulatory compliance. IUU fishing will also significantly reduce the quality of landings data available for stock assessments and hence severely compromise the ability of managers to set proper exploitation targets.

It should be appreciated that in this paper we are not employing the term "capacity" in a strict economic sense, but rather in the sense in which it is commonly employed by fishery managers and policy makers. In economics, capacity is a short-run measure of unconstrained (and efficiently produced) output from a given (fixed) level of capital stock and a given production technology. There are various alternative precise definitions of capacity but the most straightforward, conceptually, is the short-run potential output which maximises profits, given current input and output prices. Clearly, there can be problems in defining capacity in practice and these will be particularly difficult in the context of the fishery, where there are generally multiple outputs and fluctuating prices, and the unpredictable nature of the resource (not to mention the weather) means that output is stochastic and may often be limited to below potential.[1]

In the arena of fisheries management and policy, "capacity" is generally used to mean both potential output by a fishing vessel (or a fleet of fishing vessels) *and* the amount of physical capital which generates that output. Although this may not be correct, all else being equal, for a given stock of capital, existing technology, current prices, etc., capital and capacity can be considered closely related

[1] For a discussion of the concepts of capacity and capacity utilisation in fisheries see Kirkley and Squires (1999), Kirkley, Morrison Paul and Squires (2002) and Kirkley and Squires (2003).

and therefore interchangeable for most practical purposes. For example, the terms "capacity" and "over-capacity" are often used in relation to desired levels of output such as a TAC to refer to the amount of capital (or fleet size) required to harvest that output at lowest cost. Thus, a situation of over-capacity or excess capacity is one in which the TAC could be harvested efficiently by a smaller fleet, or (perhaps more likely in practice) the existing fleet (efficiently) takes a larger catch than that desired by managers.

Given the very broad definition of IUU fishing adopted by the FAO, we do need to restrict our focus somewhat in this paper. What we are principally interested in here are vessels operating outside of any regulatory regime and, for the most part, outside of EEZs. This includes vessels participating illegally in high seas fisheries which are regulated under international fishery conventions, such as the highly valuable illegal fishery for toothfish in the Southern Ocean (see Agnew 2000). Generally, these vessels are either registered in States not party to the relevant convention or in States which *are* party to the convention but which exercise no meaningful control over vessels flying their flag. Although such vessels are often referred to as "flag of convenience" (FOC) vessels, the CCAMLR uses the term "flag of non-compliance" (FONC) to emphasise that the choice of flag State for IUU fishing vessels is determined, to a great extent, by the lack of regulatory control that will be exercised over them (see Agnew and Barnes 2004). We could also, however, include vessels fishing illegally within the EEZs of States which have few resources available to devote to enforcement. What all these vessels have in common is that they have no right of access to the fishery in question and operate free of any effective regulation. Our focus is therefore on the *absence* of management rather than on the inadequate management of vessels which do enjoy a basic access right. The significance of this is that, in the absence of management, the supply of capacity to the fishery will depend only upon market forces, *i.e.*, the free interplay of demand and supply. A corollary to this assertion is that if we need to be concerned with, say, the supply of capacity to a fishery, then *de facto* we have a situation of management failure (given this, it should be apparent that management failure is not wholly confined to illegal high seas fisheries).

In the next section we set up a simple model for a fishery investment decision and in Section 3 we consider how this might look in the context of investments in IUU fishing. Section 4 then addresses the possible effects of different capacity supply prices on the level of capacity in IUU fishing. A final section presents some concluding comments.

A model for fishery investment

Let us assume that the decision to invest in IUU fishing, as we have more narrowly defined it, is taken as a normal investment decision, *i.e.*, it is based upon the expected net return from the investment over its anticipated life. Thus we assume that the investor neither wants to fish illegally for the sake of it, nor is he deterred to any significant degree by a moral objection against such an activity. In simple terms, given the opportunity to purchase a suitable fishing vessel, the decision to invest in either legal or illegal fishing depends only upon the balance of expected returns against the purchase price. To begin with, we will consider what determines those expected returns in a (legal) fishery and hence what should determine the purchase price of capacity in a perfectly competitive market. In the following section, we can then look at how the investment decision may change in the context of IUU fishing.

The present value (*PV*), evaluated over T years, of the stream of annual profits from an investment in an amount of fishing capacity (or physical capital) K at time $t = 0$ is given by

$$PV = \sum_{t=1}^{T} \rho^t \bar{\pi}_t(K), \quad (1)$$

where a discount factor ρ is defined as

$$\rho \equiv \frac{1}{1+\delta},$$

with δ being the appropriate annual discount rate (assumed constant). The (expected) gross operating profit $\bar{\pi}_t(K)$ in year t = 1,2,...T is given by

$$\bar{\pi}_t(K) \equiv p_t \bar{q}_t(K) - \mathbf{c}_t(K), \quad (2)$$

where $\bar{q}_t(K)$ is the (expected) catch at time t and p_t is the (expected) market price received for that catch.[2] Total operating costs $\mathbf{c}_t(K)$ are assumed to be made up as follows:

$$\mathbf{c}_t(K) \equiv c_t^r(K) + c_t^c(K) + c_t^m(K) + c_t^a(K) + c_t^p(K) \quad (3)$$

where $c_t^r(K)$ are normal running costs (fuel, ice, etc.), $c_t^c(K)$ are crew costs (wages), $c_t^m(K)$ are routine maintenance costs (running repairs to the vessel and its gear, plus the provision and maintenance of safety equipment) and $c_t^a(K)$ are administrative costs (which include costs arising from flag State registration, safety certificates, insurance, etc.). The final category of costs, $c_t^p(K)$, includes the (rental) costs of any fishing permits, such as licences or quota allowances. Of course, in many management regimes marketable permits are not used to allocate fishing rights and the vessel may face a fixed catch or effort limit. In this case $c_t^p(K)$ might be zero but the expected catch $\bar{q}_t(K)$ would be constrained to less than the potential for the vessel.

The *total* expected return (*ER*) from investing in *K* is given by (1) plus the discounted value of the capacity at the end of the period, which we will denote C_T, so that

$$ER = \sum_{t=1}^{T} \rho^t \bar{\pi}_t(K) + \rho^T C_T. \quad (4)$$

If *K* were a truly riskless asset, then in a perfectly competitive asset market at equilibrium we would expect the initial cost (capital value) C_0 of capacity *K* to equal *ER*, its expected return (which would in fact be a *certain* return). If it were greater than this, no-one would invest in the asset, while if it were less than this the demand for the asset by potential investors would push the price up to equal *ER*. Fishing, even when legitimate, is by no means a riskless enterprise, however. If we assume that the discount rate δ applied in the above is equal to the market interest rate *r* for a safe investment (such as a Government bond), then the investor will expect a higher (average) return from investing an

[2] For simplicity, we can think of *K* as defining the size of a given type of fishing vessel, with the expected (average) annual output (catch) *q* assumed to be an increasing function of *K*, i.e., $dq(K)/dK > 0$, so that, on average, a larger vessel will produce a higher annual catch.

amount C_0 in fishing than he would from investing in the safe (riskless) asset. Equivalently, for a given investment in fishing the investor would only be willing to pay an amount *less* than *ER*. One way to model this is to deduct a *risk premium*, *R*, from the expected total return on the fishery investment so that

$$C_0 = \sum_{t=1}^{T} \rho^t \overline{\pi}_t(K) + \rho^T C_T - R, \qquad (5)$$

i.e., the market cost of *K* (here C_0) is less than the cost of a safe investment yielding the same expected return. To be clear, C_0 represents the maximum *willingness to pay* (WTP) of investors for fishing capacity *K*. Investors will not pay more than C_0 for *K*, although they would certainly be prepared to pay less than C_0 if such an offer were made. In a perfect market, however, where there are many potential investors, the equilibrium (market) price for *K* will equal C_0, for the reason previously advanced.

It is apparent from (5) that, all else being equal, higher expected profits $\overline{\pi}_t(K)$ mean that C_0 will be higher. A reduction in C_T, the expected resale value of the vessel (capacity) at time *T*, will lower C_0, as will an increase in the riskiness of the investment and hence an increase in *R*.[3] Note that in a perfect market for capacity, C_0 will *not* be reduced by a reduction in the investment period (*T*); the vessel can always be sold to a new investor. A transfer of ownership does not affect the value of the investment.

For an individual already participating in the fishery, C_0 represents the *opportunity cost* of remaining in the fishery. Assuming an absence of non-pecuniary motivation, C_0 is the minimum amount that would have to be offered to the individual in order to entice him to disinvest, *i.e.*, to exit the fishery. Note that this *includes* any amount received from the disposal of the vessel: indeed, in a perfect market for fishery investments, as we have observed, this would be the entirety of C_0.[4]

Incentives and disincentives for investments in IUU fishing

Having set out a model for investment in fishing, albeit a greatly simplified one, we can now examine how incentives to invest in IUU fishing might differ from incentives to invest in a legal fishery, considering firstly the expected returns from IUU fishing as compared to returns from legal fishing. There are a number of reasons why revenues and operating costs in an IUU fishery are likely to differ from those in a legal fishery (Agnew and Barnes 2004 review the typical modes of operation of IUU vessels). These can be summarised as follows:

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3 The analysis of risk and the behaviour of asset markets is a large topic (see, for example, Varian 1992, Chapter 20, and Hirshleifer and Riley 1992). We can think of *R* as being related to the extent to which higher or lower returns than *ER* are perceived as likely, *i.e.*, to the *variance* of returns. Note that individual investors may differ in their judgement about the riskiness of the investment and also in their attitudes to risk. Hence C_0 may vary across individuals.

4 This follows directly from our expression for C_0: at the time of disinvestment future expected returns and (hence) the risk premium are zero so that $C_0 = \rho^0 C_{T=0} = C_0$.

Revenues. In general, IUU vessels target only the most valuable species (such as toothfish, tuna, squid, etc.). Expected revenues are therefore likely to be high, even if access to legitimate markets is made difficult by port controls or some type of catch certification scheme (Agnew 2000). Efforts to deny IUU vessels access to legitimate markets can be circumvented in various ways, however, including the transhipment of catches at sea to vessels which do have access to such markets. In addition, the absence of management means that there are no constraints on catches other than those imposed by the natural environment (the stock, the weather, etc.).

Running costs. We may assume that variable inputs such as fuel, lube, ice and so on can be accessed, one way or another, at prevailing market prices, even if direct access to normal port facilities may be denied by some countries. The *use* of fuel, however, may be relatively high due to increased steaming time to distant fishing grounds in international waters and also to the need to undertake evasion activities such as seeking refuge in international waters when fishing illegally within an EEZ.

Crew costs. IUU vessels, in common with FOC vessels generally, tend to be crewed cheaply, *i.e.*, using labour from countries where labour costs are low and where there may be few alternative employment possibilities. On the other hand, as observed by Agnew and Barnes (2004), the more senior crew, such as the skipper and engineer, typically from developed countries, may demand rather higher remuneration than they would in a legal fishery due to the risks involved in IUU fishing (in effect, a wage "risk premium") and the relatively longer periods spent at sea.

Maintenance costs. Potentially, maintenance costs could be increased due to prolonged operation in international waters. Expenditure on non-essential items such as safety equipment is likely to be lower, given the less stringent registration requirements of FOC States in which IUU vessels are generally registered. FOC registration may also mean that there are no pollutant emissions targets to be complied with. In short, there may be a lesser incentive to maintain the vessel to a high standard, although it would surely be perverse to allow the vessel to become inefficient to the extent that increased harvesting costs exceeded any savings on maintenance costs.

Administrative costs. Also likely to be lower as a result of FOC State registration are various administrative costs such as registration charges, the costs of safety inspections and certification, vessel insurance costs, as well as indirect employment costs such as national insurance contributions. Expenditure on port berthing and landings dues may also be lower.

Management costs may be taken to be zero.

Although we assume that IUU vessels are free of any effective regulation, they are nevertheless subject to attempts at apprehension and sanction. The expected annual costs to the IUU investor arising from such attempts are simply given by the expected annual frequency of successful apprehension and sanction multiplied by the expected level of penalties incurred, including forfeiture of catches and any bonds imposed for the subsequent release of the vessel. Given that successful enforcement events may be relatively infrequent, however, particularly for IUU vessels fishing predominantly in international waters (where States other than the flag State have no right of arrest under international law) the expected cost to the IUU investor may be more appropriately deducted from C_0 as an additional risk premium, rather than included as an annual operating cost. Even without the risk of capture, the risk premium for an IUU investment may be somewhat higher than in a legal

fishery if, for example, the vessel is less seaworthy because less has been spent on maintenance (or the vessel was in poor condition already) or the skipper is more prepared to take risks with the weather, etc.

Finally, in our "capacity value" equation (5) we have C_T, the (resale) value of the vessel at the end of the investment timescale. Clearly this will depend upon a number of variables, including the initial value of the vessel and how well it is maintained. If the initial investment is in an old vessel in relatively poor condition, C_T may be disregarded entirely so that C_0 depends almost entirely on the expected profits stream.

For fairly obvious reasons, there are no datasets available which would enable us to make a definitive judgement on whether the value of an investment in IUU fishing is higher or lower than the value of an investment in the same quantity and quality of capacity in a similar legal fishery (*i.e.*, a legal fishery for the same or similar species in a comparable area). On the basis of available evidence, however, (again, see Agnew and Barnes 2004) it does appear to be the case that net operating returns in IUU fishing are, if anything, relatively high, and probably comparable (I suggest) to returns in a profitable legal fishery. This is perhaps not surprising, given that IUU vessels, as we have observed, generally target highly valuable species and almost certainly face lower operating costs in a number of respects. Unless enforcement and deterrence efforts are sufficiently successful as to add a very considerable extra risk premium, it is difficult to see how the value of an IUU investment (*i.e.*, the maximum C_0 or WTP) can be very much lower than that of a similar investment in a legal fishery.

Let us assume, for the sake of argument, that expected net operating profits in an IUU fishery are at least as high as they would be in an alternative legal fishery, and that the investment is evaluated over the same timescale. Assume also that the "normal" risks associated with fishing are similar, but that in the IUU fishery there is an "excess" risk premium R_E which stems from the perceived likelihood of one or more costly enforcement events over the investment timescale. Then we can write an expression for the value (the investor's maximum WTP) for a given amount of capacity *K* in an IUU fishery, which we will denote C_0^I, as

$$C_0^I = \sum_{t=1}^{T} \rho^t \overline{\pi}_t(K) + \rho^T C_T^I - R - R_E. \quad (6)$$

Further, assume that in the absence of any intervention by the authorities, the present value of the depreciated capacity at time *T* would be the same whether the capacity is used in legal or illegal fishing. Now we can write

$$C_0^I = \left[\sum_{t=1}^{T} \rho^t \overline{\pi}_t(K) + \rho^T C_T - R \right] - R_E$$

which from (5) is simply

$$C_0^I = C_0^L - R_E, \quad (7)$$

where C_0^L is the value of the same capacity in a legal fishery. Thus the maximum WTP for equivalent capacity in an IUU fishery is given by the WTP for a similar investment in a legal fishery, *less the excess risk premium imposed due to enforcement activities*.

Overcapacity in EEZs and investment in IUU fishing

In many regulated EEZ fisheries, the nature of the past management regime has allowed excess capacity to develop, in the sense referred to in the Introduction. Although, in the short run, the impact of this excess capacity may be an increase in catches above the limits set by managers (given that in most regimes enforcement is considerably less than perfect and the allocation of fishing rights is often highly inflexible), sooner or later we would expect profitability in the fishery to decrease as the stock is depleted (see, for example, Munro and Clark 2003). The problem of excess capacity is exacerbated to the extent that fishing capacity (capital) is *non-malleable* (see Clark, Clarke and Munro 1979).[5] If existing capacity has a low resale value, the opportunity cost of remaining in the fishery is reduced and voluntary disinvestment is less likely to take place in the short run, even if current operating profits are low. This means that government intervention is almost certainly required if a significant immediate reduction in capacity is to be achieved (see Appendix 14.B). As noted earlier, it is often suggested that the subsidised removal of excess capacity in this way from regulated fisheries is responsible for a "spillover" of cheap capacity into IUU fisheries and that this may be a significant driver for IUU fishing (*e.g.*, Bray 2000, p.12, Agnew and Barnes 2004, p.20). This might take the form of redundant vessels being sold to IUU investors at "bargain basement" prices, or once-legal operators moving their vessels into IUU fisheries (in economic terms the effect is the same).[6]

Let us examine this suggestion. Recall that in a perfect market for fishing capacity, the equilibrium cost of capacity will equate the opportunity cost of capacity for incumbents (those who have already invested in the fishery) with the cost of the same capacity to new investors. It follows that if the opportunity cost for incumbents in a regulated fishery is low, this must necessarily be linked to *low* expected returns in alternative uses for that capacity, *i.e.*, use in other fisheries (otherwise, any excess capacity could obviously be sold outwith the fishery at a higher price). This may well be the case for alternative *legal* fisheries, which in general may be taken as operating at full capacity (and "new" fisheries, such as those for previously unexploited species, are relatively few and may require new capacity of a quite different technical specification). However, the existence of investment opportunities in IUU fishing, if profitable, would tend to support rather high vessel resale values. If this does not happen, and if IUU fishing is potentially profitable as we have suggested, it could be because the "supply" of potential investors in IUU fishing is greatly exceeded by the supply of secondhand capacity at any given price.[7] Thus IUU investors represent a "thin" market for capacity and collectively take the price of capacity as given (*i.e.*, the demand for capacity from IUU investors has little or no effect on the resale price of capacity, which is determined exogenously). Another (though not exclusive) explanation could be that there exist barriers to trade in vessels between legal fisheries and IUU investors which result in significant transaction costs.[8]

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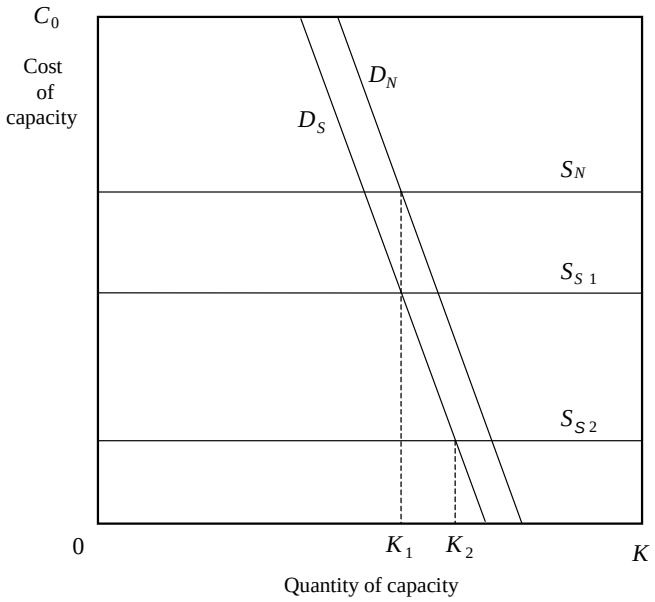
5 Capital is non-malleable if it has few (or no) alternative uses and hence a very low resale value (possibly only the scrap value). The result is that capital is treated as a *sunk cost* and the opportunity cost of remaining in the fishery is therefore significantly lowered, comprising little more than the present value of expected future operating profits.

6 For a simple explanation of the operation of a spillover effect in fisheries see Munro and Clark (2003).

7 It may be that relatively few investors are willing to engage in illegal fishing because of normative beliefs against illegal activity or a high degree of risk aversion.

8 The alternative explanation would be that demand from potential IUU investors *does* determine the resale price of capacity, but that either expected returns in IUU fishing are inherently low, or the risk from enforcement activities

Figure 14.1. The Demand for Capacity in IUU Fishing at Different Supply Prices



Consider the situation depicted in Figure 14.1. Here, the demand for an amount of capacity *K* in IUU fishing at a cost C_0 is indicated by D_N in the case of new capacity and D_S in the case of secondhand capacity. The WTP for secondhand capacity is assumed lower than for new capacity (simply because it is older and less efficient), but in both cases demand over the relevant price range is relatively *price inelastic*, reflecting a generally high WTP for investments in IUU fishing so that low capacity prices are not necessary to attract most of the potential investment. Equivalently, most of the demand for IUU capacity would be satisfied at relatively high capacity prices. Suppose that, to begin with, the supply price for new capacity (*i.e.*, new vessels ordered directly from boatyards) is given by S_N while the price of secondhand capacity (in some unspecified market) is given by S_{S1}. For simplicity, it is assumed that whether new or secondhand capacity is purchased the resulting level of capacity in the IUU fishery is the same at K_1.

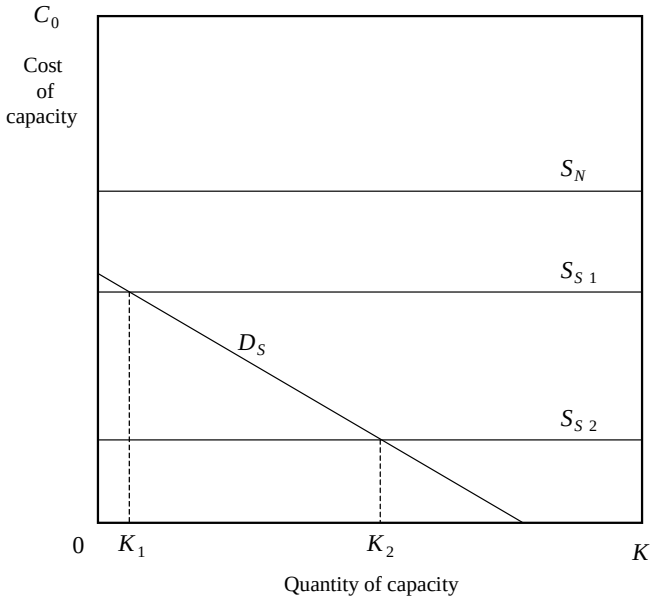
Now let a supply of "cheap" capacity S_{S2} become available as a result of the exit or subsidised removal of excess capacity from a regulated fishery. Although the price of secondhand capacity is now considerably reduced, the total level of capacity in the IUU fishery only increases by a relatively small amount, to K_2. If IUU fishing is highly profitable, as depicted in Figure 14.1., it would be hard to argue that the main driver for the level of IUU capacity is the availability of cheap capacity spilling over from a regulated fishery. Rather, the main effect of the cheap capacity is to deliver a "windfall"

(and hence R_E) is sufficiently high that the WTP for investment in IUU fishing is significantly reduced. We have suggested, however, that this appears not to be the case.

gain to the majority of investors in IUU fishing who would have invested in any case, but at a higher cost.

Now suppose that IUU operations are very marginal, *i.e.* expected returns are sufficiently low that the availability of cheap capacity *is* the main driver for investments in IUU fishing. The situation would now look more like that depicted in Figure 14.2. Little or no new capacity is invested in IUU fishing, while given a "normal" supply of secondhand capacity S_{S1}, only a relatively low level of capacity K_1 enters the IUU fishery. The availability of cheap capacity at S_{S2} now makes a significant difference, increasing the level of IUU fishing capacity from K_1 to K_2.

Figure 14.2. The Demand for IUU Capacity when IUU Operations are Marginal



Clearly, the alternative scenarios depicted in Figures 14.1. and 14.2. are hypothetical, but they serve to illustrate the following proposition. If IUU fishing *is* relatively profitable, then the use of secondhand capacity disposed of cheaply from regulated fisheries is largely opportunistic on the part of IUU investors and cutting off this supply of capacity would merely divert much of the demand to more costly secondhand capacity or even to new capacity.[9] Only if IUU fishing operates at a very low level of profitability would we expect the main driver for IUU investments to be the availability of cheap capacity and should we therefore be particularly concerned about the disposal of excess capacity from regulated fisheries.

[9] According to Agnew and Barnes (2004, p.20) there is evidence that new vessels are being built for the illegal longline fishery for toothfish.

Earlier in this paper it was suggested that it is in the absence of effective management that, in policy terms, we need to be concerned about the market supply of production factors employed in fishing. The implication here is, of course, that IUU fishing is problematic because current enforcement capabilities are inadequate to deter IUU activities. Further, if IUU fishing is relatively profitable, then to make it less profitable requires that enforcement activities are sufficient to impose very significant additional expected costs. In equation (7) we set out the simple rule

$$C_0^I = C_0^L - R_E,$$

which implies that, in order to make the value of an IUU investment significantly lower than the value of an equivalent investment in a legal fishery, we need to raise the value of R_E considerably. Given $C_0^I << C_0^L$, we might then be in a position (as depicted in Figure 2) where the spillover of cheap capacity from regulated fisheries could be an important driver for IUU fishing.[10]

Conclusion

Available evidence suggests that IUU fishing is relatively profitable rather than being of only very marginal profitability. If this is the case, then any spillover of cheap capacity from capacity reduction programmes in regulated fisheries will certainly deliver benefits to IUU operations, but it is unlikely to be the main driver for the level of capacity invested in IUU fishing. However difficult it may be to achieve in practice, the conclusion is that expected returns from IUU fishing must be reduced to the point where investment in capacity for use in IUU fisheries is no longer perceived as profitable. This could be achieved, for example, by a greatly enhanced probability of costly sanctions for engaging in IUU activities, although alternative approaches such as denying IUU vessels access to output markets would, if successful, also reduce the profitability of IUU fishing very considerably. Either approach requires a great deal of enforcement effort, which is costly to society. There is an inevitable trade-off to be made between increasing the social cost of enforcement and reducing the social cost of IUU fishing. As proposed above, it is only if expected returns in IUU fishing are very low that we should be concerned about the spillover of cheap capacity from regulated fisheries and hence the need to prevent resale of decommissioned capacity at low prices.[11]

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[10] As an interesting but extreme case, suppose that there is a very high expectation of vessel confiscation on an annual basis (so that $R_E = \rho^T C_T$ where T = 1 and hence $C_0^I = \rho\bar{\pi}_1(K) - R$). Now capacity is treated as an annual operating cost and clearly we must have $S_S << C_0^L$ if IUU fishing is to remain viable. A not dissimilar argument might apply if the IUU fishery is expected to be very short-lived, so that the entire value of the investment has to be recouped in just a few years' operating profits. This would not be the case, however, where the vessel could subsequently be transferred to a different fishery.

[11] Unfortunately, intervening in markets can often have undesirable as well as desired consequences. The availability of cheap capacity to legitimate and well-managed fisheries in less developed countries, for example, would be considered a good, but would be cut off by any policy to deny such gains to IUU vessels.

APPENDIX 14.A.

Extract from the *International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (FAO 2001).*

3. In this document

3.1 Illegal fishing refers to activities

3.1.1 conducted by national or foreign vessels in waters under the jurisdiction of a State, without the permission of that State, or in contravention of its laws and regulations;

3.1.2 conducted by vessels flying the flag of States that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which the States are bound, or relevant provisions of the applicable international law; or

3.1.3 in violation of national laws or international obligations, including those undertaken by cooperating States to a relevant regional fisheries management organization.

3.2 Unreported fishing refers to fishing activities

3.2.1 which have not been reported, or have been misreported, to the relevant national authority, in contravention of national laws and regulations; or

3.2.2 undertaken in the area of competence of a relevant regional fisheries management organization which have not been reported or have been misreported, in contravention of the reporting procedures of that organization.

3.3 Unregulated fishing refers to fishing activities

3.3.1 in the area of application of a relevant regional fisheries management organization that are conducted by vessels without nationality, or by those flying the flag of a State not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization; or

3.3.2 in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law.

3.4 Notwithstanding paragraph 3.3, certain unregulated fishing may take place in a manner which is not in violation of applicable international law, and may not require the application of measures envisaged under the International Plan of Action (IPOA).

APPENDIX 14.B.

Capacity Adjustment and "Buyback" Schemes

Given the policy decision to reduce the level of capacity in a fishery through intervention, fishing vessels could then simply be decommissioned without compensation. However, natural justice and political realities generally dictate some form of buyback scheme, usually on a voluntary basis. Under most such schemes, fishermen are invited to bid for funds in return for relinquishing the right to fish with their existing vessel. Bids are then selected according to some chosen "value for money" criterion, but this can be problematic. For example, the opportunity cost of remaining in the fishery is lower for the more unprofitable vessels and hence these are more likely to take advantage of a voluntary decommissioning scheme. Since higher levels of fishing mortality are likely to be exerted by the more profitable vessels, however, this poses a problem for managers seeking to reduce overall levels of fishing mortality while at the same time, presumably, wishing to see overall fleet profitability increase rather than decrease (see, for example, Walden, Kirkley and Kitts 2003). More generally, buyback schemes have been criticised for being costly, being relatively ineffective in practice and rarely dealing with the underlying causes of over-capacity (*e.g.*, Hatcher 1999, Holland, Gudmundsson and Gates 1999).

Buyback schemes vary in their rules for the disposal of redundant capacity. Under the EU's Common Fisheries Policy, for example, a series of "Multi-annual Guidance Programmes" (MAGPs) have, for the last twenty years or so, provided for national buyback schemes within a framework of Community rules and funding (see Hatcher 2000). Community rules have allowed vessels for which fishing rights have been relinquished to be disposed of either by scrapping, permanent transfer to a third country or permanent reassignment to non-fishing use, although Member States could determine more restrictive terms of disposal if they wished. In the UK, for instance, decommissioning rules have always required scrapping (see Pascoe, Tingley and Mardle 2002). Recently, however, Community rules have been changed to remove the possibility of transfer to a third country, with effect from January 2005.[12] According to the European Commission's *Explanatory Memorandum* for the proposed amendment to the relevant Regulation, the existing rules "only result in a transfer of Community over-capacity to third countries and do not correspond to a reasonable use of European tax-payers' money".[13]

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12 Council Regulation (EC) No 2369/2002 of 20 December 2002 amending Regulation (EC) No 2792/1999 laying down the detailed rules and arrangements regarding structural assistance in the fisheries sector. *Official Journal of the European Communities*, L358, 31.12.2002, p.49-56.

13 Commission of the European Communities, COM(2002) 187 final, Brussels, 28.5.2002, p.3.

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CHAPTER 15

EFFORTS TO ELIMINATE IUU LARGE-SCALE TUNA LONGLINE VESSELS

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Introduction

Longline fishing is the main method employed by tuna fisheries to produce frozen tuna for sashimi and sushi. It accounts for approximately 60% of Japan's total tuna catch, followed by purse-seine fishery that produces around 20% of Japanese tuna. Larger-sized tuna receive higher per-unit market price for sashimi and sushi, and most of them are captured by longline fishing vessels. Purse-seiners tend to catch smaller-sized tuna and their harvests are mostly used for canned tuna production.

Japan had the largest number of tuna longline vessels in the world, but their number is continually decreasing. In 2000, the total number of pelagic longliners (over 120 gross tons) was 529 vessels, indicating a 32% decline from 773 vessels in 1985, mostly as a result of the national fleet reduction programme implemented following the decision by the FAO. Chinese Taipei, however, has substantially increased the number of its longline vessels, followed by China. The number of flag-of-convenience (FOC) tuna long-line vessels is also considered to have increased during the 1990s.

Large-scale tuna longline vessels (LSTLVs) are highly mobile; they operate in the high seas and EEZs of foreign countries, changing oceans and rarely returning to the flag state, except for Japanese LSTLVs, and their catch is delivered directly from fishing grounds to the Japanese market by carrier vessels. For this reason, control and monitoring by the flag state of their fishing operations, in particular the catch amount, is extremely difficult without co-operation from the marketing country.

Various measures to eliminate IUU LSTLVs have been developed and implemented internationally, including trade-related measures. At the same time, a series of direct consultation meetings on the termination of IUU fishing activities have been held with IUU owners, flag governments and Japan.

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Preliminary estimation of the number of FOC LSTLVs

Since there are no official statistics which directly show the total number of tuna FOC vessels, an attempt has been made in this paper to estimate the number of FOC LSTLVs. Although it is not clear when FOC LSTLVs started, our reports indicate that FOC LSTLVs were first spotted in the Mediterranean Sea in the 1980s. It is believed that the number of FOC LSTLVs in the 1980s was smaller than the figures for the 1990s.

The estimated number of FOC LSTLVs in 1985 was 77, and this had increased to 232 in 2000. The proportion of FOCs in the total LSTLVs is estimated to be around 20% at its peak. Annual changes in the estimated number of LSTLVs are shown in Table 15.1.

Review of market related measures

Measures related to bilateral consultations

Measures to eliminate FOC IUU LSTLVs fishing were first taken by ICCAT in the early to mid-1990s. These measures were designed to focus on flag states but their effectiveness was limited since the vessels changed flags very quickly. Although the flags of FOC LSTLVs vary, almost all owners and operators were Chinese Taipei.

This section describes the history of the evolution of Chinese Taipei FOC/IUU LSTLVs and bilateral consultations between the Japanese side (government and tuna industry) and Chinese Taipei IUU owners, government and other flag governments that have accepted the Chinese Taipei LSTLVs with a history of IUU fishing, in an effort to seek direct solutions. These consultations were held in parallel with the multilateral efforts of tuna RFMOs.

Chinese Taipei - History of Emerging Chinese Taipei FOC LSTLVs

Most of Chinese Taipei's tuna longline fishing vessels were traditionally near-shore fishing vessels landing fresh fish. In the 1980s the number of LSTLVs was around 100 vessels. However, in the late 1980s, as the cost competitiveness of Korea weakened and the Chinese Taipei economy underwent rapid growth, the number of Chinese Taipei LSTLVs producing frozen tuna for sashimi increased drastically, exceeding 300 vessels by the early 1990s. These Chinese Taipei fishing vessels mainly harvested yellow fin and bigeye tunas in the tropical zone of the Indian Ocean.

In a bid to improve this situation, in 1993 the Federation of Japan Tuna Fisheries Co-operative Association and the Chinese Taipei Deep Sea Boat Owners and Exporters Association agreed to limit the annual amount of landing of Chinese Taipei frozen tuna in Japanese markets and, at the same time, agreed to adopt the Export Certification system, under the witness of the fisheries authorities of Japan and Chinese Taipei. Under this system, Chinese Taipei-produced frozen tuna were required to attach an export certificate for each loading, with quantities specified, issued by the Chinese Taipei Deep Sea Tuna Boat Owners and Exporters Association. As Chinese Taipei LSTLVs have no market other than Japan, their catch was fully monitored through the issuance of export certificates. Thus, Chinese Taipei vessel owners were in no way able to misreport their catch. At the same time, this system led to a spectacular improvement in the catch control capability of the Chinese Taipei authorities. However, this export certification system only covered Chinese Taipei-flagged vessels and did not cover other flags, while there was no limitation on the export of LSTLVs flags to foreign countries. Consequently, there was an upsurge in the number of flag-of-convenience (FOC) fishing vessels owned by Chinese Taipei.

Table 15.1. Yearly Changes in the Number of Large-scale Tuna Longline Vessels in the World

Year	Japan	Korea	China	Indonesia	Chinese Taipei	Philippines	FOC	Total	% of FOC
1985	773	156	-	18	(75+)	Unknown	77	1 099+	-
1986	771	167	-	19	(81+)	Unknown	93	1 131+	-
1987	770	189	-	37	(103+)	Unknown	103	1 202+	-
1988	759	199	-	43	(107+)	Unknown	128	1 236+	-
1989	764	196	-	60	(143+)	Unknown	132	1 295+	-
1990	758	203	-	62	(196+)	Unknown	171	1 390+	-
1991	743	194	-	31	497	Unknown	195	1 660	13%
1992	724	185	-	34	522	Unknown	177	1 542	12%
1993	722	174	3	36	681	Unknown	152	1 768	11%
1994	701	184	3	29	693	Unknown	183	1 793	13%
1995	703	201	3	35	699	Unknown	203	1 844	14%
1996	674	200	3	29	705	Unknown	190	1 801	13%
1997	661	202	3	24	714	Unknown	213	1 817	15%
1998	663	209	11	23	601	Unknown	238	1 745	16%
1999	528	202	27	21	600	(21)	248	1 626	18%
2000	529	197	52	28	597	(15)	232	1 635	17%
2001	529	198	98	70(56)	602	(14)	250	1 691	15%
2002	525	192	100	93(79)	612	24(10)	100	(1 557)	6%
2003	517	178	105	14	610	14	30	(1 475)	2%

Notes:
- FOC (1985-2000) and Indonesia (1985-2000) were estimated from import amounts of tuna for sashimi in Japan.
- The numbers for the Philippines and Indonesia in brackets are the number of vessels listed in ICCAT IUU lists.
- FOC (2001-2003) is estimated from numbers of vessels that participated in the Japan-Chinese Taipei Action Plans.
- Total figures after 2002 do not represent the world total.

Source: World Tuna Longline Fishery Conference, August 2003

Even before this arrangement, the Chinese Taipei frequently operated their vessels using the flag of a third country. For example, coastal countries in the Indian Ocean, such as Bangladesh, did not allow Chinese Taipei-flagged vessels to operate in their waters for diplomatic reasons. In some cases, Chinese Taipei fishers obtained FOC vessel registrations from countries such as Panama and Honduras to enable their vessels to operate in these coastal state waters. It was widely known among Chinese Taipei vessel-owners that such operations were profitable to them as they could evade taxation by the Chinese Taipei authorities.

After 1993, through the acquisition of FOC fishing vessels, Chinese Taipei LSTLV operations were practiced rampantly and on a larger scale because Chinese Taipei-flagged longline vessels were subject to the upper limits of the landing amount at Japanese ports. This move was accelerated by the export of secondhand LSTLVs from Japan. During the "bubble economy" era in the late 1980s-early 1990s Japanese fishers built new LSTLVs, and their old vessels were exported as cargo vessels to various countries; these were later obtained by Chinese Taipei fishers who turned these secondhand Japanese LSTLVs into FOC LSTLVs for IUU fishing. Chinese Taipei FOC LSTLVs operations were free from any catch limitations as well as from any tax obligation. Not only newly emerging vessel owners but also traditional vessel owners, who already had many duly-authorised LSTLVs, came to possess many FOC LSTLVs.

Around 1995, a poor harvest occurred in the Indian Ocean, probably due to overfishing, and the Chinese Taipei fishing fleet moved to the Atlantic. As a result, their bigeye catch in the Atlantic increased sharply and, in 1997, ICCAT took measures to restrict the annual Chinese Taipei catch of bigeye tuna to 16 500 MT. Under such conditions, Chinese Taipei vessel owners, who still wanted to increase their production of bigeye tuna in the Atlantic, apparently stepped up FOC operations in the Atlantic.

During the same period, tuna fishing grounds throughout the world experienced poor harvests and concern was loudly expressed about the deterioration of resources. The excessive number of fishing vessels, *i.e.* catch effort, was perceived as an alarming problem. In 1998, the FAO developed an international plan of action (IPOA) on excessive fishing capacity. Notably, the FAO decided in the IPOA that 20-30% reductions in the number of LSTLVs were necessary. Following this decision, Japan scrapped 20% of its LSTLVs between 1998 and 1999. In Japan, there was a growing demand for concerted vessel reduction by Chinese Taipei and the Republic of Korea – both having LSTLVs. At the same time, criticism intensified against Chinese Taipei FOC fishing vessels operating outside the framework of the international management regime.

Consultations on the elimination of FOC/IUU LSTLVs between Japan and Chinese Taipei

Consultations between Japan and Chinese Taipei began in March 1998 and more than 20 consultations were held during a three-year period before the Organization for the Promotion of Responsible Tuna Fisheries (OPRT) was established late in 2000 and specific measures were implemented.

Basic Agreement and Action Plans

A Basic Agreement was reached in the autumn of 1998 between the fisheries authorities of Japan and Chinese Taipei. Consultations continued and the Action Plans were developed in February 1999 in order to implement the Basic Agreement. The major elements of the Action Plans were:

1) Chinese Taipei would aim to reduce the number of their LSTLVs by 10%, from 600.

2) Japan would seek to scrap FOC fishing vessels originating from Japanese secondhand fishing vessels.

3) Chinese Taipei would consider calling back relatively new FOC vessels constructed in Chinese Taipei, to the Chinese Taipei registry.

At that time, it was estimated that there existed 120-130 Chinese Taipei FOC fishing vessels originating from Japanese secondhand vessels and 60-70 newly constructed vessels in Chinese Taipei. However, even after this Basic Agreement, Chinese Taipei FOC vessel owners did not fully recognise this problem, and even continued to construct new FOC LSTLVs.

Negotiations to implement the Action Plans

In February 2001, at long last the Agreement to implement the Action Plans was reached between OPRT and the Chinese Taipei FOC vessel owners. The following programmes were agreed:

1) *Scrapping programme*: Japan would purchase and scrap the FOC fishing vessels originating from Japan under a three-year programme, 2001-2003.

2) *Re-registration programme*: Chinese Taipei owners of FOC fishing vessels constructed in Chinese Taipei would purchase Chinese Taipei fishing licenses and re-register them under the Chinese Taipei registry under a five-year programme, 2001-2005.

A major change during this period was the establishment of the Kaohsiung Foreign Registered Fishing Vessel Association (KFRFVA) – an organisation set up by the owners of FOC/IUU LSTLVs to protect their interests. Through the establishment of this organisation, the real owners of FOC fishing vessels made their appearance, creating a situation where substantial talks became possible. It also became evident that the KFRFVA included many members of other Chinese Taipei tuna organisations, composed of duly licensed LSTLV owners.

KFRFVA joined the Chinese Taipei side in the Japan-Chinese Taipei consultations that took place several times in 1999, during which negotiations were held regarding the purchase price and purchase methods of FOC vessels, as well as a way to incorporate vessels into Chinese Taipei registration.

Scrapping programme

Negotiations over the purchase price and the method of procurement of funds required for purchase were particularly difficult. Conflicting interests between Japanese and Chinese Taipei duly licensed longline fishers and FOC fishers also required repeated negotiations to reach a compromise. In the final stage, it was agreed that the Japanese Government would provide the initial funds required to purchase vessels for scrapping, and that funds would be reimbursed over a long period from contributions made by Japanese and Chinese Taipei longline fishers who would continue fishing operations.

KFRFVA called on its members to participate in the scrapping programme, and owners of a total of 62 FOC LSTLVs – or half of the estimated FOC vessels originating from Japanese secondhand LSTLVs – supported this proposal. The scrapping programme began in 2001, with an initial target of 62 vessels. In fact, scrapping contracts were made for 44 vessels in that year and, by the end of 2003, a total of 43 LSTLVs were disposed of (of which 39 were scrapped and 4 sank accidentally).

Establishment of OPRT

In taking account of the long-term nature of the reimbursement of the fund as well as ensuring that efforts were not just limited to the short-term goal of scrapping fishing vessels, a consensus was formed among fishing industries and fisheries authorities in both Japan and Chinese Taipei for the establishment of a framework to *i)* cope with tuna conservation and management on a long-term basis, *ii)* contribute to the sustainable development of both Japanese and Chinese Taipei longline fisheries, and more broadly, *iii)* contribute to the conservation of tuna at large that extensively migrate throughout the world's oceans. The outcome of this consensus was the establishment of the Organization for the Promotion of Responsible Tuna Fisheries (OPRT). The significance of this organization will be discussed in the section "Measures by private initiatives" below.

Re-registration programme

An additional complicated issue was how to bring FOC vessels back under Chinese Taipei registration. Although many FOC owners were also the owners of duly licensed LSTLVs, the magnitude of their involvement in the FOC operations varied substantially. Chinese Taipei duly licensed LSTLV owners feared that their interest would be impaired substantially by the return of FOC vessels to Chinese Taipei. For example, the per-vessel share of Chinese Taipei ICCAT bigeye quota (16 500 MT) would be reduced or the value of the licence would be lessened. They demanded stringent conditions for bringing the vessels' registry to Chinese Taipei. The owners of FOC vessels, on the other hand, naturally wanted to have their vessels returned to Chinese Taipei at a minimum cost. Such adjustments of interest within Chinese Taipei took more than two years of negotiations. In 2001, the legal system for returning the FOC vessels to Chinese Taipei registration was established. The initial target for Chinese Taipei registration was 67 vessels (of which 2 sank accidentally). As of the end of March 2004, a total of 48 FOC LSTLVs had returned to Chinese Taipei.

LSTLVs shifted to other countries

In parallel with Japan-Chinese Taipei consultations, ICCAT adopted a series of measures against IUU LSTLVs. In 1998, ICCAT adopted the IUU Action Plan that enabled ICCAT to apply trade measures against countries that continued to allow IUU fishing operations to take place. In 1999, ICCAT adopted a resolution to require Contracting Parties to urge its nationals not to associate with IUU activities, including the non-purchase of IUU-caught tuna. In 2000, based on the 1998 Action Plan, ICCAT adopted trade sanctions on bigeye tuna against Belize, Cambodia, Equatorial Guinea, Honduras and St. Vincent & Grenadine.

Measures decided by ICCAT at each annual meeting usually take more than three years before actually being enforced and during this period the owners of FOC fishing vessels looked for other recipient countries and changed their registration. Consequently, the expected effectiveness of IUU counter measures was difficult to enact in a timely manner.

Philippines

The Philippines was targeted as the first destination of such evasion. From 1998, more than 40 FOC LSTLVs were abruptly transferred to the Philippines, by being chartered by Philippine companies (registration was transferred to the Philippines). Consultations were held between the Japanese and the Philippine governments from 1999, and the number of charter LSTLVs decreased to 16 before the 2000 ICCAT annual meeting. Before the end of 2001, all the charter contracts were terminated. At present, only 14 LSTLVs are owned and operated by Philippine companies.

China

The next destination of FOC fishing vessels was China. The number of Chinese LSTLVs was estimated at around 10 in the late 1990s, increasing to over 40 in the first half of 2000, before rising to 60 before the end of the same year. By the end of 2001, it had reached almost 100. Japan and China held a series of consultations over the rapid expansion of the Chinese fishing fleet.

In the case of China, a unique characteristic was that China supplied crew to FOC LSTLVs. Chinese Taipei LSTLVs have employed Chinese seamen for many years because of rising wages and crew shortages in Chinese Taipei. It was said that most of the crew, except for the fishing master, were Chinese. Therefore, unlike other flag-of-convenience countries, China not only made its vessel registration available to Chinese Taipei FOC LSTLVs, but also took them over and easily incorporated them into their own fisheries. Owing to close relations between Chinese LSTLVs and Chinese Taipei vessel owners, Chinese LSTLVs have sometimes operated jointly with Chinese Taipei LSTLVs and FOC LSTLVs, and have acquired operational know-how without much difficulty. However, as a result of Japan-China consultations, China has declared that it would terminate relations between its LSTLVs and IUU fishermen.

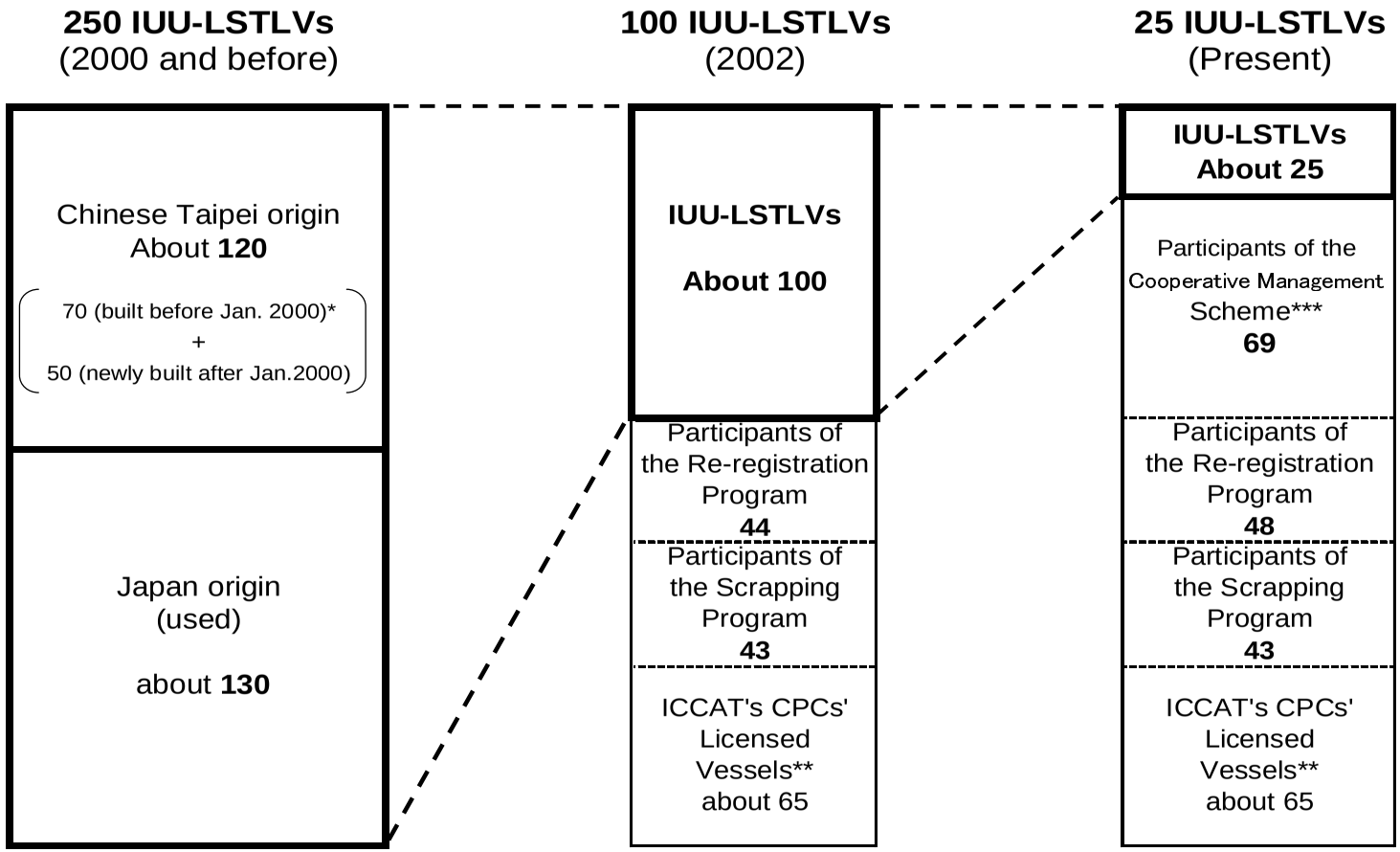
Indonesia

The third destination of FOC LSTLVs was Indonesia. Since 2000, a large number of LSTLVs suddenly appeared under Indonesian registration, exceeding 60 vessels in 2001. This prompted Japan to hold several tuna consultations with Indonesia. As a result, only 13 LSTLVs were identified as being actually owned and operated by genuine Indonesian companies. Indonesia de-registered the rest of the LSTLVs.

Seychelles and Vanuatu

Despite extensive consultations as described above, in 2002 there still remained around 100 FOC-LSTLVs. Seventy per cent of those were new, leaving no room for re-registration to Chinese Taipei. Further consultations continued, leading to a new programme to expeditiously dispose of these LSTLVs in accordance with the 2001 ICCAT resolution concerning “More Effective Measures to Prevent Deter and Eliminate IUU Fishing by Tuna Longline Vessels”. Japan talked with Vanuatu and Seychelles, the major flag states of the remaining Chinese Taipei FOC/IUU LSTLVs, and reached an agreement with them to bring these LSTLVs under strict control. A total of 69 FOC-LSTLVs committed themselves to comply with the following co-operative management schemes:

Figure 15.1. Transition of the Numbers of IUU Large-scale Tuna Longline Vessels (IUU-LSTLVs)



Notes

* Japan-Chinese Taipei Joint Action Program to Eliminate IUU Vesels concluded in January 2000.

** CPCs means "Contracting Parties" and "Cooperative non-Contracting Parties, Entities or Fishing Entites".

*** Cooperative Management Schemes between Japan and Seychelles/Vanuatu were agreed in July 2003

i) Arrangements for the legalisation of FOC-LSTLVs were established between the fishing authorities of the two flag states (Vanuatu and the Seychelles) and Japan, and vessels participating in the scheme must be subject to strict joint monitoring and control measures.

ii) All of the participating LSTLV owners must obtain Japan's fishing licences for LSTLVs and freeze those licences so as to reinforce and complement the co-operative management scheme mentioned in point i) above, as well as to prevent an increase of overall fishing capacity.

iii) Those LSTLVs are authorised to fish only in an area where, and for species for which, their fishing operations will not pose a problem, in light of regulatory measures and resolutions adopted by the relevant RFMOs. Specifically, 21 Seychelles-flagged LSTLVs may catch yellowfin and bigeye tuna in the Indian Ocean only, whereas 48 Vanuatu flag LSTLVs may fish for albacore in the Pacific Ocean (within which 4 Vanuatu-flagged LSTLVs are also exceptionally allowed to target yellowfin and bigeye tuna in the Pacific).

Despite the above efforts, approximately 25 old FOC-LSTLVs are believed to remain (Figure 15.1.). But many of them may have stopped fishing because of their age or have been transformed into other types of vessels such as squid jigging vessels and transhipping vessels. Thus, it can be presumed that the number of remaining FOC-LSTLVs is, in fact, very small at present.

Measures related to RFMOs

Introduction of Statistical Document Programmes

i) International Commission for the Conservation of Atlantic Tuna (ICCAT)

In the early 1990s, Japan compiled and analysed its trade statistics and the estimated number of FOC LSTLVs operating in the Atlantic and presented the data to the ICCAT. Japan found that its trade statistics did not contain important information required for fisheries management, such as area of catch, vessel name and flag country. This finding led to the adoption of the ICCAT Bluefin tuna Statistical Document Programme.

Initially, ICCAT did not take prompt action to combat the FOC/IUU problem, with no effective measures being implemented in the late 1980s or early 1990s. However, ICCAT measures were accelerated as moves to regulate international trade in bluefin tuna emerged under the Convention for the International Trade in Endangered Species of Wild Fauna and Flora (CITES) from 1991 to 1992 – the year CITES held its Conference in Kyoto, Japan. Sweden presented a proposal to list the western Atlantic bluefin tuna stock in CITES, Appendix I, and eastern Atlantic bluefin tuna stock in Appendix II, on the grounds that the deterioration of bluefin tuna could not be prevented, due to inadequate management by ICCAT. Although the proposal was withdrawn as a result of consultations among the countries concerned, CITES urged ICCAT to reduce quotas and take effective counter-measures *vis-à-vis* non-member states.

ICCAT then took measures against non-member states. First, it introduced the Bluefin Tuna Statistical Document Programme (BTSD Programme) in 1992. This system is designed to collect the information needed for fisheries management through international trade. Flag states are required to validate the area of catch and amount of bluefin tuna for export. The system was designed to identify flag states that accepted FOC/IUU LSTLVs.

Second, in order to restrict the export of bluefin tuna by non-Contracting Parties – which had seriously diminished the effectiveness of ICCAT conservation and management measures by accepting FOC/IUU fishing vessels – the ICCAT Bluefin Tuna Action Plan (BTAP) was then adopted in 1994. Under BTAP, the ICCAT identifies non-Contracting Parties whose vessels have been fishing for Atlantic bluefin tuna in a manner which diminishes the effectiveness of the ICCAT bluefin conservation and management measures, and requests such countries to rectify their fishing activities so as not to diminish the effectiveness of the measures. If those identified non-Contracting parties do not rectify their fishing activities in the following year, ICCAT recommends Contracting Parties to take non-discriminatory trade restrictive measures which virtually prohibit the imports of bluefin tuna from those non-Contracting Parties. According to the 1994 BTAP, ICCAT adopted measures to prohibit the import of Atlantic bluefin tuna from Panama, Honduras and Belize. In 1998, this plan was reinforced to cover all tuna and tuna-like species, under which both Contracting Parties and non-Contracting Parties whose LSTLVS have been fishing tuna and tuna-like species in a manner which diminishes the effectiveness of the ICCAT conservation and management measures are identified and treated in the same manner as under the BTAP.

Third, in order to supplement this measure by controlling the re-export of bluefin tuna to the Contracting Party *via* a third country, the Bluefin Tuna Re-export Certificate was developed in 1997. Finally, in the same way, similar Statistical Document Programmes for export and re-export of bigeye tuna (with the exemption of catches caught by purse seiners and pole and line vessels destined principally for canneries in the Convention area) and swordfish were adopted in 2001.

Since bigeye tuna is the most important species for LSTLVs in terms of financial gain, the expansion of the Statistical Document Programme to bigeye tuna has had a substantial impact on IUU LSTLVs.

ii) Indian Ocean Tuna Commission (IOTC)

In 2001, in order to cope with the problems of IUU fishing by large-scale tuna fishing vessels in the Indian Ocean, a similar Statistical Document Programme for export and re-export of bigeye tuna was adopted.

iii) Inter-American Tropical Tuna Commission (IATTC)

In 2003, in order to address the problem of IUU fishing in the Convention area, a similar Statistical Document Programme for export and re-export of bigeye tuna was adopted.

iv) Commission for the Conservation of Southern Bluefin Tuna (CCSBT)

In 1999, in order to have a better estimation of southern bluefin tuna caught by both Contracting Parties and non-Contracting Parties, and to properly control fishing activities by vessels of non-Contracting Parties, a Statistical Document Programme for export and re-export was adopted.

v) Western and Central Pacific Fisheries Convention (WCPFC)

In April 2004, the WCPFC Preparatory Conference will discuss a similar Statistical Document Programme.

Table 15.2: Sample of IUU Large-Scale Tuna Longline Vessel List

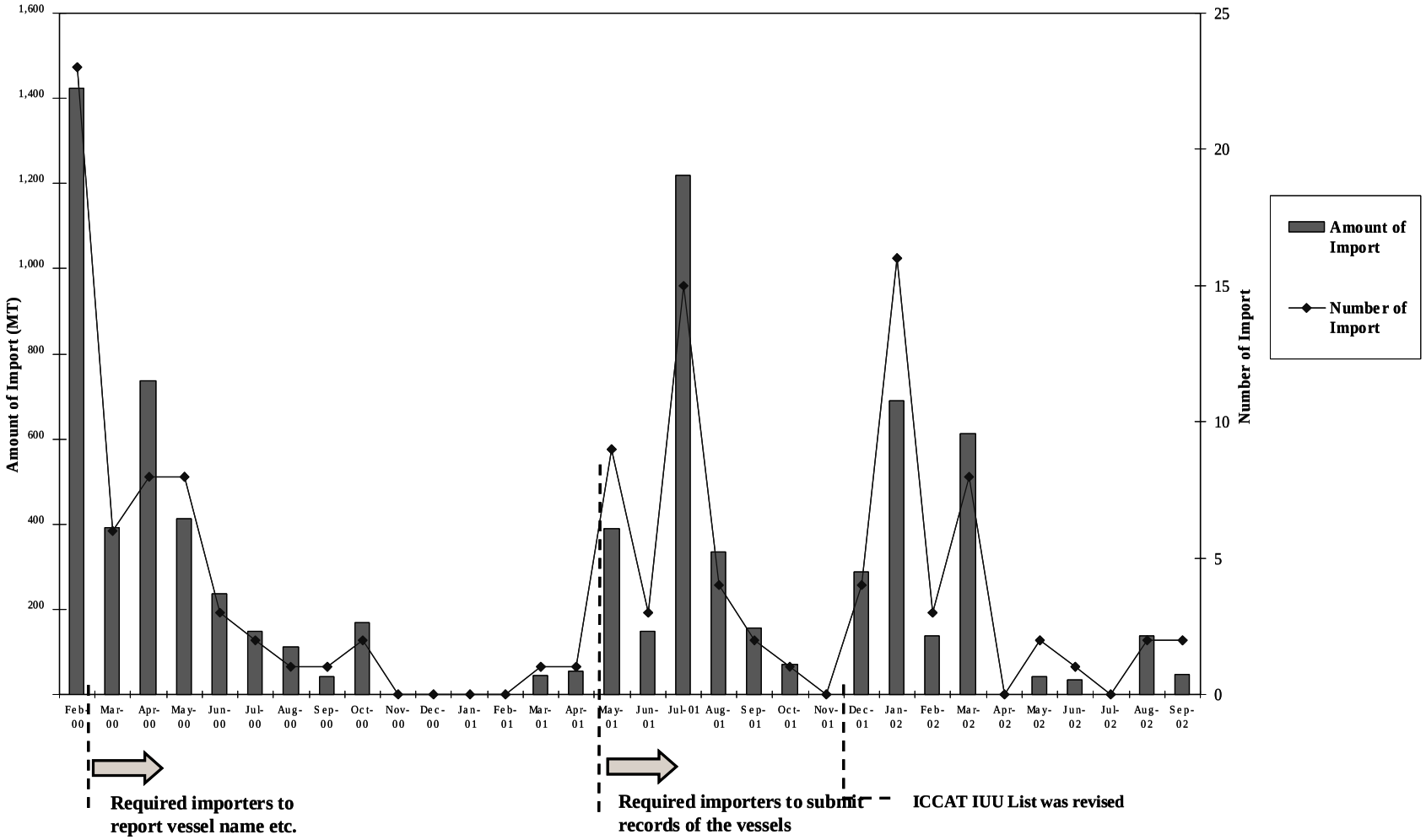
	Flag country	Name of Vessel	Owner's Name	Owner's Address	Expected Area of Catch
89	E. Guinea	Chen Chieh No. 726	Chen Chin Cheng Fishery Co. Ltd. S.A.	E. Guinea	Atlantic
90	E. Guinea	Chen Chieh No. 736	Chen Chin Cheng Fishery Co. Ltd. S.A.	E. Guinea	Atlantic
91	E. Guinea	Chen Chieh No. 8			Indian
92	E. Guinea	Chi Man	Chi Man Fishery S.A.		Atlantic
93	E. Guinea	Chia Ying No. 6	Pesquera Happy Sun S.A.	E. Guinea	Atlantic and Indian
94	E. Guinea	Columbus	Pesquera Columbus S.A.	E. Guinea	Pacific
95	E. Guinea	Dong Yih No. 688	Dong Yih Fishery S.A.	E. Guinea	Indian
96	E. Guinea	Ever Rich	Lin Ching Isang	E. Guinea	Pacific
97	E. Guinea	Exito	Pesquera Exito S.A.	E. Guinea	Indian
98	E. Guinea	Fortuna No. 1	Naviera Fortuna S. de R.I.		Atlantic and Indian
99	E. Guinea	Hai Ming No. 1	Hai Ming Fishery S.A.	E. Guinea	Pacific and Indian
100	E. Guinea	Hai Zean No. 11	Hai Zean Fishery S. de R.I.	E. Guinea	Atlantic
101	E. Guinea	Hai Zean No. 3	Hai Zean Fishery S. de R.I.	E. Guinea	Àtlantic
102	E. Guinea	Hai Zean No. 31	Pesquera Hung Lin S.A.	E. Guinea	Atlantic
103	E. Guinea	Hsiang Jang No. 11	Atlantic Fishery S.A.	E. Guinea	Atlantic
104	E. Guinea	Hsiang Jang No. 111	Kwo Jeng Productos Marinos S.A.	E. Guinea	Atlantic
105	E. Guinea	Hsiang Jang No. 112	Kwo Jeng Productos Marinos S.A.	E. Guinea	Atlantic
107	E. Guinea	Hsiang Jang No. 66	Atlantic Fishery S.A.	E. Guinea	Atlantic
108	E. Guinea	Hsin Hua No. 103	Pesquera Hsin Hua Fishery Co. Ltd.	E. Guinea	Indian
109	E. Guinea	Hung Yu No. 212	Pesquera Columbus S.A.	E. Guinea	Indian
110	E. Guinea	Hung Yu No. 606	Hung Yu Fishery Co. Ltd.	Korea	Indian
111	E. Guinea	Hwa Mao No. 202	Hwa Mao Fishery Co. S.A.	E. Guinea	Indian
112	E. Guinea	I Man Hung No. 166	Chun Far Fishery S.A.	E. Guinea	Atlantic
113	E. Guinea	Jin Cheng Horng	Navierage Ko Yuan Fishery S.A.	E. Guinea	Atlantic and Indian
114	E. Guinea	Jiyn Horng No. 116	Jiyn Horng Ocean Enterprise Co. Ltd.	Honduras	Indian
115	E. Guinea	Jiyn Horng No. 116	Jiyn Yeong Fishery S.A.	E. Guinea	Indian
116	E. Guinea	Kae S.A.	Chin Ching Fishery Co. Ltd.	E. Guinea	Atlantic
117	E. Guinea	Kae Shyuan	Chin Man Fishery Co. Ltd.	E. Guinea	Atlantic
118	E. Guinea	Kuang Horng	Chuen Song Fishery S. de R.L.	E. Guinea	Atlantic and Indian

Table 15.2: Sample of IUU Large-Scale Tuna Longline Vessel List (cont.)

	Flag country	Name of Vessel	Owner's Name	Owner's Address	Expected Area of Catch
119	E. Guinea	Lung Soon No. 212	Exito Fishery S.A.	E. Guinea	Pacific and Indian
120	E. Guinea	Lung Soon No. 282	Exito Fishery S.A.	E. Guinea	Pacific
121	E. Guinea	Lung Soon No. 662	Exito Fishery S.A.	E. Guinea	Indian
122	E. Guinea	Pesquera No. 68	Choyu Fishery S.A.	E. Guinea	Atlantic
123	E. Guinea	Shang Shun No. 622	Exito Fishery S.A.	E. Guinea	Pacific
124	E. Guinea	Shin Kai No. 6	Shin Kai Fishery S.A.	E. Guinea	Pacific
125	E. Guinea	Shing yang	Chien Chong Hsin	E. Guinea	Atlantic
126	E. Guinea	Shung Ying	Chen Chong Hsin	E. Guinea	Atlantic
127	E. Guinea	Sun Rise No. 313	Singarope Corp.	E. Guinea	Atlantic and Indian
128	E. Guinea	Viking No. 1	Viking Fishery S.A.	E. Guinea	Atlantic and Pacific
129	E. Guinea	Wei Ching	Wei Ching Ocean Enterprise S.A.	E. Guinea	Atlantic and Indian

Source: ICCAT Report, 1998-99, (II).

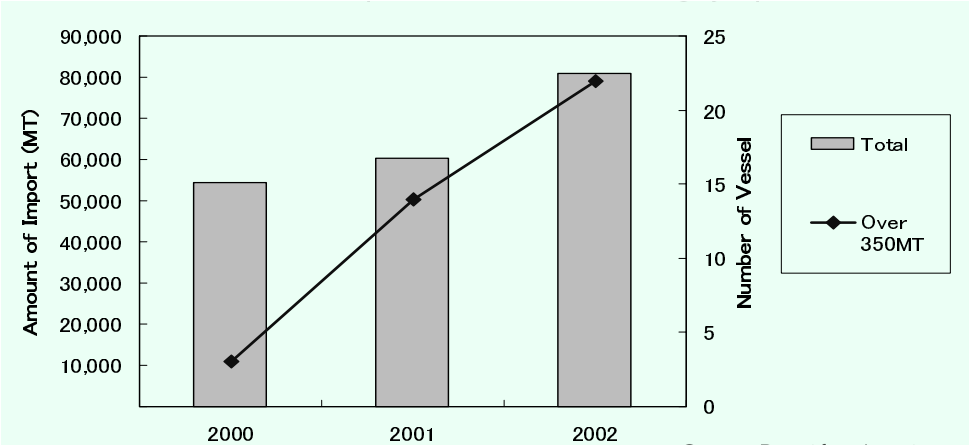
Figure 15.2. Tunas Imported to Japan Against the Non-Purchase Guidance



Source: Report from Importers.

Figure 15.3. One Implication of Tuna Laundering

Amount of Japanese Bigeye Tuna Imported from Chinese Taipei and Number of Vessels exported over 350 MT Bigeye per Year



Source: Report from Importers.

Mandatory data requirement of history of LSTLVs

Although the ICCAT adopted trade sanction measures against FOC/IUU flag states, vessels simply changed flags to evade sanctions. Japan compiled a list of LSTLVs believed to be engaged in IUU fishing activities and distributed it to the ICCAT and the IOTC (Table 15.2).

In 1999, a resolution was adopted for the ICCAT Contracting Parties to urge their general public, importers, transporters and other business people concerned to refrain from purchasing, trading and transhipping tuna caught by such IUU vessels.

Soon after this resolution was adopted, IUU LSTLVs started changing their names. Japan required importers to submit information on previous vessel names and owner names to detect the relation between IUU owners and current owners. Since this mandatory requirement was introduced, the import of IUU LSTLV caught tuna disappeared (Figure 15.1.). Instead, imports from Chinese Taipei and China increased substantially. In particular, many of these duly authorised LSTLVs doubled their annual catches despite very poor fishing conditions (Figure 15.2.). This phenomenon strongly suggested a possible at sea transfer of tuna from IUU vessels to duly authoried vessels, so-called "tuna laundering" and also pointed to limitations of the effectiveness of measures based on negative listings of vessels. Japan requested that China and Chinese Taipei investigate these incidents. As a result, the unusual record of catch per vessel disappeared. This phenomenon acted as a trigger to establish a positive listing scheme for vessels.

Adoption of Positive Listing scheme for Fishing Vessels

i) ICCAT

Taking into account the high mobility of LSTLVs, in 2000 a resolution was adopted to urge Contracting Parties to submit a list of large-scale fishing vessels (LSFVs larger than 24 metres in overall length), licensed to fish tuna and tuna-like species in the Convention area.

In order to identify tuna and tuna-like species caught by duly authorised fishing vessels and to prevent those caught by IUU fishing vessels from entering the international market, in 2002 ICCAT agreed to establish a list of duly authorised LSFVs, *i.e.* a Positive List. In addition, in order to avoid any adverse effects on tuna resources in other oceans as a result of the establishment of the ICCAT Positive List and the subsequent transfer of vessels to other oceans, requests were made to other RFMOs to establish similar records in a timely manner.

ii) IOTC and IATTC

In 2002, taking into account the ICCAT decision on the establishment of a Positive List, and the consequent shift of LSFVs from the Atlantic, and responding to the request by ICCAT to establish similar records of duly authorised LSFVs, both IOTC and IATTC agreed to establish Positive Lists.

iii) Western and Central Pacific Fisheries Convention (WCPFC)

In 2002, the third WCPFC Preparatory Conference, concerned with the potential redeployment of IUU fishing vessels from other regions, adopted a resolution urging all States and entities concerned to promote co-operation in exchanging information on IUU fishing activities. The WCPFC Preparatory Conference was scheduled to discuss a positive listing scheme in April 2004.

iv) Implementation of the positive listing scheme

In November 2003, Japan implemented a new trade monitoring and controlling system, based on the ICCAT, IOTC and IATTC Positive Listing Schemes on a global scale. Only tuna products caught by the LSTLVs listed in the Positive Lists are allowed to enter the Japanese market. All other members of these RFMOs have a legal obligation to implement the same measure.

However, about 25 LSTLVs still remain. In addition, several hundred FOC/IUU tuna longline vessels, just under 24 metres, *i.e.* 23.9 metres and less, are actively in operation. They shifted target species from bigeye to albacore or shark. The major market for albacore is the USA and for sharks Latin American countries. The FOC/IUU tuna longline vessel owners continue to operate, while Japan cannot detect their activities through its market. They may still continue to practice tuna laundering and the use of forged documents for export to the Japanese market, and it becomes harder to detect such illegal activities.

Measures by private initiatives

The Organization for the Promotion of Responsible Tuna Fisheries (OPRT) was established in December 2000. Its members come not only from fisheries, traders and consumer's organisations in Japan, but also from tuna longline fisheries industry organisations in China, Ecuador, Indonesia, the Philippines and Chinese Taipei. It covers more than 95% of duly licensed LSTLVs in the world, given the fact that Japan is the only country with a sashimi market. The OPRT's objective is to contribute actively, through the Japanese market, to the promotion of conservation and sustainable utilisation of tuna resources throughout the world.

An important role of the OPRT is to compile information on tuna landed in Japan by LSTLVs from member flags and provide such information to flag state authorities as well as to relevant international organisations. The OPRT feeds back landing information to any flag state that seriously wishes to implement fisheries management. The OPRT is also working on the development of a list of LSTLVs of countries complying with resource management.

Emergence of another problem

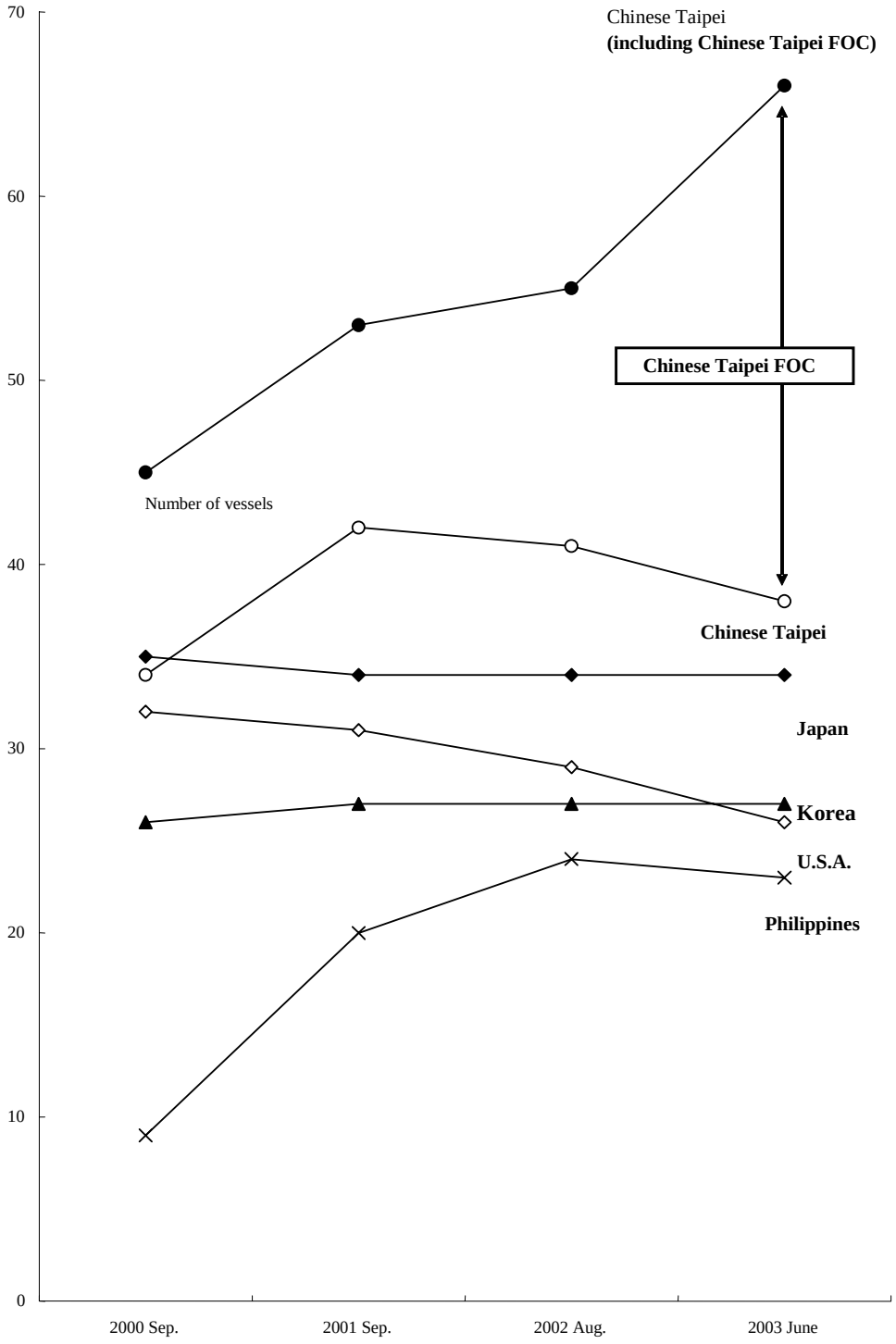
The success of the foregoing efforts can probably be attributed to the simple nature of the market for LSTLV-caught tuna; Japan is the sole outstanding market of these catches. It was relatively easy to monitor tuna caught by LSTLVs (whether legal or illegal) and to take effective measures against tuna caught by IUU fishing. In addition, it was quite fortunate that Japan was able to find out who actually conducted FOC fishing operations and directly consult with them to settle the matter. The global application of a positive listing scheme played a decisive role in achieving this progress. The highly mobile nature of this type of fishery required such a transboundary global measure, as unanimously advised at the 2003 FAO COFI meeting. Ironically, however, another type of tuna fishery – purse seine fishery – dramatically increased its capacity, and tuna longline vessels of slightly less than 24 metres LOA also increased sharply. This typically occurs in the Western and Central Pacific where no management measures have been implemented so far.

Purse seine fishery

Unfortunately, Chinese Taipei residents are again involved in these two types of capacity expansion. The vessels on the Forum Fisheries Agency (FFA) Regional Vessel Register were reviewed in respect of major fishing members (those who have more than ten purse seiners) during the period of the WCPFC Preparatory Conferences. Figure 15.4. shows the result. The Chinese Taipei FOC vessels were identified based on the Register, as well as from owner names, addresses and other information collected from Japanese trade data. Twenty-eight (28) large purse seiners were identified

as currently existing Chinese Taipei FOC vessels. Available information suggests that other vessels also exist, but it is not conclusive enough to identify them as Chinese Taipei FOC vessels. The Chinese Taipei FOC vessels in Figure 15.1. should, therefore, be considered as minimum estimates. Furthermore, most of these purse seiners are large; seven of them are over 2 200 GRT class, each of them catching more than 10 000 MT of tuna annually (more than 40 times the annual catch of a longline vessel). In short, it is surprisingly evident that the Chinese Taipei fishing industry increased its purse seine fishing capacity dramatically by using FOC, whereas all other major fishing fleets were restrained to a stable level of fishing capacity or even reduced their capacity. It was reported that the construction of large purse seiners was still under way in Kaohsiung, Chinese Taipei.

Figure 15.4. Number of Purse Seiners of Major Fishing Members registered in the FFA Regional Register



(Data Source : FFA Regional Register)

Only seven Chinese Taipei companies own all twenty-eight FOC purse seiners. All of these companies are located in Chinese Taipei. One of them used to have Chinese Taipei licensed purse seine vessels, while all the other companies currently own Chinese Taipei-licensed fishing vessels, either purse seiners or large tuna longliners. Three of those seven companies were or are engaged in the fishing vessel construction business. It seems obvious that all of the seven Chinese Taipei companies intentionally circumvented the government licensing control by use of FOC so as to continue their excessive fishing for tuna in the WCPFC Convention Area.

As shown in Table 15.3., the Chinese Taipei fishing industry has continued its construction of FOC purse seiners since 1999, when the members of the Multilateral High Level Conference, including Chinese Taipei, adopted a resolution to stop the increase of capacity in the western central Pacific. Particularly after the October 2002 WCPFC Preparatory Conference meeting in Manila, where the resolution was adopted again to restrain the capacity expansion, construction was accelerated further.

Table 15.3. Increase of Chinese Taipei FOC Purse Seiners

Sep-2001			Aug-2002			Jun-2003			Feb-2004		
Name	Flag	GRT	Name	Flag	GRT	Name	Flag	GRT	Name	Flag	GRT
KOO'S 101	MH	996	KOO'S 101	MH	996	KOO'S 101	MH	996	KOO'S 101	MH	996
KOO'S 102	MH	996	KOO'S 102	MH	996	KOO'S 102	MH	996	KOO'S 102	MH	996
KOO'S 103	MH	1198	KOO'S 103	MH	1198	KOO'S 103	MH	1198	KOO'S 103	MH	1198
KOO'S 106	MH	1096	KOO'S 106	MH	1096	KOO'S 106	MH	1096	KOO'S 106	MH	1096
KOO'S 107	MH	1096	KOO'S 107	MH	1096	KOO'S 107	MH	1096	KOO'S 107	MH	1096
EASTERN MARINE	VU	1099	EASTERN MARINE	VU	1099	EASTERN MARINE	VU	1099	EASTERN MARINE	VU	1099
FAIR CRYSTAL 707	VU	1060	FAIR CRYSTAL 707	VU	1060	FAIR PIONEER 707 ※	VU	1060	FAIR PIONEER 707	VU	1060
FAIR WINNER 707	VU	1060	FAIR WINNER 707	VU	1060	FAIR WINNER 707	VU	1060	FAIR WINNER 707	VU	1060
FONG SEONG 666	VU	2234	FONG SEONG 666	VU	2234	FONG SEONG 666	VU	2234	FONG SEONG 666	VU	2234
FONG SEONG 696	VU	2234	FONG SEONG 696	VU	2234	FONG SEONG 696	VU	2234	FONG SEONG 696	VU	2234
ORIENTAL MARINE	VU	1099	ORIENTAL MARINE	VU	1099	ORIENTAL MARINE	VU	1099	ORIENTAL MARINE	VU	1099
Total	**11 vessels**		**FAIR VICTORY 707**	**VU**	**1280**	FAIR VICTORY 707	VU	1280	FAIR VICTORY 707	VU	1280
			HF 88	**VU**	**1284**	HF 88	VU	1284	HF 88	VU	1284
			HSIANG FA 8	**VU**	**1150**	HSIANG FA 8	VU	1150	HSIANG FA 8	VU	1150
			Total	**14 vessels**		**KOO'S 108**	**MH**	**1099**	KOO'S 108	MH	1099
						FAIR CHAMPION 707	**VU**	**1280**	FAIR CHAMPION 707	VU	1280
						FONG SEONG 168	**VU**	**2380**	FONG SEONG 168	VU	2380
						FONG SEONG 196	**VU**	**2386**	FONG SEONG 196	VU	2386
						FONG SEONG 818	**VU**	**1152**	FONG SEONG 818	VU	1152
						HSIANG HAO 8	**VU**	**2200**	HSIANG HAO 8	VU	2200
						HSIANG SHENG 6	**VU**	**1150**	HSIANG SHENG 6	VU	1150
						SHUN FA 8	**VU**	**1150**	SHUN FA 8	VU	1150
						TUNA CATCHER	**VU**	**1099**	TUNA CATCHER	VU	1099
						Total	**23 vessels**		**EASTERN STAR**	**VU**	**2386**

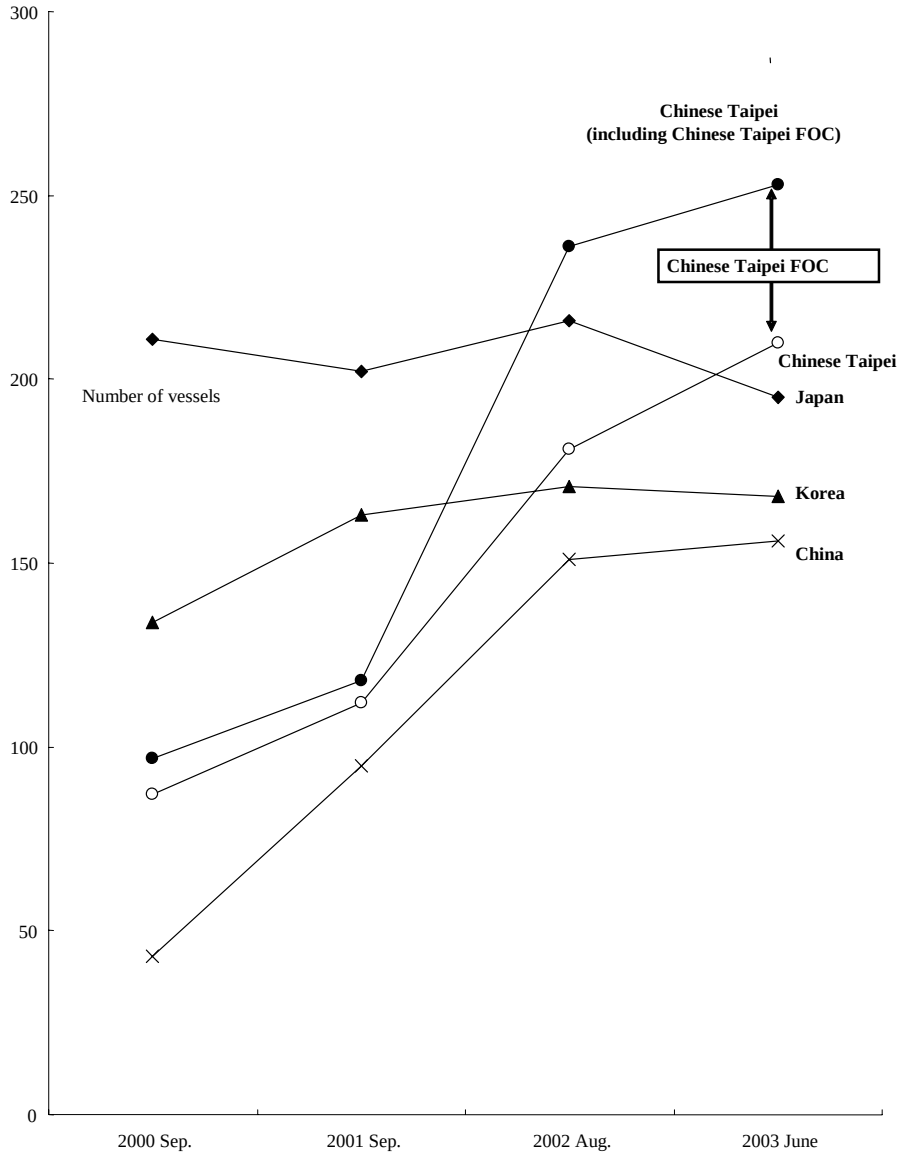
Table 15.3. Increase of Chinese Taipei FOC Purse Seiners (cont.)

Sep-2001			Aug-2002			Jun-2003			Feb-2004		
Name	Flag	GRT	Name	Flag	GRT	Name	Flag	GRT	Name	Flag	GRT
									FONG SEONG 668	**VU**	**2386**
						※ *FAIR CRYSTAL 707* was re-named *FAIR PIONEER 707*.			**TUNA QUEEN**	**VU**	**1099**
									YUNG DA FA 168	**VU**	**1152**
									YUNG DA FA 668	**VU**	**1152**
									Total	**28 vessels**	

Longline fishery

The same review was carried out for longline fishing vessels of major fishing members (those who have over fifty longline vessels) on the FFA Regional Vessel Register. The result is shown in Figure 15.5. The Chinese Taipei fishing industry experienced increases in both FOC and Chinese Taipei-licensed longline vessels operating in the WCPFC Convention area, whereas the numbers of Japanese and Korean longliners remained relatively stable. There was an increase in the number of Chinese longliners, but most of these are relatively small, with low productivity. Their catch of tuna did not increase significantly.

Figure 15.5. Number of Longliners of Major Fishing Members registered in the FFA Regional Register



It is now necessary to look not only at transboundary but also at trans-fishery measures to counteract IUU tuna fishing and the over-capacity of all fisheries for tuna resources. Otherwise, the control over one fishery, including the elimination of IUU fishing, could cause the immediate explosive expansion of other fisheries targeting the same tuna resources. At the same time, possibilities for the sound development of fisheries of developing states must be secured under overall capacity control. In the past, developed states' fishing industries took advantage of the developing states' right for fishery development so as to evade capacity control measures. In order to avoid any increase in overall capacity, such fishery development of developing states should be realised through the appropriate transfer of fishing capacity from developed states.

Conclusions and recommendations

Large-scale tuna longline vessels (LSTLVs) produce mainly frozen tuna, and land them at Japanese ports for sashimi use. Since the Japanese market offers the highest price for sashimi tunas, almost all LSTLV products come to Japan.

After Chinese Taipei started monitoring its LSTLV catch through the Japanese market in the early 1990s, many Chinese Taipei vessel owners used flag-of-convenience (FOC) LSTLVs to circumvent regulations. The global problem of IUU tuna longline fishing was caused solely by Chinese Taipei residents. The International Commission for the Conservation of Atlantic Tunas (ICCAT) took a series of measures to eliminate the FOC/IUU LSTLVs during the mid to late 1990s. However, since they focused on flag states and not on people who actually conducted IUU business, their effectiveness was easily undermined by flag hopping.

Japan analysed its trade and other data to identify the real operators of the IUU LSTLVs and started consultations with them. As a result of intense consultations between Japan and Chinese Taipei, including IUU vessel owners, as well as the efforts of the regional fisheries management organisations (RFMOs) to establish a positive vessel listing scheme, the number of IUU LSTLVs has been substantially reduced.

However, Chinese Taipei fishermen switched from large-scale longline fishing (over 24 metres) to small-scale longline (less than 23.9 metres) as well as large-scale purse seine fishing, and continued to catch tuna in an area where no management measures have been introduced, *i.e.* western and central Pacific. The flags of these vessels are developing states. In the past, developed states' fishing industries took advantage of the developing states' right for fishery development to evade capacity control measures. So long as developed countries continue to build new vessels and developing countries continue to accept these vessels under their registry, over-capacity problems will continue and will expand. The IUU tuna fishing problem is part of the tuna over-capacity problem.

Based on past experience, we can conclude that:

1) Measures focused on flag states, including trade measures, have had limited effect.

2) Trade tracking and its resulting accumulation of information by market countries is an enormous task but it provides the most important fundamentals for the creation of effective measures to combat IUU fishing.

3) Direct consultations with IUU vessel owners played an important role in solving the problem.

4) Measures based on positive listings are effective, but tuna laundering and the use of forged documents may still continue.

5) FOC/IUU fishing is part of over-capacity.

6) All FOC flag states are developing states.

7) Even after the elimination of IUU fishing, so long as developing states accept unlimited registration of foreign fishing vessels, the over-capacity problem will continue.

IUU measures should be specific to each fishery and based on trade and other data for the identification of real operators. The following global action is urgently required to solve the IUU and over-capacity problem:

1) The FAO should establish a global record of tuna fishing vessels, compiling existing records of tuna fishing vessels of relevant RFMOs, and RFMOs should co-operate with the FAO to establish such a record.

2) Developed states, parties and fishing entities should stop building new tuna fishing vessels except for those replacing existing licensed vessels with equivalent fishing capacity, whatever flag is used.

3) The FAO should request RFMOs to establish, as a matter of priority, a system to transfer fishing capacity from developed states, parties and fishing entities to developing states smoothly.

4) A nation, party or fishing entity whose residents have caused the rapid expansion of fishing capacity in recent years should cut at least that expanded portion of fishing capacity.

5) RFMOs should develop market-oriented measures for purse seine caught tuna. Countries importing purse seine caught tuna should play a vital role.

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CHAPTER 16

ILO SUBMISSION TO THE WORKSHOP ON IUU FISHING ACTIVITIES[1]

Brandt Wagner, Maritime Specialist, ILO

Summary

This document provides information on work underway by the International Labour Organization[2] to prepare a comprehensive standard (a Convention supplemented by a Recommendation) on work in the fishing sector. This work may be relevant to the issue of IUU fishing.

Introduction

At its 283rd Session (March 2002) the Governing Body of the ILO decided to place on the agenda of the 92nd Session of the International Labour Conference an item concerning a comprehensive standard (a Convention supplemented by a Recommendation) on work in the fishing sector. This standard will revise seven ILO standards (five Conventions and two Recommendations) adopted in 1920, 1959 and 1966 that are specifically aimed at persons working on board fishing vessels (henceforth "fishers"). These five standards concern the issues of: minimum age, medical examination, articles of agreement, competency certificates, crew accommodation, hours of work and vocational training. The standard may also address other issues, such as occupational safety & health and social security. The aim is to ensure "decent work" for fishers, within the context of the ILO's primary goal of promoting opportunities for women and men to obtain decent and productive work, in conditions of freedom, equity, security and human dignity.

The rationale for this revision is to reflect changes in the sector which have occurred over the last 40 years; to achieve more widespread ratification; to reach, where possible, a greater proportion of the world's fishers, particularly those working on smaller vessels; and to address other fishing operations, employment arrangements, methods of remuneration and other aspects. This revision will complement

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1 This paper was submitted as a background document to the Workshop.

2 The International Labour Organization is the UN specialised agency which seeks the promotion of social justice and internationally recognised human and labour rights. It was founded in 1919 and is the only surviving major creation of the Treaty of Versailles which brought the League of Nations into being and it became the first specialised agency of the UN in 1946.

the parallel work being done by the ILO to consolidate its standards for seafarers (on vessels engaged in commercial maritime transport) into a comprehensive new standard.

In accordance with the Standing Orders of the Conference, the Office prepared a *preliminary report* intended to serve as a basis for the first discussion of the item on the fishing sector standard by the Conference in 2004. The report gives an overview of the fishing sector and analyses the relevant legislation and practice concerning labour conditions in the sector in various ILO member states. The report and attached questionnaire were communicated to the governments of member states of the ILO, which were invited to send their replies so as to reach the International Labour Office by 1 August 2003. The report, entitled *Conditions of work in the fishing sector: A comprehensive standard (a Convention supplemented by a Recommendation) on work in the fishing sector*, Report V(1), International Labour Conference, 92nd Session, Geneva, 2004, is a available at:

http://www.ilo.org/public/english/standards/relm/ilc/ilc92/pdf/rep-v-1.pdf

It is available in English, French, Spanish, German, Russian, Arabic and Chinese.

On the basis of these replies to the above-mentioned questionnaire, the Office prepared a *second report*. Replies were received from over 80 ILO member states. In accordance with the Standing Orders of the Conference, governments were requested to consult the most representative organisations of employers and workers before finalising their replies to the questionnaire, to give reasons for their replies and to indicate which organisations have been consulted. Governments were also reminded of the importance of ensuring that all relevant departments were involved in the present consultative process, including the departments responsible for social and labour affairs, fisheries, maritime safety, health and the environment. The report also took into account the report of the Tripartite Meeting of Experts on Labour Standards for the Fishing Sector, which had been held in Geneva from 2 to 4 September 2003 in order to discuss issues to be covered in the fishing standard. It provides proposed conclusions with a view to a Convention and a Recommendation. The report, entitled *Conditions of work in the fishing sector: A comprehensive standard (a Convention supplemented by a Recommendation) on work in the fishing sector: The Constituents' Views*, Report V(2), International Labour Conference, 92nd Session, Geneva, 2004, is a available at:

http://www.ilo.org/public/english/standards/relm/ilc/ilc92/pdf/rep-v-2.pdf

It is available in English, French, Spanish, German, Russian, Arabic and Chinese.

Next steps

At the 92nd Session of the Conference (Geneva, 1-17 June 2004) a Committee on Work in the Fishing Sector will be established to consider this agenda item. The report of this Committee will be submitted to the plenary of the Conference, which is expected to adopt conclusions concerning a Convention and a Recommendation for the work in the fishing sector. Immediately afterwards, in accordance with the Standing Orders of the Conference, the International Labour Office will prepare a *third report* containing a proposed Convention and Recommendation for work in the fishing sector. This report will be sent to all ILO member states, asking them to state within three months, after consulting with the most representative organisations of employers and workers, whether they have any amendments to suggest or comments to make. On the basis of the replies received, the Office will draw up a *final report* containing the text of the Conventions or Recommendations with any necessary amendments. These latter two reports will then serve as the basis for discussion at the 93rd Session of the International Labour Conference in June 2005, which is expected to adopt the instruments. Subject

to these caveats, the ILO sets out below relevant elements in the proposed conclusions as they now stand.

Possible relevance of the proposed ILO standard to the issue of IUU fishing

The relationship between IUU fishing and conditions of work on board fishing vessels is not entirely clear. However, the nature of IUU fishing gives rise to questions concerning working conditions on board such vessels. Such operations also place fishers at risk of arrest and imprisonment. This leads to questions concerning their repatriation to their home countries.

Some provisions of the proposed conclusions prepared by the Office may be relevant to this Workshop. One proposed provision would allow port states to inspect foreign fishing vessels to ensure compliance with the standards set out in the Convention. Another provides that fishing vessels that operate internationally should be required to undergo a documented periodic inspection of living and working conditions on board the vessel. Yet another proposed non-mandatory provision states that "In its capacity as a coastal state, a member might require, when it grants licences for fishing in its exclusive economic zone, that fishing vessels comply with the standards of the Convention." This provision in particular, if retained, could contribute to action aimed at addressing IUU fishing.

Further information

For further information on the development of this standard, contact the International Labour Office (Secretariat of the ILO) at marit@ilo.org.

CHAPTER 17

IUU FISHING AND THE COST TO FLAG OF CONVENIENCE COUNTRIES[1]

Matthew Gianni, Independent Consultant on fisheries and oceans issues

The problem of IUU fishing and related infrastructure must be tackled from a number of different angles. Many of the measures debated to date have centered on taking action to deter individual vessels from engaging in IUU fishing. However, one approach worth considering might be to pursue compensation from flag of convenience states for the costs incurred by other states as a result of FOC/IUU fishing. Whether or not there is a genuine economic link between the flag state and the IUU vessels or fleets flying its flag, the flag state bears the ultimate responsibility for the activities of the vessel in relation to compliance with relevant international instruments including the conservation and management measures adopted by regional fisheries management organisations (RFMOs).

It could be argued that legitimate flag states, which are members of, participate in, and contribute to the activities of a regional fisheries management organisation, should have the right to derive long-term benefit from sustainably managed fishing in the region, commensurate with the effectiveness of conservation measures agreed by the organisation, provided they ensure that vessels under their jurisdiction abide by the rules. The conservation and management of the fisheries and the measures undertaken by a state with respect to monitoring, compliance and enforcement all come at a cost.

Conversely, a state whose vessels consistently operate in a region in contravention of the rules adopted by the relevant regional fisheries management organisation should be liable for a portion of the costs incurred by responsible flag states. While an FOC state may not be compelled to join a regional management organisation, it does have a clear duty under UNCLOS to co-operate with other states in the conservation and management of the fisheries in the region. Should it fail to do so while 'allowing', either willfully or by clear negligence, its vessels to consistently fish in the region, then the state should be liable for the costs incurred by responsible members of the RFMO associated with the failure of the FOC state to either co-operate with the regional management organisation or to exercise control over the activities of its fishing fleets operating in the area of competence of the organisation.

Costs could be measured in a number of ways. The short-term, or annualised, costs to legal operators in the fishing industry could be considered to include lost revenue resulting from lower

[1] This paper was submitted as a background paper to the Workshop. Paper prepared by Mathew Gianni, independent consultant on fisheries and oceans issues, Cliostraat 29-II, 1077 KB Amsterdam, Netherlands. matthewgianni@netscape.net

quotas, higher catch per unit effort costs as a result of overfishing by IUU operators, and lower prices as a result of excess supply of IUU-caught fish on the market. Costs to governments might be calculated on the basis of factors such as the expense of extra research resulting from scientific uncertainties arising from lack of sound information on the catch and biological characteristics of the species caught in IUU fisheries, the increased cost of monitoring, surveillance and enforcement at sea and port and market-based inspection schemes to combat IUU fishing, and the costs associated with dues and participation at annual meetings of an RFMO and its various committees. Longer-term costs could also be factored into the equation, in particular the loss of long-term benefits to the economy because of the lower productivity of overfished stocks as a result of IUU fishing, loss of future earnings from more sustainable fisheries, and the loss of tax revenue or income to the state.

Given the significant cost of IUU fishing to responsible governments and industry operators, what are the benefits to the states involved in issuing flags of convenience? Clearly, unscrupulous operators themselves benefit financially from the freedom to engage in IUU fishing on the high seas with the impunity conferred by the flags of convenience system. But are there economic benefits to FOC States that might argue for the legitimacy of the FOC system?

The information contained in a 2002 UN FAO report on open registries in relation to fishing suggests that the benefits derived by FOC states in flagging large-scale fishing vessels are relatively small. Based on information in the report, the total revenue derived from registering fishing vessels by 20 countries operating open registries (flags of convenience) was slightly more than USD 3 million per year in recent years.[2] The report states that the top four FOC countries – Belize, Honduras, Panama, and St. Vincent and the Grenadines – had a combined total of 1 148 large-scale fishing vessels registered to fly their flags. These same four countries generated approximately USD 2 625 000 in revenue from registration fees and related charges from the fishing vessels on their registries. They earned, on average, less than USD 2 500 per year for each fishing vessel registered to fly their flag. The report states that the figures are almost certainly underestimates of the total revenue derived from registering fishing vessels. However, even if the figures are off by 100% or 200% of gross revenue, it is clear that the income derived by FOC countries from flagging fishing vessels is still quite small.

It is further interesting to note, in the FAO report, the frequency and type of enforcement actions taken by the government of Belize against fishing vessels flying its flag operating outside of Belize waters. From the period 1997 through 2001, Belize reported that it took enforcement action 17 times against fishing vessels on its registry. In only five instances were the fishing vessels actually fined. Most of the fines levied were in the vicinity of USD 20 000 but only one of these vessels was actually reported to have paid the fine. Belize reported that the most common means of penalising an offending vessel was to delete (deflag) the vessel from the Belize registry. This, however, would have been at best a minor inconvenience for the vessels concerned. A fishing vessel can obtain a flag of convenience easily, with provisional registration being granted by some flag states within 24 hours of application. Many vessels change flags often, a phenomenon known as ‘flag-hopping’, taking advantage of the ease in obtaining a flag of convenience.

This history of enforcement is remarkably limited and virtually ineffective considering that several hundred large-scale fishing vessels flew the flag of Belize during the same period of time. Belize was in the top two FOC countries flagging large-scale fishing vessels in 1999 and 2001, according to an analysis prepared by Gianni and Simpson for WWF.[3] The number of large-scale

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2 Swann, J. Fishing Vessels Operating Under Open Registers and the Exercise of Flag State Responsibilities: Information and Options. FAO Fisheries Circular No. 980, Rome 2002.

3 Gianni, M. Simpson, W. - see Chapter 6 of this report.

fishing vessels registered to Belize in 1999 and 2001 was 409 and 455 vessels respectively. The average tonnage of the fishing vessels on the registry for both years was 853 GT and 768 GT respectively. These are large vessels by fishing industry standards (the FAO reports the average tonnage of large-scale fishing vessels in 2000 was 370 GT[4]). According to the FAO report, Belize-flagged vessels were reported by RFMOs to be engaged in IUU fishing in the Atlantic, Pacific, and Indian Oceans as well as the Southern Ocean around Antarctica. To its credit, the government of Belize at least provided information to the author of the FAO report and appears to have significantly reduced the number of fishing vessels on its registry since 2001, although the number still on the registry is high. All of the other countries with open registries and substantial numbers of fishing vessel on their registries ignored the request for information by the author of the FAO report.

Clearly, states that operate flags of convenience in the fisheries sector externalise the costs of their failure to regulate 'their' fishing fleets. Other countries must pay these costs in terms of scientific uncertainty in stock assessments, reduced quotas and lost revenue for legitimate operators, and the additional costs of enforcement, among other things, as well as the depletion of fish stocks and ecosystems associated with flag of convenience fishing. The costs to legitimate operators and responsible flag states are likely to far outweigh the revenue derived by FOC states in registering large-scale fishing vessels.

An important legal question arises: Does a state have the right to enjoy the privileges of being a flag state, however little these privileges may confer to the state in terms of economic benefits, while evading most, if not all, of the responsibilities associated with being a flag state, no matter how costly this evasion of flag state responsibility may be to other states and the international community as a whole?

Given the large number of IUU fishing vessels flying flags of convenience, it seems clear that the most cost effective means of eliminating the problem of IUU fishing would be to eliminate the flag of convenience system for fishing vessels. Countries which cannot or will not exercise control over fishing vessels operating outside of their EEZs should be discouraged or prevented from registering large-scale fishing vessels (*e.g.* fishing vessels greater than or equal to 24 metres as per the international standard defined by the FAO Compliance Agreement) except under strictly defined circumstances or criteria. Ultimately, what may be needed is a clear ruling from the International Tribunal for the Law of the Sea designed to further strengthen the definition of flag state responsibility under international law and ultimately render the state practice of issuing flags of convenience for fishing vessels effectively illegal.

However, until the flag of convenience 'loophole' in international law is closed, one option available to responsible flag states may be to explore the possibility of seeking compensation from FOC states for the costs incurred by responsible states as a result of IUU/FOC fishing. It would be well worth considering a means or method to document and/or reasonably estimate the costs incurred by responsible flag states as a result of FOC fishing. On this basis, compensation could then be sought, through the available international mechanisms, from specific FOC states whose vessels are fishing in a region in contravention of the measures established by a relevant fisheries management organisation to the detriment of responsible flag states' fleets and interests.

Whether or not there is a genuine economic link between the flag state and the IUU fishing vessels or fleets flying its flag, the flag state bears responsibility for the activities of the vessels. If an

[4] FAO State of World Fisheries and Aquaculture 2000. United Nations Food and Agriculture Organisation. Rome, 2001.

FOC state is faced with the prospect of paying substantial compensation to other states for its failure to regulate its fishing fleets, this could act as a disincentive to the registration of fishing vessels by the FOC state. The prospect of paying potentially large sums in compensation for the failure to exercise control over fishing vessels could potentially serve as a significant deterrent to FOC/IUU fishing in ways that could complement port state controls, market restrictions, enhanced monitoring, control and surveillance and other measures adopted thus far by states and regional fisheries management organisations. The OECD can play a role in assisting OECD members in comprehensively estimating the cost to responsible flag states of fishing by vessels flying flags of convenience.

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