Coastal Communities and the International Fishery Framework

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I. Introduction

The international framework regulating nations and individual fishermen is not deterring overfishing and irresponsible practices affecting coastal communities worldwide. With the rise of the industrial fishing fleet and the exponential growth of the fishing industry, the biomass of the world's fisheries has declined by as much as 80%.[2] As a result of the insufficient international framework, 75% of the world's fish stocks are exploited, overexploited, or depleted.[3] Scientists report that 90% of the world's large ocean fish are commercially extinct and that the world will run out of seafood by 2049.[4]

Often in traditional fishing communities, fish are an important food source, and fishing is a way of life and basis for local cultures. As fish populations decline, stocks move offshore, making them inaccessible to small-scale, artisanal fishermen who do not have equipment to access offshore stocks. The loss of fishing opportunities exacerbates poverty and unravels the social fabric of these communities.

The international framework that regulates fisheries and the fishing industry has serious shortcomings that do not protect traditional fishing communities from commercial fishing pressures. This paper will highlight several deficiencies in the treaties and other agreements that govern the fishing industry.

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[2] Ransom A. Myers and Boris Worm, *Rapid Worldwide Depletion of Predatory Fish Communities*, 423 NATURE 280, 283 (2003).

[3] UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION, THE STATE OF WORLD FISHERIES AND AQUACULTURE 2002, *available at* ftp://ftp.fao.org/docrep/fao/005/y7300e/y7300e01.pdf (last visited Feb. 1, 2009).

[4] Boris Worm et al., *Impacts of Biodiversity Loss on Ocean Ecosystem Services*, 314 SCIENCE 787 (2006).

Section II discusses the international framework that regulates States' rights and responsibilities with regard to fishery resources. Many of the relevant treaties contain antiquated fishery management provisions and enforcement is often limited, especially in developing countries. Regional management regimes lack enforcement authority and set unsustainable total allowable catch quotas, inviting overfishing to continue to the detriment of traditional fishing communities.

Section III describes bilateral fishing treaties that sell domestic fishing rights among nations. These agreements often are not negotiated at arms length and do not contain provisions that protect the rights of artisanal fishermen.

Section IV discusses the results of the deficiencies in this framework: illegal, unregulated, unreported (IUU) fishing. Without adequate enforcement mechanisms in treaties and with limited resources to police vast ocean territories, illegal fishing in developing coastal nations threatens the livelihoods of traditional fishers using sustainable methods. The European Union's (EU) irresponsible fishing practices illustrate the global shortcomings and are used as examples several times throughout this paper.

While Sections I through IV highlight several concerns with the international fishery framework, Section V describes several potential solutions that can protect traditional communities and fisheries worldwide from many of these problems. Nations should enforce existing multi-lateral treaties, employ precautionary approaches to protect their stocks, and give artisanal fishermen priority access to stocks.

II. International Framework for Fisheries Regulation

A. United Nation Convention on the Law of the Sea and Other Treaties

Modern law of the sea is governed by several international agreements, including the 1982 United Nations Convention on the Law of the Sea (UNCLOS), the 1958 Geneva Convention on the Territorial Sea and Contiguous Zone (Territorial Sea Convention), the 1958 Geneva Convention on the Continental Shelf (Continental Shelf Convention), and the 1958 Geneva Convention on the High Seas.[5]

1. Coastal Nations' Rights Over Maritime Resources

[5] Although UNCLOS is generally accepted as customary international law, the treaty did not receive the requisite sixty signatures to come into force until 1994. *See e.g. U.S. v. Alaska*, 503 U.S. 569, 588 (1992); (stating that the US has recognized the customary nature of UNCLOS despite the fact that it has not been ratified); *See e.g. U.S. v. Royal Caribbean Cruises*, 24 F.Supp.2d 155, 159 (D.P.R. 1997) (recognizing the consensus among commentators that UNCLOS reflects customary international law and is therefore binding on signatories and non-signatories alike); *See e.g. Sarei v. Rio Tinto*, 221 F.Supp.2d 1116, 1161 (C.D. Cal. 2002) (stating that UNCLOS is customary because (1) it has been ratified by a large number of countries, (2) UNCLOS was signed by the US President, (3) the Supreme Court recognized it as customary in *U.S. v. Alaska*, and (4) the Puerto Rico district court recognized it as customary in *U.S. v. Royal Caribbean Cruises*).

Under the international framework set forth in these treaties, waters within twelve nautical miles from a nation's shores are considered that nation's territorial sea.[6] A nation has the same sovereign rights over its territorial sea as it has over its land territory, such as the right to control the harvest of its resources, subject to the right of innocent passage.[7] Beyond the territorial sea is the contiguous zone, from twelve nautical miles to twenty-four nautical miles from land.[8] In the contiguous zone, nations may enforce sanitary, fiscal, customs, and immigration laws to prevent infringement of the nation's rights in its territorial sea.[9]

Beyond the contiguous zone is the exclusive economic zone (EEZ). The EEZ extends to 200 nautical miles from land, or approximately to the continental shelf.[10] A nation has the exclusive right to exploit the natural resources of the EEZ, and no other nation may exploit these resources without the express consent of the coastal state.[11] Within the EEZ, nations have sovereign rights "for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or nonliving."[12] Beyond the EEZ are the high seas, which are considered a global commons.[13] The high seas are controlled only by the law of capture and the authority of nations to assert jurisdiction over ships sailing under their flags.[14]

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[6] United Nations Convention on the Law of the Sea (UNCLOS) art. 17, Dec. 10, 1982, 21 I.L.M 1261.

[7] *Id.* The right of innocent passage is defined as follows: "Passage is innocent so long as it is not prejudicial to the peace, good order, or security of the coastal State. Such passage shall take place in conformity with these articles and with other rules of international law." Convention on the Territorial Sea and Contiguous Zone art. 14(4), Geneva, Apr. 29, 1958, 15 U.S.T. 1606, 516 U.N.T.S. 205. While foreign nations have the right to innocent passage through the territorial sea of a coastal nation, the only situation that *ipso facto* negates innocent passage is the violation of that nation's fishing laws. *Id.* at art. 14(5). UNCLOS lists several activities, including fishing, that would be considered prejudicial to peace and therefore negate innocent passage. UNCLOS, art. 19(2) *supra* note 6.

[8] *Id.* at art. 33(2).

[9] *Id.* at art. 33(1)

[10] *Id.* at art. 57. If the continental shelf extends past 200 nautical miles, the coastal country can still control the natural resources in that area. *Id.* at art. 76; *See also* Convention on the Continental Shelf art. 2, Geneva, April 29, 1958, 15 U.S.T. 471, 499 U.N.T.S. 311.

[11] UNCLOS, *supra* note 6, at art. 56, 58; *See also* Continental Shelf Convention, *supra* note 10, at art. 2.

[12] UNCLOS, *supra* note 6, at art. 56(1)(a).

[13] *Id.* at art. 87, 89; Convention on the High Seas art. 2, Geneva, April 29, 1958, 13 UST 2312, 450 U.N.T.S. 82.

[14] UNCLOS, *supra* note 6, at art. 91. U.S. Supreme Court Justice Field described the law of capture as follows:

> [I]t is a general principle of law, both natural and positibe [*sic*], that where a subject, animate or inanimate, which otherwise could not be brought under the control or use of man, is reduced to such control or use by individual labor, a right of property in it is acquired by such labor. The wild bird in the air belongs to no one, but when the fowler brings it to the earth and takes it into his possession, it is his property. He has reduced it to his control by his own labor, and the law of nature and the law of society recognize his exclusive right to it. The pearl at the bottom of the sea belongs to no one, but the diver who enters the waters and

This framework has a variety of shortcomings that indirectly affect traditional coastal communities. It creates large maritime territories, and developing nations do not have the resources to police these areas. Many provisions of the aforementioned treaties are open to interpretation or not adequately enforced. These flaws lead to a variety of problems as discussed in this article.

2. Fishing Under the International Treaties

While UNCLOS, the Territorial Sea Convention, the Continental Shelf Convention, and the Convention on the High Seas create the basic framework for control of natural resources, fishing receives special treatment in these and other international agreements. UNCLOS sets the basis for fisheries management. Nations are required to use the best available scientific information to maintain the maximum sustainable yield (MSY)[15] and are encouraged to "promote the objectives of optimum utilization."[16] In determining the MSY, UNCLOS requires nations to take relevant environmental and economic factors into consideration, "including the economic needs of coastal fishing communities and the special requirements of developing States."[17]

Requiring the use of the best scientific information available is thought to facilitate management decisions by allowing nations to regulate fishing even in the face of scientific uncertainty.[18] UNCLOS article 61(1) states, "The coastal State shall determine the allowable catch of the living resources in its [EEZ]," and nations have total discretion to determine the amount.[19] Because UNCLOS also requires that other nations have access to the surplus stocks of a coastal nation, many nations set total allowable catch at their domestic capacity in order to exclude foreign fleets.[20] Requiring nations to use MSY-based management and set total allowable catches seems to demand that nations manage their

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> brings it to light has property in the gem. He has, by his own labor, reduced it to possession, and in all communities and by all law his right to it is recognized.

Spring Valley Waterworks v. Schottler, 110 U.S. 347, 374 (1884) (Field, J., dissenting).

[15] UNCLOS, *supra* note 6, at art 61(2)-(3). "Maximum sustainable yield refers to the maximum use that a renewable resource can sustain without impairing its renewability through natural growth or replenishment." OECD, *Glossary of Statistical Terms,* http://stats.oecd.org/glossary/ ((last visited Feb. 1, 2009) (*citing* United Nations *Glossary of Environment Statistics, Studies in Methods*, Series F, No. 67, (1997)). In the context of fisheries, maximum sustainable yield refers to "largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions." *Id.*

[16] UNCLOS, *supra* note 6, at art 61, 62(2). Optimum utilization in this context probably refers to the harvesting of the maximum number of fish allowed under MSY estimates. *See* OECD Glossary *supra* note 15 (defining optimum yield as "the amount of fish harvested that . . . is prescribed as such on the basis of the maximum sustainable yield from the fishery").

[17] UNCLOS, *supra* note 6, at art. 61(3).

[18] Donna R. Christie, *It Don't Come EEZ: The Failure and Future of Coastal State Fisheries*, 14 J. TRANSNAT'L L. & POL'Y 1, 10 (2004).

[19] UNCLOS, *supra* note 6, at art 61(1); Christie, *supra* note 18, at 7.

[20] UNCLOS, *supra* note 6, at art 62(2); Christie, *supra* note 18, at 9.

fisheries through quotas, which some experts argue is an inefficient management method that is very difficult to enforce.[21]

3. Problems with Maximum Sustainable Yield (MSY) Based Management

Nations bear the burden of preventing overexploitation within their EEZ; however, it is clear from the language of UNCLOS that fisheries should be managed to "promote the objective of optimum utilization of the living resources."[22] The optimum use of resources refers to the highest and best use from an economic standpoint, thus the inclusion of this idea in UNCLOS encourages nations to exploit their resources to capacity.[23] This reflects the antiquated notion that the seas are inexhaustible and that governments are capable of determining the exact maximum capacity of a fishery.

Despite the fact that MSY has been criticized by fishery biologists for years, it remains in UNCLOS and persists in other fishery treaties and domestic legislation throughout the world.[24] One of the reasons that scientists roundly reject MSY-based fishery management is that estimating the size, resilience, and distribution of fish stocks is a field that is still riddled with scientific uncertainty.

Additionally, some of the key assumptions behind MSY have been disproved. One of these theories is that smaller fish populations are more productive than larger ones, and thus populations should be fished-down to maximize productivity.[25] However, smaller populations become *less* productive through the dispensation effect.[26] MSY also assumes that the number of offspring is not dependent on the number of mothers, because spawning fish such as cod produce over 7 million eggs a year.[27] However, this assumption has also proved to be untrue.[28]

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[21] For example, vessels may fail to report or misrepresent their catches, and it is difficult to police each vessel fishing in a nation's waters. *Id.* at 19.
[22] UNCLOS, *supra* note 6, at art. 62(1); *See also,* art. 61(2)-61(3).
[23] *See* BLACKS LAW DICTIONARY 1587 (8th ed. 2004).
[24] *See e.g.* Willard A. Barber, *Maximum Sustainable Yield Lives On*, N. AMER. J. OF FISHERIES MANAGEMENT, 8(2): 153 (1988) (illustrating that while the popularity of using maximum sustainable yield to forecast long term stock yield had declined significantly among scientists, its use among policy makers continues); *See e.g.* Christie, *supra* note 18, at 11-14.
[25] *See e.g.* COMMITTEE ON FISHERIES, EUROPEAN PARLIAMENT, REPORT ON THE IMPLEMENTATION OF SUSTAINABLE FISHING IN THE EU ON THE BASIS OF MAXIMUM SUSTAINABLE YIELD 8, A6-0298/2007, 2007 (Eur. Parl. Doc. (PE 378.735v03-00)).
[26] *See* Sherrylynn Rowe et al., *Depensation, probability of fertilization, and the mating system of Atlantic cod (Gadus morhua L.),* ICES JOURNAL OF MARINE SCIENCE: JOURNAL DU CONSEIL 2004 61(7):1144-1150 (2004), *available at* http://icesjms.oxfordjournals.org/cgi/content/full/61/7/1144 (last visited Feb. 2, 2009). The dispensation effect, also called the Allee effect, probably occurs because "(a) fertilization rate declines with abundance and (b) variance in fertilization rate increases as population size declines." *Id.*
[27] Robert Kunzig, *The Twighlight of Cod – Atlantic Cod in Danger of Extinction*, DISCOVER (Apr. 1995), *available at* http://discovermagazine.com/1995/apr/twilightofthecod489 (last visited Feb. 2, 2009); CHARLES CLOVER, THE END OF THE LINE: HOW OVERFISHING IS CHANGING THE WORLD AND WHAT WE EAT 108 (The New Press, 2006).
[28] *Id.*

MSY calculations also cannot take into account the various connections environmental factors and food web interactions play in affecting population size and resiliency.[29] Because MSY encourages nations to fish to the maximum capacity of the fishery, by definition, if the MSY is overestimated, stocks will be fished at a faster rate than they can reproduce.[30] Allowing management based on the best available scientific information in a field of widespread scientific uncertainty permits nations to manage stocks and set quotas based on woefully inadequate information, leading to high quotas and depleted stocks.

For example, fishery management based on MSY was to blame for the catastrophic collapse of the north Atlantic cod industry in 1992. The commercial cod fisheries off of Newfoundland and the northeastern United States began operations 500 years ago, and shaped the culture and economies of New England and Newfoundland.[31] It was not until the second half of the 20th Century that the amount of cod harvested began to outpace population growth, and catches began to decline.[32] As a result, Canada and the US extended their EEZs in the north Atlantic to the current borders in 1977.[33]

However, instead of implementing a sustainable management regime, both the US and Canada encouraged the growth of their own commercial cod industries while scientists made several crucial mistakes in the estimation of cod stocks.[34] Scientists in Canada's Department of Fisheries (DFO) estimated that future stock recruitment would be the same as the average of the 1960s and 1970s.[35] However, populations during that period were in decline due to fishing pressure.[36] In addition, the DFO assumed that catch data reflected populations across the seabed, as opposed to concentrated populations of spawning or feeding schools of fish.[37] Thus scientists estimated that cod populations had declined by 70% since the 1960s, when in reality they had declined by 90%.[38]

In the 1980s, when the DFO estimated that fishermen were bringing in 16% of adult cod populations every year, they were catching closer to 60%.[39] Catch quotas were based on these faulty numbers, and by the time DFO scientists realized their mistakes in the late 1980s, political pressures delayed reducing the catch quotas.[40] A former DFO scientist said, "[Commercial catch rate data] were not very clear, but they did show a decline. The

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[29] *See* Richard W. Zabel et al., *Ecologically Sustainable Yield,* 91 AMERICAN SCIENTIST 150, 153 (2003) (illustrating the complexity of the food web relating to cod and herring).
[30] *See,* OECD Glossary, *supra* note 15.
[31] JAKE C. RICE ET AL., INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA, RECOVERING CANADIAN ATLANTIC COD STOCKS: THE SHAPE OF THINGS TO COME? (CM 2003/U:06).
[32] ALICE CASCORBI AND MELISSA M. STEVENS, MONTEREY BAY AQUARIUM, SEAFOOD WATCH SEAFOOD REPORT: ATLANTIC COD, NORTHEAST REGION (US AND CANADA) 14 (2004), *available at* http://www.montereybayaquarium.org/cr/cr_seafoodwatch/content/media/MBA_SeafoodWatch_AtlanticCodReport.pdf (last visited Feb. 2, 2009); Kunzig, *supra* note 27.
[33] *Id.*; Clover, *supra* note 27, at 113.
[34] Kunzig, *supra* note 27; Clover, *supra* note 27, at 113.
[35] Kunzig, *supra* note 27.
[36] *Id.*
[37] Clover, *supra* note 27, at 112.
[38] *Id.*
[39] *Id.* at 113.
[40] Rice, *supra* note 31, at 3; Kunzig *supra* note 27; Clover, *supra* note 27, at 114.

analysis of them was completely botched. So you were already taking out too many fish, but because of the error you were taking out tremendously too many."[41]

With overly optimistic population estimates, large-scale bottom trawling vessels were allowed to continue operations. The vessels dragged nets across the seafloor, damaging cod habitat, and practiced high-grading, discarding smaller dead or dying fish when larger ones are caught.[42] On the other hand, most small-scale fishermen use traps and hook and line gear within the territorial sea. These practices are much less damaging to habitat because the gear does not drag along the sea floor. Hook and line fishing also has lower bycatch rates because cod can be targeted specifically, whereas trawls catch virtually all fish in their path.[43]

Although Canadian cod catches declined through the 1980s, they remained high into 1992, when the stocks suddenly collapsed.[44] With cod populations decreased by 99% of their historic abundance, Canada closed its cod fishery, resulting in 30,000 lost jobs.[45] The next year the US followed suit and closed large portions of the Grand Banks, where most US cod stocks are caught, to ground fishing.[46]

These closures caused the inshore fishermen, who caught the least, to suffer the most. In poor, rural Newfoundland communities, commercial fishing or fish processing was the only available livelihood.[47] The large-scale fishermen and processors were able to shift fishing effort to shrimp and crab, continuing profitability.[48] On the other hand, smaller-scale fishermen often did not have the resources to purchase new equipment, or vessels large enough to travel offshore where crab and shrimp stocks are located.[49]

Cod populations were expected to bounce back quickly when a moratorium was put in place in 1992, and the Canadian government spent $3.5 billion over the next three years in assistance to fishermen for vessel and license retirement, social assistance, and retraining.[50] Most participants said that they intended to return to fishing as soon as it was possible to do so.[51] When the financial program was over in 1995, contrary to the recommendations of DFO scientists, the government reopened a small-scale inshore fishery, which was closed again in 2003 after DFO scientists concluded "serious harm" had been done to stocks.[52]

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[41] Statement attributed to Ransom Myers. Kunzig, *supra* note 27.
[42] Cascorbi, *supra* note 32, at 12.
[43] *Id.* at 2, 13; Clover, *supra* note 27, at 123.
[44] Cascorbi, *supra* note 42, at 7; Kunzig, *supra* note 27; Clover, *supra* note 27, at 125.
[45] Kunzig, *supra* note 27; Clover, *supra* note 27, at 144, 122.
[46] Kunzig, *supra* note 27. The US has since reopened its cod fishery, but smaller stocks and stringent restrictions have caused catches to remain low. Cascorbi, *supra* note 32, at 7.
[47] *See, e.g.,* Clover, *supra* note 27, at 120-121.
[48] *Id.* at 125, 130-131.
[49] *Id.* at 130.
[50] Rice, *supra* note 31, at 6; Clover, *supra* note 27, at 125.
[51] Rice, *supra* note 31, at 6.
[52] Clover, *supra* note 27, at 126; Rice, *supra* note 31.

Population growth has taken place for some inshore stocks; however, the fishery is not healthy enough overall to allow commercial fishing of cod to resume.[53] As a result, local inshore fishermen set nets for other types of fish, such as lumpfish or winter flounder, and catch cod, facing a fine of $440 for keeping a single cod.[54] Many former cod fishermen fish for crab, lobster, or lumpfish part of the year, and collect unemployment for the rest.[55]

Some towns are focusing on tourism to boost their economies, but unemployment is still rampant.[56] Many fishermen hold on to the hope that the fishery will be reopened, although scientists contend that it is unlikely.[57] Climate change is compounding the problem by allowing species to move north and fill the ecological void caused by the overfishing of cod, making the recovery of cod more even doubtful.[58] Seven of nine Canadian cod stocks are in ongoing decline.[59] One scientist said, "There is no indication that recovery [of cod stocks] has begun or is even possible."[60] While damaging fishing practices, bureaucratization, and commercialization of government agencies were partially to blame for the collapse of North Atlantic cod, management based on MSY, as required under the international framework, was a major contributing factor.[61]

Instead of allowing management based on MSY and the best available science, treaties should require implementation of the precautionary principle in the face of scientific uncertainty. The precautionary principle is the notion that "[w]here there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation," and is championed in various environmental treaties, such as the 1992 Rio Declaration.[62] Under the precautionary principle, if the status of a commercial fish stock was uncertain or unknown, catch quotas would be set low as a safeguard against accidental overfishing.

4. Subsidies

Another major flaw in the international treaty framework is that nations are not prohibited from subsidizing their fishing fleets. Subsidies are not explicitly prohibited in UNCLOS, the Territorial Sea Convention, or the Contiguous Sea Convention, and are explicitly permitted

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[53] Clover, *supra* note 27, at 124; Rice, *supra* note 31.
[54] Clover, *supra* note 27, at 123.
[55] *Id.* at 125-126.
[56] *Id.* at 120-121.
[57] *Id.* at 129; Rice, *supra* note 31; Cascorbi, *supra* note 32.
[58] *See* NOVA MIESZKOWSKA, DAVID SIMS AND STEVE HAWKINS, MARINE BIOLOGICAL ASSOCIATION OF THE UK, FISHING, CLIMATE CHANGE AND NORTH EAST ATLANTIC COD STOCKS (May 2007), *available at:* http://www.wwf.org.uk/filelibrary/pdf/cc_cod_report.pdf (last visited Feb. 2, 2009).
[59] Cascorbi, *supra* note 32, at 10.
[60] Statement attributed to Alastair O'Rielly, Fisheries Association of Newfoundland and Labrador. Clover, *supra* note 27, at 130.
[61] Peter A. Shelton, Department of Fisheries and Oceans, Canada, *Science and Sustainable Fisheries Management in DFO*, paper presented at the Strengthening Science to Protect Canadians Symposium Gatineau Quebec, 6-7 September 2007, *available at* www.hyper-media.ca/pipsc/downloads/presentations/03-shelton-e.pdf (last visited Feb. 2, 2009).
[62] Rio Declaration on Environment and Development Principle 15, June 13, 1992, 31 I.L.M 847.

by the World Trade Organization.[63] Wealthy countries such as the US, Japan, and the EU spend up to an estimated $74 billion in annual fishing subsidies.[64] A subsidy is a grant, usually made indirectly, to an industry whose promotion is thought to be in the public interest.[65] The WTO considers a subsidy to exist if a benefit is conferred by either a financial contribution by a government or any public body; a government practice involving a direct transfer of funds, potential direct transfers of funds, or liabilities; or any form of income and price support.[66] Government fishing subsidies to distant water fishermen can include "low interest loans, tax exemptions, vessel buy-back schemes, direct payments as income, and price support schemes."[67]

Allowing subsidies creates an unsustainable global capacity that causes overfishing by artificially decreasing the costs and price of fishing for producers and consumers when prices should be increasing.[68] It is estimated that the world's fishing fleet capacity is 250% larger than what the oceans can sustainably produce, and fishing subsidies play a large part in maintaining that overcapacity.[69]

In a traditional, unsubsidized fishing industry, if the catches are good for a number of years, people generally move into coastal communities and join the fishing industry. When catches decline, people migrate out of the area. Thus, the capacity of an artisanal fishing industry is dictated by the size of stocks. In a subsidized system, instead of dropping out of the industry when stocks decline, fishing fleets remain profitable through government payments and fishing capacity does not decrease with fish stocks. As stocks are overfished, fishing becomes less profitable and the only fleets that can survive in the industry are those that receive subsidies, which are generally large-scale fleets from developed nations. This money often goes to technological advances that increase the fishing capacity of vessels, allowing them to increase their catches in the face of declining stocks. This system also keeps the price of fish artificially low, when prices should be rising due to declining stocks.[70]

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[63] World Trade Organization, Uruguay Round Table Agreement on Subsidies and Countervailing Measures art 1, 1994, *available at* http://www.wto.org/english/docs_e/legal_e/24-scm_01_e.htm#ArticleI (last visited Feb. 2, 2009).

[64] COMMODITY POLICY AND PROJECTIONS SERVICE, COMMODITIES AND TRADE DIVISION, FAO, IMPROVING THE VALUE AND EFFECTIVE UTILIZATION OF AGRICULTURAL TRADE PREFERENCES: A CONCEPTUAL FRAMEWORK FOR CASE STUDIES OF THE IMPACT OF TRADE PREFERENCES IN AGRICULTURAL PRODUCTS (2003), *available at* ftp://ftp.fao.org/docrep/fao/006/y4963E/y4963E00.pdf (last visited Feb. 2, 2009).

[65] BLACKS LAW DICTIONARY 1469 (8th ed. 2004).

[66] WTO, *supra* note 63, at art 1.

[67] Roman Grynberg, *WTO Fisheries Subsidies Negotiations: Implications for Fisheries Access Arrangements and Sustainable Management*, MARINE POLICY 27(6): 499-511 (2003).

[68] Nancy Nelson, *International Concern for the Sustainability of the World's Fisheries: United Nations Efforts to Combat Over-Fishing and International Debate Over State Fishing Subsidies*, 1999 COLO. J. INT'L ENVTL. L. Y.B. 157, 158 (1999).

[69] WORLD WILDLIFE FUND, TURNING THE TIDE ON FISHING SUBSIDIES: CAN THE WORLD TRADE ORGANIZATION PLAY A POSITIVE ROLE? 4 (2002), *available at* http://assets.panda.org/downloads/turning_tide_on_fishing_subsidies.pdf (last visited Feb. 2, 2009) (*citing* GARETH PORTER, ESTIMATING OVERCAPACITY IN THE GLOBAL FISHING FLEET (WWF 1998)).

[70] *See, e.g.,* Nelson, *supra* note 68, at 160.

A prominent fishery biologist said of this scheme, "The only equilibrium in a subsidized system is zero fish. The system is set up to fail."[71]

The case of the North Atlantic cod collapse can also serve as an example of the unsustainability of a subsidized system. Some scientists attribute unemployment insurance as one of the main reasons leading to the closing of the cod fishery.[72] Acting as a subsidy, the payments allowed fishermen to stay in Newfoundland when stocks declined.[73] After the Canadian government's financial assistance program for former cod fishermen, the effective fishing capacity was 160% of what it had been prior to the stock collapse.[74] The unemployment insurance continues to ensure that there is a fully equipped fishing fleet prepared to decimate stocks again as soon as the fishery is reopened.[75] While subsidies eventually harm everyone associated with a fishery, those who feel the effects first are unsubsidized fishers in developing nations who cannot afford to compete with large-scale, subsidized Western fleets.

B. United Nations Food and Agriculture Organization

The UN's relevant regulating body is the Food and Agriculture Organization's (FAO) Fisheries and Aquaculture Department. The FAO's main functions are to "collect, analyze, interpret and disseminate information relating to nutrition, food[,] and agriculture;" provide international and national policy recommendations; and to provide technical assistance to nations.[76] The FAO is the only institution that compiles global fisheries statistics.[77] This is an important role because the organization has the ability to give an overall picture of global fish stocks and recommend methods to improve sustainability of the fishing industry.

A commonly cited shortcoming of this framework, however, is that the FAO must rely on member nations' catch reports and those nations must rely on individual vessels' reports.[78] Both the individual vessels and the reporting states have incentives to underestimate catches in order to exceed their quotas set under different regional agreements. Even if the reporting nation wishes to report honestly, its fishermen may not. This leads to systematic violations of catch quotas, both by complacent nations and dishonest fishermen.

Although it is likely that most nations underreport their catches, China has grossly overestimated its catches.[79] This compounds the difficulty of estimating total global catch.

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[71] Statements attributed to Ransom Myers, fisheries biologist, Dalhousie University, Halifax, Canada. Clover, *supra* note 27, at 133.
[72] Clover, *supra* note 27, at 133.
[73] *Id.*
[74] Rice, *supra* note 31, at 6.
[75] Clover, *supra* note 27, at 133.
[76] U.N. FOOD AND AGRICULTURE ORGANIZATION CONST. art. 1, *available at* http://www.fao.org/docrep/009/j8038e/j8038e01.htm#P8_10 (last visited Feb. 2, 2009).
[77] Reg Watson and Daniel Pauly, *Systematic Distortions in World Fisheries Catch Trends*, NATURE 414: 29 (Nov. 2001).
[78] *Id.*
[79] *Id*; FAO FISHERIES DEPARTMENT, FISHERY STATISTICS: RELIABILITY AND POLICY IMPLICATIONS (2002), *available at* http://www.fao.org/DOCREP/FIELD/006/Y3354M/Y3354M00.HTM. The

Because China's catches represent a large percentage of global catches, China's overestimations masked a general global decline of fishery catches which likely began in 1988.[80] This in turn led to higher global catch quotas.[81]

The FAO has a variety of agreements that can serve to protect fisheries. For example, the Code of Conduct for Responsible Fisheries (FAO Code of Conduct) suggests responsible fishing practices that will protect fisheries, and the International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing (IPAO-IUU) addresses the IUU fishing problem.[82] The FAO Code of Conduct specifically addresses the rights of subsistence fishermen. It stipulates that "[s]tates should appropriately protect the rights of fishers and fishworkers, *particularly those engaged in subsistence, small-scale and artisanal fisheries*, to a secure and just livelihood, as well as preferential access, where appropriate, to traditional fishing grounds and resources in the waters under their national jurisdiction."[83]

The IPOA-IUU encourages developed nations to "support training and capacity building and consider providing financial, technical and other assistance to developing countries, including in particular the least developed among them and small island developing States" to help them comply with international obligations and combat illegal fishing.[84] However, without the requisite number of signatories, neither the FAO Code of Conduct nor the IPOA-IUU has entered into force; therefore, both remain voluntary. In fact, the FAO has no authority to compel action by UN member states to adopt any policies or agreements.[85] Uncertainty pervades FAO policy recommendations as well. While the organization advocates what are widely considered the best management practices, such as the precautionary approach and ecosystem management, the FAO acknowledged in a 1994 report, "[I]n practice, we do not yet know how to manage ecosystems."[86]

While the shortcomings of the international framework and FAO persist, overfishing will continue on a global scale. The Director of the FAO's Fisheries and Aquaculture Department acknowledged that currently "there are too many boats chasing too few fish."[87]

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overestimated catches in China are thought to be a result of the socialist economy: the entities in charge of monitoring the economy are staffed with people who are promoted based on production increases. Watson, *supra* note 77.

[80] *Id.*

[81] *Id.* Because the declining state of fisheries was unknown for several years, governing bodies set quotas assuming that stocks were healthy, thus overestimating the amount of fish that could be sustainably harvested.

[82] FAO, Code of Conduct for Responsible Fisheries (1995); FAO, International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing (IPOA-IUU) (2001).

[83] Code of Conduct, *supra* note 82, at art. 6.18.

[84] IPOA-IUU, *supra* note 82, at art. V § 85.

[85] FAO Const., *supra* note 76, at art. 14.

[86] FAO, THE PRECAUTIONARY APPROACH TO FISHERIES WITH REFERENCE TO STRADDLING FISH STOCKS AND HIGHLY MIGRATORY FISH STOCKS 12, UN Doc. FIRM/C871, FAO Fisheries Cir. No. 871 (1994).

[87] Statement attributed to Grímur Valdimarsson, director of the FAO's fishery division. John W. Miller, *Offshore Disturbance: Global Fishing Trade Depletes African Waters,* THE WALL STREET J., July 18, 2007, *available at* http://online.wsj.com/article/SB118470420636969282.html (last visited Feb. 2, 2009).

While scientific uncertainty persists and without a mechanism to ensure member states' accurate reporting and compliance with responsible fishing practices, the FAO's efforts will not solve the problems facing the world's fisheries or ease the plight of coastal small-scale fishermen.

C. Regional Organizations

There are a variety of international regulating bodies aimed at protecting fish stocks. Regional Advisory Councils (RACs) and Regional Fishery Management Organizations (RFMOs) are charged with protecting the region's fishing industry and/or a specific commercially important species through a variety of mechanisms. RACs are advisory bodies with no authority to force nations to act. Much like the FAO, RACs provide their member governments with science-based policy information such as total allowable catch limits, appropriate fishing gear and practices, etc. Without any enforcement authority or mechanisms to encourage governments to adopt their recommendations, RACs have little control over regional fishing practices.[88]

RFMOs are much more powerful organizations in that they are treaty-based and can place binding requirements such as quotas and fishing gear restrictions on member states. Nevertheless, they do not carry the requisite authority to protect traditional coastal communities from powerful international fishing pressures. RFMOs struggle to conserve marine species by confronting highly efficient fleets that methodically decimate fish stocks.

Typically, RFMOs are organizations of vested interests: they are made up of the member states that they seek to regulate. Because signatories are often loath to forfeit sovereignty over their natural resources to RFMOs, enforcement provisions in treaties are very weak and inefficient.[89] Member states can also opt out of provisions.[90] Additionally, they have no authority over non-signatories and can rarely regulate stocks in the high seas.[91]

RFMOs set fishing quotas in the face of scientific uncertainty and in an environment of vested interests that press for high quotas. As a result, fishery quotas are often set higher than is sustainable for fish populations. For example, the International Council for the Exploration of the Sea, a research organization, recommended that the quota for blue

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[88] For example, the creation of RACs in the European Union was accompanied by much anticipation; however, in practice, the European Commission was hesitant to adopt their policies or heed their recommendations. David Gray, *Regionalisation in Fisheries Governance, an Empty Vessel or a Cornucopia of Opportunity*, 86 in REVIEWS: METHODS AND TECHNOLOGY IN FISH BIOLOGY AND FISHERIES: PARTICIPATION IN FISHERY GOVERNANCE (ed. Tim S. Gray, Springer 2005).

[89] Anna Vinson, *Deep Sea Bottom Trawling and the Eastern Tropical Pacific Seascape: A Test Case for Global Action*, 18 GEO. INT'L ENVTL. L. REV. 355 (2006).

[90] Deep Sea Conservation Coalition, Policy Paper, *A Net With Holes: The Regional Fisheries Management System* 3 (2004), *available at* http://www.savethehighseas.org/publicdocs/RFMO.pdf (last visited Feb. 2, 2009).

[91] Although fishing on the high seas rarely affects artisanal fishing communities, in the case of some highly migratory species, such as bluefin tuna, fishing on the high seas can affect their near-shore availability. *See, infra* notes 103-116 and accompanying text. Currently, the Commission for the Conservation of Antarctic Marine Living Resources is the only RFMO that has acted to protect deep-sea resources. Vinson, *supra* note 89, at 371.

whiting, one of the most heavily fished species in the world, be set at one million tons.[92] Despite this recommendation, the Northeast Atlantic Fisheries Commission, an RFMO that manages various commercially important species, set the 2007 total allowable catch at 1,847,000 tons, and agreed to a catch limit of 1,150,514 tons in 2008.[93] Once set, if quotas are violated, RFMOs usually cannot adequately punish violators or force member nations to close their fisheries.[94] Unrealistic quotas and lack of enforcement allow large commercial fleets to deplete stocks that traditional communities rely on for survival.

The state of the Atlantic bluefin tuna stock is an example of the disastrous effects on artisanal fishing that can result from high catch quotas set by RFMOs. Bluefin tuna have been the center of political controversy for decades, due to their high market value and endangered status. Despite the fact that bluefin appear on the International Union for the Conservation of Nature's (IUCN) Redlist of Threatened Species,[95] it continues to be commercially sold. This is in part due to the high prices of these fish at market. Recently in Japan, bluefin sold at $39 a kilogram, and large, fresh fish have sold for up to $89,000.[96]

The International Commission for the Conservation of Atlantic Tunas (ICCAT) is the RFMO that sets tuna quotas for member states.[97] ICCAT has been criticized by scientists and conservationists for its unrealistic catch quotas.[98] Since the ratification of the International Convention for the Conservation of Tuna establishing ICCAT in 1969, the organization has utterly failed to prevent the decimation of the bluefin tuna. In the 1990s, it was estimated that the Atlantic bluefin population had decreased to less than 10% of 1975 levels.[99] Despite declining populations, consumer demand continues to increase the value of catches. Thus, quotas remain high, representing more and more of the total

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[92] Information Center for the Icelandic Ministry of Fisheries, *Blue Whiting* (2007), *available at* http://old.fisheries.is/stocks/bluewhiting.htm (last visited Feb. 2, 2009).

[93] *Id;* Agreed Record of Conclusions of Fisheries Consultations Between Iceland, The European Community, the Faroe Islands and Norway on the Management of Bluewhiting in the North-East Atlantic in 2008, London, Oct. 23, 2007, *available at:* http://www.neafc.org/news/docs/blue_whiting_2008_agreedrecord_signed.pdf (last visited Feb. 2, 2009).

[94] Vinson, *supra* note 90.

[95] International Union for the Conservation of Nature, *2007 IUCN Red List of Threatened Species*, *available at* http://www.iucnredlist.org/ (last visited Feb. 2, 2009).

[96] Tokyo-Tsukiji Market Prices, *available at:* http://www.marunaka-net.co.jp/maruna_e/pricese.htm (last visited June 12, 2008) (giving the average price in yen per kilogram at Japan's largest fish market on a daily basis); Clover, *supra* note 33, at 28.

[97] Currently ICCAT has 45 contracting parties, including the US, Japan, Panama, France, Spain, and Italy. ICCAT, *About ICCAT,* http://www.iccat.int/en/ (last visited Feb. 2, 2009).

[98] *See, e.g.,* Clover, *supra* note 27, at 35-38; DAVID NEMERSON AND CARL SAFINA, CONSIDERATIONS FOR LIMITED ENTRY IN THE BLUEFIN TUNA FISHERY: CATCH HISTORIES FROM 1990 TO 1993 (1994).

[99] Eugene H. Buck, Congressional Research Service, *Atlantic Bluefin Tuna: International Management of a Shared Resource* (Mar. 8, 1995), available at http://www.ncseonline.org/NLE/CRSreports/Marine/mar-5.cfm (last visited Feb. 2, 2009) (*citing* Nemerson, *supra* note 98, at 229). ICCAT estimates that in the 1990s the Atlantic bluefin tuna stock was at 21% of its 1975 levels. ICCAT, REPORT OF THE 2006 ATLANTIC BLUEFIN TUNA STOCK ASSESSMENT SESSION, SCRS /2006/013 (2006), *available at* http://www.iccat.int/Documents/SCRS/DetRep/DET_bft.pdf (last visited Feb. 2, 2009).

populations of bluefin tuna each year.[100] In 2004 and 2006, the United States was unable to fill its total allowable bluefin catch, leading ICCAT to speculate "that the estimate of stock status from the 2006 assessment *may be optimistic*."[101] ICCAT set 2007 Atlantic bluefin quotas for 32,000 tons, despite the fact that its own scientists recommended a quota of 26,000 tons.[102]

The overfishing of bluefin tunas has seriously affected southern Spanish traditional communities that have fished for bluefin tuna using *almadrabas* for hundreds of years.[103] The basics of this fishing method were developed by the Phoenicians about three thousand years ago.[104] An *almadraba* is a trap made of anchored nets and floats that take two months to set up and are used for three months in the summer.[105] The nets are made of hemp and have large panels to allow juvenile bluefins to escape, and because this method is selective, fishermen can decide which tuna to let live and which to harvest.[106] In contrast, the large offshore purse seining fleets use helicopters to direct boats to spawning shoals, and can catch as many fish in one day as an *almadraba* catches all season.[107] It is doubtful that these commercial vessels respect the 22-pound minimum weight for tuna, and as a result many fish are harvested before ever having a chance to spawn.[108]

In 2007, European tuna fishermen filled the year's EU catch quotas under ICCAT and were ordered by the European Commission to stop fishing in mid-September.[109] France, Cyprus, Greece, Italy, Malta, Portugal and Spain were notified by the European Commission of their failure to report official data on catches, and France and Italy were warned of shortcomings in their controls.[110] Fearful that overfishing would lead to the collapse of the

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[100] Buck, *supra* note 99.

[101] ICCAT 2006 Bluefin Report, *supra* note 99 (*emphasis supplied*). The report stated,

> [T]he failure of [the US] fishery to take about a third of its [total allowable catch], particularly for a valuable species like bluefin tuna, is a reason for concern. The continuation of this trend in 2006, and probably 2007, and other new evidence reviewed by the committee, heightened concern that the estimate of stock status from the 2006 assessment may be optimistic. *Id.*

[102] Clover, *supra* note 27, at 35.

[103] *Id.*

[104] *Id.* at 31.

[105] *Id.* The traps are set in the summer because bluefin tuna travel into the Mediterranean Sea in the summer to spawn.

[106] *Id.* at 31-32.

[107] *Id.* at 32.

[108] *Id.*

[109] Press Release, European Commission, *Bluefin tuna fisheries: Commission opens infringement procedures against 7 Member States*, September 26, 2007, *available at* http://ec.europa.eu/fisheries/press_corner/press_releases/com07_62_en.htm (last visited Feb. 2, 2009) (announcing the closure of the bluefin tuna fisheries and the infringement proceedings brought against France, Cyprus, Greece, Italy, Malta, Portugal, and Spain); Stephen Castle, *Overfishing of Tuna Prompts Threat of Legal Action in Europe*, THE INTERNATIONAL HERALD TRIBUNE, September 27, 2007, *available at* http://www.iht.com/articles/2007/09/27/news/tuna.php (last visited Feb. 2, 2009).

[110] Failure to respond to these notices could result in a suit before the European Court of Justice. The seven countries were required to respond within 30 days. *Infringement Procedures, supra* note 109; Castle, *supra* note 109.

stock, the bluefin fishery was closed to the purse seine fleets of Cyprus, France, Greece, Italy, Malta, and Spain in June of 2008, due to "failures of implementation [that] include, but are not limited to: unreliable catch declarations, failure to respect reporting deadlines, delays in submission of fishing plans, and failure to communicate satellite data on the movements of the vessels."[111]

The Commissioner for Fisheries and Maritime Affairs specifically addressed the *almadrabas* when announcing the closure: "This decision to close the fishery . . . is not only necessary to protect the stock and to respect the Community's international obligations. It is also vital to ensure fairness with the small-scale artisanal fleet that has not yet fished its quota."[112] It should be noted that these enforcement proceedings and closures are being implemented by the European Commission under EU legislation, and not by ICCAT itself.[113] These actions do, however, reflect the emerging international realization that tuna stocks must be protected immediately and rigorously if they are to recover and remain economically viable.

Due to high quotas and the commercial sector's unsustainable fishing practices and systematic violation of catch quotas, *almadraba* catches have been steadily decreasing as tuna populations plummet. A few hundred years ago, tuna were so plentiful that *almadrabas* could be set from shore, while today, they are set up offshore.[114] The director of one *almadraba* fleet reported that while 5,000 bluefin were caught in 1999, less than 900 were landed in 2005.[115] The EU has done little to protect the *almadrabas*, who have requested tougher bluefin quotas.[116] That fishermen themselves are demanding more stringent catch controls and tougher regulations on their own industry is a reflection of the dire situation facing Atlantic bluefin populations.

III. Bilateral Fishery Agreements

Bilateral fishery agreements also tend to put artisanal fishermen at risk. These agreements are a typical way for one nation to gain fishing rights in the waters of another nation. The EU has contracted with various African nations including Senegal, Madagascar, Angola, Mauritania, and the Ivory Coast.[117] Typically, these bilateral

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[111] Press Release, European Commission, *Statement from Commissioner Borg: "Closing the Bluefin tuna fishery in order to secure its future,"* June 17, 2008, *available at* http://ec.europa.eu/fisheries/press_corner/press_releases/2008/com08_47_en.htm (last visited Feb. 2, 2009).

[112] *Id.*

[113] *Infringement Procedures, supra* note 109.

[114] Clover, *supra* note 27, at 31.

[115] *Id.* at 32.

[116] *Id.* at 37.

[117] Protocol setting out the fishing opportunities and the financial contribution provided for in the Agreement between the European Economic Community and the Government of the Republic of Senegal on fishing off the coast of Senegal for the period from 1 July 2002 to 30 June 2006, EU-Senegal, 2001, L 349/46; Protocol defining for the period 1 January 2004 to 31 December 2006 the tuna fishing opportunities and the financial contribution provided for in the Agreement between the European Economic Community and the Democratic Republic of Madagascar on fishing off Madagascar, EU-Madagascar, 2004; Agreement in the form of an exchange of letters concerning the provisional application of the Protocol setting out, for the period from 3 August 2002 to 2 August

agreements are between developing and developed nations, with the poorer nation selling fishing rights to the richer. These agreements can often be weighted against developing nations, who have less bargaining power. For example, one third of Mauritania's national budget comes from payments from the EU stemming from a bilateral fishery agreement.[118] With bilateral fishery agreements comprising such a large percentage of government resources, developing nations must rely heavily on the sale of their fishing rights and often, this results in agreements that are not negotiated at arms length. Additionally, the money exchanged through these agreements often does not benefit the coastal fishermen who are harmed by the foreign fishing fleets, but rather goes to other government projects and expenses.

Further, bilateral agreements often do not require that responsible fishing practices be used. Many non-governmental organizations (NGOs) have been encouraging the EU to require more responsible practices, such as prohibiting their distant fishing fleets from discarding unwanted catch.[119] These organizations believe that reducing discards "is particularly important in the coastal zone of tropical countries, where wasteful practices directly affect local coastal communities, who depend on fishing for their livelihoods."[120] Developing countries that allow foreign fishing vessels in their waters need "to be convinced of the necessity" of stopping the unnecessary depletion of their resources.[121] Requiring that foreign vessels use responsible fishing practices is yet another tool that developing countries fail to utilize to protect their coastal fishing communities.

The European Community has recognized the "significant positive potential" of fisheries to add "economic and social value" to developing nations and the importance of "the repatriation of this value-added between developing and developed countries."[122] Despite this knowledge, fishing subsidies and biased bilateral agreements with poor African nations continue in the EU, whose member nations account for 85,000 fishing vessels.[123] According

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2004, the fishing opportunities and the financial contribution provided for by the Agreement between the European Economic Community and the Government of the Republic of Angola on fishing off Angola, EU-Angola, 2002, L 351/91; 2001 EU-Mauritania Treaty, *infra* note 133; Protocol establishing the fishing rights and financial compensation provided for in the Agreement between the European Economic Community and the Republic of Côte d'Ivoire on fishing off the coast of Côte d'Ivoire, EU-Ivory Coast, 1994.

[118] Miller, *supra* note 87.

[119] Coalition for Fair Fisheries Arrangements, Joint NGO Position on the EU Proposed Policy to Reduce Discards (2007), *available at*: http://www.illegal-fishing.info/uploads/CFFA_discards_-_FPA_issues.pdf (last visited Feb. 2, 2009). This position has been taken by the following NGOs: Bird Life International, Greenpeace International, Coalition for Fair Fisheries Arrangements, International Collective in Support of Fishworkers, Oceana, North Sea Foundation, the EU Fisheries Secretariat, and European Bureau for Conservation & Development. Discarding is done mainly for two reasons: high-grading (discarding smaller fish to make room for larger fish) or getting rid of unwanted catch (bycatch). *Id.*

[120] *Id.*

[121] *Id.*

[122] European Commission Communication (2000) 724 to the Council and the European Parliament, Mr. Nielson in agreement with Mr. Fisher, *available at* http://www.seaaroundus.org/Dakar/scienceDocs/Doc_Gen_02-EN.pdf (last visited Feb. 2, 2009); *See also,* Council of the European Union Resolution, Brussels, Nov. 8, 2001.

[123] Miller, *supra* note 87.

to a researcher at the University of British Colombia, fish in West African waters have declined 50% in the last three decades.[124] Thousands of Africans have been put out of work as a result, and many have attempted to migrate illegally into Europe in their fishing boats.[125]

Today, 340 foreign boats are licensed to fish in Mauritania's waters, mostly from the EU and Asian nations.[126] Many of these boats target octopus, the nation's most important fishery export, accounting for about $80 million in 2004.[127] Mauritania has entered into various fishery access agreements with the European Community since 1987. [128] The standing agreement was amended in 1995 between the two nations to increase EU octopus catches in Mauritanian waters when Morocco unilaterally terminated its fishery agreement with the EU, probably due to declining catches.[129] By opening the fishery to large-scale foreign fleets, Mauritania is forcing its small-scale local fishermen to compete with huge trawlers from nations such as Spain, Russia, and China, and as a result, catches are dropping fast. One local fisherman from a small village claims, "You used to be able to fish right in the port. Now, the only thing you can catch here is water."[130] Mauritanian scientists estimate that the octopus stock has declined about 31% from historical averages.[131] These results are not surprising, considering the staggering amount of fish being removed from Mauritania's waters through large commercial operations. For example, while a local fisherman can catch about 32 pounds of octopus a day, the Spanish vessel *Segundo San Rafael*, which fishes in Mauritanian waters using a trawl, can catch 260,000 pounds of octopus on a 45-day outing.[132]

Although a 2001 agreement between Mauritania and the EU suggested that €800,000 of the €86 million annual payment go to "support to develop small-scale fishing," Mauritania has discretion to allocate this money, and it is unclear if any of it has gone to its stated purpose.[133] There is no other mention of small-scale fishing or human rights protections

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[124] *Id.*

[125] *Id.*

[126] *Id.*

[127] Eurofish, *Fish INFO Network Market Report on Octopus*, *Sept. 2004*, *available at* http://www.eurofish.dk/indexSub.php?id=1880&easysitestatid=-915739447 (last visited Feb. 2, 2009).

[128] Draft European Parliament Legislative Resolution on the proposal for a Council regulation on the conclusion of the Agreement in the form of an Exchange of Letters concerning the amendments to the Protocol setting out the fishing opportunities and the financial contribution provided for in the Agreement on cooperation in the sea fisheries sector between the European Community and the Islamic Republic of Mauritania for the period August 1, 2001 to July 31, 2006 (COM(2005)0591 – C6-0433/2005 – 2005/0229(CNS)), Eur. Parl. Doc. (PE 365.137v04-00) 6 (2006).

[129] *Id.*

[130] These statements are attributed to Sall Samba, a small-scale octopus fisherman who was forced to beach two of his three boats and fire employees due to declining stocks. Miller, *supra* note 87. In the 1990s and early 2000s, Samba's catch used to bring in over $2300 a month, and he earned $600 a month in profit. *Id.* Today, just a few short years later, he earns less than $200 a month. *Id.*

[131] *Id.* One large octopus fishing company reported a catch of 818 tons in 2006, down from 1,241 tons in 2001. *Id.*

[132] *Id.* That's about 5,780 pounds per day.

[133] Protocol Setting out the Fishing Opportunities and Financial Compensation Provided for in the Agreement on Cooperation in the Sea Fisheries Sector Between the European Community and the

within this document. The agreement set a limit of 16,500 tons of octopus per year.[134] As a result of declining stocks, Mauritanian scientists recommended opposing any deal that permitted EU boats to fish for octopus in Mauritanian waters.[135] This recommendation was not heeded, however, and in July 2006, Mauritania signed an agreement that will net a payout of $700 million over six years and increase the number of European octopus trawlers in Mauritanian waters.[136] In this agreement, the EU required Mauritania to license the 4,000 canoes used by local fishermen, with EU scientists arguing that stock declines are the result of local fishermen and that the fishery can only support a quarter of the current canoe fleet.[137] If licensing canoes is carried out and entry into the fishery is limited, it may further restrict coastal fishermen from accessing the stocks they need to survive.

IV. The Results of Deficiencies in the System: Illegal, Unregulated, Unreported (IUU) Fishing and Flags of Convenience

As a result of noncompliance and weak enforcement mechanisms in the international treaty framework and inequitable bilateral agreements, IUU fishing, also known as "pirate fishing," is on the rise. The term IUU fishing includes many forms of destructive fishing. Illegal fishing refers to fishing in the jurisdiction of a nation without permission, operating in violation of treaties to which the flag state of the vessel is bound, or fishing "in violation of national laws or international obligations."[138] Unreported fishing means "fishing activities which have not been reported, or have been misreported, to the relevant national [or international] authority."[139] Unregulated fishing includes fishing in the jurisdiction of an RFMO by a vessel who is not party to the agreement, violating the conservation and management measures of an RFMO within its jurisdiction, or fishing in an area with no management regime in a manner that is inconsistent with the flag-state's responsibilities under international law.[140] Common forms of IUU fishing include fishing legally by day and fishing in restricted areas by night, exceeding and/or underreporting catch quotas, fishing in areas not subject to RFMOs, poaching, and fishing in marine reserves.

One particularly problematic form of IUU fishing involves vessels operating under "flags of convenience." The Geneva Convention on the High Seas and UNCLOS both require a "genuine link" between the state in which a vessel is registered and the fishing vessel;[141]

Islamic Republic of Mauritania for the period 1 August 2001 to 31 July 2006, EU-Mauritania, L 341/128 (2001). There is little to suggest that payments set aside to promote small-scale fishing have gone to their stated purpose. News reports of the situation in Mauritania do not suggest that the nation has any sort of support programs for small-scale fishermen. *See, e.g.,* Miller, *supra* note 87.

[134] 2001 EU-Mauritania Treaty, *supra* note 133.

[135] Miller, *supra* note 87.

[136] Eur. Parl. Doc. (PE 365.137v04-00), *supra* note 128; Miller, *supra* note 87. While ignoring Mauritanian scientists' recommendation to halt EU octopus fishing, this agreement did call for a moderate decrease in catches. *Id;* Eurofish, *Fish Info network Market Report on Octopus, Dec. 2006*, *available at* http://www.eurofish.dk/indexSub.php?id=3392 (last visited Feb. 2, 2009).

[137] Miller, *supra* note 87.

[138] IPOA-IUU, *supra* note 82, at art III § 1.

[139] *Id.* at art III § 2.

[140] *Id.* at art III § 3.

[141] High Seas Convention, *supra* note 13, at art. 5(1); UNCLOS, *supra* note 6, at art. 91(1).

however, this link has proven to be open to interpretation. Many nations that do not oversee their fleet or enforce international agreements have open vessel registries, allowing vessels without a genuine link to fish under their flag for a nominal fee of a few hundred dollars. These vessels are said to be flying "flags of convenience" because the sole reason for registering in the flag nation is to avoid enforcement of treaties and fishing regulations of their home ports.

Globally, the IUU fishing fleet is worth about $1.2 billion, and 15% of the large-scale fishing fleets sail under flags of convenience or unknown flags.[142] In 2001, it was estimated that 80% of fishing vessels using flags of convenience flew under the flag of Belize, Honduras, Panama, and St. Vincent & the Grenadines.[143] In 2005, it was estimated that 65% of the world's merchant fleet was registered outside of the owner's domicile.[144] The amount of these vessels that engage in IUU fishing and their impacts are difficult to estimate because vessels often use shell corporations and change names, flags, and crew frequently to obscure the owners' identities.[145] It is known, however, that IUU fishing vessels can devastate fish stocks. The World Wildlife Fund estimates that IUU fishing accounts for 30% of catches in some important fisheries, and the irresponsible fishing methods often used by these vessels threatens sea birds, sea turtles, dolphins, and other non-targeted species.[146]

IUU fishing can have devastating effects on developing nations and their coastal communities. For example, in Guinea, it is estimated that up to 60% of the fishing vessels in its waters are unlicensed.[147] The total value of the IUU catch in sub-Saharan Africa is estimated to be 16% of the total catch value, or almost $1 billion.[148] A recent study found that in Africa, one of the "major infringements" that IUU fishermen commit is encroaching in the areas reserved for "vital artisanal fisheries," leading to "serious conflicts between

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[142] MATHEW GIANNI AND WALT SIMPSON, THE CHANGING NATURE OF HIGH SEAS FISHING: HOW FLAGS OF CONVENIENCE PROVIDE COVER FOR ILLEGAL, UNREGULATED, UNREPORTED FISHING 5 (Oct. 2005), *available at* http://www.wwf.org.uk/filelibrary/pdf/flagsofconvenience.pdf (last visited Feb. 2, 2009).

[143] GREENPEACE, PIRATE FISHING: PLUNDERING WEST AFRICA 5, Sept. 2001, *available at* http://iodeweb1.vliz.be/odin/bitstream/1834/649/1/Doc_NGO_04-EN.pdf (last visited Feb. 2, 2009); Gianna, *supra* note 142.

[144] This statistic measures the percentage of total tonnage of the world's fleet that is flagged out. INSTITUTE OF SHIPPING ECONOMICS AND LOGISTICS, ISL MARKET ANALYSIS 2005: OWNERSHIP PATTERNS OF THE WORLD MERCHANT FLEET (April, 2005), *available at* http://www.isl.org/products_services/publications/pdf/COMM_4-2005-short.pdf (last visited Feb. 2, 2009).

[145] Jessica K. Ferrel, *Controlling Flags of Convenience: One Measure to Stop Overfishing of Collapsing Fish Stocks*, 35 ENVTL. L. 323, 340 (2005) (*citing* BOLESLAW ADAM BOCZEK, FLAGS OF CONVENIENCE 6 (1962)).

[146] World Wildlife Fund, Fishing Problems: Illegal Fishing, *available at* http://www.panda.org/about_wwf/what_we_do/marine/problems/problems_fishing/illegal_fishing/index.cfm (last visited Feb. 2, 2009). Environmentalists estimate that up to 50% of some important species such as Patagonian toothfish catches (also known as Chilean sea bass) are illegally caught. *Id.*

[147] MARINE RESOURCES ASSESSMENT GROUP LTD., REVIEW OF IMPACTS OF ILLEGAL, UNREPORTED AND UNREGULATED FISHING ON DEVELOPING COUNTRIES, SYNTHESIS REPORT 6 (2005) (prepared for the for the United Kingdom's Department for International Development), *available at* www.dfid.gov.uk/pubs/files/illegal-fishing-mrag-report.pdf (last visited Feb. 2, 2009).

[148] *Id.* at 7.

industrial and artisanal fishermen, including loss of gear and life."[149] Apart from the obvious macro-economic impacts of decreased actual revenue in the fishing industry, IUU causes a variety of indirect impacts to developing nations and coastal communities. The fish processing industry is affected and the incomes of fishermen and anyone involved in fish processing and packaging, marketing, and transport industries are reduced, impacting the ability of fishing families to provide for themselves.[150] Additionally, IUU vessels typically use destructive practices that hinder the ecosystem's ability to recover, causing their effects to be felt well after the vessels leave the fishing grounds.

Ghana serves as another example. When members of Greenpeace traveled through several fishing villages and cities to assess the situation facing fishing communities, the story in each village was the same: "fish stocks are in rapid and serious decline due to a combination of [commercial] fishing in Ghanaian waters and, more recently, pirate fishing vessels."[151] Stocks have declined at a dramatic rate, and some species that were common fifty years ago are now gone from fishing nets.[152] With the rise of commercial fishing fleets, the problem of IUU fishing is increasing.

The fishing industry is important to Ghana and critical to the survival of its traditional coastal villages. While 60% of animal proteins consumed in Ghana come from fish, today West Africa is the only place in the world where fish consumption is decreasing.[153] About 5,000 Ghanans are directly involved in artisanal fishing, and about 3 million are involved in the industry as fishermen, processors, fishmongers, or other related occupations.[154] Despite technological innovations creeping into fishing villages, traditional practices still govern. Greenpeace reported that they first had to receive the blessing of the local chief before fishermen would speak to them.[155] Tuesdays are set-aside as non-fishing days to allow fish time to recover and for fishermen to repair their nets.[156] Fishing is typically done in wooden canoes called *pirogues* with hand-made nets.[157] While men fish, the women in these communities also play an important role in the fishing sector. Women, often organized into cooperatives, smoke, process, and sell the fish, and they often control the financing of new gear and fuel.[158] Because the social structure is inextricably linked to traditional fishing, the inability to survive using these traditional practices threatens the social structures of these communities.

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[149] *Id.* at 5.
[150] *Id.*
[151] Martin Freimuller, Greenpeace, Pirate Fishing Impacts: The Importance of Fishing for Traditional Life in Ghana's Coastal Villages, *available at* http://archive.greenpeace.org/oceans/stoppiratefishing/impacts/ghanaimpact.html (last visited Feb. 2, 2009).
[152] *Id;* Greenpeace, *supra* note 143, at 6.
[153] *Id*; Simon Robinson, *Greenpeace Goes Fishing*, TIME, March 30, 2006, *available at* http://www.time.com/time/world/article/0,8599,1178485,00.html (last visited Feb. 2, 2009).
[154] Freimuller, *supra* note 151.
[155] *Id.*
[156] *Id.*
[157] *Id;* Greenpeace, *supra* note 143, at 6.
[158] Freimuller, *supra* note 151.

These pirate fishing vessels not only deplete the fish stocks that they target, but they also have high bycatch rates and destroy the habitats necessary for fish to lay eggs and survive as juveniles, limiting the ability of ecosystems to recover. The effects of these injurious practices have spread beyond the fishing industry. It has been reported that declining fish stocks have forced many people in Ghana to turn to the illegal bushmeat trade to earn a living and feed their families.[159]

Concerned that IUU fishermen are destroying their livelihoods, local fishermen have participated in demonstrations in the capital city of Accra and made reports about the activities of trawlers.[160] The government's lack of response is due to the oft-cited problems of inadequate information of the state of fish stocks and limited resources for effective enforcement.[161]

Ghana's Department of Fisheries has undertaken several programs to prevent pirate fishing and support local fishing communities. They have formed a Directorate consisting of the navy, police, customs service, attorney general, and harbor authorities to monitor fishing and patrol the harbors.[162] However, the lack of resources and difficulties inherent in patrolling large areas of ocean will not likely result in major improvement to the situation. Additionally, corruption is often a problem in the governments of developing nations. One fisher reported to Greenpeace that the Ghanaian navy, which patrols Ghana's waters, often lets illegal fishing vessels go in exchange for a portion of their catch.[163] Nations such as Ghana must be offered solutions that will protect the livelihoods of small-scale fishermen and their communities.

V. Solutions that will Protect Artisanal Fishing Communities

While the future of the global fishing industry and small-scale fishing communities appears bleak, there is hope on the horizon. Nations finally show signs of acknowledging the global fishery crisis, and they are taking action to protect their stocks by enforcing treaty requirements on vessels sailing under their flag. This is evidenced by the European Commission taking legal action against its member states for violating tuna subsidies and failing to report catches.[164] The EU has been guilty of pressing for high quotas, subsidizing its fleet, and engaging in irresponsible, unsustainable fishing practices. If the EU is finally beginning to rein in its fleet and end its irresponsible fishing practices, perhaps the tide is starting to turn. Nevertheless, a wide range of changes must take place on a global scale to protect traditional fishing communities and promote sustainable fishing practices.

One obvious step toward protecting traditional fishing communities is to enforce the treaties that are already in place. Nations should ensure that national policies and fishing vessels under their jurisdiction adhere to the rules set forth in the FAO Code of Conduct

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[159] Justin S. Barshares et al., *Bushmeat Hunting, Wildlife Declines, and Fish Supply in West Africa*, 306 SCIENCE 180 (Nov. 12, 2004).
[160] Freimuller, *supra* note 151.
[161] *Id.*
[162] *Id.*
[163] *Id.*
[164] *See supra* note 109-113 and accompanying text.

and the IPOA-IUU. The fishery policies of developed nations should set sustainable catch limits and gear restrictions and enforce regulations against all vessels fishing under their flag.[165] When contracting for fishing rights within the waters of developing coastal nations, developed nations should take into account the rights and traditional practices of artisanal fishing fleets.[166] IUU fishing and the use of flags of convenience should be halted by any means necessary. The international community should put pressure on nations with open vessel registries to implement the genuine link requirement of UNCLOS.[167] Additionally, nations should take steps to discourage their own nationals from fishing under of flags of nations that do not meet their flag state responsibilities.[168] This would prevent IUU vessel owners from registering their boats in a nation solely to avoid enforcement of international requirements. Members of RFMOs should ensure their fleets adhere to fishery quotas and follow responsible fishing practices. Enforcement should be stepped up to impose domestic and international requirements on all vessels and to punish vessels that participate in IUU fishing and nations that do not meet their flag state responsibilities.

Australia is one of the leading nations in combating IUU fishing and ensuring that its fishing fleet adheres to international requirements. Australia is a party to a variety of international, regional, and subregional agreements regulating fisheries. The Minister of Agriculture, Fisheries, and Forestry established a task force aimed at combating IUU fishing on the high seas.[169] Vessels operating under the Australian flag follow a stringent management regime controlled by federal, state, and territory laws in order to ensure long-term sustainability of fisheries.[170] Australian vessels may not fish outside of Australian waters without a special permit.[171]

Australia has adopted a National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing in accordance with the IPOA-IUU.[172] This national plan states that "[s]trict fisheries surveillance and enforcement measures regulate Australian fisheries, including the mandatory use of vessel monitoring systems (VMS) in most major nationally-managed fisheries."[173] Australia has also undertaken several high profile hot pursuits of suspected IUU fishing vessels.[174] If all nations followed Australia's

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[165] *See* FAO Code of Conduct, *supra* note 82, at art. 2.
[166] *Id.* at art. 6.18.
[167] *See* IPOA-IUU, *supra* note 82, at art III, § 22.
[168] *Id.* at art. III § 18.
[169] Department of Agriculture, Fisheries, and Forestry, Australia, *Steps Australia has Taken to Address Illegal Fishing, available at* http://www.daff.gov.au/fisheries/iuu/illegal-fishing (last visited Feb. 2, 2009).
[170] *Id.*
[171] *Id.*
[172] *Id*; IPOA-IUU, *supra* note 82, at art. IV § 25.
[173] DEPARTMENT OF AGRICULTURE, FISHERIES, AND FORESTRY, AUSTRALIA, NATIONAL PLAN OF ACTION TO PREVENT, DETER AND ELIMINATE ILLEGAL, UNREPORTED AND UNREGULATED FISHING 11 (2005), *available at* http://www.daff.gov.au/__data/assets/pdf_file/0006/33963/npoa_iuu_fishing.pdf .
[174] *See, e.g.,* Australian Fishery Management Service, Fact Sheet,*Enforcement Operations in the Southern Ocean* (2006), *available at* http://www.customs.gov.au/webdata/resources/files/fs_enforcement_operations_in_the_so1.pdf . The IPOA-IUU encourages publicizing enforcement efforts in order to educate the public as to the problems of IUU fishing. IPOA-IUU, *supra* note 82, at art. IV § 32.

example in adhering to their obligations under international law and committing the resources to enforce international requirements, the state of the world's fisheries would be much improved.

However, enforcement of current treaties is not enough. The seminal law of the sea treaties must be reformed in accordance with our current knowledge of fishery management. MSY-based management should be prohibited rather than encouraged. Instead of allowing management based on the best available science, treaties should require implementation of the precautionary principle in the face of scientific uncertainty.[175]

Another crucial change that must take place is facilitating and promoting sustainable fishing practices, including the protection of artisanal fishing, both in the international treaty framework and in smaller-scale agreements. A coalition of international environmental NGOs recommends that "[f]ishing units [practicing] environmentally friendly, economically viable, and socially equitable fishing should be given priority access," recognizing that small-scale, sustainable coastal fisheries are vital to protection of the social fabric of traditional coastal communities.[176]

Traditional fishing practices are both sustainable and critical for coastal communities to thrive. By giving them priority access, their rights will be protected and other fishers will have an incentive to use responsible, sustainable practices to gain access. The international community also should prevent subsidies to ensure that the international fishing fleet capacity does not exceed the capability of the ocean to supply it. Without subsidies, when a fishery becomes overfished or unprofitable, fishermen will shift effort to different species or new areas, allowing stocks to recover from fishing pressure and allowing traditional fishermen to remain competitive in the industry.

It is also important for fishing communities to effectively participate in fishery management. Malawi, one of the many African nations whose environmental issues are driven by basic survival needs, is an example of a nation that has successfully implemented this approach. Facing dwindling near-shore fishery productivity, locals and government officials established a partnership to manage fishery resources.

In 1997, Malawi's Legislature passed the Fisheries and Conservation Management Act, which introduced the concept of co-management into Malawi's legislation for the first time.[177] Projects that brought about this legislative change focused on cooperation with local

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[175] Rio Declaration, *supra* note 62, at Principle 15.

[176] Coalition for Fair Fishery Agreements (CFFA), Position Paper, *Commission Consultation on Rights-Based Management Tools in Fisheries* 3 (2007), *available at* http://ec.europa.eu/fisheries/cfp/governance/consultations/contributions260207/development_ngo_en.pdf (last visited Feb. 2, 2009). These recommendations were written by Birdlife International, Coalition for Fair Fisheries Arrangements, International Collective in Support of Fishworkers, and Seas at Risk, which comprise the CFFA's NGO Contact Group for the Advisory Committee on Fisheries and Aquaculture.

[177] Tracy Dobson, *Human Rights and the Environment: Community Participation in Natural Resource Management in Malawi: Charting a New Course for Sustainability,* 1998 COLO. J. INT'L ENVTL. L. Y.B. 153, 165-166 (1998). Co-management refers to a participatory decision-making between representatives of stakeholder groups and government agencies. Svein Jentoft, *Co-*

communities in setting fishing gear restrictions and other management efforts.[178] Such projects enhance the involvement and enthusiasm of fishermen and personally invest them in fishery regulation enforcement. Expanding such a management regime to allow local fishers to participate in setting quotas and limiting foreign fishing fleets would incorporate the interest of local communities into bilateral agreements and protect the interests of subsistence fishing communities. Providing artisanal fishermen a say in management would also foster a diverse array of fishery management techniques that are tailored to each fishery.[179]

Often it is the artisanal fishery communities themselves that must organize to effect change in national systems. CoopeTárcoles is a fishing cooperative located in Tárcoles, Costa Rica.[180] The cooperative's original aim was distribution of tax-free gasoline, rental of fishing equipment, facilitation of equipment repair, ice supply, and support in obtaining fishing licenses.[181] CoopeTárcoles has also incorporated an environmental theme into its operating strategy. It has adopted the FAO Code of Conduct and educates its members on responsible fishing practices.[182] The FAO has said that "The maintenance and reinforcement of small-scale, artisanal fishing faces many problems [in Costa Rica] because of the lack of modern legislation permitting the structuring of fisheries, including, for example, methods of protection of the resources that sustain them."[183]

The community is lobbying the Costa Rican Government to protect their traditional fishing grounds through legal means, including a marine protected area.[184] The interests of artisanal communities like Tárcoles should be respected by their national governments. Often these communities are aware of the effect of fishing pressure on stocks long before scientists become aware of problems, and if their interests are recognized, these communities can become the first line of defense in protecting their fisheries.

RFMOs and bilateral fishing treaties must undergo reform as well. Total allowable catch quotas should be science-based and precautionary instead of the result of negotiation by vested interests. The recommendations of the FAO and RACs should not be ignored, but

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management: The Way Forward, in THE FISHERIES CO-MANAGEMENT EXPERIENCE: ACCOMPLISHMENTS, CHALLENGES, AND PROSPECTS 3 (Douglas C. Wilson et al., eds. 2003).

[178] *Id.* at 165-166.

[179] The Coalition for Fair Fishery Agreements stresses that diverse approaches to fishery management allow each nation and region to adapt their programs to the specific needs of their small-scale fisheries, emphasizing that problems do not arise from diverse management regimes, but from opaque procedures and a lack of control. *Rights-Based Management Tools, supra* note 176, at 3.

[180] A cooperative is "[a]n organization or enterprise owned by those who use its services." BLACKS LAW DICTIONARY 359 (8th ed. 2004).

[181] MARIAMALIA RODRÍGUEZ CHAVES, UNIVERSIDAD DE COSTA RICA, PESCADORES ARTESANALES EN TÁRCOLES: DIAGNÓSTICO LEGAL [ARTISANAL FISHERMEN IN TÁRCOLES: LEGAL ANALYSIS] 6, *available at* http://www.law.ufl.edu/conservation/international/pdf/pescaadores.pdf (last visited Feb. 2, 2009).

[182] *Id.* at 7, 18.

[183] FAO, *Información Sobre la Ordenación Pesquera de la Rebública De Costa Rica* [Information About the Structuring of Fisheries in the Republic of Costa Rica] (2004), *available at* http://www.fao.org/fi/oldsite/FCP/es/CRI/body.htm (last visited Feb. 2, 2009) (translated by Melanie King).

[184] Chavez, *supra* note 181, at 7.

rather should be given their due weight as leading authorities in the field of sustainable fishery management. Bilateral fishery agreements should contain a mechanism to protect artisanal fishermen and ensure that a portion of the money paid to developing nations goes to benefit communities impacted by foreign fleets.

As fish stocks decline worldwide, it seems like these drastic reforms are unlikely to be implemented in the near future. However, if nothing is done, the world will face depleted fish populations past the point that recovery is possible and the obliteration of traditional fishing communities that rely on them. To protect our oceans and the coastal communities that rely on them, the international framework that governs fishery resources must be modified to reflect modern fishery management capabilities.