he human community insistently pushes the oceans’ limits, seeking to exploit all of its varied resources – fisheries, fuels, minerals and genetic material – now at the centre of the world economy. All of these developments draw oceans closer to the heart of contemporary human societies.

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Fishermen bypassing fishing regulations compromise fish stocks management efforts. Countering this lawlessness requires strengthened cooperation between countries and Regional Fisheries Management Organizations. It would entail systematic and truthful captures documentation, information exchange, and the creation of an Interpol-like agency for marine activities.

ON THE CURBING OF ILLEGAL, UNREPORTED AND UNREGULATED (IUU) FISHING

A number of studies have shown the progressive devastation of marine fisheries around the world (Pauly et al. 1998; FAO 2007); the Food and Agriculture Organization of the United Nations (FAO) believes that only about 25% of commercial stocks, mostly of low-priced species, are currently under-exploited. The FAO maintains that the “issue of illegal, unreported and unregulated fishing in world fisheries is of serious and increasing concern” (FAO 2001). The FAO goes on to state that IUU fishing undermines attempts to manage world capture fishery resources, with negative effects on world food security and environmental protection (FAO 2001). It has been recently estimated that the IUU catch of marine capture fishery resources may be as much as 12 million tonnes per annum, with a value in the order of US$10-$11 billion (Agnew et al. 2009). To put these figures into perspective, we can state, on the basis of FAO, World Bank and academic research estimates, that total reported marine capture fisheries catch per annum is in the order of 85 million tonnes, with a value around US$80-$85 billion (Sumaila et al. 2007; FAO 2009; Kelleher et al. 2009).1

In discussing this issue, we shall first clarify definitions of illegal as opposed to unregulated and unreported fishing. We will then briefly examine the economic

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1. FAO provide estimates of the volume of total and marine capture fisheries production, but only of the value of total capture fisheries production (marine plus inland).
drivers of IUU fishing, followed by an example of a developing fishing state that ultimately succeeded in reducing IUU fishing to tolerable proportions. Next, we briefly discuss the situation of tuna in the Mediterranean Sea, where IUU fishing remains a large problem. This, in turn, introduces the valuable analytical tools supplied by game theory as they apply to cooperative action among the affected states. We shall conclude by examining the serious threat that IUU fishing poses to the management of shared fishery resources, in particular those found in the high seas.

**IUU FISHING DEFINED**

As a preliminary, we must make a distinction between ocean fishery resources under coastal state jurisdiction and those found in the high seas. Fishery resources under coastal state jurisdiction are essentially those encompassed by the coastal state 200-nautical-mile Exclusive Economic Zone (EEZ). The EEZ regime emerged as a consequence of the 1982 United Nations (UN) Convention on the Law of the Sea (UNCLOS).

With respect to fishery resources in the high seas, we must distinguish between those under the jurisdiction of Regional Fisheries Management Organizations (RFMOs) and those found in the high seas area, which are not under the management jurisdiction of any RFMO and are governed by Part VII of the 1982 UN Convention on the Law of the Sea.

**BOX 1 IUU FISHING DEFINITIONS**

- **Illegal fishing** is conducted by national or foreign vessels in waters under the jurisdiction of a state without its permission, or in contravention of its laws and regulations. Illegal fishing includes fishing conducted by vessels flying the flag of states that are members of a RFMO, but which operate in contravention of the conservation and management measures of that organization [RFMO], and by which the states are bound or relevant provisions of the applicable international law. Finally, illegal fishing is in violation of national laws or international obligations, including those undertaken by states cooperating with a relevant regional fisheries management organization.

- **Unregulated fishing** occurs within the high seas under the management jurisdiction of a RFMO, by a flagless vessel, or vessel flying the flag of a state or entity not a party to the RFMO, in a manner inconsistent with the conservation and management measures of the RFMO. If the state in question is a party to the 1995 UN Fish Stocks Agreement, then it is bound not to allow one of its vessels to operate in the high seas area under the management jurisdiction of the RFMO, unless the state is a member of the RFMO, or unless it has agreed to abide by the conservation and management measures of the RFMO (Munro, Van Houtte and Willmann 2004). If the state in question is not a party to the 1995 UN Fish Stocks Agreement, then it is not at all clear that the state is so bound. Also, unregulated fishing is deemed to occur in high seas areas, not under the management jurisdiction of a RFMO, where fishing is undertaken in a manner inconsistent with the relevant state’s obligations under international law (FAO 2001, para. 3.2). Such a state is governed by Part VII of the 1982 UN Convention on the Law of the Sea, which pertains to the high seas. While Article 87 puts forth the freedom of the high seas for fishing, this right is circumscribed by Articles 116-120, and in particular by Article 117, which requires states fishing on the high seas to cooperate with other states for the purpose of conserving the high seas fishery resources (UN 1982, Part VII). Part VII of the 1982 UN Convention is deemed part of customary international law (Lodge et al. 2007).

- **Unreported fishing** is defined as fishing that has not been reported, or has been misreported, to the relevant national authority or to the relevant RFMO (FAO 2001, para. 3.2). It is very difficult to distinguish between unreported fishing on the one hand and illegal and unregulated fishing on the other. Any vessel engaged in illegal and/or unregulated fishing can be expected either not to report the activity, or to misreport it.
(RFMOs), and those that are not. The now-widespread RFMO regime has emerged as a consequence of both the 1982 UNCLOS, and the 1995 UN Fish Stocks Agreement (UN 1982; 1995). The typical RFMO, e.g. the Northwest Atlantic Fisheries Organization (NAFO) or the Western Central Pacific Fisheries Commission (WCPFC), has both coastal states and distant water fishing states (DWFSs) as members.

We provide brief definitions of IUU fishing, based on the FAO International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU) in Box 1 (FAO 2001).

**TACKLING IUU FISHING**

**A SUCCESS STORY: A DEVELOPING COASTAL STATE CASE STUDY – NAMIBIA**

Namibia has an extensive coastline bordering the highly productive northern Benguela Current ecosystem, dominated by pelagic (upper water) fishes, mainly sardine, anchovy and horse mackerel. The demersal (lower water) ecosystem is dominated by the 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 (fish-eating) species; 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 et al. 2004).

Prior to independence in 1990, there was no Namibian EEZ. In the high seas off Namibia, distant water fishing states (DWFSs) were subject to the high seas provisions of the UNCLOS (UN 1982, Part VII). The weakness of these provisions became manifest as unregulated fishing off Namibia grew rampant. It is estimated that by the mid-1980s, there were sixteen DWFSs engaging in unregulated fishing off Namibia. Sumaila and Vasconcellos (2000) demonstrate the huge and negative impacts, resulting in the over-exploitation by distant water fleets; as a consequence, the newly-independent Namibia inherited an altered ecosystem whose productive potential was severely reduced (Willemse et al. 2004). In addition, the country suffered huge socio-economic losses during this period due to the activities of DWFSs.

Fishing activities in Namibian waters were not effectively regulated, so the reporting of catches was very poor, and this led to the development of a “free-for-all” situation. This implied that all the direct drivers of IUU fishing were skewed in favor of fishers who wanted to undertake IUU fishing activities – what we call “the IUU Fisher’s Paradise.” The potential for gaining additional revenue from IUU fishing without any risk of being caught was high. Penalties were non-existent, and the violators engaged in avoidance activities with zero cost while benefitting highly.

Namibia gained independence in 1990, and promptly established an EEZ. What had hitherto been unregulated fishing now became illegal fishing. Namibia was not slow to exercise its power. During 1990 and 1991, eleven Spanish trawlers and one Congolese trawler were arrested for illegal fishing and successfully prosecuted; most

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**THE IUU CATCH OF MARINE CAPTURE FISHERY RESOURCES MAY BE AS MUCH AS 12 MILLION TONNES PER ANNUM**
of the vessels were forfeited to Namibia by the Namibian courts. The World Wildlife Fund (WWF 1998) has recently reported that with the announcement of the EEZ regime by the independent government, there followed a decrease of more than 90% in the number of unlicensed foreign vessels fishing in the area.

Namibia achieved this feat by rapidly adopting a fisheries management system with a strong monitoring, control and surveillance component (Bergh et al. 2004), with a primary goal of restricting fishing only to those entitled to do it, and ensuring that such fishing was carried out within legal and administrative guidelines (MFMR 1994). 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, the chances of being caught engaging in IUU fishing increased, and the penalty violators faced turned positive – immediately affecting fishers’ risk calculations and inclinations to engage in IUU or not. More concretely, the annual running cost of the Fisheries Observer Agency (FOA), the organization responsible for providing observer services to the Ministry of Fisheries and Marine Resources (MFMR), increased to about NAD 20 million (personal communication, Mr. Hafeni Mungungu, CEO of FOA, June 2002).

There are many reasons for Namibia’s post-independence success in tackling its huge IUU fishing problem. Some of these are specific to the country while others can be generalized to other countries. A key positive factor for Namibian fisheries is their major contribution 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 MFMR to fund and implement an effective MCS system. Secondly, because it attained nationhood only recently, Namibia could draw from a number of negative examples from around the world, and learn how not to manage its fisheries. This opportunity appeared to have been used effectively - to the extent that the Namibian Constitution itself contains sustainability requirements. 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; this meant that coastal fishing communities have never really developed. This had a positive socio-cultural consequence on the management of the resources: there was no coastal community with long-term claims to fishing rights to pacify. Finally, the country undertook drastic and dramatic initial enforcement of fisheries regulation in its EEZ, sending a clear signal to potential violators, with a huge positive effect on keeping IUU fishers out of the country’s EEZ.

**IUU FISHING: THE MEDITERRANEAN BLUEFIN TUNA AND GAME THEORY**

An internationally shared capture fishery resource is one that is exploited by two or more fishing states (or entities). The FAO estimates that up to one-third of marine capture fishery catches are accounted for by such resources (Munro et al. 2004). There are two major categories: transboundary fish stocks that move between or among
two or more EEZs, and straddling fish stocks, found in the waters of the EEZ and the adjacent high seas (Munro et al. 2004). Straddling stocks are exploited by coastal states and by distant water fishing states (DWFSs). The 1995 UN Fish Stocks Agreement calls for straddling stocks (broadly defined) to be managed through RFMOs, whose members include relevant coastal states and DWFSs with a “real” interest in the resource or resources (UN 1995; Munro et al. 2004). In passing, an RFMO may also involve so-called cooperating non-members. A good example of a shared stock is the Mediterranean bluefin tuna (BFT), which is targeted by several countries.

IUU fishing is widely recognized as one of the biggest concerns in BFT management in the Mediterranean Sea and Atlantic Ocean areas. The WWF (2006) found huge gaps between national reports on BFT trade and catch reports to the International Commission for the Conservation of Atlantic Tunas (ICCAT), indicating that a large amount of IUU fishing takes place in the region. The cited study estimated that the total BFT catches in the East Atlantic and the Mediterranean Sea were approximately 45,000 tonnes in both 2004 and 2005, 40% above the total allowable catch limit (TAC) of 32,000 tonnes set by ICCAT. If one includes catches for domestic markets by national fleets in Spain, France, and Italy, the total could be well above 50,000 tonnes per year (WWF 2006).

ICCAT is also fully aware of this IUU problem. In 2006, based on the number of vessels operating in the Mediterranean Sea and their catch rates, ICCAT estimated the total catches in the early 2000s to approach 43,000 tonnes. In 2008, a new evaluation by ICCAT suggested a 2007 catch of 47,800 tonnes for the Mediterranean Sea and 13,200 tonnes for the East Atlantic. These numbers were estimated from ICCAT’s list of BFT vessels, catch rates and stock information. This new evaluation indicates a total catch of 61,000 tonnes from both areas, which is higher than WWF’s estimate. ICCAT’s IUU estimates are also supported by the mismatch between reported data and various measures of market sales data. (ICCAT 2008). The shared nature of BFT in the Mediterranean Sea means that tackling IUU fishing is many times more difficult than in the Namibian case. The reasons for this level of difficulty will be developed below.

**WHY IS TACKLING IUU FISHING MORE DIFFICULT FOR SHARED STOCKS?** The chief characteristic of any internationally shared fish stock is the strategic interaction that almost invariably occurs among the states (entities) exploiting it. Consider the simplest case, that of two coastal states sharing a transboundary stock. The catching activities of one coastal state will have an impact upon the opportunities available to the other – hence the strategic interaction. Economists have known for over thirty years that the economics of these resources’ management cannot be analyzed without recourse to the theory of strategic interaction, better known as game theory (Bailey et al. 2010). The theory rests on two broad sub-sections: the theory of non-cooperative or competitive games, and cooperative games.
Competitive game theory helps answer the question of what consequences will ensue if the states (entities) sharing the fishery resource do not cooperate in managing it. The assumption is that each state would manage its share of the resource to the best of its ability.

Perhaps the most famous of all competitive games is one known as the Prisoner’s Dilemma, named for a story that the author of the game uses as an illustration. The point is that in a competitive game, “players” will be driven to adopt courses of action, “strategies,” that each knows is sub-optimal if not damaging. The Prisoner’s Dilemma applies with great force to the shared fish stock case. Non-cooperation carries the risk that the sharing states will adopt policies that sharply reduce the economic returns from the fishery, and that may damage the resource (Bailey et al. 2010; Munro et al. 2004).

Straddling stocks provide a case in point. The opaque nature of Part VII of the 1982 UN Convention, pertaining to the high seas segments of straddling stocks, led to uncertainty about the rights and duties of coastal states as opposed to those of DWFSs; this made it extremely difficult to establish stable cooperative management regimes for these resources. The competitive fishery games that emerged based on these resources had sufficiently destructive consequences that the UN felt compelled to convene the 1993-1995 UN Fish Stocks Conference, which would give rise to the RFMO regime. In any event, the analysis, validated by experience, has taught us that with few exceptions, cooperation does indeed matter.

Cooperative game theory, which is really a theory of bargaining, devotes a great deal of attention to the conditions that must be met for such games to remain stable over time. If the cooperative regime is unstable, the “players” will revert to competitive behavior with all the consequences that implies.

One fundamental condition – a common-sense one – is that every “player” must be convinced, now and in the future, that it receives an economic return from the cooperatively managed fishery at least equal to what could be expected under competitive circumstances. As the FAO has noted, this condition, which should be obvious, is often ignored in practice (FAO 2002). Of course, allocations of the economic returns among the “players” must be seen as equitable. This condition, however, is not sufficient.

Consider the following situation: a strictly transboundary fishery resource is shared by three neighboring coastal states, A, B and C. Suppose that there is agreement on the allocation formula. Compliance monitoring among the three, however, is lax. Suppose that A is convinced that B and C have cheated extensively, and that

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2. The prisoner’s dilemma demonstrates why two people might not cooperate even if it is in both their best interests to do so.

3. In the theory of cooperative games, this is referred to as the Individual Rationality Constraint.
such cheating is uncontrollable. Applying the IPOA-IUU criteria, it can be said that \( B \) and \( C \) vessels are engaged in illegal fishing (unregulated fishing is irrelevant in this case). State \( A \) could well conclude that it is actually worse off than it would be under competitive conditions. Its willingness to cooperate will vanish. The only sensible strategy for \( A \) is to join in the “illegal” fishing. The cooperative regime will disintegrate.

Now consider now a straddling fish stock that is under cooperative management through a RFMO, such as the Northwest Atlantic Fisheries Organization (NAFO), or the Western Central Pacific Fisheries Commission (WCPFC). As with the management of transboundary stocks, the cooperative regime will founder if the members of the RFMO do not comply – if they engage in illegal fishing, to use the FAO definition. The cooperative management of straddling fish stocks does, however, differ from that of transboundary stocks in at least two fundamental ways.

First, cooperative game theory concludes that the difficulty of achieving a stable regime rises almost exponentially with the number of “players.” Monitoring behaviour among the “players” to prevent illegal fishing, for example, obviously becomes more difficult as the number of regime members increases. Typically, the number of “players” in the cooperative management of strictly transboundary stocks is small. Cooperative management regimes for such stocks commonly involve no more than two states. The typical RFMO, by contrast – having both coastal states and DWFSs as “players” – has a large number of members.

Secondly, there is the problem of unregulated fishing, compounded by the so-called “new member” issue. Unregulated fishing, fishing by non-members, is what game theory refers to as “free riding.” Free riding can have exactly the same impact upon the stability of the cooperative management regime as non-compliance among its members. The same fundamental condition must be met once more, if cooperation is to prove stable over the long run: every “player” must believe that it will be at least as well-off as it would be without cooperating.

Let \( Z \) be a DWFS that is contemplating becoming a “charter” member of a RFMO governing a straddling stock that had been overexploited in the past. It is the objective of the RFMO to invest in the resource by restricting current catches in the hope of future economic benefits. Suppose that unregulated fishing is uncontrollable. \( Z \) will anticipate making present sacrifices through reduced catches, but will see “free riders” taking much of the future economic benefits of the resource investment. The chances are high that \( Z \) will calculate that it would actually be better off by joining the “free riders.” Cooperation will unravel, and with it the opportunity for effective management of the resource.

A recent analysis has applied state-of-the-art cooperative game theory to management of straddling stocks. The analysis concludes first that stable cooperation among the “players” is more likely if they are heterogeneous, differing, for example, in terms of fishing costs. It then demonstrates that even with heterogeneous “players,” no cooperative straddling fishery game with more than seven potential players will be stable as long as unregulated fishing remains uncontrolled. This will hold regardless
of how flexible and imaginative the formula for allocating the fishery's economic benefits may be (Pintassilgo et al. 2010). It can be added in passing that a RFMO with only seven potential “players” is a small one indeed.

In 2006, an independent panel was established, based at the Royal Institute of International Affairs (Chatham House), London, to create recommendations for improving RFMO improved governance. In its report, popularly known as the Chatham House Report, the panel states that “a core conclusion is that the success of international cooperation [in fisheries] depends largely on the ability to deter free riding” (Lodge et al. 2007). In its recommended best practices for RFMOs, the panel further states that “in each RFMO, members should recognize the grave threat to the stability of the cooperative regime posed by IUU fishing and work vigorously towards the suppression and elimination of such fishing” (Lodge et al. 2007).

The so-called “new member” issue arises because the terms of the 1995 UN Fish Stocks Agreement require RFMOs to consider accepting new members (UN 1995, Articles 8, 10, 11). In all but exceptional cases, the prospective new member will be a DWFS that was not a “charter” member of the RFMO, but which now professes a “real” interest in the fishery and a desire to join. There is, of course, the implicit threat that, if the DWFS is blocked, it will be tempted to engage in unregulated fishing, in disregard of the 1995 UN Fish Stocks Agreement.

To date, the new member issue has not been dealt with satisfactorily. In a study on RFMO practices, Willock and Lack (2006) point out that there have been two broad approaches to this issue. The first is to welcome new members and grant them total allowable catch (TAC) allocations at the expense of “charter” members, which the latter justifiably view as a form of implicit free riding (Kaitala and Munro 1997). Some RFMOs adopting this practice attempt to mask the pain to “charter” members by simply adding the new member catch allocations to the existing TAC, leading in most cases to excessively large TACs – a repudiation of good resource management. The other approach is to welcome new members, but advise them that the relevant fisheries are already fully subscribed and that they can look forward to catch allocations only from “new” fisheries. Willock and Lack aptly describe this approach as “effectively closing the door on new members” (Willock and Lack 2006).

It takes little imagination to see that the “closing the door” approach acts to stimulate unregulated fishing. If we return to the expected net benefits from IUU equation, the $m&f$ variable, moral standing and fairness, now becomes positive – fairness violated.

One approach, presently only at the discussion stage, is that of effectively granting “charter” members collective property rights to the relevant fishery resources, and then establishing tradable catch quota rights for each of them. The rights would be tradable not only among the “charter” members, but also between these members and prospective new ones. New members would then be allowed to enter the fishery by leasing or buying quota. The FAO considered this approach in 2002, as did the Chatham House independent panel in 2007 (FAO 2002; Lodge et al. 2007). According to the Organization for Economic Cooperation and Development (OECD), at least
one RFMO is currently discussing this strategy, the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) (OECD 2009).

**DRIVERS OF IUU FISHING**

To provide a framework for our examination of IUU fishing, we adopt the straightforward model developed by Sumaila, Alder and Keith in their 2006 analysis (Sumaila et al. 2006). The model ultimately rests upon economic models developed by Gary Becker on the economics of crime (Becker 1968). The basic idea is that a vessel contemplating engaging in IUU fishing will undertake a subjective cost-benefit analysis. The expected net return from engaging in IUU fishing will depend upon:

- (i) the net monetary returns from harvesting and selling the fish,
- (ii) the expected penalty, which will in turn depend both upon the actual penalty if apprehended, and the probability of being apprehended,
- (iii) the cost of engaging in avoidance activities.

Sumaila et al. then add in negative non-monetary drivers, namely:

- (iv) the vessel owner’s moral sense, and
- (v) his or her social standing in society.

Thus, if the vessel owner has a strong moral conscience, s/he will be deterred from engaging in what are seen as morally reprehensible activities (Sumaila et al. 2006). We shall modify (iv) to address both moral standing and sense of fairness.
It will be seen that, in the case of high seas fishing and RFMO regimes, the concept of fairness can act as a positive driver of IUU fishing.\(^4\)

The prospective IUU fisher must weigh the revenues from harvesting against its costs, along with the expected costs of penalties incurred, plus his/her pangs of conscience and the impact upon his/her standing in the community. A foreign-flagged vessel engaged in illegal fishing in a coastal state EEZ could expect severe penalties if apprehended. Furthermore, the vessel’s home state could be seriously embarrassed, and could be expected to ensure that the vessel owner shared the consequences. This can be contrasted with a vessel engaged in unregulated fishing in high seas under RFMO jurisdiction, where the vessel flies the flag of a non-member of the RFMO, one which has as yet to ratify the 1995 UN Fish Stocks Agreement.

**DEALING WITH IUU FISHING**

Figure 1 understates the extent and the magnitude of the problem, because it focuses on illegal fishing. Data on unregulated fishing is very limited. That understatement is even more significant given that unregulated fishing presents the most difficult component of IUU fishing overall and, we would suggest, poses the greatest risk to the management of world capture fishery resources. We must now ask what if anything can be done about this threat to the emerging RFMO regime.

In broad terms, we have now seen that two requirements are necessary. The case of Namibia demonstrates what can be done when unregulated fishing becomes illegal fishing. With regard to RFMOs, the first requirement is that the provisions of the 1995 UN Fish Stocks Agreement achieve the status of customary international law. This would, in effect, create the necessary legal transformation in the high seas under RFMO governance. The second general requirement is that the “new member” issue be satisfactorily resolved. Otherwise, it will continue to act as powerful stimulus to unregulated fishing.

More specifically, other actions can be taken and are already underway. The equation of expected net benefits from IUU fishing equation is designed to provide negative incentives, by increasing the penalties, the probability of detection, and (where possible) the shame factor. The Chatham House Report on RFMO governance discusses in detail the measures that can be, and have been, applied (Lodge et al. 2007). Vessels that a RFMO finds engaged in unregulated fishing can be blacklisted. Member states can then be called upon to deny port facilities to all such vessels, and to impose trade restrictions on all fish products arising from blacklisted vessels’ catches.

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\(^4\) This model in equation form can be expressed as: \(\text{ENB} = [ph(A, e, x) \cdot T(e, A)] - \theta(e, A, R)F ± m&f(e) - s(e)\), where \(\text{ENB}\) denotes expected net benefits, where \(h\) denotes the catch from IUU fishing, \(p\) the price of caught fish, \(e\) IUU fishing inputs, \(x\) the biomass of the fish stock being exploited, \(A\) the level of avoidance activity being undertaken, \(R\) the set of regulations in place, \(F\) the penalty faced, if apprehended, \(\theta\) the probability of being apprehended, with \(0 \leq \theta \leq 1\); \(m&f\) the vessel owner’s moral standing and sense of fairness, and \(s\) the vessel owner’s social standing. The expression \(T(e, A)\) denotes the total cost of IUU fishing, excluding penalties incurred (Sumaila et al. 2006).
One obvious lesson is that actions by RFMOs, taken in isolation from one another, are wholly inadequate. If intra-RFMO cooperation is essential for effective capture fishery resource management, inter-RFMO cooperation is also very important. One of the strongest recommendations from the Chatham House Report is that such cooperation be strengthened (Lodge et al. 2007).

Let two examples suffice. The RFMOs of the North Atlantic (NAFO) and the Northeast Atlantic Fisheries Commission (NEAFC) have a joint blacklisting agreement. If a vessel is blacklisted by NAFO, it is automatically blacklisted by NEAFC and vice-versa (Lodge et al. 2007). The second example concerns trade restrictions on IUU-caught fish. Vessel owners will, of course, attempt to circumvent the trade restrictions by “laundering” the catches. This laundering may be countered by catch documentation schemes. These schemes can only hope to succeed through cooperation extending far beyond any one RFMO.

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) provides a second example of what may be done in the face of very difficult circumstances. Their focus is on the potentially very valuable Patagonian toothfish fishery. The species is a slow-growing groundfish, fished primarily in the Antarctic, with most of the final sales of the catch in the Northern hemisphere, particularly the Japanese, American and European markets (Österblom and Sumaila 2010).

By the late 1990s, CCAMLR realized that IUU Patagonian toothfish activity had reached a crisis. It was estimated that as much as 75% of the total catch was accounted for by IUU fishing. A significant portion of this 75% was misreported as “legal” catch taken in FAO Areas 51 and 57 (Indian Ocean), outside of the CCAMLR convention area (Mooney-Seuss et al. 2007). Clearly, unless drastic measures were taken, cooperative management of the resource would collapse. It was argued within CCAMLR that the crisis threatened the very credibility of the RFMO (Österblom and Sumaila 2010).

Action was taken by the CCAMLR member states, but also, importantly, by non-state “players”. Non-governmental organizations (NGOs) from Australia and Norway, for example, undertook intelligence operations and discovered that several vessels engaging in IUU fishing were flying the flags of CCAMLR members. Evidence of this illegal fishing was brought forward, to the embarrassment of those CCAMLR members. The NGOs were joined by fishing companies involved in legal fishing of the resource. The latter arrived in time (2003) to establish the Coalition of Legal

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5. Return to the Sumaila et al. equation cited above. The joint blacklisting increases both the probability of apprehension and the penalties, both monetary and non-monetary.

6. For a thorough and detailed discussion of the actions taken through CCAMLR see: Österblom and Sumaila (2010).
Toothfish Operators (COLTO), which gained observer status within CCAMLR. The NGOs and industry were to play an important role in implementing the catch documentation scheme introduced by CCAMLR in 2000 (Österblom and Sumaila 2010).

The war against IUU fishing required that CCAMLR seek cooperation beyond the “charter” members of CCAMLR. Thus Mauritius and Namibia, for example, were identified as important transhipment centres for IUU-caught toothfish. Both states were invited to become observers at CCAMLR, and eventually to become full members. In addition, the cooperation of the city-states of Hong Kong and Singapore had to be obtained to curb the laundering of IUU-caught toothfish (Österblom and Sumaila 2010).

The crackdown also involved state cooperation, in what amounted to military operations in pursuit of vessels engaged in IUU fishing. Such operations were undertaken by Australia, New Zealand, South Africa, Norway and France, on the one hand, and the South African Development Community states (South Africa, Namibia, Mozambique and Kenya), on the other (Österblom and Sumaila 2010).

To what extent has the war against IUU fishing of Patagonian toothfish succeeded? It is not possible to give precise estimates. That said, in their world survey of the extent and the trends in IUU fishing, Agnew et al. (2009) maintain that illicit catches of Patagonian toothfish reached their peak in the late 1990s and have declined significantly since (Agnew et al. 2009). The war has not yet been won, but it is moving in the right direction.

This experience brings us back to inter-RFMO cooperation. Such cooperation is vital not just for joint blacklisting catch documentation schemes, but also for the sharing of knowledge. The lessons learned by CCAMLR, for example, should be made universally available among RFMOs.

CONCLUSION
IUU fishing continues as a major danger to the sustainable management of the world’s capture fishery resources. Its greatest threat is to the stability of the emerging RFMO regime. While IUU fishing can never be eliminated entirely, it can be reduced to tolerable proportions. The first requirement is that the 1995 UN Fish Stocks Agreement achieve the status of customary international law. Unregulated fishing must, in effect, come to be seen as illegal fishing. The second requirement is that cooperation become the norm not just within individual RFMOs, but between and among RFMOs on a global level. What is required is a marine equivalent of Interpol.

Despite the continued and serious threat, there is no cause for unrelieved pessimism. The experiences of Namibia and of CCAMLR demonstrate what can be done to curb IUU fishing, even under the most difficult of circumstances.

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ON THE CURBING OF ILLEGAL, UNREPORTED AND UNREGULATED (IUU) FISHING

CHAPTER 9

A PLANET FOR LIFE

WORKS CITED


Ministry of Fisheries and Marine Resources (MMFR), Namibia (1994) *Namibia Brief. Focus on Fisheries and Research*. Windhoek, Namibia: Ministry of Fisheries and Marine Resources.


The human community insistently pushes the oceans’ limits, seeking to exploit all of its varied resources – fisheries, fuels, minerals and genetic material – now at the centre of the world economy. All of these developments draw oceans closer to the heart of contemporary human societies.

International governance is challenged by the blurring frontier between the mainland and the ocean, constantly redefined by new technologies, scientific discoveries, industrial demands and most recently, by ecological imperatives. No sea escapes these onslaughts.

This volume takes the reader straight to the heart of how human-ocean interactions, work, and identifies contemporary trends, mechanisms and tools that can influence current strategies and choices.

**Featuring**
- Papers by leading international experts and scholars
- New perspectives through in-depth analyses
- Multiple maps, charts, tables
- A wealth of ideas for specialists and non-specialists alike (policy-makers, administrators, concerned citizens, development professionals, entrepreneurs, journalists, students, and others).