

MONITORING ARRANGEMENTS IN REGIONAL FISHERIES MANAGEMENT

Hyeran Jo¹

Department of Political Science
University of Michigan

February 20, 2007

Prepared for the International Studies Association Annual Convention, Chicago, IL, Feb 28 - March, 2, 2007. Preliminary Draft: Please do not cite without author's permission.

¹ I thank Ron Mitchell, Sarah McLaughlin Mitchell, Edward Parson, and D.G. Webster for their kind suggestions during the development of this paper. Of course, all errors are mine.

Monitoring Arrangements in Regional Fisheries Management

Abstract

Monitoring institutions, ranging from independent scientific bodies to highly intrusive observer/inspection schemes, play a crucial role in fisheries management, with implications for both management and conservation. While information is available on a variety of institutional arrangements, no systematic analysis of the determinants of the design of monitoring institutions is yet to be found in international relations literature. Focusing on the distributional conflicts over various institutional arrangements, I theorize how different political environments present obstacles to the establishment of international monitoring bodies.

Regional fisheries agreements provide fertile ground to test arguments about the influence of political determinants on international institution building. Drawing on seventy-three multilateral fisheries agreements generated by the International Environmental Agreements (IEA) database, I examine the factors driving the adoption of monitoring institutions, including nations' often conflicting preferences for one kind of institution over another, with some favoring political consultative mechanisms and others favoring fisheries commissions with scientific subcommittees or relatively intrusive inspection/observer schemes.

I assess and estimate the impact of asymmetric compliance environments caused by factors such as the differing political strength of domestic fishing industry lobbies. I find that asymmetric political environments are inimical to the establishment of monitoring bodies on the international level. I additionally test hypotheses regarding the determining importance of epistemic community and national administrative capacity on nations' preferences for one monitoring institution over another and find partial/mixed support for both hypotheses.

INTRODUCTION

Motivation for the design of monitoring institutions in fisheries management

Fisheries management has recently received international attention because of its potential social, political, and environmental problems. 50 percent of the world's marine fishery resources are fully exploited, 25 percent are overexploited, and about 25 percent could support higher exploitation rates.²

The activity of collecting and analyzing scientific information, collectively termed "monitoring" in this paper, is considered necessary for sound management of fisheries. Theories of international relations have analyzed the potential benefits of collecting and utilizing information in governing international environmental agreements. Victor, Raustiala, and Skolnikoff (1998) describe such monitoring institutions as "systems of implementation review (SIR)" and show that they are essential to implementation of regulatory measures. In a similar vein, Jacobson and Brown Weiss (1998) note the importance of transparency mechanisms to foster compliance in environmental agreements. International legal scholarship has also paid attention to the importance of monitoring. Wold et al. (2003), for instance, study the Monitoring, Surveillance, and Control (MSC) systems and argue that MSC systems assist fisheries regimes in a positive way. Throughout these studies, monitoring is an important component of conservation and management measures, alongside enforcement mechanisms such as trade restrictions.³

However, even as these authors present a compelling case for the importance of monitoring institutions, they fail to address a set of underlying questions. Why are monitoring institutions designed the way they are, and what political conditions contribute to their formation? If it is beneficial and efficient to have such institutions, why do we not observe such institutional arrangements in *all* agreements? Many scholars agree that accurate, reliable information is essential for cooperation, but we also know that formal structures to promote or enforce cooperation are, in actuality, often controversial and contested. We therefore have to recognize that political constraints exist in designing such monitoring institutions. What are the sources of these political obstacles to independent monitoring bodies on the international level? What are the political mechanisms or processes that favor or disfavor the establishment of international bodies? Since the available literature does not provide answers to these questions about the formation of such informational institutions, this paper attempts to fill the gap.

The topic of the selection of informational mechanisms during the institution-building or agreement-making stage was first addressed in Downs et al. (1996), where the authors theorize the selection process states go through due to political reasons while negotiating international agreements. The topic was more systematically explored in the project on the rational design of international institutions,⁴ and the topic's empirical relevance was established in Von Stein (2005) in her study of the impact of Article VIII of the IMF agreements on the compliance behavior of member states. The question I propose to pursue—how monitoring systems are established and why they are difficult to create in

² The Director-General of Food and Agriculture Organization (FAO) of the United Nations Dr. Jacques Diouf at the Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem (1-4 October 2001), re-quoted from Sullivan 2003.

³ ICCAT implemented trade restrictions with respect to bluefin tuna. See Balton 2004.

⁴ Koremenos et al. 2001

some cases—is important in the study of international cooperation, because we have to understand not only what factors promote cooperation, but also why beneficial mechanisms are often difficult to obtain politically. By identifying the political obstacles that exist on the international level, I seek to advance understanding of the dynamics of international cooperation and provide an explanation as to why and how cooperation-enhancing mechanisms—such as monitoring mechanisms—are often bogged down in the process of cooperation-building.

The empirical assessment of monitoring mechanisms has also been impaired by the lack of systematic empirical investigations. For example, in their article on verification in environmental agreements, Ausubel and Victor (1992) conclude,

Because international organizations have neither the power nor the capacity to monitor and enforce standards, we tentatively suggest that the most effective standards are those that allow for unilateral action, whether by parties to the agreement or by other actors such as NGOs.

Partly influenced by the fledgling regulatory system in international environmental governance of the time when the article was written, the observation about the lack of information power of international institutions implies that the institutional basis or capacity for monitoring is *uniformly* lacking. However, this conclusion does not coincide with the dominant view proposed by Keohane (1984) that informational institutions in fact perform an important informational role. These potentially conflicting evaluations call for a more systematic and objective empirical investigation to examine the extent to which various international organizations in fact fulfill their monitoring function, performing their task with relevant available measures.

To make this discussion more concrete, we may now consider the monitoring institutions that are part of seventy-three fisheries management agreements.

Table 1 Types of Monitoring Bodies in 73 multilateral fisheries agreements

Monitoring Body	Absent	Present	Total
Scientific Committee	51	22	73
Commission	21	52	73
Observer System	66	7	73

The variation in monitoring mechanisms—with some agreements adopting scientific committees, others preferring observer systems, and some embracing both—clearly asks for an explanation. Certainly, the statistical summary shows that we cannot conclude that international bodies are inherently weak. The institutional variation also suggests that conventional arguments to the effect that states are reluctant to delegate monitoring authority due to sovereignty concerns do not readily hold up. We therefore have to seek alternative explanations to understand the institutional variation.

This paper addresses the theoretical lacuna about the design of monitoring systems and provides a theory for the design of monitoring systems in regional fisheries management. In what follows, I present my argument as to why differences in domestic political factors are likely to negatively affect the adoption of international monitoring institutions. After the theoretical discussion, I provide empirical evidence to examine the effect of the political differences.

THEORY IN BRIEF

Domestic political constraints as primary determinants of institutional design

Monitoring systems are designed within a larger political and institutional context. State parties entering into negotiations have positions or preferences with regard to what kind of monitoring systems they favor, given their respective domestic political conditions. The impetus to monitor the compliance behaviors of states also stems from the other institutional arrangements that are part of a given agreement, as well as broader considerations of international politics, in particular the prevailing cooperation environment.

To make the present analysis of the design of monitoring institutions more concrete, it may help to picture two states or groups of states entering into fisheries negotiations in a multilateral setting. The participating states will weigh the available monitoring institutions. Their choices include, but are not limited to, 1) an independent scientific committee that could advise and recommend catch allocations to a political body, 2) a political body such as a commission charged with collecting information from member countries, or 3) a more stringent inspection mechanism designed to independently collect information that can be cross-examined later.

One commonly encountered international cooperation environment is such that one state allows the others some latitude for “sovereign escapes” from the terms of the agreement when their domestic political situations are not very favorable.⁵ Such leniency, under special circumstances, is a common feature of international cooperation. In fisheries management, this might take the form of country *A* allowing country *B* to delay the scrapping of its over-sized or over-capacity vessels. As new technologies develop, over-fishing has become a problem, and the livelihoods of many fishermen are now threatened as governments restructure and regulate their fishing industry so as to ensure that fishing continues at a sustainable level. International cooperation in fisheries management is in this manner intertwined with domestic politics. Introducing reforms in the fishing industry requires the political consent of relevant stakeholders, particularly fishermen; jobs may be lost or changed, and people may have to transition to other sectors of the economy. In such a relatively non-mobile sector, national governments may prefer to provide subsidies and protect the industry rather than committing to the cause of sustainable fisheries. Judging whether a neighbor’s violation of a fisheries agreement may be considered “legitimate,” and therefore be left unpunished, is a difficult exercise, but states still have to manage cooperation given this uncertainty.

In these political circumstances, and given these uncertainties, on the international level, reciprocal punishment (e.g. denying access to one’s territorial waters) is usually suspended when other parties are seen to be experiencing “special circumstances.” If these special situations do not occur frequently, both parties could benefit from having an institution that can produce objective scientific information about catches along with recommendations for catch limits and get its advice on whether domestic restructuring and stringent management are necessary.⁶ If these situations are too frequent⁷ and

⁵ See Milner and Rosendorff 2001 for the discussion of escape clauses (safeguards, antidumping, etc.) in trade relations.

⁶ See Jo 2006 for formalization of the idea of domestic compliance environments and their impacts on the institutional design.

asymmetrically benefit one party over the other, participating states may not favor establishing a third party international institution such as a scientific body. If one state party tries to exploit its “special circumstances,” using them as a pretext for circumventing its duties for sustainable management, distributional conflicts tend to arise. The asymmetry in different domestic political environments therefore can be harmful to the establishment of international monitoring bodies.

Domestic political concerns impact institutional design on the international level because they create uncertainties for other states with regard to future credibility. Fishing GDP, the portion of GDP deriving from the fishing industry, is in most cases minuscule (1-5%).⁸ However small the impact of fishing on the economy may be, the political factors at play in each member state are taken into account during the institutional design process, as they affect the perception of the other involved states about how future cooperative relations would play out. If one state signals that it may want to deviate from cooperation to accommodate its domestic political difficulties, other states’ willingness to invest in monitoring institutions may dissipate. In those cases of asymmetric compliance environments among member states, monitoring institutions may lose their value as collectors of relevant information and producers of coherent sustainability policies.

This model of institutional design that considers larger domestic and international political contexts in strategic cooperation environments yields a key insight regarding the characteristics of distributional conflicts as these conflicts of interests among member countries contribute to building monitoring mechanisms. The argument ultimately concerns the constraining effect of political asymmetry among member countries. States need monitoring systems to sustain cooperation, which has been suggested by the functionalist account of international institutions—the demand creates the need for such institutions. However, political differences can and do impose constraints on the development of international monitoring systems. Differences in political environments necessitate the development of monitoring systems but can generate serious political issues regarding future commitment.

In what follows, I present in detail the argument about the political roots of international regulatory measures. I first describe monitoring problems in the context of fisheries management and identify problem structures.⁹ Next, I introduce the concept of domestic compliance environments and explain why domestic political structures or conditions may affect the choice of monitoring institutions on the international level.

⁷ The threshold for this frequency level is determined in the theoretical model by the level of stakes involved. If the stake is high for the party that expects other party invoking these special circumstances, it is more likely to oppose to stringent monitoring mechanisms.

⁸ See Fishery Country Profile at <http://www.fao.org/fi/fcp/fcp.asp>

⁹ In Mitchell (2006)’s sense. The problem structure involves the inherent uncertainties surrounding the issue, goals of cooperation, and asymmetric (or symmetric) expected benefits or costs.

PUTTING THE THEORY IN CONTEXT

Compliance problems in fisheries agreements and their effects on institutional choice

Status of global fisheries

As Hardin (1968) trenchantly predicted, the tragedy of the commons problem has manifested itself in international fisheries. In the 1980s, seriously depleted fisheries resources emerged as an international problem, as evidenced by the collapse of northern cod fisheries, primarily as a result of technological developments in catching, coupled with illegal, unregulated and unreported (IUU) fishing. According to the Food and Agricultural Organization (FAO), a major international body within the United Nations that regulates global fisheries, almost 70 percent of all fish stocks are either fully to heavily exploited (44 per cent), over-exploited (16 per cent), depleted (6 per cent) or very slowly recovering from over-fishing (3 per cent).¹⁰ Dating back to the early twentieth century,¹¹ many international agreements have been concluded to enact a range conservation measures with respect to diverse marine resources such as dolphins, seals, and whales, with varying degrees of effective implementations and different levels of institutionalization.

Informational and political problems in fisheries management

Informational problems in assessing fish stocks in fisheries management arise primarily because fish do not respect borders. Prominent fisheries scientist John Shepherd cogently states the challenge scientists face:

“Estimating the number of fish in the sea is just the same as counting the number of trees in a forest, except you can’t see the fish and they move.”¹²

Despite the inherent uncertainty that affects the scientific modeling of fish stocks, the exchange of information about catches is crucial for sustainable fisheries management, as the annual sustainable yield is determined by weighing the available catch against the caught amount. Reliable assessments of fish stocks are crucial for implementing fisheries agreements. Since many fisheries agreements involve sharing “surplus stocks,” the estimation of those stocks is necessary for implementing the agreement with the objective of sustainable development.

Fisheries are impure public goods that have characteristics of both private and public goods, which complicates the regulatory process. Coastal countries have their own EEZ of 200 nautical miles with special rights over the exploration and use of marine resources. Areas outside EEZs are virtually unregulated, with the exception of some global and regional measures. As most measures imposed on fishing vessels are the responsibilities of flag states (states where the vessels are registered), some commercial

¹⁰ <http://www.un.org/ecosocdev/geninfo/sustdev/fishery.htm>

¹¹ According to the International Environmental Agreements (IEA) database, the earliest international fisheries agreements include Convention Between Alsace-Lorraine And The Two Initial Parties To The Convention Between Baden And Switzerland Concerning Fishing In The Rhine And Its Influxes As Well As In Lake Constance (1877) and Convention for Regulating the North Seas Fishery (1882).

¹² Re-quoted in the Full Committee Hearing on Global Overfishing and International Fisheries Management, Thursday, June 12 2003. <http://commerce.senate.gov/hearings/witnesslist.cfm?id=808>

vessels adopt “flags of convenience” to get around the stringent regulations of some coastal states. Illegal fishing activities therefore cause informational problems in verifying catch amounts, particularly in high seas where regulation is lax or virtually non-existent.

Another informational problem in fisheries management is that states do not necessarily want to share information and, indeed, have some incentive to hide or distort information in the interest of their domestic commercial fishing industries. Besides the high profile cases of underreporting by Russia in the 1980s¹³ and over-reporting by China in the 1990s,¹⁴ national reporting has been a chronic problem.¹⁵ An ADE study notes that “figures used for negotiating and implementing the fisheries agreements, seem to be more the result of a commercial bargain than of scientific studies.”¹⁶ In many cases, because of pressure to adhere to allocated quotas, fishermen have also resorted to the practice of releasing “discards” (dead fish) into the ocean, which upsets the ecological balance.¹⁷

These informational problems of hiding information about catch statistics or getting around existing regulations usually go in tandem with other political problems that may affect the international negotiation of fisheries agreements. With respect to fisheries management, development goals often conflict sharply with the goal of sustainability. Member states to a fisheries agreement have to weigh these often-competing objectives. With respect to development, and the choice between maintaining subsistence and developing the fishing industry, national governments have to consider the domestic political ramifications of supporting international measures that could influence the status and economic viability of their fishing industry.

Although typically minuscule as a portion of the overall national economy, national fishing industries involve both economic and social aspects. Employment in fishing generally does not allow mobility, since the industry involves huge sunk costs as well as adjustment costs. At the same time, the fisheries sector is inherently vulnerable to economic changes. Because of these industry characteristics, traditional fishermen in industrialized countries are subsidized at an average of 17%.¹⁸ Fishing subsidies take many forms, from direct financial transfers to assistance in development projects.¹⁹ The extent of fishing subsidies has been increasing against the backdrop of the decreasing competitiveness of traditional fishing sectors. In the case of the EU, targeted compensation to the fisheries sector has recently increased²⁰ compared to untargeted compensation that is provided to national governments.

Private stakeholders (fishermen, ship-owners) in many developed countries are constituents with political power. The potentially harmful effects of fishing subsidies are well documented—they contribute to oversized fishing fleets and overcapacity²¹—and recently, making matters worse, big deep-sea trawlers have been subsidized by many major

¹³ Documented in Weiss and Jacobson 1998

¹⁴ Watson and Pauly 2001 in *Nature*; a response by FAO Fisheries Department

¹⁵ See Jacobson and Weiss 1998 for empirical records of state reporting to international environmental agencies or bodies.

¹⁶ ADE-PwC-EPU, p.57

¹⁷ Bounds, Andrew. 2007. “EU Fisheries Commissioner: Dumping of dead fish is immoral, says Borg” *Financial Times*, Feb 20, 2007

¹⁸ ADE-PwC-EPU 2002

¹⁹ Westlund 2004

²⁰ ADE-PwC-EPU 2002

²¹ Milazzo 1998, Cox and Schmidt 2002

fishing nations with \$150m a year. These deep-sea trawlers are otherwise economically unviable, and they have been shown to disrupt deep-sea ecosystems that exhibit slow growth compared to ecosystems in shallow waters.²² This subsidy problem is not limited to developed countries. In developing countries where the people rely on fish for subsistence, fisheries-dependent communities are often important constituents for politicians. Local communities dependent on fisheries also often demand exclusive fishing rights. Because of the political prominence of fishing lobbies in many developing countries, direct or indirect fishing subsidies are common in these countries as well as developed ones.

Clashes among different compliance environment countries

Purely scientific problems, in tandem with political conditions, may work against compliance with the central tenet of fisheries agreements: sustainable fisheries management. These scientific and political difficulties, I argue, may ultimately block the institutional building process, especially when parties to an agreement experience divergent domestic political conditions.²³ In what follows I define the domestic political situations that may favor or disfavor compliance with international obligations as “compliance environments.”

How do domestic political considerations and compliance environments affect international negotiations regarding monitoring arrangements? Fisheries-dependent countries (mostly distant water fishing nations) expect more flexibility and therefore may seek flexible measures or weak regulations in monitoring mechanisms. They will approve centralized monitoring mechanisms only if flexibility mechanisms are included in written agreements.

To illustrate these theoretical points about strategic considerations that guide institutional creation, I rely on the Fish Stock negotiation between 1995 and 1997. I chose this global negotiation episode because negotiation materials for smaller-scale treaties are difficult to come by. In the Fish Stocks negotiation, the different compliance environments of fishing nations yielded different bargaining positions regarding the kinds of monitoring systems that were preferred. Each member country belonged to one of the following categories:

- Distant water fishing nations (DWFNs): states that possess many vessels or fleets operating for extending periods far from their home base
- Coastal states: to which the Law of the Sea conferred exclusive economic rights, including the right to fish within 200 miles off their shores
- Port states: states with national ports that foreign ships temporarily embark
- Flag nations: states that register vessels

The major divide was between costal states and “distant water” fishing nations (DWFNs) on the high seas. Costal states that worried about their domestic harvest included Argentina, Australia, Canada, Chile, Iceland and New Zealand. DWFNs that were

²² Cookson, Clive. 2007 “Scientists Warn Deep Sea Trawling Strips the Ocean” *Financial Times*. February 20, 2007. Largest payers are Japan, Russia, South Korea, and Spain.

²³ The political and scientific problems influence each other. For example, political differences color scientific evaluations and rhetoric involved in discussion of scientific facts.

responsible for 90 percent of distant water fishing included Russia, Japan, Spain, Poland, the Republic of Korea, and Taiwan province of China.²⁴

The major areas of contention over management schemes during the negotiation illustrate the political tensions that arise when countries experience divergent compliance environments. The central debate opposed distant water fishing nations (DWFNs) to costal states. Distant water fishing nations pushed for non-binding guidelines for the detailed regulatory measures, while costal states favored a binding treaty.²⁵ DWFNs also rejected strong enforcement measures, which led to the 1995 *FAO Code of Conduct for Responsible Fisheries*, a non-binding agreement. As in other negotiations, the position of states with unfavorable compliance environments (in this case, DWFNs) was adamant, ignoring the potential benefits that rigorous international monitoring mechanisms can provide. Coastal states complained that their conservation efforts were marred by indiscriminate over-fishing by distant water fishing nations. DWFNs, including the EU, wanted not to strengthen existing inspection measures, so as to avoid the possibility of any use of force on the high seas (that is, claiming the extended level of “special circumstances”), while costal states emphasized their right to board and inspect vessels as part of their enforcement of conservation measures.²⁶

As the negotiation over the Fish Stocks Agreement demonstrates, the conflicting preferences of member countries stem from their domestic compliance environments, and divergent compliance environments tend to result in disputes that often work against the adoption of strong management measures. In the following section, I examine whether any systematic evidence for this theory exists in regional fisheries agreements.

²⁴ Earth Summit backgrounder, <http://www.un.org/ecosocdev/geninfo/sustdev/fishery.htm> Earth Summit +5: Special session of the General Assembly to Review and Appraise the Implementation of Agenda 21. New York 23-27 June 1997, Backgrounder

²⁵ Devaney 2005

²⁶ Earth Summit backgrounder, <http://www.un.org/ecosocdev/geninfo/sustdev/fishery.htm>

DATASET OF REGIONAL FISHERIES AGREEMENTS

To test my theory of the design of monitoring institutions, I analyze seventy-three multilateral fisheries agreements. Regional fisheries agreements have various legal provisions ranging from action plans with relatively light obligations to regional conventions underpinned by strong legal frameworks. Associated protocols often deal with specific problems in a manner consistent with the goals stated in the original convention.

Fisheries management is organized in four layers: global, regional, national, and local. On the global level, the UN Convention on the Laws of the Sea (UNCLOS) regulates the fishing behavior of member countries with specific written regulatory details in the FAO Code of Conduct for Responsible Fisheries (FAO-CC), along with its historical predecessors, as summarized in Table 2.

Table 2 *Milestones: Historical overview of legal instruments for global fisheries management*

Mid-1970s	Creation of EEZ
1982	United Nations Convention on the Law of the Sea (EEZ regime emerged)
1993	1993 Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (Compliance Agreement)
1995	United Nations Fish Stocks Agreement (entered into force in 2001)
	FAO Code of Conduct for Responsible Fisheries
2001	International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU)

On the regional level, regional fisheries bodies (RFB) implement the regulations complementary to global rules. On the national level, each nation has its own fishing program and more often than not, local fisheries management influences how the upper levels of national and regional management operate.

The global fisheries regime, like other international cooperation regimes, relies heavily on national level implementation. States are expected to improve their monitoring, control and surveillance systems (MCS), establish mandatory licensing regimes and strengthen legal frameworks.²⁷ As of 2005, the percentage of FAO member states that had adopted vessel-monitoring systems (VMS) to some degree had increased from 26 percent in 2001 to 70 percent.²⁸ Today, global regulation continues to depend on voluntary national implementation.

Although the development of the global fisheries regime is well worth studying, not least for the light such analysis can shed on the political conflicts that complicate the building of fisheries regimes, it is a much-studied topic²⁹ and does not give much leverage for large-N statistical analysis because it varies with time but exhibits little variation. In

²⁷ COFI/2005/2

²⁸ Vessel registration is the easiest method; states rarely monitor by-catch and discards.

²⁹ See Kaye 2001 for recent work on the global fisheries regime.

order to tackle a less-studied area that exhibits great variation, I chose to examine regional fisheries agreements, for which good data is available”³⁰

I am not suggesting that the study of global fisheries management is in any way ill conceived or misdirected. Rather, my decision to focus elsewhere reflects that the examination of regional fisheries agreements presents itself as an analytically fruitful exercise due to the large number and wide geographical distribution of these agreements. Certainly global and regional arrangements interact with each other, mostly in a coherent manner: regional systems aid the implementation of globally agreed rules while at the same time influencing the adoption of rules on the global level. Ultimately, the interaction between global, regional, and national levels should be studied,³¹ and this paper contributes to the discussion by first examining and trying to explain the variation in regional fisheries agreements.

Besides providing a sufficiently large dataset to allow me to estimate the effects of political differences among member states, other benefits of looking at regional agreements include the ability to sort out “problem features”—characteristics of problems that cooperation purports to solve—that may otherwise impair inference, if they are uncontrolled for. As Mitchell (2005) notes, regional fisheries agreements share the goal of addressing the issue of over-harvesting, a fact that allows an analyst to control issue characteristics that might otherwise weaken his/her research design. Controlling for the aims of agreements is important, since different goals tend to generate different motives among parties as they choose among various possible monitoring institutions.

To control for the end-goals of treaties, I have ensured that every agreement in the sample addresses the issue of over-harvesting or common pool resource (CPR) problems, committing to the protection of certain stocks, for example.³² Some agreements specifically target the problem of sustainable management of fisheries while other agreements address this as a secondary goal, instead focusing on the problem of free passage, conferring rights to fish. If an agreement did not state these sorts of goals and interests in its Preamble or in the provisions that outline convention objectives (e.g. conservation of marine environment, optimum utilization of fishery resources), it was left out of the sample.

Sample and Data Source

To identify an adequate sample for testing the aforementioned hypotheses regarding the institutional design of monitoring systems, I first cast my net over the entire

³⁰ It would be ideal to have the dataset of local fisheries management regulatory measures, but this does not yet exist. Besides, my goal in this paper is to examine the domestic political roots of international regulatory measures.

³¹ See the collection of papers from the Nested and Overlapping Institutions Conference at Princeton University, February 24, 2006, for recent theoretical efforts to explain different levels of cooperation. Available at http://www.princeton.edu/~smeunier/conference_nesting.htm (accessed on December 22, 2006)

³² One caveat here is that I do not control for the characteristics of fish species, which could be potentially important. For example, tuna and swordfish are classified as “highly migratory stocks” while cod and pollack are classified as “straddling fish stocks”—fish that live between different EEZ jurisdictions. See Munro et al. 2004 for more information regarding the classifications. Their characteristics may well affect the monitoring mechanisms, although it is unlikely the characteristics would determine the centralization of monitoring institutions.

universe of multilateral fisheries agreements by consulting the International Environmental Agreement (IEA) database³³ The IEA database contains 200 multilateral and 570 bilateral fisheries agreements. The agreements pertain to pacific salmon, northeast Atlantic fisheries, Baltic Sea fishing, international whaling, and a host of other issues. As explained before, I excluded global-scale agreements, such as the agreements related to the UN Convention on the Laws of the Sea (UNCLOS).³⁴ These global-scale agreements may influence arrangements on the regional level, which will be later briefly explored in the statistical analysis. I currently also exclude bilateral fisheries agreements, since the majority of these agreements deal with the issue of access rather than the issue of collective management and conservation.³⁵ Many bilateral agreements pertain to conferring fishing rights to the other party, usually one country granting access and the other providing financial assistance in return. Since I am mainly interested in the initial design of agreements rather than subsequent institutional changes, I additionally exclude further amendments and protocols.³⁶

This elimination process leaves only about 100 multilateral agreements. Unfortunately, some legal texts are unavailable or in a language other than English, so the current sample contains a total of 90 agreements. Some explanatory variables are limited in time and scope (for example, catch data may be available for a 50-year period with respect to species and areas, but environmental governance indicators may be available only for 2005 and 2000), which finally leaves 73 agreements that can be usefully analyzed. The independent variables are collected by Earth trends,³⁷ the Environment Sustainability Index (ESI),³⁸ the Environment Vulnerability Index (EVI),³⁹ and the FAO fishery country profile.⁴⁰

³³ Available at <http://iea.uoregon.edu/>

³⁴ Ron Mitchell organized the database such that the related agreements are linked by “lineage.” So, the Laws of the Sea lineage includes the original convention in 1982 as well as the 1995 Fish Stocks agreement.

³⁵ This claim is currently under investigation. Bilateral agreements involving shared seas (e.g. the Yellow Sea between China and Korea) concern conservation and management measures, while bilateral agreements involving distant fishing nations (e.g. African countries and the EU) express less concern for sustainable fishing.

³⁶ This omission leaves further room for future research on the evolution and development of monitoring systems. The theory of institutional change has to be developed first, or one has to examine whether the theory of institutional design can be transplanted to explain institutional change. Empirical testing can be done using hierarchical linear models.

³⁷ Earthtrends is from the World Resources Institute and their research topics include 1) coastal and marine ecosystems, 2) water resources and freshwater ecosystems, 3) climate and atmosphere, 4) biodiversity and protected areas, 5) environmental governance and institutions. Available at <http://earthtrends.wri.org/>

³⁸ The Center for International Earth Science Information Network (CIESIN) with the World Economic Forum, provides a composite index tracking a diverse set of socioeconomic, environmental and institutional indicators that characterize and influence environmental sustainability at the national scale. Available at <http://www.yale.edu/esi/>

³⁹ Developed by the South Pacific Applied Geoscience Commission (SOPAC), the United Nations Environment Programme (UNEP) and their partners, the index provides 50 ‘smart indicators’ to capture the key elements of environmental vulnerability. Available at <http://www.vulnerabilityindex.net/>

⁴⁰ FAO’s Fisheries Department prepares and publishes Fishery Country Profiles (FCP) with economic and demographic data, including structure and characteristics of the fishing industry. Available at <http://www.fao.org/fi/fcp/fcp.asp>

Dependent variable: aggregate measure of monitoring institutions

The dependent variable is the aggregate measure of monitoring institutions. The variable takes the value of zero when an agreement employs none of the following three available monitoring institutions in fisheries agreements⁴¹: 1) Commission, 2) Scientific Committee, 3) Observer or Inspection System. Among the available institutions, such as Secretariats or sub-committees, these three sub-bodies are directly related to monitoring activities. I exclude *ex ante* monitoring measures such as licensing and vessel registration because these measures do not directly monitor compliance behaviors but rather serve as measures to prevent illegal fishing in advance.

*Table 3 Summary Statistics of Dependent Variable
Three Levels of Monitoring Systems in Regional Fisheries Agreements*

Number of Monitoring Institutions (Commission, Scientific Committee, Observer and Inspection System)	
None (no monitoring institution specified)	15
One (either Commission, SC, or OS)	36
Two (e.g. Commission and Scientific Committee)	21
Three (all three institutions)	1
Total	73

The dependent variable is therefore an ordered variable that indicates greater and greater centralization as the number increases. The larger values indicate higher-order monitoring institutions with more independence and information collection capacity on the international level. A Commission typically has the mandate to make political decisions, is often empowered to collect scientific information, and is equipped by the member states with the power to establish a technical committee. Scientific bodies are organs that most often monitor compliance and compliance-related data in fisheries agreements. The respective fisheries institutions in each country's domestic arena collect key information, but scientific bodies in regional fisheries bodies operate as repositories of information. A Scientific Committee normally reports to a Commission by providing recommendations.⁴² In rare cases, the inspection and observer schemes are introduced to monitor compliance in a more objective way by bringing neutral observers on board. In cases where no formal institutions exist, consultative mechanisms using national contact points within governments serve the purpose of information exchange.

However, one should note that the distance between the four scores is not equal. Adopting observer or inspection schemes is usually a bigger step forward than establishing a commission and scientific committee together. This means that observer or inspection schemes are not usually politically appealing options due to the high level of delegation of

⁴¹ Wold et al. (2003) in their study on ten fisheries agreements identify six categories of monitoring, surveillance and monitoring systems: 1) vessel registration, 2) vessel monitoring systems (VMSs), 3) comprehensive observer programs, 4) catch documentation schemes, 5) inspection, and 6) compliance mechanisms (e.g. trade prohibitions). See their report for the collection of respective legal provisions.

⁴² An interesting episode that captures the political nature of commission work under fisheries agreements: “scientific advice this year recommended closing the North Sea cod fishery, yet the Commission asked for a mere 25% cut at the annual December quota-setting-meeting. Ministers trimmed that to between 14% and 20%” Bounds, Andrew. 2007. “EU Fisheries Commissioner: Dumping of dead fish is immoral, says Borg” *Financial Times*, Feb 20, 2007.

authority to international organizations by member states, compared to the combined option of commission and scientific body.

A caveat is in order with regard to using this kind of aggregate measure of institutions as a proxy for the strength of monitoring institutions. The key issue is whether the written legal provisions reflect actual practices. Once international agreements are signed, their implementation is at the mercy of corresponding national legislatures and political realities. The proposed measures may not reflect the extent to which scientific programs are actually conducted by such monitoring institutions. For these reasons, one cannot guarantee that practices on the ground perfectly coincide with what has been written. However, in this research, I am primarily interested in the *ex ante* design of monitoring institutions, so actual practices are less important than they might otherwise be for my analytical purposes. Additionally, a researcher may prefer objective measures to often-subjective assessments of reality. By adopting unobtrusive measure (i.e. just looking at legal provisions), an analyst can avoid the risk of employing subjective assessments and measures of actual practice.⁴³ Based on these two reasons, I have based my research on the objective coding of information mechanisms written into legal provisions.

Independent Variable I: Fisheries-Related Employment

I have posited that the asymmetry in compliance environments has a negative impact on the development of fisheries management measures. National governments want to appeal to their domestic fishing constituencies while also considering broader environmental impacts. Amid this tradeoff between domestic political interests and international obligations, each government looks to the other governments. When the parties to an agreement exhibit many differences, national governments are less likely to choose the benefit of soundly managing the environment. The reason is that state parties with widely divergent compliance environments cannot jointly maximize their benefit from an agreement by assenting to an institution that determines members' catch allocations based on scientific evidence. A state party with a small number of people employed in its fishing industry would welcome the prospect of the other state party restraining its fishing activity. On the other hand, a state party with a larger number of people employed in the fishing industry would suffer some temporary political loss, regardless of the benefits of having clear institutional bases for joint monitoring.

A potential political pressure arising from the fishing industry—one of the factors shaping a nation's domestic compliance environment—is proxied by the percentage of its total population employed in fishing.⁴⁴ Data on the number of people employed in fishing and aquaculture is available from Earthtrends. To obtain a relative measure, the number was divided by total population to estimate the importance of the fishing industry in the economy of each member country in the signing year. Later, to obtain a measure of asymmetry among member countries, I calculated the standard deviation of the percentage

⁴³ Another practical issue is that coding of written rules is clearly superior in terms of getting inter-coder reliability.

⁴⁴ A better alternative measure, I think, is fisheries GDP, an estimate of the contribution of fishing to the GDP and as a part of agricultural GDP. The measure includes the production of offshore fishing, incorporated fishing enterprises involved in processing and services, small-scale commercial fishing, and the contribution of subsistence fishing. This measure is in the process of being incorporated into the dataset by the author.

of each country's population employed in fishing. Standard deviation is a standard measure for dispersion, and in order to capture the idea of how diverse fishing populations are among member countries, I used standard deviation measures. The theoretical expectation is that the larger the difference in fishing employment among member countries (i.e. the larger the standard deviation), the less likely states are to adopt a monitoring institution that involves the delegation of authority.

Independent Variable II: Productivity Overfishing (Degrees of Overfishing)

Countries with overfishing problems at home tend to send their vessels outside their territorial waters, and consequently become distant water fishing nations (DWFNs). They are usually the ones with efficient fishing technology and low capture-per-unit-effort. Countries with a high level of productivity overfishing are likely to be distant water fishing nations. In terms of the Environmental Sustainability Index (ESI) measure of overfishing with seven-point scale, for instance, Japan scores 7 along with China and South Korea. Most European countries, including Ireland and Italy, score 5 and above. Consequently, these countries are generally classified as DWFNs. As illustrated in the UN Fish Stocks negotiation case, DWFNs tend to discourage the development of stringent monitoring systems. We therefore expect less centralized monitoring institutions when an agreement's membership includes more overfished nations.

Independent Variable III: Polity Asymmetry

Many studies find that democracies are more prone to international cooperation than non-democratic regimes.⁴⁵ To control for general political differences, I include the differences in polity scores, conventional measures in political science that measures how democratic (or autocratic) a country, for each agreement. Again, differences are measured in terms of the standard deviation of each signatory in the signing year.

Independent Variable IV: Scientific Knowledge Creation

While the first two variables are based on theories of interests and strategic interactions, the next two independent variables serve as competing hypotheses that are identified in international cooperation literature, namely, the view that focuses on national capacity to comply (an approach called the “managerial thesis”) and the perspective that scientific networks contribute most to international cooperation in environmental governance.

The role of epistemic community in international environmental governance has been documented by many international relations scholars, most notably and comprehensively by Haas.⁴⁶ An “epistemic community” is a network of knowledge-based experts or groups with an authoritative claim to policy-relevant knowledge within the domain of their expertise.⁴⁷

⁴⁵ See, for example, Mansfield et al. 2002 for the international trade context and Lai and Reiter 2000 for the alliance context.

⁴⁶ Haas 1992

⁴⁷ Haas 1992, p.3

The variable “knowledge creation in environmental science, technology and policy” was constructed by the Environmental Sustainability index (ESI). The variable is an average rank between 1 and 78 of three individual regressions with small values corresponding to above average performance. The reference year I have used is 2003.⁴⁸ The methodology of the ESI was to study the publication of scientific knowledge in the top-rated peer-reviewed journals in the fields of environmental science, technology, and policy. Three regressions were carried out as follows and the residuals of each regression were ranked⁴⁹ and aggregated to form an average rank score.

1. Publications per author per million population ~ researchers per million population + R&D spending as % of GDP + publications per area and population
2. Publications about foreign countries ~ log (GDP) + Publications per area
3. Publications per area ~ publications per author + population

I have to admit that this index is not a perfect measure of epistemic community. First, the measure does not entail the core concept of “connectivity” among scientific experts. Second, the measure may proxy for the government effectiveness and capacity of a nation and may be correlated with it.⁵⁰ Despite these limitations, if the epistemic community serves a role in establishing international monitoring bodies, we would expect it to have a significantly positive impact.

Independent Variable V: Government Effectiveness

Managerial views of international cooperation have emphasized the administrative and bureaucratic capacity of a nation. According to Chayes and Chayes (1995), national capabilities—or the lack thereof—may constitute critical obstacles to compliance. We should therefore see a significant “mirror image” effect when we consider the influence of national capabilities on domestic politics. Countries that rate higher in terms of government effectiveness will tend to favor better international coordination and the building of centralized monitoring institutions.⁵¹

To see how national environments contribute to institutional coordination on the international level, and to examine how national measures translate into international politics, I also include the variable “government effectiveness,”⁵² constructed by the World Bank.⁵³ The Bank aggregates 25 resources of information on governmental effectiveness to produce comparable indicators including “quality of public service provision, the quality

⁴⁸ This variable is only available for 1993, 1998 and 2003, and the rankings do not change much over time.

⁴⁹ Regression residuals are often used as performance measures. If a model predicts y_{hat} but actual outcome is y , the difference (y minus y_{hat}) serves as the measure for performance. See Wang and Jamison (1998) for their discussion of the methodology and actual practice of using residuals as performance measures.

⁵⁰ Indeed, in my dataset, there was a moderate level of correlation (.2) between knowledge and capacity variables with some significance (.06).

⁵¹ It could be that effective measures at home might cancel the need for any international measures. The aforementioned “managerial perspective” does not directly address institutional design issues, so I am drawing a hypothesis based on the implications of the managerial thesis.

⁵² The data reference year is 2002; I checked later for endogeneity in order to examine whether global monitoring institutions in turn affected government effectiveness. It is unlikely but possible that global measures may enhance a national government’s effectiveness.

⁵³ <http://info.worldbank.org/governance/kz2005/pdf/ge.pdf>

of bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies.”⁵⁴

Control Variables

For control variables, two agreement features are included in the model: 1) the number of member countries and 2) the binary variable that specifies whether a specific agreement was concluded before or after the United Nations Convention on the Laws of the Sea Agreement (UNCLOS) of 1982. The number of countries is included because of the concern that a smaller number of countries may be conducive to easier bargaining. To control for the size-effect in collective action, I include the number of state parties to each agreement in the sample. The UNCLOS variable is included to address the concern that the global regime that specified the EEZ regime may have impacted the kinds of arrangements considered on the regional level. As discussed before, this variable is helpful when examining the interaction between global and regional regimes, specifically when assessing whether a change in the global regime drove a change in the regional setting as well.

⁵⁴ ESI codebook

Table 4 *Summary of Variables*

<i>Variable</i>	<i>Source</i>	<i>Note (reference year, scale, etc.)</i>
Dependent variable		
Aggregate measure of monitoring institutions	Author	4 point scale of centralization of monitoring institutions for each agreement in the sample
Independent variables		
Asymmetry of Fishing-related Employment	Earthtrends	Percentage of population employed in fishing and aquaculture
Average of Productivity	ESI	Average for 1993-1998; 7-point scale
Overfishing		
Polity Asymmetry	Polity IV	Standard deviation of policy scores among member countries in an agreement
Average of Scientific Knowledge Creation	ESI	Ranked score of 1-74 the publication of scientific knowledge in the top-rated peer-reviewed journals in the fields of environmental science, technology, and policy; Available only 1970, 1980, and 1990 ⁵⁵
Average of Government Effectiveness	ESI	Standardized score (z-score) with high values corresponding to high levels of effectiveness; Average of government effectiveness scores of member countries; Reference year: 2002
Control Variables		
Number of Membership		Number of signatories to a given agreement
United Nations Convention on the Laws of the Sea Agreement (UNCLOS)		Binary variable (0 for pre-UNCLOS, 1 for post-UNCLOS)

RESULTS

To summarize, the sample considered here consists of seventy-three regional fisheries agreements, each with its own member characteristics or agreement features, as summarized in Table 4. The main unit of analysis is therefore a regional fisheries agreement. Based on the theoretical framework, member characteristics might include differences in the size of the fishing industry, political regime type, and environmental conditions contributing to overfishing. Additionally, I include two variables to estimate the effect of epistemic community and of national governmental capacity on the institutional arrangements on the international level.

The dependent variable is an ordered – multiple and ranked discrete variable, so I use the estimation method of ordered probit. Table 5 provides the estimation results of two ordered probit models of institutional choice. The results suggest that greater asymmetry in

⁵⁵ I recoded such that pre-1975 measures use 1970 measure, 1975-85 use 1980 measure, 1985-95 use 1990 measure.

fishing industries among member countries, higher polity scores, and higher levels of overfishing are all associated with decreased centralization of monitoring institutions.

Table 5 Ordered Probit Results on the Choice of Monitoring Institutions in Regional Fisheries Agreements

	Model 1 Baseline Model	Model 2 Testing the influence of the global regime
Fishing Employment		
% of population in fishing and aquaculture industry (asymmetry among members)	-.496 ** (.233)	-.471** (.238)
Degree of overfishing (average among members)	-.649 *** (.246)	-.504* (.263)
Polity asymmetry	.169 * (.088)	.131 (.092)
Government effectiveness (average among members)	.035 (.248)	.097 (.257)
Knowledge creation (average among members)	-.044 ** (.021)	-.043** (.021)
UNCLOS		.423 (.347)
Number of member countries		.027 (.025)
cut 1	-5.389 (1.567)	-4.243 (1.727)
cut 2	-4.140 (1.523)	-2.959 (1.696)
cut 3	-2.052 (1.489)	-.840 (1.698)

* p<0.10, **p<0.05, ***p<0.01. Robust standard errors are in parentheses.

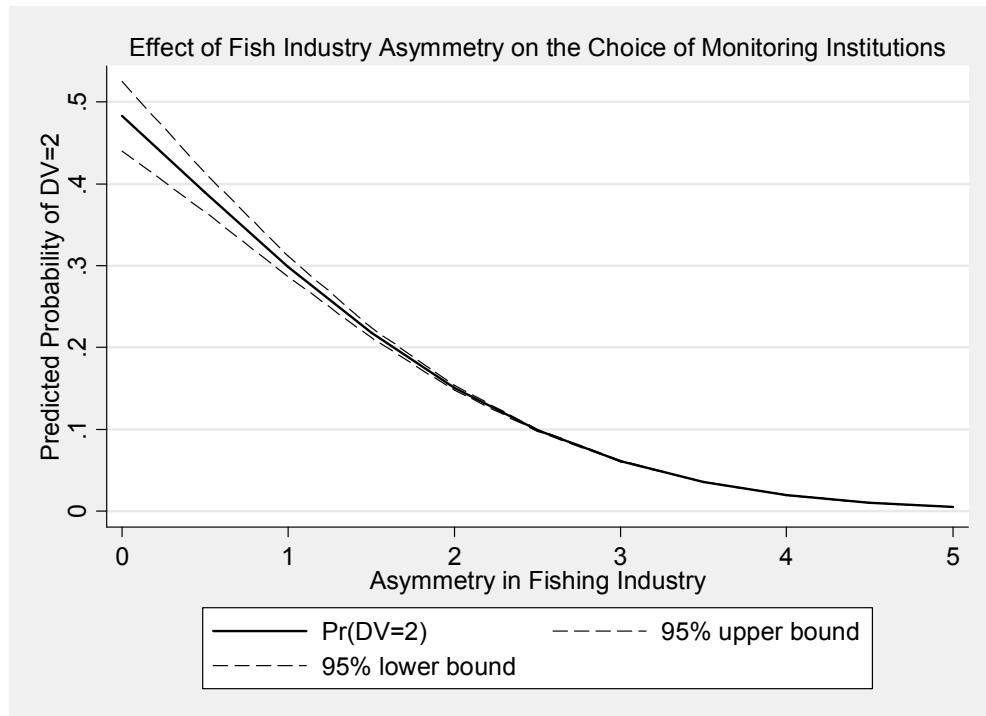
The results generally support the theoretical discussions, and at the same time, yield interesting observations about the determinants driving the institutional choice of international monitoring systems in regional fisheries agreements.

The difference in domestic compliance environments, measured by the differences in fishing industries, decreases the probability that centralized monitoring systems will be adopted. Figure 1 shows the estimated effect of the asymmetry in fishing industries on the choice of international monitoring systems. As the asymmetry increases, the probability of a relatively centralized monitoring institution (Level 2, such as the combination of scientific body and commission) decreases. The effect is as large as 50%.⁵⁶ This means that the asymmetry in compliance environments can reduce the probability of adopting a centralized monitoring institution by as much as half.

⁵⁶ The effect is estimated holding other variables at their means and changing the value of the variable of interest, in this case, the asymmetry level in fishing industry, which ranges from zero to five.

Figure 1

*Predicted Probability of the Choice of Monitoring Institution (Level 2)
depending on the Asymmetry in Fishing Industries among Member Countries*



I return to the interpretation of other results presented in Table 4. The significantly negative sign for the degree of overfishing confirms our casual empirical observation that overfished nations are distant water fishing nations and therefore more likely to oppose stringent regulatory measures.

It also appears that the knowledge variable reflecting the idea of epistemic community has a negative impact on the adoption of a centralized monitoring institution on the international level. This is a curious result because epistemic community literature would predict that domestic scientific communities have a positive impact on the development of international institutions. The empirical result may suggest an opposite causal mechanism: efficient domestic epistemic communities may serve as sufficient governance mechanisms, and may reduce the perceived benefit deriving from additional regulatory and monitoring mechanisms. Depending on whether we view epistemic communities as substitutes or complements to international regulatory measures, the negative and marginally significant impact of epistemic community discovered in this study might produce a novel interpretation of the relationship between domestic epistemic communities and international regulations.

Finally, government effectiveness does not produce a statistically significant impact on the choice of monitoring systems on the international level. The UNCLOS variable was added to check whether global-level regulations changed the landscape for regional regulations, but the effect is statistically insignificant, although the positive sign means that the signing of the global convention may have had some positive impact on the development of the regional-level monitoring systems.

CONCLUSION

Summary and further research directions

This paper started with a puzzle: “Why do states not adopt information mechanisms on the international level in all agreements, if they are deemed beneficial?” I have presented a theory that highlights the distributional issues in establishing monitoring institutions in international fisheries management. I have argued that the sovereignty costs are not uniform across potential member countries. Differences in domestic compliance environments have negative effects on the establishment of monitoring bodies on the regional level, creating conflicts at the bargaining table. To examine this theoretical argument empirically, I have identified the relevant monitoring systems in fisheries management and tested the hypothesis against other prominent hypotheses, such as the epistemic community hypothesis and the so-called “managerial thesis.” The statistical analysis of seventy-three regional fisheries agreements largely supports the theoretical argument that differences in compliance environments tend to harm the development of a stringent international regulatory environment.

However, the results presented in this report should not be taken as conclusive evidence, due to the study’s limited sample size. The full sample, including the development of each lineage (international whaling, pacific salmon, etc.), will bring the present results into even sharper focus. A natural future research direction therefore would be to examine the development and implementation of particular institutional structures for monitoring fisheries agreements. Some agreements develop scientific or other monitoring programs fairly quickly after the initial agreements are signed, while in other cases there is a lengthy delay. For example, the International Whaling Commission (IWC) instituted a formal mechanism comprising a scientific committee in 1954, almost ten years after the original agreement. The Commission is still struggling to conclude the Revised Management Scheme, which could include more conservative measures relating to the determination of quotas.⁵⁷ The International Commission for the Conservation of Atlantic Tunas (ICCAT), on the other hand, developed their institutional structures for monitoring within a much shorter timeframe. Comparing the development of various agreements and attending institutions will provide a wealth of data that will, in turn, advance an examination of the political strategies and associated conditions that contribute to resolving political differences among member countries. In addition to tracing the development of various fisheries cases, the exact causal mechanisms that shape negotiations of regional fisheries agreements should also be carefully examined, not least to find out how states negotiate past their differences and how negotiators themselves perceive the political obstacles they face in establishing international regulatory measures.

⁵⁷ Obertur, 1998

REFERENCES

- ADE-PwC-EPU. 2002. Evaluation of the Relationship between Country Programmes and Fisheries Agreements: Final Report, ADE-PricewaterhouseCoopers-EPU.
- Alder, Jack, Gail Lugten, Robert Kay and Bridget Ferriss "Compliance with International Fisheries Instruments" Sea Around Us: North Atlantic, page 55
- Ausubel, J.H. and David Victor. 1992. "Verification of International Environmental Agreements" *Annual Review of Energy and Environment* 17:1-43.
- Balton, David 2004 "Dealing with the 'Bad Actors' of Ocean Fisheries" Directorate for Food, Agriculture and Fisheries. Organization for Economic Co-operation and Development (OECD). AGR/FI/IUU/RD(2004)
- Chayes, Abram and Antonia Chayes 1993 "On Compliance" *International Organization* 47: 175
- COFI/2005/2, Committee on Fisheries, Twenty-sixth session, Rome Italy 7-11 March 2005. "Progress in the Implementation of the Code of Conduct for Responsible Fisheries and Related International Plans of Action"
- Cox, Anthony and Carl-Christian Schmidt 2002 "Subsidies in the OECD Fisheries Sector: A Review of Recent Analysis and Future Directions" Paper prepared for the FAO Expert Consultation on Identifying, Assessing and Reporting on Subsidies in the Fishing Industry, Rome, 2-6 December 2002.
- Devaney, Patricia L. 2005. "Regional Fisheries Management Organizations: Bringing Order to Disorder" in Lawrence Susskind and William Moomaw (eds.) *Papers on International Environmental Negotiation*, Volume 14, Program on Negotiation at Harvard Law School Clearinghouse. Available at http://www.pon.org/downloads/ien14_4Devaney.pdf
- Downs, George, David Rocke and Peter Barsoom. 1996. "Is the Good News about Compliance Good News for Cooperation?" *International Organization*. 50: 379-406.
- ECOLEX: A Gateway to Environmental Law. www.ecolex.org
- Environmental Vulnerability Index (EVI): Description of Indicators. 2004. UNEP and SOPAC. South Pacific Applied Geoscience Commission (SOPAC), the United Nations Environment Programme (UNEP)
- Esty, Daniel C., Marc Levy, Tanja Srebotnjak, and Alexander de Sherbinin. 2005. *2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship*. New Haven: Yale Center for Environmental Law and Policy.
- FAO. 1996. "Precautionary Approach to Capture Fisheries and Species Introductions" FAO Technical Guidelines for Responsible Fisheries.
- FAO Fisheries Department. 2002. "Fishery Statistics: Reliability and Policy Implications" Available at <http://www.fao.org/DOCREP/FIELD/006/Y3354M/Y3354M00.HTM>
- FAO FARISIS Database <http://www.oceanlaw.net/texts/index.htm>
- FAO Fisheries Global Information System (FIGIS)
- Firestone, J. and T. Polacheck. 2004. "The Effectiveness of the UN Convention on the Law of the Sea in Resolving International Fisheries Disputes: The Southern Bluefin Tuna Case" in *Science and*

- Politics in the International Environment*, Harrison, Neil. and Gary Bryner. (eds.), Landham, MD : Rowman & Littlefield Publishers, Ch. 9, 99. 241-270.
- Haas, Peter. 1992. "Introduction: Epistemic Communities and International Policy Coordination" *International Organization*, 46(1)
- Hardin, Garrett. 1968. "The Tragedy of the Commons" *Science*. 162: 1243-1248.
- Henriksen, Tore, Geir HØnneland, and Are Sydnes. 2006. *Law and Politics in Ocean Governance: The UN Fish Stocks Agreement and Regional Fisheries Management Regimes*. Leiden, Netherlands, Martinus Nijhoff Publishers.
- Hilborn, Ray, J.M. Orensanz and Ana Parma. 2005. "Institutions, Incentives and the Future of Fisheries" *Philosophical Transactions of the Royal Society B: Biological Sciences*. 360(1453): 47-57.
- Jo, Hyeran 2006 "The Design of Monitoring Institutions in International Cooperation" *Paper presented at the Midwest Political Science Association*, Chicago IL, April 2006
- Kaye, Stuart. 2000. *International Fisheries Management*. Kluwer Law International.
- Keohane, Robert. 1984. *After Hegemony*. Princeton University Press.
- Koremenos, Barbara, Charles Lipson and Duncan Snidal. 2001. "The Rational Design of International Institutions" *International Organization* 55(4): 761-800.
- Lai, Brian and Dan Reiter 2000 "Democracy, Political Similarity and International Alliances, 1816-1992" *Journal of Conflict Resolution*. 44(2): 203-227.
- Mansfield, Edward, Peter Rosendorff and Helen Milner 2002 "Why Democracies Cooperate More: Electoral Control and International Trade Agreements" *International Organization*. 56: 477-513
- Milazzo, Matteo. 1998. "Subsidies in World Fisheries: A Reexamination" *World Bank Technical Paper Series*. No.406. Fisheries Series.
- Milner, Helen and Peter Rosendorff. 2001. "The Optimal Design of International Institutions: Why Escape Clauses are Essential" *International Organization*. 55(4): 829-57.
- Mitchell, Ronald. 2006. International Environmental Agreements (IEA) Database. <http://iea.uoregon.edu/>
2006. "Problem Structure, Institutional Design, and the Relative Effectiveness of International Environmental Agreements" *Global Environmental Politics* 6(3): 72-89.
2005. "The International Environmental Agreements Project: Structure, Analytic Goals, and an Example from Fisheries" *Paper presented at the Annual Meeting of the American Political Science Association*, September 1-4, 2005.
- 2003 "International Environmental Agreements: A Survey of Their Features, Formation, and Effects" *Annual Review of Environment and Resources* 28: 429-61.
- Mitchell, Ronald, William Clark, David Cash and Nancy Dickson (eds.), 2006. *Global Environmental Assessments: Information and Influence*. MIT Press. Cambridge, MA.
- Munro, G. Van Houtte, A., Willmann, R. 2004. "The Conservation and Management of Shared Fish Stocks: Legal and Economics Aspects" *FAO Fisheries Technical Paper* No.465, Rome.

- Obertur, Sebastian. 1998. "The International Convention for the Regulation of Whaling: From Over-Exploitation to Total Prohibition" *Yearbook of International Cooperation on Environment and Development* 1998/9, 29-38
- Ostrom, Elinor, Roy Gardner, and James Walker (eds.) 1994. *Rules, Games and Common Pool Resources*. Ann Arbor. University of Michigan Press.
- Riddle, Kevin W. 2006. "Illegal, Unreported, and Unregulated Fishing: Is International Cooperation Contagious?" *Ocean Development & International Law* 37(4): 265 - 297
- Sullivan, Patrick. 2003. "Testimony on Global Overfishing and International Fisheries Management" *Hearing at the U.S. Senate Committee on Commerce, Science and Transportation*, Thursday, June 12 2003. Available at <http://commerce.senate.gov/hearings/witnesslist.cfm?id=808>
- The Economist. 2001. "Global fish stocks: Fishy figures" *The Economist*, December 2001: 99-100
- Thorpe, Andy. 2005. "Mainstreaming Fisheries into National Development and Poverty Reduction Strategies: Current Situation and Opportunities" *FAO Fisheries Circular No.997*. FIPP/SFLP/C997, Rome, FAO. 2004. 121p.
- Tickner, Joel, Carolyn Raffensperger, and Nancy Myers. "The Precautionary Principle in Action" A *Handbook*. First edition. Available at <http://www.biotech-info.net/precautionary.html>
- Vicuna, Francisco Orrego. 1999. *The Changing International Law of High Seas Fisheries*. Cambridge University Press.
- Victor, David, Kal Raustiala, and Eugene Skolnikoff. 1998. *The Implementation and Effectiveness of International Environmental Commitments: Theory and Practice*. MIT Press.
- Von Stein, Jana. 2005. "Do Treaties Constrain or Screen? Selection Bias and Treaty Compliance" *American Political Science Review*. 99(4): 611-622.
- Wang, Jia, and Dean Jamison. 1998. "Regression Residuals as Performance Measures: An Assessment of Robustness in the Context of Country-Level Data" *Paper presented at the Annual Meeting of the American Educational Research Association*, San Diego, CA, April 13-17, 1998.
- Watson, R. and D. Pauly. 2001. "Systematic distortions in world fisheries catch trends" *Nature*, 414(29): 534-536
- Weiss, Edith Brown, and Harold Jacobson. 1998. *Engaging Countries: Strengthening Compliance with International Environmental Accords*. MIT Press.
- Westlund, Lena. 2004. "Guide for Identifying, Assessing and Reporting on Subsidies in the Fisheries Sector" *FAO Fisheries Technical Paper 438*
- Wold, Chris, Shari Arrigotti, Lisa Johnson, Amy Van Horn and Lockey White. 2000. "A Review of Monitoring, Control, and Surveillance Programs of International Fisheries Agreements with a View to the IWC's Inspection and Observation Scheme of the RMS" *Mimeo. Northwestern School of Law of Lewis & Clark College*. Available at http://www.lclark.edu/org/ielp/objects/comp_regimes.pdf
- World Resources Institute. 2007. *EarthTrends: Environmental Information*. Available at <http://earthtrends.wri.org>. Washington DC: World Resources Institute.

APPENDIX

List of Fisheries Agreements in the Sample

- Treaty Name
- 1 Convention For The Regulation Of The Meshes Of Fishing Nets And The Size Limits Of Fish
 - 2 International Convention For The Regulation Of Whaling
 - 3 Agreement For The Establishment Of The Indo-Pacific Fisheries Commission
 - 4 International Convention For The Northwest Atlantic Fisheries
 - 5 Convention For The Establishment Of An Inter-American Tropical Tuna Commission
 - 6 Agreement For The Establishment Of A General Fisheries Commission For The Mediterranean Exchange Of Notes Constituting An Agreement Between The United States Of America, Canada And Japan Relating To Scientific Investigations Of The
 - 7 Fur Seals In The North Pacific Ocean
Agreement Concerning Measures For The Protection Of The Stocks Of Deep Sea Prawns (*Pandalus Borealis*), European Lobsters (*Homarus Vulgaris*), Norway Lobsters (*Nephrops Norvegicus*) And Crabs (*Cancer Pagurus*)
 - 8 International Convention For The High Seas Fisheries Of The North Pacific Ocean
Convention On The Organization Of The Permanent Commission Of The Conference On The Exploitation And Conservation Of The Maritime Resources
 - 9 Of The South Pacific
Agreement Supplementary To The Declaration Of Sovereignty Over The Maritime Zone Of Two Hundred Miles To The Permanent Commission Of The
 - 10 South Pacific
 - 11 South Pacific
 - 12 Agreement Relating To The Issue Of Permits For The Exploitation Of The Maritime Resources Of The South Pacific
 - 13 Agreement Relating To Penalties Under The Permanent Commission Of The South Pacific
Agreement Relating To Measures Of Supervision And Control In The Maritime Zones Of The Signatory Countries To The Permanent Commission Of The
 - 14 South Pacific
 - 15 Agreement Relating To A Special Marine Frontier Zone Under The Permanent Commission Of The South Pacific
 - 16 Regulations Governing Whaling In The Waters Of The South Pacific
 - 17 Agreement relating to the International Convention for Regulating the Police of the North Seas Fishery signed at The Hague on 6 May 1882
 - 18 Convention On The Canalization Of The Mosel
 - 19 Interim Convention On Conservation Of North Pacific Fur Seals
 - 20 Convention Concerning Fishing In The Waters Of The Danube
 - 21 Northeast Atlantic Fisheries Convention
 - 22 Convention Concerning Fishing In The Black Sea
 - 23 Agreement Concerning Cooperation In Marine Fishing
 - 24 Agreement On The Protection Of The Salmon In The Baltic Sea
 - 25 Act Regarding Navigation And Economic Cooperation Between The States Of The Niger Basin
 - 26 Agreement Concerning An International Observer Scheme For Factory Ships Engaged In Pelagic Whaling In The Antarctic
 - 27 European Fisheries Convention
Agreement as to transitional rights between Ireland, Belgium, the Federal Republic of Germany, the Republic of France, the Netherlands, Spain and the
 - 28 United Kingdom of Great Britain and Northern Ireland
 - 29 Agreement Relating To The International Legal Personality Of The Permanent Commission Of The South Pacific
 - 30 International Convention For The Conservation Of Atlantic Tunas
 - 31 Agreement On Reciprocal Access To Fishing In The Skagerrak And The Kattegat
 - 32 Convention On The Conduct Of Fishing Operations In The North Atlantic
Exchange of letters constituting an agreement between Denmark and the European Community concerning concessions from the European Economic
Community on herring
 - 33
 - 34 Agreement Establishing The Southeast Asian Fisheries Development Center
 - 35 Agreement On The Regulation Of North Pacific Whaling
 - 36 Agreement On The Regulation Of North Pacific Whaling
Agreement Between The Governments Of Iceland, Norway And The Union Of Soviet Socialist Republics On The Regulation Of The Fishing Of The
 - 37 Atlanto-Scandinian Herring
Agreement Between The Government Of Canada, The Government Of The Republic Of Iceland And The Government Of The Kingdom Of Norway
 - 38 Concerning An International Observer Scheme For Land-Based Whaling Stations In The North Atlantic Area
 - 39 Convention For The Conservation Of Antarctic Seals
Agreement Between The Government Of The Union Of Soviet Socialist Republics, Iceland And Norway Concerning The Regulation Of Fishing Of The
 - 40 Atlanto-Scandinian Herring
 - 41 Convention On Fishing And Conservation Of The Living Resources In The Baltic Sea And Belts
 - 42 Arrangement Relating To Fisheries In Waters Surrounding The Faroe Island
Agreement Between The United Kingdom, Norway And The Union Of Soviet Socialist Republics On The Regulation Of The Fishing Of North-East Arctic
(Arcto-Norwegian) Cod

- 44 Agreement For The Establishment Of An Organization To Manage And Develop The Kagera River Basin
- 45 Convention On Future Multilateral Cooperation In The Northwest Atlantic Fisheries
- 46 South Pacific Forum Fisheries Agency Convention
- 47 Agreement Incorporating Colombia Into The System Of The Permanent Commission Of The South Pacific
- 48 Convention On The Conservation Of Antarctic Marine Living Resources
- 49 Convention On Future Multilateral Cooperation In Northeast Atlantic Fisheries
- 50 Convention Creating The Niger Basin Authority
- 51 Nauru Agreement Concerning Cooperation In The Management Of Fisheries Of Common Interest
- 52 Convention For The Conservation Of Salmon In The North Atlantic Ocean
- 53 Constitutional Agreement Of The Latin American Organization For Fisheries Development
- 54 Eastern Pacific Ocean Tuna Fishing Agreement
- 55 Convention Concerning The Regional Development Of Fisheries In The Gulf Of Guinea
- 56 Convention For The Establishment Of A Sub-Regional Commission On Fisheries
Agreement For The Establishment Of The Intergovernmental Organization For Marketing Information And Technical Advisory Services For Fishery Products In The Asia And Pacific Region
- 58 Treaty On Fisheries Between The Governments Of Certain Pacific Island States And The Government Of The United States of America
- 59 Agreement Establishing The Economic Community Of Cattle, Meat And Fishing Resources In UDEAC
- 60 Agreement On The Network Of Aquaculture Centres In Asia And The Pacific
- 61 Agreement Creating The Eastern Pacific Tuna Fishing Organization
- 62 Convention For The Prohibition Of Fishing With Long Driftnets In The South Pacific
- 63 Arrangement Implementing The Nauru Agreement Setting Forth Minimum Terms And Conditions Of Access To The Fisheries Zones Of The Parties
Second Arrangement Implementing The Nauru Agreement Setting Forth Additional Terms And Conditions Of Access To The Fisheries Zones Of The Parties
- 65 Agreement On The Conservation Of Seals In The Wadden Sea
- 66 Western Indian Ocean Tuna Organization Convention
- 67 Convention On Fisheries Cooperation Among African States Bordering The Atlantic Ocean
Agreement For The Establishment Of The Intergovernmental Organization For Marketing Information And Cooperation Services For Fishery Products In Africa
- 69 Agreement Establishing Common Fisheries Surveillance Zones Of Participating Member States Of The Organisation Of Eastern Caribbean States
- 70 Convention For The Conservation Of Anadromous Stocks In The North Pacific Ocean
- 71 Agreement On The Conservation Of Small Cetaceans Of The Baltic And North Seas
- 72 La Jolla Agreement On The Reduction Of Dolphin Mortality In The Eastern Pacific Ocean
- 73 Niue Treaty On Cooperation In Fisheries Surveillance And Law Enforcement In The South Pacific Region
- 74 Arrangement For The Management Of Western Pacific Purse Seining Fishery
- 75 Agreement To Constitute The International Center For Living Aquatic Resources Management As An International Organization
- 76 Convention For The Conservation Of Southern Bluefin Tuna
- 77 Extension To The Treaty On Fisheries Between The Governments Of Certain Pacific Island States And The Government Of The United States of America
- 78 Constitution Of The Centre For Marketing Information And Advisory Services For Fishery Products In The Arab Region
- 79 Convention Under The Sub-Regional Commission On Fisheries On Cooperation In The Exercise Of The Rights Of Maritime Pursuit
- 80 Agreement To Promote Compliance With International Conservation And Management Measures By Fishing Vessels On The High Seas
- 81 Agreement For The Establishment Of The Indian Ocean Tuna Commission
- 82 Constitution Of The Centre For Marketing Information And Advisory Services For Fishery Products In Latin America And The Caribbean
- 83 Convention On The Conservation And Management Of Pollock Resources In The Central Bering Sea
- 84 Convention For The Establishment Of The Lake Victoria Fisheries Organization
- 85 Federated States Of Micronesia Arrangement For Regional Fisheries Access
- 86 Agreement On The Conservation Of Cetaceans Of The Black Sea, Mediterranean Sea And Contiguous Atlantic Area
- 87 Inter-American Convention For The Protection And Conservation Of Sea Turtles
- 88 Convention Regulating Fishing Activity Within The Waters Of The Member States
Agreement Of Cooperation For The Conservation Of The Marine Turtles In The Caribbean Coast Of Costa Rica, Nicaragua And Panama (Tripartite Agreement)
- 90 Agreement On The International Dolphin Conservation Program
- 91 Agreement Between Iceland, Greenland/Denmark, And Norway About The Capelin Stock In The Area Between Greenland, Iceland, And Jan Mayen
- 92 Agreement Between Iceland, Norway And Russia Concerning Certain Aspects Of Cooperation In The Area Of Fisheries

- 93 Agreement For The Establishment Of The Regional Commission For Fisheries
- 94 Agreement for the Establishment of the International Organisation for the Development of Fisheries in Eastern and Central Europe (eurofish)
- 95 Framework Agreement For The Conservation Of The Living Marine Resources Of The High Seas Of The South Pacific
- 96 Convention on the Conservation and Management of the Highly Migratory Fish Stocks of the Western and Central Pacific Ocean
- 97 Convention On The Conservation And Management Of Fishery Resources In The South East Atlantic Ocean
Second Extension To The Treaty On Fisheries Between The Governments Of Certain Pacific Island States And The Government Of The United States of America
- 98 Convention For The Strengthening Of The Inter-American Tropical Tuna Commission Established By The 1949 Convention Between The United States Of America And The Republic Of Costa Rica