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Regional Public Goods in the Blue Economy: Lessons from 14 Cases of International Cooperation

RONALD U. MENDOZA, PH.D. FACULTY, ASIAN INSTITUTE OF MANAGEMENT

CHARLES IRVIN S. SIRIBAN RESEARCH ASSOCIATE, AIM POLICY CENTER

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THE AUTHORS



RONALD U. MENDOZA, PH.D. Asian Institute of Management Center for Development Management AIM Policy Center



CHARLES IRVIN S. SIRIBAN Asian Institute of Management Policy Center

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Ronald U. Mendoza Charles Irvin S. Siriban

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ABSTRACT

The blue economy is a term used recently to emphasize the sustainable utilization of marine resources, spanning fisheries, energy and international trade, among other aspects. As a contribution to the policy discussions, this paper uses a regional public goods framework to analyze several cases of international cooperation to ensure more successful and sustained outcomes in the blue economy. The main lessons include the use of financing and burdensharing mechanisms, and the importance of joint research and producing credible data and information for conducting collaborative policymaking and, if necessary, settling disputes. Some solutions benefit from clear delineation of territories, but need not hinge on this element alone. The analysis herein offers possible avenues for exploring arrangements that promote a "blue economy" approach to the management of natural resource wealth.

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Key words: marine economy, blue economy, sustainability, regional public good

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INTRODUCTION

Marine ecosystems provide livelihoods and critically important resources for millions of people who live in coastal communities and large cities dependent on the maritime economy. By at least one estimate, the global revenue from fisheries alone amounts to about US\$80-85 billion a year (estimated in 2003). However, when one considers the broader economic activity supported by marine fisheries (covering other economic sectors such as boat manufacturing or fish canning), the total global value is approximately US\$240 billion annually, or about three times the landed value of marine fisheries. And Asia leads globally in total income supported by the marinefisheries sector—with over 55 percent of household income from fisheries earned in Asia.¹

For the past years, human activities and external factors (such as climate change) have induced significant pressure on the sustainability of various marine resources. A 2011 report by Burke et al (2011) noted that almost 75% of the world's coral reefs are threatened by human activities and thermal stress associated with the warming of oceans. The proportion is also high for many regions, with more than 90% of coral reefs in Southeast Asia and Atlantic regions facing medium or higher risk levels (see Figure 1). For Southeast Asia, almost half of the coral reefs are facing high or very high threat due to factors such as overfishing and the use of destructive fishing practices². The same report also projected an increasing proportion of global coral reefs in the coming years (roughly 50% by 2030s and 95% by 2050s) that will be adversely affected by thermal stress. These have important implications especially for those who significantly depend on marine resources, as in the case of citizens of many small island developing countries in which fish constitutes a significant proportion of their total animal protein intake (FAO, 2012).

In order to sustainably manage natural resources in the marine economy, a growing number of experts have begun to call for a paradigm shift-from one that tolerates an aggressive and often untenable extraction of resources from the world's oceans and seas, to one that recognizes the importance of the "blue economy". The latter term has seen increasing use in recent years, and it is often viewed as a version of the "green economy" made relevant to seas and oceans. Essentially, the term implies an approach to natural resource management that is

¹ See Dyck and Sumaila (2010). ² See Burke et al (2011): 55

guided by improved human well-being and social equity, while also promoting sustainability, mitigating environmental risks and minimizing ecological damage.³



Figure 1. Proportion of Coral Reefs Affected by Integrated Local Threats and Thermal Stress

Source: Burke et al (2011): 42

An economic framework could be used to operationalize this shift to a "blue economy" approach. Markets often fail to price the externalities produced from activities that deplete natural resources like fish stocks and coral reefs; and markets alone are also typically inadequate in promoting social objectives like equity and inclusive economic development. Key public goods are needed to help balance the workings of the market, and hence also achieve social and economic objectives. In the context of the blue economy, international collective action could help to promote more sustainable resource utilization, while also helping to enhance the sustainable and fair functioning of rapidly integrating market economies in certain regions.

In this paper, we turn to a regional public good lens in order to analyze the extent to which international cooperation could help attain more sustainable use of natural resources in the marine economy, notably in Asia. This paper uses a regional public goods framework to analyze

³ See "Countries call for blue economy to protect the Mediterranean," UNEP News Centre, 10 February 2012. [Available at: http://www.unep.org/newscentre/Default.aspx?DocumentID=2667&ArticleID=9025&l=en].

several cases of international cooperation on maritime issues, in order to identify possible common elements that help to ensure more successful and sustained outcomes. Based on this brief review, the main lessons include the use of financing and burden-sharing mechanisms, and the importance of joint research and producing credible data and information for conducting collaborative policymaking and, if necessary, settling disputes. The solutions sometimes benefit from clear delineation of territories, but need not hinge on this element alone. The analysis herein offers possible avenues for exploring arrangements that promote a "blue economy" approach to the management of natural resource wealth.

In what follows, section 1 briefly reviews a few concepts on regional public goods in order to help shed light on how certain aspects of the blue economy could be operationalized. Section 2 then briefly synthesizes key insights gleaned from a collection of fourteen cases of regional public goods that aspire toward the sustainable management of natural resource wealth in various maritime contexts in different regions. A final section briefly synthesizes the main insights in the analysis.

I. REGIONAL PUBLIC GOODS

The textbook definition of a public good points to its non-rivalrous and non-excludable characteristics. Put simply, this implies that within a given area, a public good can be consumed by (or it could provide benefits⁴ for) anyone in that area. Non-excludability implies that people in this area cannot be prevented from consuming or benefiting from this public good. Non-rivarly means that many people could consume or benefit from the public good without necessarily reducing said benefit. And because of these two characteristics, markets are unable to effectively price public goods, thus warranting collective action.

There is an extensive policy literature that has further elaborated on this basic definition of public goods, and the key innovation seems to point to the variable nature of the non-rivalry and non-excludability characteristics thanks to advances in technology and policy measures, among other factors that could make a good "public" in its characteristics.⁵ International public

⁴ An alternative formulation points to the costs of a "public bad" (as opposed to the benefits of a public good). However, this practice in the literature mixes normative and positive descriptions, which tends to be confusing. I will treat the term "good" in public good as an object or outcome that can be produced using a certain process, which will typically involve collective action.

⁵ See for instance, Kaul and Mendoza (2003).

goods are simply variants of these basic definitions, covering wider cross-border areas (as opposed to a national public good which is only relevant to people within a country's borders).

Perhaps more policy issues can now be characterized as international public goods these are public goods that are either regional or global, depending on the scope of their impact on people.⁶ This is thanks to such trends as international economic integration, advances in technology that connect more markets and people, and the broader types of externalities that are the outcome of human activities (such as climate change resulting from overproduction of greenhouse gases). For the rest of this paper, we will focus on a special type of public goods called regional public goods—these are public goods that affect people beyond a single nation but do not extend worldwide.

Regional public goods (RPGs), like most public goods, represent collective action challenges. The technology for the provision of RPGs depend critically on their context and type. Arce and Sandler (2002:21) attempt to summarize the production or aggregation technology for producing different regional public goods based on a synthesis of the policy and academic literature (see Table 1).⁷ The examples of RPGs are grouped according to "pure public goods" (non-rival and non-excludable), "impure public goods" (only either non-rival or non-excludable), "club goods" (involving some degree of excludability, benefiting only club members) and "joint products" (involving different outcomes with their respective impacts or benefits). Without reiterating information already reflected in table 1, the main point here is that production technologies for RPGs clearly vary, depending on how different contributions matter to the final outcome.

Production or aggregation technologies matter critically to the type of cooperation arrangement and the possible avenues and mechanisms through which these could be sustained. For instance, summation RPGs, like limiting air pollution or providing health infrastructure, imply a simple sum of inputs from different contributors to the provision of the RPG—and all inputs tend to matter with equal importance.

⁶ For a discussion on the factors behind regional and global public goods, see among others Arce and Sandler

^{(2002),} Estevadeordal et al (2002), Ferroni and Mody (2002), Kaul et al (2003), and Sagasti and Bezanson (2001). ⁷ Most RPGs are likely to involve various production technologies at the same time; but for purposes of illustration here, we simply focus on the main technology required.

Aggregation/Production		Exa	nples	
Technology			-	
	Pure Public	Impure Public	Club	Joint Product
Summation: Overall level	Limiting air	Providing public	Satellite	Deterrence through
of public good equals sum	pollution;	health	communication	peace-keeping;
of country contributions	preventing	infrastructure;	network;	preservation of
	desertification	market boards for	transnational parks	rain forests
		commodities		
Weighted sum: Each	Reducing ambient	Limiting run-off	Free trade	Eliminating threat
agent's contribution can	pollutants; liming	pollution; curbing	agreements; power	of terrorism;
have a different additive	the spread of HIV-	acid rain	grid	eliminating threat
impact on the overall level	AIDS			of revolutions
Weakest link: The smallest	Inhibiting the	Surveillance of a	Transportation	Family planning;
effort determines the public	spread of a pest;	disease outbreak;	network; Basel	security
good level	eliminating a	drug interdiction	Accord among G-	intelligence
	disease; labor		10 countries	
	standards			
Best shot: The largest effort	Cure for orphan	Agricultural	Crisis	Quelling of flare-
determines the public good	diseases;	research findings;	management	up by
level	monitoring	genetically	squad; satellite	peacekeepers;
	technologies	engineered crops	launch site	bioprospecting

Table 1. Types of Regional Public Goods and their Aggregation/Production Technologies

Source: Arce and Sandler (2002:21), with some adaptations based on the authors' analyses.

However, a weighted sum RPG implies that some contributions could be more important in producing the RPG. For example, in limiting the spread of diseases like HIV-AIDS, the final outcome will depend critically on the actions of countries with already high disease loads. On the other hand, weakest link RPGs depend on the contributor with the smallest (or weakest) effort. This is the case for inhibiting the spread of a pest, or eradicating a disease—the country with the weakest input, or with the highest vulnerability to regress, is likely going to determine the success of the entire initiative. For RPGs of this type, some form of incentive or assistance (such as from a richer contributor) may be necessary in order to ensure that the weakest contributor does not jeopardize the full provision of the RPG. "Best shot" RPGs, on the other hand, are typically dependent on the provider with the most capability to provide the RPG. This often occurs in research, which relies heavily on the contributor with the strongest capability in research. Finally, RPGs involving joint products—such as preserving rainforests which helps to mitigate climate change while at the same time provides bioprospecting opportunities—offer several benefits which may help incentivize more actors to support its provision.

For RPGs related to marine resources and ecosystems, it is possible that the necessary technologies may imply "best shot" (such as for research on marine ecosystems and development of clean technologies to generate energy from the blue economy), "weakest link" (such as in combating smuggling and human trafficking, or preventing environmental damage from energy and resource extraction activities) and weighted sum (such as in managing fisheries stocks, and in implementing trade and investment agreements) technologies. The production of different RPGs therefore require a context specific analysis of the key features in their provision, as well as the necessary cooperation arrangements that might work better under those conditions.

II. LESSONS FROM FOURTEEN CASES OF REGIONAL PUBLIC GOODS PROVISION

The preceding framework for understanding different RPGs and their respective aggregation and production technologies could be useful in analyzing international public goods linked to marine ecosystems and resources, and the blue economy approach to their sustainable utilization. This section synthesizes some of the main insights gleaned from cases of collective action toward sustainable use of marine resources and ecosystems. Table 2 summarizes the main characteristics of these initiatives, while fuller descriptions are included in the annex to this paper. In the analysis, we focus on the actual cooperation or collective action initiative itself, rather than the marine resource(s).⁸ The cooperation initiatives featured here appear to have several common characteristics that help to improve their prospects for effective and adequate cooperation to produce the RPG. These characteristics are further discussed as follow.

Cooperation framework of the concerned countries

Cooperation initiatives with well-defined cooperation frameworks—embodied in legal framework agreements and treaties—include the Barents Sea Fisheries Management (i.e. several

⁸ For policymakers, this is possibly a more useful approach in framing the "regional public good" under analysis, since it allows a stronger focus on the nature and technology of collective action rather than just its subject, i.e. the marine resource. The latter resources are exhaustible and finite, so we can avoid confusion by focusing on their sustainable management or preservation rather than focus narrowly on the actual resources under analysis.

quota and zonal agreements between Norway and Russian Federation and also with third parties), the Pelagos Sanctuary for Mediterranean Marine Mammals (i.e. an agreement to create a marine sanctuary signed by France, Italy and Monaco), Danube River Basin Preservation (i.e. the Danube River Protection Convention signed by the riparian countries), Western and Central Pacific Tuna Management (i.e., several agreements to regulate quotas and catch areas signed by Pacific Island countries) and bilateral joint development initiatives pursued by countries involved in maritime disputes, as in the case of Thailand and Malaysia (i.e., 1979 Memorandum of Understanding and the agreement that established the Malaysia-Thailand Joint Authority) and of Guinea Bissau and Senegal (i.e., 1993 Management and Cooperation Agreement which established the joint development zone), among others. The agreements aim to address a variety of issues, such as equitable allocation and conservation of fish resources for cooperation initiatives that aim to manage shared and straddling fish stocks; proper allocation of water resource, pollution mitigation and ecosystem conservation for cooperation initiatives that aim to manage shared water basins (as in the case of Danube River); and mechanisms that can be utilized to tap the resources found in the disputed area, and benefit-sharing arrangements in the case of joint development agreements. These agreements help to articulate shared objectives and at the same time help to specify commitments of all countries involved. In some cases, these agreements help to clarify aspects related to disputed territories (as in the case of the joint development agreement between Thailand and Malaysia in which it was explicitly stated that the countries would continue to negotiate maritime delimitation in the Gulf of Thailand); but this is not always necessary in order to facilitate cooperation. Indeed, in cases where marine resources such as fish stocks are moving through different countries' marine boundaries so that the boundaries matter less (as in the case of cod stocks in Barents Sea), coordinated quota management across borders becomes more useful.

Some of these agreements entail the creation of organizational entities tasked with facilitating cooperating countries' collaborative actions to carry out the agreements and treaties. Examples include the International Commission for the Protection of the Danube River (ICPDR), the Pacific Salmon Commission, the Western and Central Pacific Fisheries Commission (WCPFC), the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) and the joint authorities established by countries with maritime disputes in charge of managing the joint development zones. These organizations play important roles, including

coordinating collective action, spurring data collection and sharing as well as joint research, providing a forum for policy discussion and adjustments in the cooperation strategy, and embodying clear burden-sharing in coordinated activities and shared functions (e.g. research). In the case of joint development agreements, organizational entities manage the economic activities in the joint development zones (such as oil exploration and extraction) and in some cases, also take the lead in marine conservation efforts, as in the case of Agence de Gestion et de Cooperation entre le Senegal et el Guinea-Bissau (AGC) which serves as the joint authority of the Guinea Bissau-Senegal Joint Development Zone. Organizational entities also play an important role in managing straddling fish stocks (as in the case of various tuna species that migrate between the exclusive economic zones of Pacific island countries and the high seas) given their potential to impose policies (such as quotas and resource tax on member countries) that can maximize overall resource rent while also ensuring the conservation and sustainability of the shared resource⁹.

Some of the organizational entities have provision for approximately equal representation of the countries that are part of the agreement. Examples include the International Commission for the Protection of the Danube River (ICPDR) (member countries are tasked to send at least one expert on each of the working groups) and the Malaysia-Thailand Joint Authority (composed of two chairmen (one from each country) and equal number of representatives from the two countries). Potentially, these arrangements can provide a more conducive environment for countries to voice out their concerns and influence the decision-making process, and ensure that the policies implemented by the organizational entities will be more comprehensive in taking into account their different concerns.

Cooperation in research

In many cases, the generation of credible and unbiased data and evidence proves critical in spurring and sustaining collective action. For instance, research on marine ecosystems and fish stocks plays a key role in motivating sustainability and preservation concerns. The results of

⁹ Chand, Grafton and Petersen (2003) developed a theoretical model for countries that share a straddling fish stock. The result shows that a single policymaker (such as an organizational entity) can act as a Stackelberg leader when countries choose to cooperate, such that the entity can impose tax or other equivalent quantity instruments to member countries. This in turn can be used to ensure the sustainability of the resource and thus the long-term returns that the member countries will attain from the shared resource.

simulations conducted by McKelvey, Miller and Golubtsov (2003) using a two country case¹⁰ show that as the quality of information available increases, the two countries will be better off (in terms of their respective long-term economic returns¹¹) cooperating in their harvesting efforts as opposed to engaging instead on a competition. Further, the gain from cooperation will be higher when the fish stock is less resilient (i.e., more vulnerable to extinction when a significant proportion of the stock is harvested)¹². In this case, cooperation can proceed in two stagescooperation among countries in terms of research and eventually, cooperation in jointly managing the shared resources¹³. As Gulland (1980) noted, cooperation in research would enable countries to have a more complete account of events (such as changes in the migration pattern of fish stock) as compared to merely depending on national assessments. This in turn would allow them to have a more complete set of information which they can utilize in coming up with more equitable quota management and benefit sharing arrangements¹⁴. In the case of the Pelagos Marine Sanctuary, research initiatives have played an important role in increasing the awareness of the governments and citizens of the countries concerned (Italy, France and Monaco) on the threats to the cetacean population in the area which in turn, motivated the three countries to establish a sanctuary zone for marine mammals and collaborate in harmonizing their monitoring efforts and implementing policies that would minimize the adverse impact of human activities on the marine mammals. On the other hand, in the cases of the Barents Sea Fisheries Management and the Conservation of Southern Blue Fin Tuna, research initiatives continue to play a key role in guiding the progress of these cooperation initiatives¹⁵. As marine ecosystems are ultimately interconnected across countries' territorial boundaries, collaborative research across countries is itself a type of RPG since the knowledge and information produced could be useful across

¹⁰ For these simulations, McKelvey, Miller and Golubtsov (2003) assumed that there is symmetry on the level of information that each country has with regards to amount of fish stock available on its EEZ.

¹¹ The discounted sum of annual returns was used to measure long-term economic returns for each country.

¹² Simulations conducted by McKelvey, Miller and Golubtsov (2003) also yield results which show that cooperation is associated with higher proportion of escapement of fish stock (from the harvesting fleets of the two countries), which is important (especially in cases where the fish stock is less resilient) for the fish stock to recover to its previous level and grow further. ¹³ See Gulland (1980)

¹⁴ See also Caddy (1997)

¹⁵ Munro et al (2003) cited the cases of South Africa, Namibia and Angola, and of Argentina and Uruguay in emphasizing the importance of cooperation in research on the stability of cooperative arrangements. For the first case, the lack of scientific knowledge has previously served as a hindrance for the countries to cooperate in managing their shared hake stock and for the second case, a decrease in level of scientific cooperation between Argentina and Uruguay (due to financial reasons) also had detrimental impact on the joint management of their shared fish stocks.

countries and over generations. This type of RPG also helps to underpin other RPGs including those that actually preserve and manage resources in the blue economy.

In addition, research and evidence also play a key role in establishing how effectively the RPG is being produced by the cooperation initiative. In certain cases, the research also proves critical in avoiding (or in some cases settling) disputes, as new information is necessary to continue to validate original agreements and ensure that a sense of fair benefit and burdensharing is still being promoted.

Clarification of burden-sharing arrangements

Just as benefit-sharing is often clarified (e.g. in fisheries, through clear catch allowances vis-à-vis over-all sustainable quotas established), so too are burden-sharing arrangements in the provision of the RPG. Essentially, each country that takes part in international cooperation measures its respective net benefits from the cooperation initiative. Ultimately, cooperation must make sense for all parties involved, in order for it to be sustainable¹⁶. An example of a specially designed burden-sharing arrangement is the way countries finance the Commission for the Conservation of Southern Blue Fin Tuna (CCSBT). The member countries of the Commission share equally in their contribution to the 30% of the Commission's budget. Presumably, this reflects a logic that follows the summation aggregation technology. Nevertheless, each member also contributes to the remaining 70% of the budget, based on the share of its nominal catch to the total nominal catch of southern blue fin tuna. This adjustment allows for countries with larger catches (and therefore larger economic benefits) to appropriately pay more for the cooperation initiative (since they are extracting more benefits from it). A similar burden-sharing scheme is utilized in the case of the West and Central Pacific Fisheries Commission (WCPFC) but in addition to the base fee (10% of the total contribution which is shared equally by the member countries) and the fish production components (70% of the total contribution which is based on the total catch taken within the Convention area), the contribution of each member state also includes a national wealth component (20% of the total contribution which is based on the GNI

¹⁶ As Munro et al (2003) noted, in the case of fisheries agreements, a necessary condition for them to be stable is the satisfaction of the Individual Rationality Constraint which states that each country should be at least as better off in cooperation as compared to not engaging in a cooperation initiative.

per capita of the member countries) to account for the state of development of the member countries and their ability to pay¹⁷.

In the case of joint development agreements covered by the study, there are some notable differences in terms of burden-sharing arrangements. While Malaysia and Thailand have agreed to equally share the benefits and costs (including the initial financing) that would accrue from the Malaysia-Thailand Joint Authority (MTJA), Guinea Bissau and Senegal provided unequal amounts of capital investment to the corporate arm of the joint authority, with 67.5% of the investment coming from Senegal. Relatedly, the benefits accruing from mineral resource activities in the joint development area are shared unequally by the two countries, with Senegal receiving greater proportion of the benefits (85% initially but was revised later to 80%). In this case, some studies noted that the existing engagement of Senegal on hydrocarbon exploration and development activities in the area (before the two countries agreed on a joint development initiative) is one of the possible reasons behind the unequal benefit and burden-sharing¹⁸. Despite the disparities associated with the allocation of costs and benefits, the agreement has provision for adjustments of the hydrocarbon resource sharing in case there are new discoveries of mineral resource in the area. The agreement has also given Guinea Bissau greater allocation of benefits from fisheries resources in the area (50% of the benefits), and that the laws of Guinea Bissau are followed with regards to the management of fish resources in the joint development zone.

The use of side payments

Some cooperation initiatives have utilized side payment schemes in which transfers are made (either monetary or non-monetary) by one member country to another. Examples include Cooperation in the Management of Pacific Salmon (provision of the United States of a significant proportion of the initial funding to the endowment funds established to support scientific research and conservation initiatives), Cooperation in Management of West and Central Pacific Tuna (recent move by some Pacific Island Countries (such as Micronesia, Marshall Islands, Nauru and Papua New Guinea) to allow other countries' fishing fleets to operate within their territorial waters in exchange for the latter's commitment not to fish in the high seas in between the former's EEZs), and Barents Sea Fisheries Management (Mutual access

¹⁷ See WCPFC (2003).

¹⁸ See Miyoshi (1999) and Kim (2004).

agreement between Norway and Russia on the shared fish stock found on each other's exclusive economic zone, and a similar agreement between the two countries and third parties as in the case of Iceland). A side payment scheme provides flexibilities on the part of each country that shares a common marine resource (fish stock for instance), as it makes a country's harvest share only one of the sources of economic returns that the latter attains from the said resource. This in turn enables all countries that are part of a cooperative resource arrangement to attain higher economic returns relative to the case where they merely depend on their respective harvest shares (See Box 1). In the case of some Pacific Island Countries, a possible reason behind their decision to use side payments lies on their lack of jurisdiction over the high seas and given that tuna stocks migrate between their EEZs and the high seas, excessive fishing efforts in the latter by other countries' fishing fleets can also affect the tuna stock available in their respective EEZs. On the other hand, many of the cod stocks found on the Russian side of the Barents Sea are of young age and if there is no provision for side payments (i.e., Russia is not given access to the more mature cod stocks of Norway), Russia would have to depend merely on its cod stock to fulfil its quota and this can have serious implications on the cod stock that will be available to Norway eventually¹⁹.

Further, as Munro et al (2003) noted, it is possible that a cooperative outcome will not exist if the benefits that a country will receive from cooperation are less than the benefits that it will attain when it decides not to cooperate. In this case, side payments, through the increased scope for bargaining that it induces among the countries concerned, will increase the likelihood that the countries will come up with a more stable cooperative arrangement²⁰. Some empirical studies found evidence supporting the said point, such as the study by Arnason, Magnusson and Agnarsson (2001) in the case of the migratory Norwegian Spring Spawning Herring stock, which found in their simulations that despite the potential of a grand coalition among the parties that share the resource (i.e., Norway, Faroe Islands, Iceland, Russia and the European Union) to produce the highest overall benefit among the different possible coalitions (e.g. coalition only between 2 countries), there is no assurance that the coalition will be stable unless side payments are introduced.

¹⁹ See for instance, Caddy (1997)

 $^{^{20}}$ See Box 1 for a graphical illustration of the said point.

Box 1: Cooperation and the use of side payments: An illustration

There are two minimum conditions that must be satisfied for a cooperative arrangement between two countries sharing a common resource to exist: (1) Pareto Optimality which implies that at a particular cooperative point, no party can be made better-off without making the other party worse-off; (2) and, Individual Rationality which posits that a country should attain at least the same level of net benefits from cooperation as compared to the case when it chooses not to cooperate. These conditions are illustrated in Figure 2. The vertical axis represents the present value of the net economic returns of country 1 from the shared resource while the horizontal axis represents the present value of the net economic returns of country 2. The downward sloping curve (Pareto frontier) represents the set of combinations of net economic returns of country 2 (and vice versa). If a cooperative arrangement yields a combination of net economic returns that can be found below the Pareto frontier, the said arrangement will not be stable given that there are other cooperative arrangements which can make both countries better off at the same time (i.e., those found in the Pareto frontier).





Suppose that the net economic returns that countries 1 and 2 will receive in the absence of a cooperative arrangement are represented by the "Threat Point". In this case, the net economic returns of countries 1 and 2 are α_0 and β_0 , respectively. Given this, the "core" of the game (i.e., set of cooperative arrangements that will give countries 1 and 2 at least the same net economic returns as when they choose not

to cooperate) is the portion of the Pareto frontier curve bounded by the dashed lines (i.e., cooperative arrangements where the net economic returns of country 1 is greater than or equal to α_0 and the net economic returns of country 2 is greater than or equal to β_0). For figure 2, the "core" of the game exists and a stable cooperative arrangement between countries 1 and 2 will come from this set. However, it is possible that the "core" of the game does not exist when the net economic returns that either country 1 or country 2 will attain from cooperation will be less than what either of them will attain otherwise (i.e., when the threat point is above the Pareto frontier curve).



When side payments are introduced, the Pareto frontier curve will be a downward-sloping 45 degree line (see Figure 3) and in this case, at any point in the new Pareto frontier curve, the sum of the net economic returns of countries 1 and 2 is constant. With side payments, countries maximize the overall net economic returns through time that can be attained from the shared resource, and they will in turn bargain with regards to the distribution of the benefits (Munro et al, 2003; Munro and Miller, 2004). Side payments imply a wider array of sources of net economic returns for both countries, and these will enable both of them to reap higher net economic returns from cooperation. Thus, side payments make a stable cooperative arrangement possible in many cases in which it previously cannot exist because the net returns to either of the two countries are higher in not cooperating. This is illustrated by figure 3 in which the threat point can be found outside the Pareto frontier without side payments. With side payments, the "core" of the game exists and is represented by the portion of the new Pareto frontier curve in-between the two dashed lines.

Sources: Munro et al, 2003; Munro and Miller, 2004

Side payments can also be used to induce countries sharing common marine resource to cooperate when there are differences in the level of information available to each country regarding the nature of the stock. McKelvey, Miller and Golubtsov (2003) found in their simulations that there are instances in which a country with higher level of information can attain higher economic returns when it chooses not to cooperate with the other country. This has implications on the sustainability of the shared fish stock and in this case, the country with lower level of information can utilize side payments to convince the other country to cooperate. Also, side payments can be useful in cases when external changes in the environment can alter the migration pattern of straddling fish stocks and in some cases, can cause adverse impact on their survival. This can be seen in the case of Pacific Salmon in which the warming of the Northeast portion of the Pacific Ocean contributed to fluctuations on the amount of salmon available to US and Canada, which made it difficult for the Pacific Salmon Commission to determine the allowed amount of harvest for each country. This in turn has caused significant instabilities on the cooperative arrangement. In this case, the use of side payment scheme (through the endowment funds established which will be used for the conservation of southern (Washington and Oregon) and northern (Canada) salmon stocks), together with change in allocation regime towards a scheme that utilizes indices based on abundance of salmon stock for each country, can potentially make the present cooperative arrangement more stable as the said amendments can provide more safeguards in case salmon stocks have reached a fragile state²¹.

Role of external parties, private groups and the public

External parties also played a major role in some agreements (e.g. Asian Development Bank and the Global Environmental Facility in the Coral Triangle initiative; and the European Union to some extent in the preservation of the Danube river basin). This type of involvement may be necessary in cases where there are challenges in the ability of the countries to adequately provide the RPG. In the case of the Coral Triangle Initiative, the Global Environmental Facility (GEF) provided a significant proportion of the initial funding of the project. The Asian Development Bank, on the other hand, has been involved in capacity-building efforts of the relevant government agencies of some signatory countries in terms of knowledge management and

²¹ See Miller, Munro and Bjorndal (2004)

information sharing, and of training with regards to utilizing an ecosystem-based approach in managing the shared resources. In this case, the said capacity-building efforts underscore the importance of building institutional capacities of government of each member country in the provision of RPGs, as states with weak capacities can contribute less and can even induce negative externalities with regards to the production of RPGs²².

Private groups have also played an important role in the provision of RPGs in some cases. In the case of Pelagos Marine Sanctuary, the lobbying efforts of the private groups have led one of the leaders of the three countries (Prince Rainier of Monaco) to seek the cooperation of the other two countries in the conservation of marine mammals. The private groups have also taken the lead in ensuring the momentum of the conservation initiative. Similarly, in the absence of a formal agreement among the governments of Greece, Macedonia and Albania, environmental NGOs have played an important role in coordinating efforts by various stakeholders to implement necessary measures for the conservation of the Prespa Lake.

Lastly, in the case of the conservation of Danube River, the cooperation initiative has a mechanism that aims to involve public participation in the drafting of the Strategic Action Plan in the 1990s and recently, in the drafting and refining of the Danube River Basin Management Plan. Various avenues were used (such as forums, websites and questionnaires) to elicit response from the public with regards to the Danube River Basin Management Plan. Such mechanism has the potential to provide the relevant policymakers (such as the ICPDR) a more comprehensive view of the issues, which in turn can guide them in crafting more appropriate policies with regards to the production of RPGs.

In addition, while the cases seek to identify RPGs, it is possible that a wider set of countries (even those beyond the immediate region under analysis) is concerned with the adequate provision of the RPG, due to its intrinsic value. (For example, even people from industrialized North America and Europe may be willing to pay for the preservation of unique species or habitats in regions not immediately near them. Also, for instance, the majority of the funds received by the Nile Basin Initiative came from donors such as development agencies of some European countries, and multilateral institutions such as the World Bank, and the African

²² See Nogueira (2003)

Development Bank. As of 2011, contributions from the riparian states account for approximately one-tenth of the total contributions received by the Initiative.)

Arriving at positive net benefits from cooperation is important, but so too is building a sense of fairness from the overall initiative. Assistance for lower income countries that are part of the initiative may serve as a means to compensate them for providing "services" (e.g. honoring their commitments to the initiative) to ensure full production of the RPG.²³ A similar logic could be applied when viewing the individual contributions of countries, when actions by low income families and stakeholders are compensated for by national authorities. This is the case when fishermen are provided resources during fishing moratoriums, in order to help fish stocks replenish.²⁴

An interesting element in some cooperation initiatives is the continued non-resolution of territorial disputes by the countries involved. Previously, Norway and Russian Federation concluded a number of agreements notwithstanding their territorial disputes. These agreements included the: a) 1975 Framework Agreement (i.e. provided a mechanism in setting annual quota of shared fish stocks that can be harvested and in allocating the quota to the 2 claimant states and third parties); b) the Mutual Access Agreement (i.e. access by one claimant state to the fish stocks in the exclusive economic zone of the other claimant state); and c) the Grey Zone Agreement (i.e. set up the parallel jurisdiction of the two claimant-states in a portion of the disputed area). On the other hand, Thailand and Malaysia have decided to form a joint development zone covering an area in the Gulf of Thailand in which they have overlapping maritime claims. The said countries have come up with a Memorandum of Understanding (MOU) and an agreement that outline mechanisms which they would utilize to manage and allocate the mineral and marine resources found in the joint development zone, while explicitly noting that the joint development initiative would not prejudice their maritime delimitation efforts. Clearly, these agreements are not yet ideal long term solutions to the challenge at hand for some of these countries; however, they do establish the foundations for building collective

²³ See Arce and Sandler (2002) and Kaul et al (2003).

²⁴ Brazil, for instance, has been implementing the *defeso* system wherein the affected fishermen receive salary (based on the minimum wage) from the government during the closed season (Begossi et al, 2011). Also, some Indian states have been implementing a savings-cum-relief scheme such that fishermen will be provided with financial assistance during the lean season. The fund's sources include contributions from fishermen (during the fishing season) and from the Central and State governments (Kurien and Paul, n.d.).

action, avoiding conflict, discussing and accepting possible fair solutions, and perhaps building towards a longer term resolution.²⁵

²⁵ In 2010, an agreement was signed by Norway and Russian Federation, delineating the agreed maritime boundary in the Barents Sea (See

https://www.dur.ac.uk/ibru/news/boundary_news/?itemno=10741&rehref=%2Fibru%2Fnews%2F&resubj=Boundar y+news%20Headlines). Previous agreements signed by the two countries will still hold except for the Grey Zone Agreement (parallel jurisdiction in a portion of the disputed area).

Case	Countries Involved	Institutional Arrangement	Burden-sharing
Barents Sea Fisheries Management	Norway and Russian Federation (plus Iceland)	 Norway and Russia previously forged a series of agreements while the territorial dispute was going on: 1975 Framework Agreement : mechanism in setting annual quota of shared fish stocks that can be harvested and in allocating the quota to the 2 claimant states and third parties; Mutual Access Agreement: access by one claimant state to the fish stocks in the EEZ of the other claimant state Grey Zone Agreement: parallel jurisdiction of the two claimant-states in a portion of the disputed area. 	The two countries both provided maritime personnel in charge of monitoring the Barents Sea including portions beyond their EEZs. Continuous marine research efforts (which serve as the guide of the Joint Norwegian- Russian Fishing Commission) have been led by the marine research agencies of the two countries.
		The two countries also resorted to bilateral negotiations with third parties. The Loophole Agreement was signed by the two claimant states and Iceland which allowed the latter to harvest fish in the EEZs of Norway and Russia in exchange of allowing vessels from the claimant states to access national waters of Iceland	
Coral Triangle Region Preservation	Malaysia, Philippines, Indonesia, Papua New Guinea, Solomon Islands and Timor Leste	The heads of state of Malaysia, Philippines, Indonesia, Papua New Guinea, Solomon Islands and Timor Leste signed a declaration in 2009 which established the Coral Triangle Initiative and adopted a Regional Plan of Action which contains goals (such as application of ecosystem- based approach on fisheries management) that the signatory countries are expected to fulfill.	Initial amount of \$ 120 million was committed in support of the initiative, a significant portion of which came from the Global Environment Facility (\$ 63 million) and the United States (\$ 41.6 million). Signatory countries also pledged to contribute to the initiative, with the Philippines and Indonesia each committing initial amount of \$ 5 million and the latter expressing willingness to host the office of the Secretariat. Technical assistance and knowledge management programs were largely funded by international donors (such as ADB and GEF), with the

Table 2. Summary of Information on 14 Cases of Regional Public Goods

			signatory countries covering additional contributions to cover some costs of these projects.
Danube River Basin Preservation	Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovak Republic, Slovenia and Ukraine	The Danube River Protection Convention aims to foster cooperation among the riparian states to ensure proper management of ground water and surface water in the basin. The convention also established the International Commission for the Protection of the Danube River (ICPDR). Further, all the parties to the Danube River Protection Convention agreed to follow the guidelines of the EU Water Framework Directive (EU WFD).	The signatory countries are expected to contribute equal amount annually to the fund of the ICPDR unless the signatory countries unanimously allowed otherwise applicable for a transitional period. The European Union (EU) also contributes to the ICPDR fund, with its contribution in 2011 accounting for approximately 2.5% of the overall contribution.
Ganges River Water Resources Management	India and Bangladesh	The 1996 treaty contains a formula on water-sharing (of the waters of Ganges river entering the Farakka barrage) between Bangladesh and India during the dry season. The treaty also led to the establishment of a Joint Committee which will check the amount of daily water flow at certain parts of the Ganges river and will serve as the initial arbiter of any water-sharing related dispute between the two countries.	India and Bangladesh send equal number of representatives to the Joint Commission established under the 1996 treaty. India, on the other hand, is the one primarily in charge of the operation of the Farakka barrage.
Nile River Basin Preservation	Kenya, Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Rwanda, Sudan, South Sudan, Tanzania, and Uganda	The 1959 agreement allocates a significant amount of water in the Nile River to Egypt and Sudan and decrees other riparian states to seek permission to the former whenever they implement water-related projects (such as irrigation). A transitional arrangement was established by the riparian states (through the Nile Basin Initiative), which aims to foster cooperation among the latter in managing the resources of the said river.	Majority of the funds received by the Nile Basin Initiative came from donors such as development agencies of some European countries, and multilateral institutions such as the World Bank, and the African Development Bank. As of 2011, contributions from the riparian states account for approximately 1/10 of the total contributions received by the Initiative.
Pacific Salmon Management	United States and Canada	The main treaties guiding the present cooperation between the US and Canada in managing the stock of Pacific salmon are the 1985 treaty which led to the formation of Pacific	Two endowment funds ("Northern Fund" and "Southern Fund") were established by the 1999 agreement to be used in stock enhancement and conservation initiatives.

		Salmon Commission, and the 1999 Agreement (updated in 2008 to include further provisions on science-based conservation) which promotes long term abundance-based management of the Pacific salmon stock.	The United States provided the initial funding and Canada provided additional contributions. The funds are stipulated to be placed on investments such as interest bearing accounts, bonds and securities.
Pelagos Sanctuary for Mediterranean Marine Mammals	France, Italy and Monaco	The 1999 agreement signed by France, Italy and Monaco which established the Sanctuary aims to address among others the need for the three countries to cooperate in regulating the human activities in the area. The European Union also has regulations which aim to limit the use of driftnet fishing in the region.	Italy hosts the office of the Secretariat while Monaco is the one in charge of the scientific and technical committee. Participating countries have allocated funds for the activities and ratification of laws relevant to the Agreement (e.g. monitoring efforts, research programs).
Prespa Lake Basin Preservation	Albania, Greece and Macedonia	A joint declaration was signed by the Prime Ministers of the three riparian states in 2000 calling for the creation of a transboundary Prespa Park and the Prespa Park Coordination Committee (PPCC). The said body has representatives from the government, local community and NGOs for each riparian state, and from the International Ramsar/ Medwet system. An internationally binding agreement was signed by the Environmental Ministers of the riparian states in 2010 which institutionalized the declaration signed earlier.	Private groups (NGOs such as WWF-Greece, Society for the Protection of Prespa and multilateral entities such as UNDP) contributed to the projects of the PPCC such as the formulation of a Strategic Action Plan, and the development of the Transboundary Environmental Monitoring System.
Southern Blue Fin Tuna Management	Australia, Japan, Republic of Korea, Taiwan, New Zealand and Indonesia	The Commission for the Conservation of Southern Blue Fin Tuna (CCSBT) sets a total allowable catch (TAC) per country, monitors the compliance of the member countries (Australia, Japan, Republic of Korea, Taiwan, New Zealand and Indonesia), and sponsors scientific research programs regarding the southern blue fin tuna population. In case of violation of the TAC by one of its members, the Commission brings the case to the International Tribunal for the Law of the Sea (ITLOS) for arbitration.	The member countries of the Commission share equally in their contribution to the 30% of the Commission's budget, while the contribution by a member country to the 70% of the budget is based on the share of its nominal catch to the total nominal catch of southern blue fin tuna.
Western and Central Pacific Tuna	Pacific Island Countries	Agreements that shaped the cooperation among the Pacific island countries include the Nauru Agreement and Palau Agreement (among the equatorial states in the Pacific)	The Pacific island countries and the distant water fishing nations contribute annually to the fund of the West and Central Pacific Fisheries Commission (WCPFC). The

Management		which aim to strengthen their position with respect to the distant water fishing nations in negotiations over access fees. The Pacific island countries also forged the Niue Treaty which aims to foster cooperation regarding surveillance initiatives in their EEZs. A convention established the Western and Central Pacific Fisheries Commission (WCPFC) which is composed of representatives from Pacific island countries and distant water fishing nations and which currently serves as the regional body that manages fishery stocks in the region (including the high seas).	indicative contribution of each country is divided into the following components: base component (10% of the total contribution which is shared equally by the member countries); national wealth component (20% of the total contribution which is based on the GNI per capita of the member countries); and fish production component (70% of the total contribution which is based on the total catch of member countries' vessels within the Convention area)
Malaysia- Thailand Joint Development Initiative	Malaysia and Thailand	The 1979 Memorandum of Understanding (MOU) delineated the joint development area and called for the establishment of a joint authority with equal representation from member countries that would be in charge of overseeing the economic activities in the joint development area. On the other hand, the 1990 Agreement established the Malaysia-Thailand Joint Authority (MTJA) which was given vast powers, including approval of exploration and extraction activities of the contractors.	The two countries equally shared the initial funding of the Malaysia-Thailand Joint Authority (MTJA) and the same proportion is used in allocating the other costs, and benefits that will accrue from the activities of MTJA. Malaysia and Thailand appoint equal number of delegates to the joint authority. The 1979 MOU, on the other hand, divided the joint development area into two- 930 square miles for Malaysia and 1,100 square miles for Thailand. The countries are assigned to exercise jurisdiction in their assigned areas with regards to controlling illegal fishing activities.
Joint Development Initiative by Guinea Bissau and Senegal	Guinea Bissau and Senegal	The Management and Cooperation Agreement signed by the two countries in 1993 delineated the joint development zone and stipulated resource-sharing formula with regards to the fisheries resources (50:50) and mineral resources (85:15 in favour of Senegal) found in the area. The two countries have also agreed that Senegalese laws would apply with regards to mineral resource exploration and extraction activities in the area, while the laws of Guinea Bissau would have jurisdiction on matters related to	Senegal and Guinea Bissau contributed 67.5% and 32.5%, respectively, of the capital of the Enterprise (corporate arm of the joint authority).

		fisheries. An agreement in 1995 established the AGC which serves as the joint authority composed of 3 entities: High Authority (policy-making body composed of Heads of State or their designate), Secretariat, and the Enterprise (corporate body of the joint authority). An agreement in 2000 revised the resource-sharing formula for mineral resources to 80:20 (in favour of Senegal)	
Joint Development Initiative between Norway and Iceland	Norway and Iceland	The Fishing Agreement of May 1980 called for the establishment of the Fisheries Commission with equal number of representatives from Norway and Russia. The Commission was tasked to submit recommendations to the governments of the 2 countries with regards to total allowable catch, distribution of harvests and conservation- related measures over the area between Iceland and Jan Mayen island. The agreement also recognized Iceland's right to generate 200 nm EEZ on the said area, and Jan Mayen's entitlement to 200 nm EEZ in areas where it is not limited by Iceland's EEZ. An agreement in 1981 delineated a joint development zone in the waters between Jan Mayen Island and Iceland and stipulated provisions with regards to joint development of hydrocarbon resources in the area.	A larger portion of the joint development zone (32,750 square kilometres or 61% of the total area of the zone) lies on the EEZ of the Jan Mayen island. Norway (through its Petroleum Directorate) was tasked to borne the full costs of seismic surveys in the joint development zone
Joint Development Initiative in the Timor Gap	Australia and East Timor (previously Australia and Indonesia)	The Timor Gap Treaty between Australia and Indonesia created a joint development zone which was composed of three areas. 90:10 mineral resource sharing rule (in favour of Indonesia) was implemented in the area closest to Indonesia and the same resource-sharing formula (in favour of Australia) was also implemented in the area closest to Australia. On the other hand, 50:50 mineral resource sharing rule was implemented on the middle area (termed as area A) which is part of the Timor Gap. Upon independence of East Timor, a new agreement was signed by Australia and East Timor which nullified the Timor Gap Treaty and revised the resource-sharing rule in area A (now	Indonesia and Australia sent equal number of representatives to the joint authority established under the Timor Gap Treaty. In the case of Australia and East Timor, the two countries are also tasked to send representatives to the joint authority in charge of the Joint Petroleum Development Area.

	termed as the Joint Petroleum Development Area) to 90:10	
	(in favour of East Timor). The Treaty on Certain Maritime	
	Arrangements of the Timor Sea was signed by Australia	
	and East Timor in 2007 which stipulated equal sharing of	
	hydrocarbon resource in the Unit Area which straddles the	
	Joint Petroleum Development Area.	

Sources: Authors' compilation. See the annex to this paper for a synthesis of the sources and information on which this table is based.

III. CONCLUSION

The blue economy is a term used recently to emphasize the sustainable utilization of marine resources, spanning fisheries, energy and international trade, among other aspects. As a contribution to the policy discussions, this paper uses a regional public goods framework to analyze several cases of international cooperation to ensure more successful and sustained outcomes in the blue economy. Key characteristics of the initiatives include, among other aspects, well-defined legal frameworks underpinning the international cooperation initiative, as well as financing mechanisms to support the contribution of different partners, including low income countries that are part of the cooperation agreement. The cases also help emphasize the importance of (sometimes joint) research and producing credible data and information for conducting collaborative policymaking and, if necessary, settling disputes. These different features reflect different production technologies for regional public goods, suggesting that the modalities for cooperation could be adapted to reflect key features that seem to work in other international cases. These offer useful lessons for regions that are yet addressing the challenge of managing natural resource wealth in areas with high externalities, typically characterizing marine ecosystems. Some international cases benefit from clear delineation of territories, but cooperation need not hinge on this element alone. The analysis herein offers possible avenues for exploring arrangements that promote a "blue economy" approach to the management of natural resource wealth, through win-win international cooperation strategies.

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Annex: Selected Cases of Regional Public Goods Initiatives

A. Barents Sea Fisheries Management

The 1.4 million square kilometer Barents Sea is located north of Russia and Norway and is bordered by the Arctic Ocean to the north. The sea contains vast amounts of oil with the identified amount of extractable oil equal to at least 0.3 billion sm³ (standard cubic meters of oil equivalent) on the part of the sea included in Norway's Exclusive Economic Zone and 8 billion sm³ on Russia's side according to unofficial sources (Kullerud and Raestad, 2002). Further, the sea also contains large amounts of cods, haddocks and other types of fish and aquatic resources (Stokke, 2002). However, territorial dispute existed between Norway and Russia regarding their maritime boundaries on the Barents Sea. Norway invoked the use of median line (based on the UNCLOS) in delineating its border with Russia while the latter adhered on another principle (i.e., the use of continental shelves), citing special circumstances such as the difference between the land area of the two claimant countries (Laegreid, 2003). The territorial dispute started during the Soviet era and lasted for 40 years until an agreement was signed by the top officials of Norway and Russia in 2010 which divided the disputed area almost equally between the two (Harding, 2010).

While the dispute was going on, the two countries were able to establish mechanisms which would allow the two sides to cooperate in managing the fisheries in the area. This cooperation has various facets which primarily include joint research efforts and joint regulation of fishing. These efforts, especially the joint management of resources in the Barents Sea, encountered difficulties as the two countries needed to maintain their territorial claims and to deal with other parties that had interest in fishing activities in the area.

Cooperation initiatives between Norway and Russia. Stokke (2002) noted that there are three agreements which shaped the collaboration between Russia and Norway regarding the Barents Sea issue. The first one is the 1975 Framework Agreement which called for the establishment of the Joint Norwegian-Russian Fishing Commission whose duties are: (1) to make a mutually-agreed recommendation annually regarding the total quotas (i.e., maximum amount of resources that can be harvested) of the shared stocks of cod, haddock and capelin; (2) to allocate quotas to the two parties and decide as well the amount allocated to third parties; (3) to determine operational restrictions; and (4) to coordinate scientific research among marine

research institutions in the two countries. Even before the enactment of the 1975 agreement, the Norwegian Institute of Maritime Research (IMR) and the Russian Polar institute of Maritime Fisheries and Oceanography (PINRO) have worked jointly in areas such as providing data for sustainable harvest of shared resources, determining locations that were densely populated by small fish and providing inputs for standardizing fishing gears used by the two countries (Criscione, 2012).

The other agreements specify further the allocation of shared resources in the area. The Mutual Access Agreement provides one claimant state access to the 200 mile Exclusive Economic Zone of the other state subject to its rules and agreed-upon quotas (Stokke, 2002). This has enabled Russia to have further access to mature cods given that a significant proportion of the cods in the Russian EEZ are of young age (Miller and Munro, 2004). In contrast, coming up with an agreement on the management of resources in the disputed area appears to be difficult. But as Stokke (2002) noted, options other than cooperation can be detrimental to the two countries, possibly affecting the total stock of shared resources to be allocated between the two (if fishing in the disputed area is left unregulated) or the territorial claim of one state (if the responsibility of regulating harvest of resources in the disputed area is delegated to the other claimant state).

In this regard, the two countries eventually came up with a Grey Zone Agreement (refer to figure 1 regarding the location of Grey Zone) which applied only to certain parts of the disputed area. The agreement recognized parallel jurisdiction in some parts of the disputed area such that both states could issue licenses with agreed quotas and that the state which issued the license is responsible for implementing management and conservation measures in that particular area. (Stokke, 2002). Despite a near-split decision by the Norwegian Parliament regarding the Grey Zone Agreement, it was extended for 32 times until July 2011 (Stokke, 2002; Ministry of Foreign Affairs, 2011).

Lastly, Norway and Russia also worked on negotiating an agreement regarding the allocation of shared resources in the area with third parties. Changes in temperature and salinity in the loophole area (see figure 1) contributed to an increase in available amount of cods in the area and this enticed fishing operations from Greenland, Faroe Islands, the European Community and Iceland. Bilateral negotiations by Norway with Greenland, Faroe Islands and the European Community were successful in limiting the fishing activities of the latter in the area. On the other

hand, negotiations with Iceland were less successful despite the use of economic sanctions by Norway and Russia²⁶ to curb unregulated harvest in the area. Eventually, a Loophole agreement was signed in 1999 which allowed Iceland to harvest cod and other fish (based on quotas imposed) only in areas that are part of the Exclusive Economic Zones of Norway and Russia in exchange of granting Norwegian and Russian vessels access to national waters of Iceland (Stokke, 2002).





Source: Stokke (2002)

²⁶ As Stokke (2002) noted, Norway for instance cut off its supply of provisions, fuels and services to vessels operating in the loophole area (unregulated harvesting of resources) and these vessels were not allowed to access the Norwegian Exclusive Economic Zone.

Outcomes of the collaboration. Marine research collaboration between Norway and Russia has expanded for the past years, taking also into account the need to monitor the status of ecosystem in the Barents Sea. Further, the International Council for the Exploration of the Seas (ICES), together with the Arctic Fisheries Working Group, has been playing an important role in the research collaboration which assures that the results of joint research efforts are within the bounds of international standards and are less affected by political lobbying (Hoel, 2012). Recently, the leading marine research agencies of the two countries have identified areas for further collaboration, such as: extending joint analysis of data collected by one claimant state (not only to data collected jointly by the two countries); harmonizing research methods; and simplifying rules to facilitate further exchange programs among their research specialists (Criscione, 2012). Research inputs serve as the basis of the Joint Norwegian-Russian Fishing Commission in managing the shared resources in the area and these efforts to expand areas for research collaboration are hoped to contribute to better management of resources (The Norwegian Ministry of Fisheries and Coastal Affairs, 2011).

Cooperation initiatives forged by Norway and Russia have also extended in other areas, such as cooperation in monitoring the whole migration area of the cod stock. Norway and Russia introduced the Surveillance Program in the Barents Sea in the late 1980s which stipulated continuous monitoring of the area to determine on which fishing areas do species whose size is below the prescribed minimum level aggregate. These areas will in turn be closed to fishing. Further cooperation ensued between the Coast Guard authorities of the two countries in areas such as exchange of catch and landing data and of inspectors on each country's Coast Guard vessels, and establishment of satellite-based Vessel Monitoring System on each other's jurisdiction, and the two countries have formalized the initiative through an Agreement on Monitoring, Control and Surveillance signed in 2000 (Munro et al, 2003).

However, problems with illegal fishing remained during the immediate years of implementation of the Loophole agreement. This induced the two countries (Russia and Norway) to push for further cooperation. In 2004, Norway and Russia agreed on a harvest control rule and this together with more strict regulations led to an 84% decline in illegal, unreported and unregulated (IUU) fishing in the Barents Sea between 2005 and 2008 (Allick, 2010). Presently, the Barents Sea is considered as home to one of the remaining cod stocks that are in relatively

good position, with the quota stock set for 2013 equal to one million tonnes (Allick, 2010; Hoel, 2012).

B. Coral Triangle Preservation

The Coral Triangle (see figure 2), covering an area of 600 million hectares in the western Pacific region, is considered as the center of the world's coral reef diversity (Ardiansyah, 2009; GEF, 2008). The area is home to 30% of the world's coral reefs, 76% of the world's known coral species and over 3000 species of fish (Ardiansyah, 2009; Clifton, 2009). A report by the GEF (2008) noted the importance of the area in the global tuna production. Further, the Coral Triangle, which is comprised by portions of territorial waters of the Philippines, Indonesia, Malaysia, Timor Leste, Papua New Guinea and Solomon Islands, supports a coastal population of about 150 million people, many of which depend primarily on fisheries and other marine resources as their source of protein and income (GEF, 2008; Clifton, 2009).





Source: <u>http://www.thegef.org/gef/CTI</u>

Presently, there are threats to the resources found in the Coral Triangle. Climate change, as evidenced by the increasing sea temperatures in many parts of the Coral Triangle and rising sea levels can severely impact some components of the coastal ecosystem such as coral reefs and

mangroves (WWF and the University of Queensland, Australia, 2009). Many of the coral reefs in the area are relatively resilient to climate change but these are still vulnerable to the impact of other threats such as pollution and destructive fishing practices (GEF, 2008). A report released by the World Wildlife Fund noted that the potential destruction of coral reefs caused by the factors mentioned above will have serious implications on the food production in the region²⁷ and on the livelihood of the people in coastal villages (The Telegraph, 2009).

The establishment of the Coral Triangle Initiative. Indonesia Pres. Susilo Yudhoyono expressed his intention to initiate regional cooperation efforts in the conservation of resources in the Coral Triangle region during the 8th Conference of the Parties to the Convention on Biological Diversity in 2006. This was followed by a proposal made by Indonesia and 5 other countries (Philippines, Malaysia, Papua New Guinea, Solomon Islands and Timor Leste) to establish the Coral Triangle Initiative (CTI) in 2007 which was eventually endorsed by the heads of state of the Asia-Pacific countries and by the ASEAN +3 (Fidelman et al, 2011). A declaration formally expressing the desire of the 6 countries to establish the CTI was signed by the heads of state of the six countries in 2009 (GMA News, 2009). Also, the leaders of the said countries adopted a Regional Plan of Action whose goals include among others the development of a more effective management system of marine protected areas, application of ecosystem-based approach on fisheries management, protection of marine species in the area and implementation of climate change adaptation measures for the coastal communities in the region (Sukoyono, 2011).

Private groups and signatory countries have committed an initial amount of \$ 120 million for the project, more than half of which came from the Global Environment Facility (GEF) (\$ 63 million). The United States also pledged financial support worth \$ 41.6 million and an initial funding was committed by Australia worth \$ 1.6 million. Among the signatory countries, Indonesia and the Philippines each committed \$ 5 million, with the former also expressing willingness to host the Secretariat of the initiative and finance its daily operation (Simamora and Setiawati, 2009). The Asian Development Bank (ADB) led the organization of further international technical and financial support and also implemented projects in line with the Regional Plan of Action, among which are technical assistance programs to the relevant

²⁷ The article cited a World Wildlife Fund report which noted that the destruction of coral reefs in the Coral Triangle area can induce an 80% decrease in food production in the region.

government agencies of the signatory countries. In 2011, ADB approved a project which aims to provide technical assistance and capacity-building to the relevant government agencies in Malaysia, Indonesia and the Philippines, and to demonstrate ecosystem-based approach in managing coastal and marine resources²⁸. ADB allotted \$ 12.2 million for the project, with the majority of the funds coming from the Global Environment Facility (\$ 11.2 million). The governments of the three countries also pledged to contribute \$ 1 million each to cover some costs of the project (ADB, 2011). ADB also implemented a technical assistance project which aims to foster cooperation among the signatory countries in terms of information exchange and knowledge management, and establishment of sustainable financing schemes. The project's estimated cost amounts to \$ 2.3 million, with the signatory countries shouldering approximately one-fourth (\$ 0.6 million) of the total cost (ADB, 2009).

Progress in the implementation of the initiative. A series of Senior Officials Meeting (SOM) of the 6 countries have been held since the signing of the declaration in 2009 and these meetings primarily delved into the establishment of a permanent Regional Secretariat (Fidelman et al, 2011). In the 8th SOM held last November 26, 2012 in Putrajaya, Malaysia, three countries (Malaysia, Solomon Islands and Timor Leste) gave their approval to the proposal to establish a Permanent Regional Secretariat based in Manado, Indonesia. Other developments in the said meeting include the approval by the Council of Ministers of the proposal to conduct a feasibility study which will cover among others the assessment of current funding mechanisms and the plausibility of creating a regional fund (Malaysian National Oceanography Data Centre, 2012).

On the other hand, the technical assistance project of the ADB on information exchange and knowledge management led to the development of CTI Regional Learning Resource Network, a website that contains data, learning materials and other information platforms relevant to the CTI. Efforts are also underway to assist each National Coordinating Committee in the development of its respective website. Further, the technical assistance project also conducted workshops among members of the team (from the signatory countries) that are part of the E-FACT (Economics of Fisheries and Aquaculture in the CTI) study which aims to determine the impact of various threats to biodiversity on the economies of the signatory countries (Harnessing collective knowledge to serve the CTI). Also, for the first time, in July

²⁸ One of the expected outputs of the said component of the project is the pilot implementation of a fishery monitoring, control and surveillance system in the Sulu-Sulawesi Marine Ecoregion Priority Seascape

2012, the six member countries released their respective State of the Coral Triangle report, and among the common themes that emerged are the need for additional government funding and issues such as destructive fishing practices and coastal population growth (Margarita, 2012).

With the progress made by the signatory countries (in collaboration with multilateral institutions and NGOs) in information exchange and other aspects of the project, some challenges remain that need to be addressed. Burke et al (2011) noted that the proportion of reefs in the Coral Triangle area threatened by local human activities (such as overfishing and watershed-based pollution) is higher than the global average of 60%. Also, Fidelman et al (2011) emphasized the need for the rules created under the CTI to consider existing initiatives at lower levels of governance to fit the real ecological, political and socio-economic conditions on each of the signatory state, as in the case of stakeholders such as the local fisherfolk communities.

C. Danube River Basin Preservation

The Danube is Europe's second largest river, only next in length to the Volga river. There are 19 countries that share the river basin (see figure 3). These are: Albania, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Italy, Macedonia, Moldova, Montenegro, Poland, Romania, Serbia, Slovak Republic, Slovenia, Switzerland, and Ukraine. The management of the Danube River began with concerns about navigation conditions. It was only in the mid-1980's when issues regarding water quality were brought up. Waste was amassing from the many cities the river traversed; industrial and agricultural activities of the millions of individuals were contributing to the pollution of the river (Wolf and Newton, 2008a).



Figure 3. The Danube River Basin



(http://wwf.panda.org/about_our_earth/about_freshwater/freshwater_problems/river_decline/10_rivers_risk/danube/)

In response to the faltering water quality, the "Declaration of the Danube Countries to Cooperate on Questions Concerning the Water Management of the Danube" was signed by the then eight riparian states in 1985, a precursor to the establishment of the 1991 Danube Environmental Program and the 1994 Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Wolf and Newton, 2008a).

Facets of the Cooperation Initiative. In 1991, meetings were held among riparian states and interested international institutions in Sofia, Bulgaria which led to the establishment of the Danube Environmental Program, an initiative which aims to reinforce the restoration and conservation efforts of each riparian state (Wolf and Newton, 2008a). As Wolf and Newton (2008a) noted, other than agreeing on the need to specify rules regarding protection of wetland habitats and conservation of areas of ecological importance or aesthetic value, the participants also assented to address the following issues:

- the use of same monitoring systems in assessing environmental impact
- the liability of each participant to cross-border pollution

Under the same program, the Task force, created to coordinate efforts in the Environmental Program, consented to prepare a Strategic Action Plan for the Danube Basin. This action plan was significant because it was the first time the public was invited to participate and strengthen the initiatives of any international management plan. It was made to complement the then developing Danube River Protection Convention (DRPC) - with its objectives and priorities based on the cooperative and collaborative mechanisms outlined in the convention to address transboundary problems.

The convention forms the legal framework for cooperative and protective actions taken by its contracting parties, functioning as the main legal instrument used in the Danube River Basin for transboundary water management. It was signed by 11 Riparian states in 1994: Austria, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Moldova, Romania, Slovakia, Slovenia, and Ukraine; as well as the European community. It came into effect in 1998. One of the main goals of the Convention is the attainment of a "sustainable and equitable water management" (Danube River Protection Convention, Article 2) which includes "the conservation, improvement and the rational use of surface waters and ground water in the catchment area as far as possible..." (Danube River Protection Convention, Article 2). This meant parties have to maintain and improve the quality and quantity of surface and ground water; prevent hazards from flowing into the river; and limit the amount of pollution entering the Black Sea from the Danube River Basin. The parties also have to improve water quality and avert harmful substances from reaching the river and its surrounding environment (Danube River Protection Convention, Article 2). As of today, there are 15 contracting parties committed to the Danube River Protection Convention - including Bosnia and Herzegovina, Montenegro, Serbia, and Ukraine (ICPDR, 2009).

The implementing body of the convention is the International Commission for the Protection of the Danube River (ICPDR). It manages the team of experts assigned to the following issues: Monitoring, Laboratory and Information Management Systems (MLIM), Emissions (EMIS), Accident Prevention and Control (APC), Ecology (ECO), Flood Protection (FP) and River Basin Management (RBM) (ICPDR, n.d.) Countries are represented in these work groups, sending at least one expert from their country to join each separate group. These groups meet at least twice a year and they produce regular reports to the OCPDR (Weller, 2004).



Figure 4. Breakdown of 2011 contribution of ICPDR member countries and EU to the overall contribution amount

Source: Authors' computations based on ICPDR (2011):13.

Further, the signatory countries are expected to contribute equal share to the budget of the Commission unless there is a unanimous decision by the Commission which allows otherwise. Some of these exceptions however are only applicable for a transitional period (ICPDR, 2002). In 2011, equal contributions were made by majority of the member countries (contributing approximately \$ 97,000 or 8.85% of the overall contribution) except for Ukraine, and Bosnia and Herzegovina, each of which contributed approximately \$ 33,000 or 3% of the overall contribution amount, and Montenegro and Moldova which contributed 2% and 1% of the overall amount, respectively (see figure 4) (ICPDR, 2011). The same report showed that contribution from the European Union (\$ 27,401.13) accounted for 2.5% of the overall contribution amount, with the overall contribution in 2011 amounting to approximately \$ 1.1 million.

Outcomes of the agreement. The convention not only brought about a high level of cooperation from participating governments to improve and maintain the water quality in the Danube, but it has help set a precedent, acknowledging the important role of the public in regional cooperation. The case study presented by Wolf and Newton (2008a) credits this move for the haste in which some initiatives of the signing parties were put forward.

A challenge arose in 2000 with the introduction of the EU Water Framework Directive (EU WFD). Members of the EU were required to meet the directives for water management. The Danube River Basin was one of the rivers outlined in the EU WFD; and this posed a problem because not all parties in the Danube River Protection Convention belonged in the EU. Of the 15 contracting parties, 8 were members of the EU while 6 were non-members. Both the EU WFD and the ICPDR had to coordinate with each other (Weller, 2004).

In November 2000, the states part of the Danube River Protection Convention all agreed to follow the guidelines of the EU WFD within their jurisdiction and to work together with the ICPDR to form a unified Danube River Basin Management Plan. Bilateral coordination was an option for countries whose territories encompass less than 2000 km of the Danube River Basin. Nonetheless, all committed to implement the EU WFD, the non-EU members doing so within the frame of the Danube River Protection Convention. As the states that were part of the EU were legally bound to the directive; the non-EU states were asked to make a political commitment. After which, all countries sent in regular reports to the ICPDR on their respective progress with the implementation of the EU WFD in their own territories (Weller, 2004).

In 2003, furthering this partnership with the EU Water Framework Directive, the Danube River Basin Strategy for Public Participation was outlined to include the public in the development of the Danube River Basin Management Plan (Wolf and Newton, 2008a). When the draft came out in 2009, the public was invited to share their comments and criticisms. Forums, websites, questionnaires, and the like were sent out to get the consensus of the public. These channels of communication continued to receive the publics' input, as issues were further discussed and reviewed by the experts. The current plan basically aims to reach 'good status'' for all waters in the Danube Basin over the period of 2009 to 2015 (Weller, 2004; ICPDR, 2009).

D. Ganges River Water Resources Management

The 2600 km Ganges River flows through India and Bangladesh and also has tributaries in Nepal. Water-sharing in the Ganges River has been a point of contention between India and Bangladesh which share 57 trans-boundary rivers²⁹. A major source of tension is the construction of Farakka barrage 17 km from the Indo-Bangladeshi border to divert a fraction of water to the

²⁹ Available at: http://www.jrcb.gov.bd/57rivers.html

Hooghly River. The idea was floated during the British rule as a proposed solution to siltation of Calcutta port (McKinney, 2007). During the 1950s, series of negotiations took place between Pakistan (which was then in charge of Bangladesh) and India regarding the proposal. The Indian government also cited the need to provide saline free water supply to Calcutta as a reason for pushing the proposal while Pakistan expressed reservation due to the possible adverse impacts of lower dry season water flow as a result of construction of the barrage (Rahaman, 2006). The Indian government pushed through with the construction of the barrage which was finished in 1974 (Wolf and Newton, 2008b).

With the Bangladeshi declaration of independence in 1971, negotiations continued which led to the establishment of Indo-Bangladeshi Joint Rivers Commission, citing the need to cooperate in developing the rivers common to the two countries (Wolf and Newton, 2008b). The two countries also agreed on the need to augment the dry season water flow of the Ganges River. However, no agreement was reached on how to increase the supply of water. The barrage started operating on a limited basis from April 21 to May 31, 1975 after which it started operating at its full capacity. The observed adverse impacts of the barrage on Bangladesh³⁰ led to a formal protest by the latter against India in the General Assembly of the United Nations which called for the two countries to meet urgently and arrive at a "fair and expeditious settlement" (Wolf and Newton, 2008b). This led to the first specific water-sharing agreement signed on November 5, 1977. Among the highlights of the 1977 agreement are as follow (Rahaman, 2006):

- The overall amount of water reaching Farakka barrage during the dry season (January 1 to May 31) would be allocated such that 60% would go to Bangladesh and 40% to India. Water would be released by 10-day periods and the proportion of water that Bangladesh would receive for each 10-day period varied from 51% to 63%.
- 2. Bangladesh was guaranteed to receive at least 80% of its share for each 10-day period.
- 3. A Joint Committee was tasked to implement the agreement and recommend long-term solution on augmenting the dry season flow of water.

However, the Joint Committee failed to come up with a proposed long-term solution and the agreement expired on November 1982. The two countries attempted to come up with a new

³⁰ Among the adverse impacts cited by Wolf and Newton (2008b) are: desiccation (or extreme drying) of the tributaries of the Ganges River in Bangladesh, salination along the coast. The same authors also noted that the full operation of barrage in the dry season of 1976 also caused negative consequences to agriculture, fisheries, navigation and industries in Bangladesh.

agreement and some efforts were made to reach out to Nepal (another riparian state) but the two sides failed to agree on a unified proposal to augment the dry season water flow of the Ganges River.

The 1996 water-sharing treaty. A treaty was signed by the prime ministers of Bangladesh and India on December 1996 regarding the Ganges River water-sharing issue. Unlike the previous agreement, the treaty is effective for a longer period (30 years) and required a full cabinet approval (McKinney, 2007). The treaty stipulated a new formula on water sharing for each 10-day period and this is shown on table 1. If the amount of water reaching Farakka barrage is less than 50,000 cubic feet per second (cusecs), the governments of the two countries are tasked to meet and come up with a solution based on "principles of equity, fair play and no harm to either party"(Wolf and Newton, 2008b). The figures cited are computed based on the average availability of water for each 10 day period from 1949 to 1988.

Similar to the 1977 agreement, the treaty provides for the establishment of a Joint Committee composed of equal number of representatives appointed by the two countries. Among the functions of the Joint Committee are (Rahaman, 2006):

- 1. Collection of data on daily water flow on the parts of Ganges River near Farakka barrage and Hardinge bridge (in Bangladesh)
- 2. Submission of data collected and annual report to the two governments
- 3. Arbitration of any dispute that will arise regarding the water-sharing arrangement

In this regard, the Joint Committee will refer any unresolved dispute to the Indo-Bangladesh Joint Rivers Commission which in turn will refer the dispute to the two governments if not resolved, which "shall meet urgently at the appropriate level to resolve it by mutual discussion" (1996 water-sharing treaty, Article VII). Article VIII of the treaty reiterates the need for the two governments to find long-term solution on augmenting the flow of Ganges River during dry season. Lastly, Article X of the agreement requires the two countries to review the water-sharing arrangement every 5 years; in case of disagreement, India is required to release "water at a rate not less than 90% of Bangladesh share" (1996 water-sharing treaty, Article XI) based on the formula in table 1 until the two countries come up with a mutual agreement.

Flow amount (cubic feet per	India	Bangladesh
second)		
<70,000	50%	50%
70,000 - 75,000	Balance of flow	35,000
>75,000	40,000	Balance of flow

Table 1: Water-sharing arrangement based on the 1996 treaty

Source: 1996 water-sharing treaty

Assessing the current agreement between Bangladesh and India. A major criticism of the 1996 treaty is the use of data on water flow from 1949 to 1988. Since 1988, there is an observed lower amount of discharges during dry season due to increased water-drawing activities in the upstream areas. This in turn makes it more difficult for the two countries to receive the amount allocated on Table 1 (Wolf and Newton, 2008b). As Wolf and Newton (2008b) noted, the amount of water that reached Farakka barrage on April 1997 was below the minimum provided in the treaty (based on average flow from 1949 to 1988), forcing Bangladesh to request a review of the state of the watershed.

The said agreement also does not contain any clause recognizing the need to cooperate with other riparian states whose development plans can affect the amount of water flowing downstream (Wolf and Newton, 2008b; Rahaman, 2006). India is also presently involved in a mega river linking plan which aims to redistribute amount of water from Brahmaputra and Ganges basins to its western and southern regions via aqueducts and pumping stations (Wolfman and Newton, 2008b; Rahman, 2012). As Wolfman and Newton (2008b) noted, this project can exacerbate the present problem of augmenting dry season water flow in the Ganges River.

Similar to previous agreements, the 1996 treaty does not contain any clause addressing environmental issues such as the implications of lower amount of dry season water flow and salinization on the fauna and flora, and mangrove forest on the Bangladeshi part of the Ganges basin (McKinney, 2007). However, as compared to the 1977 agreement, the 1996 treaty is effective for a longer period and this will give India and Bangladesh more time to consult with other riparian states and come up with a long-term solution that will benefit all the countries concerned and will consider other issues such as the joint management of resources in the Ganges River.

E. Nile River Basin Preservation

Considered as the world's longest river, the Nile is shared by eleven African countries or Basin states—Kenya, Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Rwanda, South Sudan, Sudan, Tanzania, and Uganda. These countries depend heavily on the Nile River for irrigation and view it as the key to development (Okoth-Owiro, 2004). Until today, the 1929 Nile Basin Treaty, revised in 1959, regulates the use of the Nile waters (Laudicina, 2007).

From 1885 until the Second World War, nations with colonial representation, such as Sudan and Egypt, were able to exploit the resources of the other Basin nations through bilateral treaties regarding the use of the Nile (Laudicina, 2007). When the First World War ended, Egypt realized the need for a formal agreement on water allocation to advance any regional development plans. The result is the 1929 Treaty, which gave most of the Nile's water to Egypt (Laudicina, 2007). In 1952, the new Egyptian government proposed to build the Aswan High Dam. After debating whether the dam be built as a unilateral Egyptian project or a cooperative project, the government finally decided to include Sudan in the negotiations in 1954. Negotiations were disrupted by the events leading up to the independence of Sudan in 1956 and it was only in 1958 that Egypt was able to pick up the negotiations with the Sudan military regime (Wolf and Newton, 2008c). Sudan convinced Egypt that its population has doubled since the 1929 estimate and the two countries revised the treaty to adjust the water allocations accordingly (Laudicina, 2007). Ratified in 1959, the Agreement for the Full Utilization of the Nile Waters (Nile Basin Treaty) between Egypt and Sudan is still upheld today (Wolf and Newton, 2008c).

Every year, the Nile produces an estimated seventy-four BCM (billion cubic meters) of water, of which fifty-five and a half BCM goes to Egypt and eighteen and a half BCM goes to Sudan. The two countries estimated that the combined needs of all other riparian nations would not exceed one or two BCM per year. The treaty has biased specifications, such as claims for more water from riparian states must be approved by a unified Egyptian-Sudanese position and Egypt has the right to unilaterally start any Nile-related project without consulting the other riparian nations (Laudicina, 2007).

Conflicts started to arise after the Second World War. When the countries surrounding the Nile gained independence as widespread decolonization occurred, the new states claim they are no longer bound to the previous treaties which were signed on their behalf by previous regimes (Okoth-Owiro, 2004). The eight other riparian states started to show discontent with their access to the Nile. One example is Ethiopia, which has spoken of creating a unilateral water development since 1957 and announced the need to use Nile water in its territory (Wolf and Newton, 2008c). A second example is Tanzania's plan of a \$27.6 billion project that constructs a pipeline to extract drinking water from the Nile. A third example is the public statement of the Kenyan government after its independence that it does not recognize the treaty. Yet most basin nations continue to adhere to the 1959 treaty because of Egypt's declaration that it will deem any action against the treaty as an "act of war" (Laudicina, 2007).

Cooperative Action and Outcomes. Since the Nile Waters Treaty of 1959, the countries within the Nile River Basin have held various cooperative activities, such as the HYDROMET project, which is designed to collect hydrometeorologic information within the basin, and the formation of the Technical Cooperation Committee for the Promotion of the Development and Environmental Protection of the Nile Basin (TECCONILE) in 1993. It was only in May of 1999 that the Nile Basin Initiative (NBI) was launched because it was seen that "a cooperative effort in the development and management of Nile waters will bring the greatest level of mutual benefit on the region." All nations surrounding the basin joined the organization (Wolf and Newton, 2008c). The NBI also created the Nile Council of Ministers (Nile-COM), comprising water ministers from all of the riparian countries, as its highest decision-making body.

The 2011 Corporate Report of the Nile Basin Initiative noted that since its inception, NBI has received total funding amounting to approximately \$ 272 million. Almost 2/3 of the total funding received are accounted for by the Nile Basin Trust Fund which serves as the financing mechanism of the initiative to administer support of various donors³¹ (Nile Basin Initiative, 2011). Other international donors (such as GIZ) and the African Development Bank have also contributed significant amount of support to the NBI while the riparian states' contribution (cash and in-kind) accounts for approximately 1/10 (approximately worth \$ 25.84 million) of the total funding received by the initiative (see figure 5) (Nile Basin Initiative, 2011). Being only a transitional arrangement designed to foster communication until a permanent framework is in place, the NBI does not have specific goals or deadlines for progress. The political instability in

³¹ Nile Basin Initiative donors that are members of the Nile Basin Trust Fund are: Canada (CIDA), Denmark (DANIDA), European Commission, Finland, France, Netherlands, Norway, Sweden (SIDA), United Kingdom (DFID) and the World Bank (through the Development Grant Facility).

the region has led to unilateral actions which threaten the effectiveness of the NBI, such as the irrigation plans in Ethiopia and the pipeline construction in Tanzania (Laudicina, 2007).



Figure 5. Contributions received by the Nile Basin Initiative since 2001, by source of funding

Source: Authors' computations based on Nile Basin Initiative (2011): 28

Laudicina (2007) sums it up quite well: "the 1929 treaty continues to govern the Nile Basin as customary international law. The NBI represents a momentous step of collective action, but without effective enforcement mechanisms in place, it will not prevent conflict. Despite international discussions beginning to form, Egypt still controls the water supply, tensions remain high, and faced with extreme poverty, disease and drought, other Basin nations are beginning to take unilateral actions to violate the treaty."

In 2010, some Nile basin nations such as Ethiopia, Rwanda, Uganda, Kenya and Tanzania signed a new water sharing agreement which prohibits upstream countries to utilize the waters of the river in ways that can be detrimental to downstream states. However, the proposed agreement removes the absolute veto power of Egypt regarding upstream water projects (Lamere 2012). As of this point, Egypt and other downstream nations (such as South Sudan) are reluctant to sign the agreement but as Lamere (2012) noted, there were some indications that the new Egyptian government is willing to negotiate with the other basin states in striking a mutually acceptable agreement among all the concerned parties.

F. Pacific Salmon Management

The United States and Canada have a long history regarding Pacific salmon management—one that oscillates between cooperating on the management of harvests and fighting over their shares of the catch (Miller, 2002; Williams, 2007).

The conflict, commonly called the Pacific Salmon War (Williams, 2007), is caused by the anadromous nature of the Pacific salmon, i.e., adults return to spawn in rivers and streams where they were born after years of living in the ocean (see figure 6). Most salmons swim across to the feeding grounds of the subarctic Pacific to reproduce, filling the streams and rivers along the west coast of North America. It is therefore inevitable that some of the Pacific salmon produced in the rivers of a country will be "intercepted" by fishermen of another country (Caldwell, 1999; Miller, 2002; Pacific Salmon Commission, 2006; Williams, 2007). Interception can frustrate the management plans of the home country and may even discourage investment in conservation and enhancement of the salmon stock if the fish produced by the home country are overharvested by another country (Pacific Salmon Commission, 2006).



Figure 6. General Migratory Pattern of Pacific Salmon

Source: Canada (1997), Department of Fisheries and Oceans, *Pacific Salmon Treaty: Moving Towards Equity and Conservation*, paper prepared by Bud Graham, Director of Fisheries Management, Department of Fisheries and Oceans, Pacific Region.

Awareness of overharvesting and development led to the first cooperative action, the signing of the United States-Canada Convention for the Protection, Preservation and Extension of the Sockeye Salmon Fishery in the Fraser River System (Fraser River Convention) on May 26, 1930 (Williams, 2007). Although the Fraser River lies entirely in Canada, its mouth lies close to the border of British Columbia and Washington State (Miller, 2002). The Convention divided the sockeye and pink salmon within the "Convention Waters" as well as management and restoration costs equally between the two nations (Miller, 2002; Williams, 2007). However, different events, such as the dissatisfaction of the Canadians with sharing half of the stocks of the Fraser River salmon, the discovery that there are ways to circumvent some of the regulations by fishing outside the Convention Waters, and the interception of countries not included in the Convention led to a series of renegotiation (Miller, 2002).

In March of 1985, the Pacific Salmon Treaty was signed, forming the Pacific Salmon Commission, which was assigned to develop and recommend fishing regulations for the overall harvest and allocation of salmon stocks (Miller, 2002; Williams, 2007). The Commission is comprised of one section from each represented country and may only make decisions with the approval of both sections. The two main provisions of the Treaty are the conservation and equity principles, which prevent overfishing and provide optimum production, and give each treaty party benefits equivalent to the production of salmon originating in its waters (Pacific Salmon Treaty, Article III).

There were several reasons why the Treaty started to collapse. One of the main problems was the extent of the equity clause: "...provide for each Party to receive benefits equivalent to the production of salmon originating in its waters" (Pacific Salmon Treaty, Article III). Although all parties acknowledge that the clause was meant to reflect economic values and did mean a "fish-for-fish balancing rule," how the balance was to be measured can vary legally (Miller, 2002). Another problem was that despite changes in fisheries management, temporary climatic conditions, such as the warming of coastal waters due to El Niño-Southern Oscillation (Miller, 2002), can cause salmon populations to fluctuate arbitrarily, making it difficult for the Commission to develop a maximum annual catch limit, known as "ceilings," which were not responsive to annual variations in abundance (Williams, 2007). In 1993, the failure of the Treaty became evident and so began the six year-crisis that climaxed in the summer of 1997 where 100

Canadian fishing vessels blockaded an Alaskan Marine Highway ferry and its 300 passengers in the port of Prince Rupert, British Columbia, for three days (Caldwell, 1999; Williams, 2007).

The United States and Canada finally came to terms in June of 1999 and reauthorized the Pacific Salmon Treaty (Williams, 2007). The 1999 Agreement does not replace the 1985 Treaty, but rather puts additional obligations on the treaty parties and replaces the short-lived ceiling-based regimes with a long-term commitment to define harvest shares as a function of the abundance of each salmon species in the areas covered by the Treaty (Miller, 2002). The Commission is now focused on implementing this long-term regime and improving scientific cooperation and supervising joint efforts to assist the recovery of weak stocks in its mission (Miller, 2002).

One key feature of the agreement is its provision for two endowment funds called the Northern and Southern Restoration and Enhancement funds ("Northern Fund" and "Southern Fund") (Pacific Salmon Commission, 2006). The annual investment earnings from these two funds will be used to support scientific research, habitat restoration and enhancement of wild stock production in their respective areas. The United States provided the initial funding, but additional contributions can be given by either party or even outside parties, with the agreement of the two treaty states (Miller, 2002).

The 1999 Agreement overcomes some of the major sources of instability in previous efforts to cooperate. The improvements of the 1999 Agreement from the Fraser River Convention and the 1985 Treaty can be summarized into the following:

- a. Long-term abundance-based management is more appropriate than the ceiling approach to maintaining appropriate levels of harvesting effort when there are large natural changes in salmon abundance, while avoiding the costly and uncertain process of frequent renegotiations. Thus, it serves to uphold time consistency (Miller, 2002).
- b. The introduction of side payments in the form of the endowment funds allows for flexibility in the allocation of the benefits of the fisheries and accommodates the asymmetries among the parties to the agreement (Miller, 2002).

However, some issues remain unresolved. The abundance estimates have already caused some disagreements as the parties do not have a common index of abundance that will be used to set their harvest targets (Miller, 2002). Moreover, the scientific information that would be needed to develop robust long-term regimes for certain stocks does not exist. Continuing efforts to

enhance scientific cooperation and to further develop and refine joint management models should help in providing a solution to these issues (Miller, 2002).

The 1999 Treaty was further updated through the recommendations of the Pacific Salmon Commission in May 2008. The new bilateral agreement was produced after 18 months of negotiations and pushes for science-based conservation and sustainable harvest sharing of the salmon resource between Canada and the U.S. The new fishing regimes were approved in December 2008 by the respective governments and will be implemented from 2009-2018 (Pacific Salmon Commission, 2006).

G. Pelagos Sanctuary for Mediterranean Marine Mammals

The Pelagos Sanctuary (see figure 7) is a special marine protected area (MPA) covering an area of 87,500 km² in the Northwest Mediterranean Sea. The sanctuary was formed through an agreement between France, Italy and Monaco that was ratified in 2002 and implemented in 2005 (Notarbartolo Di Sciara et al, 2008). More than half of its total area (53%) is part of the Mediterranean high seas while approximately 32% and 15% of the Sanctuary are parts of territorial waters and internal waters of the three riparian states, respectively (Notarbartolo Di Sciara, 2009a). The sanctuary is home to various species of cetaceans or marine mammals, among which are the fin whales and striped dolphins (Notarbartolo Di Sciara et al, 2008). Historically, there were sightings of marine mammals in the area³² but it was only until the 1980s when research explorations were conducted to study their population. The said explorations revealed the presence of large populations of cetaceans in the northwest Mediterranean that are genetically distinct from their Atlantic counterparts (Notarbartolo Di Sciara et al, 2008).

Human activities have exerted significant pressure on the marine mammals in the area. The area covered by the Pelagos Sanctuary is an important passageway of various ships, among which are the transport ships connecting the Corsica and Sardinia islands with mainland France and Italy whose activity significantly increased in the recent years (Mangos and Andre, 2012). As Mangos and Andre (2012) noted, the presence of many ships can cause changes in the behavior of marine mammals which in turn can interrupt their feeding period or make them more

³² As Notarbartolo Di Sciara, Hyrenbach and Agardy (2007) noted, the Romans would call the coast facing the northwest Mediterranean Sea the "coast of the whale" while Prince Albert III of Monaco recounted that he had more sightings of whales in Monaco than in the Arctic.

vulnerable to potentially fatal collision with the vessels. Further, some of the ships carry hazardous substances which can have detrimental impacts on the marine life in the area in case collision and other accidents occur, as in the case of an oil spill near Genoa in 1994 (Notarbartolo Di Sciara et al, 2008).



Figure 7. Area Covered by the Pelagos Sanctuary for Mediterranean Marine Mammals

Source: Cetacean Habitat (http://www.cetaceanhabitat.org/pelagos.php#)

Fishing activities, particularly the use of driftnets in catching tuna, also pose a threat to the cetacean population in the area. In the 1990s, some of the fishing vessels used driftnets with

an average length of 20 km and these nets were said to cause high risk of cetacean accidental catch (estimated by the French study group GECEM to be around one hundred individuals annually) and mortality (Mangos and Andre, 2012; Notarbartolo Di Sciara et al, 2008). Other human activities include recreational activities such as whale-watching and high-speed motorboat races; offshore exploration activities; military exercises; and industrial developments in the area (Mangos and Andre 2012)

The Establishment of Pelagos Sanctuary. The formation of Pelagos sanctuary was motivated by lobbying efforts of private groups in 1990 in response to findings by research explorations that indicated significant cetacean populations, and the presence of various human activities in the area (Notarbartolo Di Sciara et al, 2008). Previously, similar efforts by private groups to protest the proliferation of driftnet fishing led to Italian court rulings that banned the use of driftnets for many Italian vessels in a portion of the Ligurian Sea. As Notarbartolo Di Sciara et al (2008) noted, the establishment of a driftnet free zone in the Ligurian Sea was the first attempt in the Mediterranean to enclose an area from fishing to protect cetaceans. The proposal of the private groups to declare a portion of the Mediterranean as a marine protected area (entitled "Project Pelagos") was supported by Prince Rainier III of Monaco and eventually by the environment ministers of France and Italy. Series of meetings among the representatives of the governments of the three countries led to their joint declaration of their intent to establish a sanctuary zone in the Mediterranean. The declaration has no binding force and it took some time before an agreement pushed by the government of Monaco, various NGOs and fishing communities in Italy was signed by the three countries in Rome in 1999 (Notarbartolo Di Sciara et al, 2008). Ratification soon followed and in 2005, the agreement entered into force and it was agreed that Italy (Genoa) would host the main office of the Secretariat, a French national would be appointed as the Executive Secretary and that Monaco would be responsible for the scientific and technical committee of the Secretariat (Notarbartolo Di Sciara et al, 2008).

The agreement aims to foster cooperation among the countries concerned in terms of assessing the situation of the marine mammal population in the area (Article 5) and in information and perspective sharing regarding the creation of regulations that will encourage the use of fishing tools characterized by minimal probability of indirectly capturing marine mammals (Article 7) (Agreement Concerning the Creation of a Marine Mammal Sanctuary in the Mediterranean). Further, the same article (Article 7) directs the riparian countries to comply with

the standards of the European community and international community with regards to the use of driftnets. A European Community regulation in 1992 prohibits the use of driftnet with length of more than 2.5 km while a European Council regulation in 1998 prohibits the use of driftnets of any length (Notarbartolo di Sciara et al, 2008). The agreement also prohibits any deliberate taking or disturbance of marine mammals (Article 7) with an exception in case of emergency (for non-lethal taking of individual marine mammals). Lastly, the agreement also directs the riparian countries to regulate watching of marine mammals (Article 8) and high-speed motorboat competitions (Article 9) within the sanctuary (Agreement Concerning the Creation of a Marine Mammal Sanctuary in the Mediterranean).

Outcomes of the agreement. A management plan was adopted following the implementation of the agreement. Funding of the programs included in the agreement came from the national governments of the riparian states³³ and from private groups such as NGOs and some universities in the area (Regional Activity Center for Specially Protected Areas). Research programs are currently being implemented and some of these are supported by the governments of the riparian states, as in the case of the first winter census of cetaceans in the Pelagos Sanctuary which was financed by the Italian Ministry of Environment (Department of the Environment, Principality of Monaco, 2010). Further, harmonization of monitoring efforts among the maritime authorities of the three countries is currently underway (Regional Activity Center for Specially Protected Areas). There were also initiatives to minimize human activities in the area as seen in the case of the Italian Navy which decided to cease military exercises (especially those involving the use of ordnance or sonar) in the sanctuary (Notarbartolo Di Sciara, Hyrenbach and Agardy, 2007). Also, some private groups developed the REPCET (Realtime plotting of Cetaceans) system (co-financed by the Single Inter-ministerial Fund, France) which enables real-time sharing of information among the navigators regarding sightings of cetaceans in the area (Mangos and Andre, 2012; REPCET, 2011).

However, Notarbartolo Di Sciara (2009b) noted that the efforts of the three riparian states are insufficient given the limited funding and resources available to the Secretariat. In this case, Notarbartolo Di Sciara (2009b) recommended the formation of a stronger management body that would be able to implement stronger ecosystem-based management approach of the area and

³³ Notarbartolo Di Sciara, Hyrenbach and Agardy (2007) for instance noted that Italy allocates around half a million euros per year in supporting the provisions of the agreement.

address more effectively the need to minimize impact of human activities in the area by implementing regulations such as restricting the maritime traffic in the area along established corridors and creating zoning schemes. Nevertheless, the formation of the sanctuary is considered to be significant, as it increased public awareness and enabled the governments of the three countries and private groups to coalesce in addressing the issues regarding the cetacean population in the area (Notarbartolo Di Sciara, Hyrenbach and Agardy, 2007).

H. Prespa Lake Basin Preservation

The bio-diverse Prespa region is shared by Macedonia, Albania, and Greece. 62% of the total area surrounding the basin is within Macedonia, 17% of it in Albania, and 21% of it in Greece. The three countries surround two interconnected tectonic lakes, Megali (Macro) Prespa and Mikri (Micro) Prespa. The former has a surface area of 259.4 km² while the latter has a surface area of 47.4km² (Gletsos et al, 2012). The region has a high proportion of species per unit of area and at least 50 of the animal species and 19 of the plant species found are endemic to Prespa Basin (Zuna, 2010). Given the concentration of endemism and sub-endemism in the area, it makes it important from a conservationist's point of view - particularly because numerous species of flora and fauna surrounding the place, some already endangered, rely on that ecosystem to thrive.

However, the local inhabitants are not fully aware of the importance of the natural resources before them. The "unsustainable agricultural, fisheries, and water management practices" of the people put a significant stress on the environment – leading to relentless environmental contamination from pollution, pesticides, and waste (Sekovski and Popovska, 2009).

To enumerate some of the environmental problems experienced by the area: the shoreline is affected with the development of agricultural land; water habitats are harmed by wastewater and other forms of water pollution from to fertilizer and pesticides; and the numbers of endemic species are decreasing due to overfishing and the introduction of exotic species (Sekovski and Popovska, 2009).

The Establishment of Prespa Park Coordination Committee. On February 2, 2000, the Prime Ministers of Greece, Albania, and Macedonia signed the joint declaration for the creation of the transboundary Prespa Park, the protected area being the first of its kind in the Balkan region (SPP, 2013). In order to properly coordinate among the concerned countries, the declaration called for the establishment of the Prespa Park Coordination Committee (PPCC) – the main political, administrative, and institutional body governing the Prespa region. The committee's task is to accomplish joint programs to preserve the rich yet vulnerable ecosystem of the area while promoting peace and cooperation among the multi-national local community. Each country has a representative from three important sectors: Government, Local Community, and NGOs; to comprise nine out of the ten members in the committee. The last seat goes to a representative from the International Ramsar/Medwet system. The Ramsar Convention on Wetlands and the Mediterranean Wetlands (Medwet) Initiative are two intergovernmental initiatives that aim to promote regional cooperation for the management of wetlands such as the Prespa Park (Medwet, n.d.).

On the heels of the signing of the declaration, the Strategic Action Plan for Sustainable Development of Prespa Park was created because it was recognized that a complete assessment of the Prespa Basin at a transboundary level was missing; and they needed a foundational directive for the management and sustainability of the area. The project was handled by the Society for the Protection of Prespa (SPP) with the help of WWF-Greece, the Protection and Preservation of the Natural Environment in Albania (PPNEA), and the Macedonian Alliance for Prespa (Koutseri, 2012). The Strategic Action Plan (SAP) aims to engage various stakeholders in information and knowledge sharing, and to clarify and specify the objectives of the establishment of the Prespa Park and the means (i.e., institutional, economic, management initiatives and procedures) through which the objectives can be fulfilled (SPP et al, 2005) . The SAP was endorsed by the PPCC in 2004 after a long process of consultations and deliberations among the authorities and stakeholders from the three countries (Koutseri, 2012).

Aside from the strategic action plan, the PPCC had other projects, including the Devolli Study (2005-2006) and the Development of the Transboundary Environmental Monitoring System (2007-2011). The Devolli study entailed an evaluation of the environmental impact of the artificial connection of the Devolli River to Lake Mikri Prespa and an assessment of the hydrological needs of Albania. The study showed that the southern end of Lake Mikri has been adversely affected, with the artificial intervention causing destruction of the breeding grounds of fishes in the Albanian portion (SPP, 2006). This led to a series of proposals and recommendations to rehabilitate Lake Mikri Prespa, focusing on the irrigation needs of the
surrounding local area as well. The diversion of the Devolli River was permanently stopped in 2008 (SPP, n.d.).

The Transboundary Environmental Monitoring system, started by the Society for the Protection of Prespa and supported by the UNDP-GEF Prespa Regional Project, began development in 2007, with the Monitoring and Conservation Working Group (MCWG) taking the lead in managing the project. It is composed of representative stakeholders in each of the three countries involved, facilitating cooperation on all stages of development of the Transboundary Environmental Monitoring System. The pilot application took place from December 2009 to April 2011. The final approval of the system, with the adjustments proposed from the lessons learned in the pilot program, has yet to come (SPP, 2012).

On the tenth anniversary of Prespa Park, along with the EU commissioner for environment, the Environment Ministers of Greece, Albania, and Macedonia signed an internationally binding agreement. This formally institutionalizes the earlier declaration, legally binding the states to perform more concrete actions to protect the area, such as the establishment of permanent structures that will guide the cooperation initiatives of the countries concerned (SPP, 2010)

Present status of the cooperation initiative. Although the international agreement was signed in 2010 (see figure 8), after three years, the Greek government remains the last signatory to ratify the agreement (SPP, 2013). This delays the completion of the process, stalling the actions outlined in the agreement.

This minor setback, however, has not hampered the efforts to save the region. Public and private stakeholders continue to do their part in conserving the area, simply lacking a coordinated transboundary approach. This void is filled by the three Environmental NGOs in the three countries (Macedonian Ecological Society (MES), Protection and Preservation of Natural Environment in Albania (PPNEA), and Society for the Protection of Prespa (SPP)) – who have taken it upon themselves to provide a more coordinated approach in the spirit of the international agreement (SPP, 2013). For example, it was through their efforts the projects aforementioned were able to push through.

The 2009 Transboundary Diagnostic Analysis concludes that the basin may still suffer from the damage from pollutants and other external elements. Pollution from agricultural practices through hazardous substances and organic waste, unregulated fishing activities and the introduction of foreign species, and municipal wastewater, are just some of the listed key factors responsible for the continued degradation of the Basin (REC et al, 2009).

I. Southern Blue Fin Tuna Management

There is a single global stock of Southern Blue Fin Tuna because they are known to only have one spawning ground, found near Indonesia south of Java, and there are no morphological differences among them regardless of where they are caught (CCSBT, 2011a). They are a highly migratory species, thus no single nation can have complete control over the population.

The Southern Bluefin Tuna (SBT) can often grow up to 2.45 meters, weigh up to 260 kg, and live up to 40 years. They become sexually mature between 8-11 years of age, thus their generation length can be estimated to be around 12 years. They are not resilient to fishing because of their slow growth and long life span. Their minimum population doubling time stands at a lengthy 5-14 years - making their kind especially vulnerable to overfishing (United Fisheries New Zealand, 2012).

Fishing for SBT began in the 1950's and it peaked in the 1960's. By the time it reached the late 1980s, the stock of Southern Bluefin tuna was heavily depleted. It has been classified *Critically Endangered* by the International Union for Conservation of Nature (IUCN). From the years 1973-2009, the SBT stock has decreased by an estimate of 85%. The fish was caught initially for canning but the growth of the Japanese sashimi market has shifted demand. According to the IUCN (n.d.): "If the current exploitation continues, it is estimated that the population will be below 500 mature individuals in 100 years. According the most recent stock assessment, there is no current sign that the spawning stock of this species is rebuilding".

Cooperative Solution. The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) was a formalization of the already existing efforts of Australia, Japan and New Zealand to save the Bluefin Tuna. It was established in 1994. Korea and Indonesia joined the commission later on, while the fishing entity of Taiwan retains a membership in the extended commission. The Philippines, South Africa and Europe are considered as Cooperating Non-Members. Membership permits the states to vote in the commission's affairs; while cooperating non-members are not. Regardless of voting privileges, all must adhere to the commission's rules and quotas (CCSBT, n.d.).

The CCSBT aims to conserve the stock of Southern Bluefin Tuna, allowing the depleting stock to recover to sustainable levels. The commission monitors member compliance and sets a total allowable catch per country. It requires fleets to supervise and present data regarding the catches; and it also maintains the scientific research program that was established to help further the commission's goals (CCSBT, n.d.).

A formula regarding the amount of financial contribution that each member state must provide to the Commission is stated in the Article 11 of the Convention establishing the Commission. The article specifies that each member country will share equally in their contribution to the 30% of the budget, while the contribution to the rest of the budget will be determined based on the share of the nominal catch of a member country to the total nominal catch of southern blue fin tuna (Text of the Convention for the Conservation of Southern Bluefin Tuna).

For 2011, more than half of the total contribution is accounted for by Australia and Japan, with each required to contribute \$ 449, 280 or approximately 30% of the total contribution (see figure 9) (CCSBT, 2011b).



Figure 9. Contribution by each member country to the 2011 Approved Budget (in million US \$)

Source: Authors' computations based on Annex 2 of CCSBT (2011b)

Present Status of the Commission. In 1999, Australia and New Zealand sued Japan, claiming it breached their agreement to observe the allowable catch quotas. Japan increased their

Tuna harvest by 2000 tons, citing the increase as a necessity in order for them to conduct research for their Experimental Fishing Program. Because the three countries could not come to an agreement, they brought the issue to the International Tribunal for the Law of the Sea (ITLOS). Australia and New Zealand argued that the research Japan was conducting would do more harm than good (Rubin, 2007). As Rubin (2007) noted, the two countries argued that Japan went against Article 119 of the United Nations Convention on the Law of the Sea (UNCLOS) which among others decrees the states with nationals utilizing the same living resources or different resources within the same area to negotiate in consideration of the need to implement conservation measures.

Despite Japan's objections and claims about the tribunal's jurisdiction, the tribunal prescribed certain measures to resolve the dispute. The three nations were to prevent aggravation of the dispute, to keep their fishing levels to the agreed quotas, to cease experimental fishing programs which may harm the Southern Bluefin Tuna stock, and to continue dialogues with other stakeholders.

The CCSBT works on consensus, and if one country does not want to cooperate, the effectiveness of the commission weakens (Rubin, 2007). For example, in 2006, Australian investigators unearthed a Southern Blue Tuna scandal wherein \$2 billion worth of tuna have been sold directly to retailers instead of the Japanese fish auctions, increasing the real catch of the Japanese to more than their agreed quota (Darby and Debelle, 2006). The Commission approved a proportional allocation program in 2009 such that the amount of southern Bluefin tuna that can be harvested by a member country would decrease based on the proportion of its allocation in case Total Allowable Catch decreases. When Total Allowable Catch (TAC) increases, member countries that have voluntarily given up their additional share of harvest are allowed to regain the said entitlement in the future and similarly, unused allocation of TAC can be tapped by member countries in the succeeding years. However, the Commission does not allow member countries to transfer their respective share of TAC to other member countries (Bailey et al, 2013).

J. Western and Central Pacific Tuna Management

The Pacific Islands Region (see figure 10) is composed of 14 island countries and 8 territories with small land masses and large exclusive economic zones (EEZs) covering approximately

30,569,000 square kilometres of the West and Central Pacific Ocean (WCPO) (Hanich, Parris and Tsamenyi, 2010). The region is home to highly migratory tuna species (such as skipjack, yellow fin and albacore species) and more than half of the total tuna catches in the region (around 57%) come from the Exclusive Economic Zones (EEZs) of the Pacific Island Countries (PICs) (Clarke, n.d.; Hanich, Parris and Tsamenyi, 2010). The tuna fishing industry plays an important role in the economies of many PICs, with a report by Gillett et al (2001) noting that around half of the total exports in the region are accounted for by tuna. The same report also noted that the tuna fishing and tuna processing industry employed approximately 11% of all the employed members of the labour force in countries such as Solomon Islands, Kiribati and Cook Islands.



Figure 10. The Pacific Islands Region

Source: UNESCO (http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/casestudies/asia-the-pacific/pacific-islands-2009/)

For the past years, a significant proportion of the total tuna catch in the region are harvested by vessels from distant water fishing nations. In 1998, around 89% of the total tuna catch (\$ 1.712 billion) were accounted for by non-PIC states such as Japan, South Korea, and the United States, while harvests by vessels from PICs over the same period amounted to \$ 204

million (World Bank, 2000). The region is not spared from pressures of overfishing which in turn can pose a threat to the sustainability of the tuna stock, as evidenced by the steady decline in the biomass of the yellow fin tuna since 1990 (Clarke, n.d.). Given the small size of many countries in the region, monitoring the fishing activities in their vast EEZs would be difficult to accomplish, and this served as an impetus for them to cooperate in monitoring and regulating the fishing activities in the area.

Cooperation initiatives among the Pacific island countries. Cooperation among the Pacific island countries started with the establishment of the Pacific Islands Forum Fisheries Agency (FFA) in 1979 which facilitated cooperation in managing the tuna stock within each country's EEZ. FFA became instrumental in the ratification of the 1982 Nauru Agreement (by equatorial Pacific states³⁴) which aims to strengthen their position with respect to distant water fishing nations in negotiations over the access fees paid by the latter (in exchange for allowing their vessels to fish within the EEZs of the equatorial Pacific states). The agreement recognized among others the need to harmonize their (equatorial Pacific states) policies in managing the shared tuna stock without violating the sovereignty of each signatory state, and the need to establish minimum criteria in allowing foreign vessels to access their respective waters. Further, the agreement also noted the need to prioritize local fishing vessels in terms of giving license (Hanich, Parris and Tsamenyi, 2010).

Eventually, the need for cooperative conservation measures surfaced due to concerns regarding the overexploitation of yellow fin tuna with the rapid expansion of purse seine fishing in the area (Dunn, Lodwell and Joseph, 2006). In 1993, the parties to the 1982 Nauru Agreement signed the Palau Agreement which put limit on the total amount of licenses that will be issued to the purse seine fishing vessels in their EEZs on the premise that it would decrease the total catches which would then drive up the price of tuna (Hanich, Parris and Tsamenyi, 2010). In 1995, the signatory countries started to implement the agreement which also contains provisions that aim to encourage non-PIC operators to base their vessels in the region, and encourage investments from distant water fishing nations to the local tuna industry (Dunn, Rodwell and

³⁴ The equatorial Pacific states that are parties to the Nauru Agreement include: Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu.

Joseph, 2006). Vessel Day Scheme³⁵ (VDS) was introduced in 2007 as an amendment to the licensing system to account for effort creep³⁶ (Hanich, Parris and Tsamenyi 2010).

The Pacific island countries also forged the Niue Treaty to enable the establishment of further agreements regarding surveillance cooperation. However, the high cost associated with implementing surveillance cooperation made the progress of the subsidiary agreements slow (Hanich, Parris and Tsamenyi, 2010). Efforts were made to invite Non-Pacific Island states in the surveillance and monitoring of the EEZs of the PICs, as in the case of Australia which donated patrol vessels for maritime surveillance (Van Santen and Muller, 2000). As van Santen and Muller (2000) noted, the Pacific island countries forged other agreements, among which are the establishment of the Regional Register of Foreign Fishing Vessels; establishment of a centralized satellite-based Vessel Monitoring System (VMS) wherein an electronic equipment is used on each VMS-registered fishing vessel to track its position, speed and direction; and a collaboration among Pacific island countries on tuna research and data collection via the Joint Fisheries Research and Statistical Monitoring agreement.

Prospects for Cooperation between the PICs and the Distant Water Fishing Nations. As Hanich, Parris and Tsamenyi (2010) noted, the cooperation initiatives among the PICs, some aspects of which were supported by distant water fishing nations and donors³⁷, were mostly limited to their EEZs. In this regard, PICs recognized the need to engage other countries further by establishing a regional forum that would address the need to manage tuna stocks in high seas and other portions of the Pacific (Hanich, Parris and Tsamenyi, 2010). From 1994, a series of conferences were held between the PICs and distant water fishing nations and these meetings led to the establishment of the West and Central Pacific Fishing Commission (WCPFC) which aims to consider the need for long term conservation in managing the migratory tuna stocks in the

³⁵ In the Vessel Day Scheme(VDS), instead of allocating a certain total amount of licenses across the EEZs of the equatorial Pacific states, total allocation of (purse seine vessel) fishing days will be set by the equatorial Pacific states and will be bid out to the distant water fishing nations. In this case, a fishing day varies according to the vessel length which can be modified over time to account for changes in technological efficiency (Pacific Islands Fisheries Forum Agency)

³⁶ Effort creep refers to the possibility that a fishing vessel will be capable of increasing its annual catch through time due to technological innovations.

³⁷ As of 2000, the distant water fishing nations (DWFNs) have contributed assistance in areas such as installation of VMS (\$5 million), operation of VMS (\$850,000) and Regional Register of Foreign Fishing Vessels (\$ 500,000) (Van Santen and Muller, 2000)

region (including high seas) in accordance to international laws (Hanich, Parris and Tsamenyi 2010).



Figure 11. Contributions to the WCPFC fund across member countries, 2010

Source: Authors' computations based on WCPFC (2012): 4

The total contribution of a member country to the fund of the Commission is divided into three components: namely, the base component (10% of the total contribution) which is shared equally by the member countries; the national wealth component (20% of the total contribution) which is based on the GNI per capita of a member country; and the fish production component (70% of the total contribution) which is based on the total catch of a member country's vessels within the Convention area (WCPFC, 2003). Figures on the contributions in 2010 show that Japan was the leading contributor, with its contribution amounting to approximately US \$ 1.2 million or 28.65% of the overall contributor in 2010, with their total contribution amounting to 23.34% of the overall contribution amount. Other countries whose contribution amounted to more than 10% of the overall contribution include South Korea (\$ 717,311 or 17.16%), Taiwan (\$ 687,259 or 16.44%) and the United States (\$569,704 or 13.63%) (WCPFC, 2012).

³⁸ The Pacific island countries group includes Tuvalu, Nauru, Niue, Tonga, Samoa, Palau, Kiribati, Solomon Islands, Cook Islands, Fiji, Federated States of Micronesia, Marshall Islands, Vanuatu and Papua New Guinea.

The WCPFC implemented conservation management measures that were agreed upon during their annual meeting. One of the initiatives taken by the WCPFC is to limit the blue fin tuna fishing based on the 2002-2004 average annual catch for 2011 and 2012 (Real, 2010). However, the Commission currently faces challenges for it to function more effectively, among which are the disagreement between the PICs and distant water fishing nations on whether the measures adopted by the Commission also applies to the EEZs of the former (Hanich, Parris and Tsamenyi, 2010) and the distribution of the conservation burden among the member states (Hanich, Sant and Fordham, 2012).

On the other hand, some Pacific Island Countries, particularly Kiribati, Micronesia, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu, have agreed to offer foreign fishing fleets access to their respective territorial seas. In exchange for the said access, the countries have asked the foreign fishing fleets to deter from operating in portions of high seas that can be found in between the participating Pacific Island Countries' Exclusive Economic Zones (Development Asia, 2013).

K. Malaysia-Thailand Joint Development Initiative

The Gulf of Thailand is a semi-enclosed body of water adjacent to South China Sea and is surrounded by Malaysia, Vietnam, Cambodia and Thailand. Given the vast hydrocarbon potential in the area, the said states have pursued their maritime claims (which overlap with each other) in the area despite the relatively narrow size of the Gulf (Schofield, 2007a). In the case of Thailand and Malaysia, the maritime dispute arose from their failure to agree on whether to consider the uninhabited Thai islet Ko Losin an island in accordance to the UNCLOS. Thailand argued for the consideration of Ko Losin as an island capable of generating a maritime zone, while Malaysia insisted otherwise, noting that the islet has no economic life of its own (Thao, 1999; Schofield, 2007a). This, in turn, has led to the emergence of an overlapping area bounded by the equidistant lines drawn by the two countries (Thao, 1999).

Cooperative solution. The disagreement caused a deadlock on the maritime delimitation negotiations between Malaysia and Thailand but eventually, the two sides came up with a compromise. Malaysia and Thailand signed a Memorandum of Understanding (MOU) on February 21, 1979 which delineated a 7238 km² Joint Development Area that covers the overlapping area (see Figure 12). The two countries have noted in the Memorandum that

negotiations on further delimitation of their respective continental shelves in the Gulf of Thailand would still continue, while also recognizing the importance of exploiting the seabed resources in the area (1979 Memorandum of Understanding between Malaysia and the Kingdom of Thailand).

Article III of the MOU called for the establishment of a Joint Authority, which will be led by two chairmen, one from each country. Further, each country is decreed to send equal number of members to the said entity. The MOU also states that the Joint Authority shall act on behalf of the two countries in performing their functions with regards to the utilization of non-living natural resources in the area. The same article stipulates that in case the supply of mineral deposit extends beyond the joint development area, the Joint Authority and the other parties concerned shall negotiate and exchange information regarding the most effective approach in exploiting the resource (1979 Memorandum of Understanding between Malaysia and the Kingdom of Thailand).

Figure 12: Malaysia-Thailand Joint Development Area



Source: Miyoshi (1999)

Under the MOU, previous concessions made by Malaysia and Thailand shall not be affected by the establishment of the Joint Authority. Also, the two countries shall equally share all the benefits and costs related to the activities of the Joint Authority. On the other hand, the MOU has a provision that divided the criminal jurisdiction in the Joint Development Area between the two countries- 930 square miles for Malaysia and 1,100 square miles for Thailand. The MOU explicitly states that the division is not tantamount to demarcation of sovereignty rights; rather, the inclusion of the said provision is a response of the two countries to problems of illegal fishing in the disputed area (Thao, 1999). It was agreed that the arrangement would last for 50 years; in case no boundary delimitation has been reached by the two countries after the agreement period elapses, the functions of the Joint Authority shall continue for an indefinite amount of time (Schofield, 2007a).

Challenges and Outcome. The implementing agreement on joint development was signed by Malaysia and Thailand 11 years after the signing of the MOU. As Schofield (2007a) noted, the delay in the implementation can be attributed to different factors, among which was the change in administrations in the two countries which led to the departure of the Prime Ministers who served as the signatories of the MOU. Further, disputes over fishing rights in the Gulf of Thailand have undermined their bilateral relations, and Thailand was also involved in a commercial dispute with some firms already operating in the area (Schofield, 2007a). Miyoshi (1999) noted that the establishment of a Joint Authority entailed that Malaysia and Thailand adjust their respective domestic laws related to exploration and exploitation of hydrocarbon resources. While Malaysia started to implement a production-sharing contract approach with the enactment of its Petroleum Development Act of 1974, Thailand was utilizing a concession-based approaches has led to further delays in the implementation of the joint development initiative (Miyoshi, 1999; Schofield, 2007a).

The 1990 implementing agreement stipulated the enactments of laws (Acts of Parliaments) by the governments of Thailand and Malaysia that would delineate the capacities of the Malaysia-Thailand Joint Authority. Similar to the proposed Joint Authority under the 1979 MOU, the Joint Authority established under the 1990 agreement should have 2 chairmen (one from each country), and each country should also initially nominate 6 members (excluding the chairperson) to the said entity. The agreement also provides the Joint Authority with a wide array of powers and functions, which includes approval of period of exploration and exploitation, work programs and budget, and production programs of a contractor; inspection of an operator's accounts and books related to its operation in the Joint Development Area; and approval of

tenders and contracts related to goods and services utilized in the petroleum operations, among others (1990 Agreement Establishing the Malaysia-Thailand Joint Authority).

The agreement also contains a production-sharing scheme between the Joint Authority and the contractors, which requires that 10% of the gross production shall be paid to the Joint Authority as royalty, while half of the gross production will be allocated to the contractor for cost recovery purposes. The remaining amount (after royalty and cost recovery payments are deducted) shall be the profit which will be equally divided between the Joint Authority and the contractor (1990 Agreement Establishing the Malaysia-Thailand Joint Authority). As Miyoshi (1999) noted, the contractor will solely be responsible for the operation costs associated with its exploration and exploitation activities. The agreement also provides for equal sharing between the two countries of the benefits and costs incurred by the Joint Authority, and that the governments of the two countries shall provide equal amount of financing to the Joint Authority while the latter has not yet generated an amount of income sufficient to finance its operation expenditure (1990 Agreement Establishing the Malaysia-Thailand Joint Authority).

Two production-sharing contracts were signed by the Malaysia-Thailand Joint Authority (MTJA) and contractors in 1994, while the first gas from the JDA was produced in February 2005 delivered to a Peninsular Gas Utilization system in the Malaysian border (Chensavasdijai, 2011). Thailand, on the other hand, started receiving natural gas produce from the Block B-17 of the Muda and Jengka natural resources fields in the JDA (which amounted to 135 million cubic feet) in February 2010. The operation of the block at its full capacity would enable Thailand to increase its natural gas reserves to approximately 750 million cubic feet per day (Asia News Monitor, 2010).

L. Joint Development Initiative between Norway and Iceland

The Jan Mayen island is located 292 nautical miles from Iceland and 550 nautical miles from Tromso in Norway. The island has a total area of 373 square kilometers and is considered as part of the Norwegian territory by virtue of an Act passed by the Parliament of Norway in 1929. However, in 1977, the Norway in establishing its Exclusive Economic Zone (EEZ) adjacent to its main coast, failed to delineate an EEZ or a 200 mile fishing zone around the Jan Mayen. This, in turn, became a source of dispute between Norway and Iceland when Icelandic fishermen made significant harvests of capelin near the island's coast in 1978 (Richardson,

1988). This led the governments of the two countries to enter into negotiations which culminated in the signing of the Fishing Agreement of May 1980.

Fishing Agreement between Norway and Iceland. As Eze (2011) noted, the Agreement recognized the importance of the fisheries industry in the economies of the two countries, especially Iceland, and the problem of overfishing which threatened the highly migratory capelin stock. The Agreement called for the establishment of the Fisheries Commission to be composed of one representative and one deputy representative from each party. The Commission was tasked to submit proposals and recommendations to the governments of Iceland and Norway regarding the total allowable catch, distribution of harvests between the two countries, and conservation-related measures. The recommendation should be unanimous, and would become binding after two months in case the governments of the two countries do not raise objection (Agreement between Norway and Iceland on Fishery and Continental Shelf Questions, 1980).

The Agreement set Norway's share of the Total Allowable Catch for capelin in the first four years of its implementation at 15%. It also recognized the right of Iceland to the full extent of its EEZ between the latter and the Jan Mayen Island, while Jan Mayen is allowed to generate EEZ extending to 200 miles in areas where it is not limited by Iceland's EEZ (Richardson, 1988). Further, Norway or Iceland is also allowed to transfer its allocated fishing rights to a third party, provided that the third party is only allowed to fish within the former's own zone. The Agreement however failed to resolve the dispute on the continental shelf surrounding the Jan Mayen Island, particularly the Jan Mayen Ridge, as both Iceland and Norway (which has jurisdiction on the Jan Mayen Island) claimed that the ridge is part of their respective continental shelves. To settle this, Article 9 of the Agreement called for the establishment of a Conciliation Commission which would submit recommendations on how to divide the disputed shelf area. The Article emphasized the need for the Commission to consider factors such as the strong economic interests of Iceland in the disputed area, and geographic and geological factors in its recommendation (Agreement between Norway and Iceland on Fishery and Continental Shelf Questions, 1980).

Conciliation Commission's Report and the Establishment of a Joint Development Zone. As Richardson (1988) noted, the Commission decided not to tackle the establishment of continental shelf and recommended instead the establishment of a joint exploration and development zone which includes portions that most likely contain hydrocarbon endowments. The Commission collaborated with a group of scientists, who examined the Jan Mayen Ridge and found out that the ridge cannot be considered as a natural extension of the continental shelf of either Jan Mayen or Iceland (Richardson, 1988). In this case, the Commission decided not to draw a continental shelf line different from the EEZ line delineated by the 1980 Fishing Agreement. Further, the Commission called for the establishment of a rectangular joint development zone which lies across the boundary of the EEZs of Jan Mayen Island and Iceland, with the larger portion of the zone (around 32,750 square kilometers or 61% of the total area of the zone) located in the Jan Mayen side (Miyoshi, 1999; Schofield, 2012). Norwegian legislation would apply in the Jan Mayen side of the proposed joint development area while Icelandic legislation would be applicable on the other side (Richardson, 1988).



Figure 13: Joint Development Zone between Iceland and Norway

The Commission also recommended that cooperation between Norway and Iceland should start at exploration/ pre-drilling stage, in which experts of the two countries would have equal opportunity to lead the activities. The full costs of seismic surveys shall be borne by Norway (through its Petroleum Directorate). The results of the seismic surveys will be open for bidding to oil companies, and the profit that would accrue from it shall be divided equally between the two countries. Further, in the development stage, the Commission recommended joint venture for exploration and drilling contracts with oil companies in which the combined participation of Iceland and Norway would account for at least half of a joint venture (Richardson, 1988). Also, the Commission recommended that Norway and Iceland be entitled to 25% participating interest in hydrocarbon activities on the other party's side of the joint development zone (Richardson, Andersen and Evensen, 1981). However, the recommendation stipulated different terms for the governments of Norway and Iceland in terms of cost-sharing. While Iceland has an option not to participate in joint venture until the discovery of commercial finds, Norway is not entitled to such right and instead can opt to negotiate with private partners such that private partners would bear the government's share of cost at the early development stage, which will be reimbursed by the government until commercial finds are made (Richardson, 1988; Miyoshi, 1999). The Commission also recommended that hydrocarbon deposits located entirely at the Jan Mayen side of the joint development area be considered as lying entirely within the joint development zone (Miyoshi, 1999).

Iceland and Norway adopted most of the recommendations of the Conciliation Commission through an agreement in 1981 despite many provisions that put Iceland at an advantage over Norway. Richardson (1988) noted that the Conciliation Commission cited the heavy dependence of Iceland on hydrocarbon imports, and the low hydrocarbon potential in the area surrounding Iceland except in Jan Mayen Ridge as some of the factors that served as the basis of the Commission's recommendation. The disparity between Iceland and the Jan Mayen Island in terms of population is also a possible explanation behind the disparity in the delineation of the joint development zone (Schofield, 2012). Further, Miyoshi (1999) cited the underlying political relationship between the two Scandinavian countries as a possible reason on the willingness of the governments of Norway and Iceland to adopt most of the provisions of the Commission's recommendation.

For the past years, Norway and Iceland have collaborated to survey the joint development area and in 2008, the governments of the two countries signed an agreement which sets further clarity on the technical and practical aspects of the 1981 agreement (Oil Daily, 2008). Among the provisions of the agreement include the need for the two countries to reach a special agreement in case a hydrocarbon deposit extends to the continental shelf of the two countries, and specification of procedures that each party will undergo regarding their right to 25% participating interest in petroleum activities on the other party's side of the joint development area (Ministry of Foreign Affairs Iceland, 2008). Estimates from the Norwegian Petroleum

Directorate put the amount of expected resource in the Jan Mayen area at approximately 90 million standard eu m of oil equivalent, with an upside of as much as 460 million standard eu m (Oil and Gas Journal, 2013). Iceland, on the other hand, granted exploration licenses to British firms Faroe Petroleum and Valiant Petroleum in its portion of the joint development zone in 2012 (Kavanagh, 2012).

M. Joint Development Initiative between Senegal and Guinea Bissau

A maritime dispute existed between Guinea Bissau and Senegal in West Africa due to a previous delimitation agreement pursued by France (which had jurisdiction over Senegal) and Portugal (which had jurisdiction over Guinea Bissau) in 1960. The agreement stipulated the demarcation of a straight line towards the sea starting from Cape Roxo at 240 degrees (see figure 14). The straight line serves as the border of the territorial seas, contiguous zones and continental shelves of the two colonies (Miyoshi, 1999; Tanga, 2010). However, Guinea-Bissau questioned the legality of the 1960 agreement, and eventually brought the case to an arbitration tribunal with consent from Senegal. In 1989, the tribunal ruled that the delimitation agreement can be considered as having the force of law with respect to the three territorial features mentioned earlier (i.e., territorial sea, contiguous zone and continental shelf) (Miyoshi, 1999).



Figure 14: Senegal-Guinea Bissau Joint Development Zone

Source: Miyoshi (1999)

Guinea-Bissau filed an appeal to the International Court of Justice (ICJ) questioning the decision of the arbitrary tribunal, citing the opinion of an arbitrator which contradicted the tribunal's decision. Further, Guinea-Bissau noted the failure of the tribunal to address the issue of EEZ (Exclusive Economic Zone) delimitation which was not covered by the 1960 agreement (Kim, 2004). The ICJ validated the awarding of the tribunal, which led the Guinea Bissau to file a second motion asking the ICJ to delimit all maritime territories between Senegal and Guinea Bissau on the disputed area. The International Court of Justice, in response, noted that unresolved issues must be settled by both parties and this paved the way for the parties to undergo negotiations which led to the establishment of a joint development zone straddling the initial demarcation line (Miyoshi, 1999).

The establishment of a joint development zone. The governments of Guinea Bissau and Senegal signed the Management and Cooperation Agreement on October 14, 1993. The agreement established a joint development zone with an arc of 48 degrees, radius of 200 nautical miles and center at Cape Roxo (see figure 14). The agreement explicitly excluded the territorial seas of the two parties from the joint development zone, while noting that small-scale fishing be allowed within the zone. It also stipulated different resource-sharing formulas between the two parties for the fishery and non-living resources- the two countries shall equally share the fishery resources in the zone while the allocation formula for mineral resources is 85:15 in favour of Senegal (Management and Cooperation Agreement between the Government of the Republic of Senegal and the Government of the Republic of Guinea-Bissau, 1993). Some analysts cited the existing hydrocarbon exploration and development activities of Senegal with an Irish oil company in the area as a possible reason behind the disproportionate allocation of mineral resources, with reference to the magnitude of the discoveries.

The parties agreed that the Senegalese law would govern the hydrocarbon exploration and extraction activities in the joint development zone, while the laws of Guinea-Bissau have jurisdiction over matters related to fisheries (Kim, 2004). Further, the agreement stipulated the establishment of an international agency in charge of resource exploitation activities in the zone, and that the provisions of the agreement shall enter into force for twenty years when the two countries come up with another agreement that would delineate the organization and functions of the international agency (Management and Cooperation Agreement between the Government of the Republic of Senegal and the Government of the Republic of Guinea-Bissau, 1993).

The establishment of the international agency and resource exploration activities in the area. The international agency (Agence de Gestion et de Cooperation entre le Senegal et el Guinea-Bissau or AGC) was established through an agreement between the two parties in 1995, and is composed of three entities; namely, the High Authority composed of the Heads of State or their designate which would be in charge of policy-related functions; the Secretariat composed of a Secretary-General and a Deputy Secretary-General, in charge of organizing the meetings of the High Authority; and the Enterprise, a corporate body which would serve as the operating arm of the agency (Eze, 2011; Balde, 2007). The 1995 agreement stipulated that the agency shall be responsible for activities related to exploration of hydrocarbon resources in the area, such as geological and geophysical studies, and drilling works. The agency would also be in charge of fisheries resources management and marine ecosystem conservation efforts in the joint development zone, and in related efforts such as the marketing of the petroleum and fisheries resources in the area (Eze, 2011). On the other hand, as Kim (2004) noted, the AGC, through the Enterprise, shall assist firms with hydrocarbon resource development licenses in the area on their administrative transactions/dealings with the governments of the two countries.

Further, the two countries injected capital to the Enterprise, with Senegal contributing 67.5% of the capital and the rest coming from Guinea-Bissau. The agreement also gave the Enterprise (corporate arm of AGC) the right to undertake resource exploration and extraction activities in the area by itself or with other companies simultaneously. The agreement decreed as well that the two countries and the AGC shall cooperate on areas such as scientific research, security and surveillance in the joint development zone (Eze, 2011).

For the past years, the AGC forged agreements with some private companies interested to undertake mineral resource exploration and extraction activities in the area. In 1998, the agency signed an oil exploration/production agreement with the American firm Benton Oil and Gas that would undertake drilling operations in the Dome Flore field in the joint development zone, while an exclusive Technical Cooperation Agreement was pursued by the AGC with the Fusion Oil and Gas company (Global Investment Center, 2011). Fusion Oil and Gas was awarded a contract to undertake exploration activities in a 1600 sq km block within the joint development zone. In this case, Fusion Oil and Gas, and AGC have 85% and 15% interest in the venture, respectively (Ford, 2003). Lastly, the resource-sharing formula for mineral resources was revisited by the two countries and revised to 80:20 in favor of Senegal through an agreement signed in August 2000 (Global Investment Center, 2011)

N. Joint Development in the Timor Gap

The disagreement on the delimitation of maritime boundary between Australia and East Timor, which until now has not been settled, can be traced back to the attempts of Australia and Indonesia to delimit their maritime boundaries in the 1960s. Indonesia insisted on the use of the median line while Australia cited the 1958 Convention on the Continental Shelf and used the concept of natural prolongation (i.e., the maritime boundary of a country should be based on the extent of its continental shelves) on its proposed maritime border (Nevins, 2004). Australia noted that there are two continental shelves in the Timor Sea which are divided by the Timor Trough, a seabed depression parallel to the Timor island whose maximum depth is about more than 3500 m (see figure 15). In this case, Australia argued that the demarcation line should be closer to the axis of the Timor trough which made the maritime border proposed by Australia closer to Indonesia relative to the maritime border line under the median line argument (Schofield, 2007b). Eventually, the two countries came up with an agreement which gave more weight to the boundary proposed by Australia as natural prolongation was considered as a powerful argument at that time, as manifested by the International Court of Justice (ICJ) ruling on the North Sea Continental Shelf cases of 1969 (Schofield, 2007b).

However, the boundary agreement did not cover the portion of the Timor Sea south of East Timor (Timor Gap) as it was a colony of Portugal at that time. Informal discussions were held between Australia and Portugal but there were also disagreements between the two countries on which principle to use. Portugal, in this case, argued for the use of median line and eventually expressed its decision to wait for the agreement from the Third United Nations Law of the Sea Conference, particularly on the issue of how to delimit sea boundaries across adjacent states (Nivens, 2004).

In 1975, East Timor attained its independence from Portugal but Indonesia decided to send troops to the East Timor. Australia eventually recognized the jurisdiction of Indonesia over

East Timor through an expression of *de jure* recognition in 1979, and this paved the way for the governments of the two countries to commence maritime delimitation negotiations on the Timor Gap which culminated in the Timor Gap Treaty signed by the foreign ministers of the two countries on December 1989 (Nivens, 2004)



Figure 15: Joint Development Area under the Timor Gap Treaty

Source: Agreements, Treaties and Negotiated Settlements Project (http://www.atns.net.au/agreement.asp?EntityID=711)

The Timor Gap Treaty

As Nivens (2004) noted, Australia continued to insist on continental shelf argument despite the growing acceptance of the legal community at that time on the use of median line on boundary delimitation. The continued disagreement between the two countries has led to a compromise solution in which in accordance to the Article 83 of UNCLOS, a provisional cooperative arrangement was agreed upon which did not prejudice the final boundary delimitation (Nivens, 2004). The treaty covers an area of approximately 60,000 square kilometers whose north and south boundaries serve as the indicators of the potential maximum extent of each country's claim (Espina, 2012). The treaty area is divided into three; namely area C found at the northern part of the treaty area and considered as the closest to East Timor; area B found at the southern part of the treaty area and bounded by the median line between Indonesia and Australia at the south; and area A which is located between areas B and C (see figure 15). Area A comprises around half of the total area of the treaty zone, and as Nivens (2004) noted, the said area contains some of the potentially wealthiest hydrocarbon reserves in the area. The treaty

stipulated that Australia be given jurisdiction over area B while area A was placed under Indonesia's control. Moreover, Article 4 stipulated that each country should inform each other of the activities of its government regarding the regulation of exploration and extraction activities in its area of jurisdiction, and should award the other country 10% of the Gross Resource Rent Tax collected from corporations operating in the area (1989 Treaty between Indonesia and Australia). On the other hand, the largest area (area A) was placed under the joint control of the two countries and the treaty stipulated that the two countries should equally share the government revenues from the hydrocarbon exploration and exploitation activities in the area (Espina, 2012; Schofield, 2007b).

Article 3 of the Treaty delegated the role of managing area A to the Ministerial Council and the Joint Authority. The Ministerial Council would be composed of relevant Ministers from the 2 countries and in this case, there should be an equal number of Ministers from both countries in the Council. The Treaty stipulated that the Council should meet at least once a year, and that decisions must be reached by consensus (1989 Treaty between Indonesia and Australia). On the other hand, the Joint Authority, in line with the laws of the two countries, would serve as the overall manager of the exploration and exploitation activities in the area and some of its duties included dividing area A into contract areas, and taking the lead in production-sharing contracts with private firms interested to pursue mineral resource activities in the area. The activities of the Joint Authority (such as involvement into production sharing contracts) were subject to the approval of the Ministerial Council, which served as the primary body in charge of all activities in the area. However, the Joint Authority could make recommendations to the Ministerial Council on issues such as renewal or cancellation of production-sharing contracts (1989 Treaty between Indonesia and Australia).

As Espina (2012) noted, the Treaty also stipulated that the two countries should cooperate on areas other than resource extraction in area A, such as marine scientific research, coordination on surveillance and search and rescue activities, and conservation and protection of the marine environment, among others. Further, Article 30 of the Treaty instructed the parties to consult each other or engage in negotiations in case there are conflicts in the interpretation or application of the provisions of the Treaty. The two countries also agreed that the Treaty would remain valid for an initial 40 year term and for successive terms of 20 years in case the two Parties have not yet agreed on a permanent continental shelf delimitation on the zone of cooperation (1989 Treaty between Indonesia and Australia)



Figure 16: Greater Sunrise Unit Area

Source: Department of Resources, Energy and Tourism, Australia (http://www.ret.gov.au/resources/upstream_petroleum/jpdaandgreatersunrise/Pages/default.aspx)

The Independence of East Timor and New Treaties. With the recognition of independence of East Timor in 2002, its government insisted that it is not required to comply with the agreements forged by Indonesia on its behalf with other countries, as in the case of the Timor Gap treaty. To ensure that mineral resource exploration and extraction activities in the area would not be affected by the declaration of the East Timorese government, Australia decided to enter into an interim arrangement with East Timor through the Timor Sea Treaty (Schofield, 2007b). The new agreement established a Joint Petroleum Development Area covering area A of the former Timor Gap Treaty. Article 4 of the new treaty stipulated the benefit-sharing formula between East Timor and Australia to be 90:10 in favour of East Timor. The new treaty prescribed that consultations or negotiations be held in case disputes arise regarding the implementation of its provisions. Further, the treaty shall be in force for a maximum period of 30 years (Timor Sea Treaty).

Another issue between Australia and East Timor concerns the Greater Sunrise complex of fields, which lie across the Joint Petroleum Development Area and the seabed east of the joint development zone (see figure 5). Initially, East Timor and Australia agreed that 20.1% of the Greater Sunrise complex of fields would lie within the Joint Petroleum Development Area and the remaining 79.9% within the eastern portion of the cooperation area which is under the jurisdiction of Australia (based on previous maritime delimitation agreements with Indonesia). This implies that only about 18% (90% of 20.1%) of the total benefits from the Greater Sunrise complex of fields would accrue to East Timor and a perception of unfairness has led to the nonratification of the unitization agreements by the Parliament of East Timor and insistence of the East Timor for a more equitable benefit-sharing scheme (Schofield, 2007b). This led to the signing of the Treaty on Certain Maritime Arrangements in the Timor Sea which stipulates equal sharing of revenues from exploitation of petroleum resources within the Unit Area defined by previous unitization agreements (which includes the Greater Sunrise complex of fields). The Treaty has an explicit provision indicating that the agreement does not prejudice the claims of the two countries regarding the delimitation of maritime boundaries. The agreement is set to be effective for 50 years but its effectivity will cease if no development plan has been approved within 6 years, or if production of petroleum has not commenced within 10 years after the treaty entered into force (Schofield, 2012)

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