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Ecosystem-based fisheries management in small-scale tropical marine fisheries: Emerging models of governance arrangements in the Philippines

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ABSTRACT

There has been a gradual evolution in fisheries management over the past decades from a focus on sustainability of a single species or stock and resources to a focus on marine ecosystems. Among the issues to be addressed for effective implementation of ecosystem based fisheries management (EBFM) are the appropriate governance arrangements and scale for management. The purpose of this paper is to examine these issues of governance and scale as related to EBFM in tropical developing countries through an analysis of approaches being taken in the Philippines to manage fisheries on a multi-jurisdictional level. The management of fisheries and coastal resources in a number of bays and gulfs, which represent marine ecosystems, is presented. The opportunities and constraints to ecosystem based fisheries management in the Philippines are discussed and lessons for broader application of these governance structures in tropical developing country marine ecosystems are presented.

1. Introduction

There has been a gradual evolution in fisheries management over the past decades from a focus on sustainability of a single species or stock and resources to a focus on marine ecosystems. This new approach has come to be called ecosystem-based fisheries management (EBFM) [1–3] or alternatively the ecosystem approach to fisheries management (EAFM) [4–6]. Following FAO [5], EBFM is defined as "managing fisheries in a manner that addresses multiple needs and desires of society, without jeopardizing options for future generations, to benefit from the full-range of goods and services provided by marine ecosystems" Hence, EBFM is geographically specified fisheries management that takes account of knowledge and uncertainties about and among living marine resources, their habitats, and human components of ecosystems, and strives to balance diverse societal objectives. A set of ecosystem principles is posited and policies to implement them are indicated. Management decisions would be oriented toward precautionary management to better take into account risk and uncertainties as well as to anticipate or plan for trends or changes over time in the fished ecosystem. The aim is to ensure that, despite variability, uncertainty, and likely natural changes in the ecosystem, the capacity of aquatic ecosystem health, both natural and human, is maintained indefinitely for the benefit of present and future generations. The EAFM approach is advocated by the United Nations Food and Agricultural Organization (FAO) and differs from the EBFM approach by balancing societal economic needs with ecological function. FAO [5] defines EAFM as "…strives to balance diverse societal objectives, by taking account of the knowledge and uncertainties of biotic, abiotic, and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries." EAFM focuses on fishery management to make decisions while taking into account other ecosystem components. Ecosystem-based management is an environmental management approach that recognizes the full array of interactions within an ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation [7,8].

Among the issues to be addressed for effective implementation of EBFM are the appropriate governance arrangements and scale for management. Rice [9], writing about changes between ecosystem area management (EAM) and "classic" management states that: "In the end, the fourth aspect of EAM—governance systems that work—may matter most. Governance is the most independent of the four components of EAM because one can improve governance at scales from local to international, and in settings addressing considerations of types 1, 2 or 3 (consider effects of all major environmental forcers on the dynamics of the resource(s) being used; consider impacts of the activity being managed on all major ecosystem properties, not just the

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resource(s) directly used; consider the consequences of all human activities in the sea, not just one's own sector; respectively) alone or in all combinations. It is simultaneously the most co-dependent of the four components. None of the other factors can be addressed without effective management tools."

The spatial extent of the ecosystem determines which species, other ecosystem attributes, and human activities are the focus of EBFM. The EBFM faces the challenge of defining the relevant "fish stock" to manage, i.e., setting the right boundaries, as well as deciding on the appropriate scale and scope within which to manage. Heiman and Wendt [10] state that ecosystem based management must be implemented at the multiple spatial and temporal scales that reflect the natural hierarchical organization of ecosystems (e.g., from large marine ecosystems such as the South China Sea in East Asia to small estuaries such as San Miguel Bay in the Philippines). EBFM is by its very nature about interactions: those between land and sea, people and the environment; among stakeholders, managers, and scientists; and among different spatial and temporal scales. Heiman and Wendt [10] state that there is a need to develop flexible, responsive management structures. These structures integrate the organizational structure of science, management, and stakeholder involvement across different scales.

EBFM often involves "scaling up" management, for example, from single-species fisheries management to management of multi-species assemblages; from looking at isolated drivers of change to considering all environmental and human impacts; from design of individual protected areas to planning protected area networks; from conservation of a fragment of habitat to comprehensive spatial management [11]. Issues of scale include what is the appropriate scale of the marine ecosystem for fisheries management purposes [12] and "scaling-up" from other management arrangements [11,13,14] such as community-based management to an ecosystem scale. There is a need to assure harmony between scales of management and linkages between and among the various scales. One of the challenges of EBFM is to fashion ways to ensure that the actions of the coastal and fisheries institutions at each level of government are harmonized with one another and are consistent with agreed EBFM goals and policies. Management decisions that are matched to the spatial scale of the ecosystem, to the programs for monitoring all desired ecosystem attributes, and to the relevant management authorities are likely to be more successful in achieving ecosystem objectives.

Chua [15] states that scaling up in integrated coastal management (ICM) refers to three different contexts: (1) geographical expansion, (2) functional expansion, and (3) temporal considerations. The same contexts may hold true for small scale fisheries management. Geographically, the expansion could be from a small coastal community operating in a nearshore area up to the entire bay. Functional expansion involves adding new program interventions, for example, if the current intervention relates largely to enforcement, functional expansion may involve adding new interventions such as livelihoods and education. Temporal considerations involve integrating fisheries management within the broader administrative programs of the local government units.

Issues in establishing governance arrangements for EBFM include not only the appropriate scale, but also boundaries and type of management for a marine ecosystem. Marine resources are usually managed at a political jurisdiction level rather than an ecosystem level. The question is how to develop governance arrangements at the appropriate scale that addresses political, social/customary, and ecosystem needs for management. In addition, the question is how to establish the appropriate type of governance arrangement—central, co-management, community-based—to manage the ecosystem.

The purpose of this paper is to examine these issues of governance and scale as related to EBFM in tropical developing countries through an analysis of approaches being taken in the Philippines to manage fisheries on a multi-jurisdictional level. The management of fisheries and coastal resources in a number of bays and gulfs, which represent marine ecosystems, are presented. The legal and institutional structure recently developed in the Philippines provides for governance of fisheries and coastal resources at an ecosystem scale in nearshore areas. The opportunities and constraints to ecosystem based fisheries management in the Philippines are discussed and lessons for broader application of these governance structures in tropical developing country marine ecosystems are presented.

2. Methodology

The Philippines was selected for this study due to a number of actions taken by the Philippine government over the last two decades to improve fisheries and coastal resource management through legislative reforms, as well as innovative projects and programs. While these actions were not specifically undertaken for EBFM, the activities undertaken and the outcomes produced provide lessons that are important in developing governance arrangements for EBFM. This section will discuss these legislative reforms and projects and programs, and the data collection methods used in the study.

2.1. The Philippines

Based on the Fisheries Code of 1998, Philippine fisheries are legally categorized into municipal and commercial fisheries sectors. Municipal fisheries involve the use of motorized and non-motorized fishing boats of three gross tons (GT) or lower, as well as fishing without the use of vessels. The literature uses the terminology "small-scale", "artisanal", and "traditional" fishing interchangeably with municipal fishing. Commercial fisheries utilize fishing vessels of more than 3 GT and operate legally in fishing areas more than 15 km from the shoreline.

The management of the fishery resources is distributed among several government levels. The basic jurisdictional divisions are as follows: (1) village, municipal or city governments within 15 km for "municipal waters" and resources within the territorial boundaries of these municipalities or cities; (2) Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR) (a national agency with regional offices) for commercial (e.g., outside municipal waters) fishing activities and public lands such as tidal swamps, mangroves, marshes and foreshore land and ponds; and (3) Department of Environment and Natural Resources (DENR) (a national agency with regional offices) for shoreline and foreshore areas and, through Protected Area Management Boards (PAMBs), for areas under the National Integrated Protected Area System.

Fisheries management in the Philippines is largely guided by three key national laws: (1) Local Government Code (LGC) of 1991 (RA 7160), (2) Agriculture and Fisheries Modernization Act of 1997 (RA 8435), and (3) Fisheries Code of 1998 (RA 8550). These guide the Department of Agriculture (DA)-Bureau of Fisheries and Aquatic Resources (BFAR) at the national level, as well as the local government units (province, municipality, village/*barangay*). In 1991, the government recognized the need to increase participation in management and to devolve control over resource access to local levels of government through policy and institutional reforms. The Local Government Code of 1991 (LGC) devolved much authority to local government units (LGUs), specifically municipalities. The basic tenet of the LGC is decen-

tralization. A general operative principle is a provision that the LGUs may group themselves, consolidate or coordinate their efforts, services and resources for purposes commonly beneficial to them. Section 35 specifically states that LGUs may enter into joint ventures and such other cooperative arrangements with people's organizations (PO) and non-governmental organizations (NGOs) to engage in the delivery of certain basic services, capability building and livelihood projects, and to develop local enterprises designed to diversify fisheries, among other things. The LGUs and local communities are also given certain privileges and/or preferential rights. Municipalities shall have the exclusive authority to grant fishery privileges in municipal waters, up to 15 km from shore, and impose rentals, fees and charges [16,17].

In 1998, Republic Act no. 8550 or the Philippine Fisheries Code was signed into law. Under the Fisheries Code, several sections of the LGC were supported such as the devolution of the function of fisheries management to local government; the designation of municipal waters up to 15 km from shore; and the granting of preferential rights to fishing privileges in municipal waters to registered fisher organizations and cooperatives. Section 16 of the Code states that "The management of contiguous fishery resources such as bays which straddle several municipalities, cities or provinces, shall be done in an integrated manner, and shall not be based on political subdivisions of municipal waters in order to facilitate their management as single resource systems. The LGUs which share or border such resources may group themselves and coordinate with each other to achieve the objectives of integrated fishery resource management." In addition, the Fisheries Code (Section 73) endorsed the establishment of Fisheries and Aquatic Resources Management Councils (FARMC) at the national, municipal and village (*barangay*) levels. The FARMCs are mandated to carry out a number of management advisory functions in close collaboration with the LGU. These functions include assisting in the preparation of Municipal Fishery Development Plans, recommending the enactment of fishing ordinances, assisting in enforcement, and advising the LGU on fishery matters. The FARMCs are formed by fisher organizations and cooperatives and NGOs with assistance from the LGU. Section 76 allows for creation of Integrated Fisheries and Aquatic Resources Management Councils (IFARMCs). The IFARMCs can be created in bays, gulfs, lakes and rivers, and dams bounded by two (2) or more municipalities/cities. The IFARMC serves as the venue for close collaboration among LGUs in the management of contiguous resources to achieve the objectives of integrated fishery resource management. It shall have 14 members composed of the Chairperson of the Committee on Agriculture/Fisheries of the concerned municipality or city, the Municipal/City Fisheries Officers of the concerned municipality, the Municipal/City Development Officers, one representative from an NGO, one from the private sector, and nine from the fisherfolk. The IFARMC shall assist in the preparation of the Integrated Fishery Development Plan and submit such plan to the concerned Municipal Development Councils; recommend the enactment of integrated fishery ordinances to the concerned Municipal Council (*sangguniang bayan/panlungsod*) through its Committee on Fisheries, if such has been organized; assist in the enforcement of fishery laws, rules and regulations in concerned municipal waters; advice the concerned *sangguniang bayan/panlungsod* on fishery matters through its Committee on Fisheries, if such has been organized; and perform such other functions which may be assigned by the concerned *sangguniang bayan/panlungsod.* Every five years, the Fisheries Code mandates an updated national fisheries management plan, the most recent completed in 2006 [18].

Thus, for coastal and marine ecosystems and fisheries within 15 km of the shore, the location of the major centers of marine biodiversity within the Philippines, the Fisheries Code provides the legal structure for establishing governance structures for EBFM through the IFARMC and the ability of municipalities to coordinate municipal fisheries ordinances to address common concerns and enforcement.

The Department of Agriculture has mandated the creation of two consultative bodies composed of government, private sector, and civil society representatives [19]. Sections 70–72 of the Philippine Fisheries Code of 1998 (RA 8550) created the Fisheries and Aquatic Resources Management Council (FARMC). The National Agriculture and Fisheries Council (NAFC), on the other hand, was established under the mandate of the Agriculture and Fisheries Modernization Act of 1997 (RA 8435). The NAFC and FARMC each have their respective counterparts in the regional and municipal levels. These coordinate inter-agency and inter-sectoral efforts as well as further facilitate civil society participation in decision-making processes. Both were created to serve as consultative, advisory, and monitoring structures to assist the Secretary of the DA in the formulation of national policies dealing with the agriculture and fisheries sector.

The DA Administrative Order 6 Series of 1998 serves as the Implementing Rules and Regulations (IRR) of the Republic Act 8435 or the Agriculture and Fisheries Modernization Act. Rule 113.1 of this order mandated the strengthening of the existing NAFC to assist the Department of Agriculture in the broad-based monitoring and coordination of the agricultural and fisheries modernization process. The NAFC is mandated to act as an advisory body to ensure the success of the DA programs and activities. It is also tasked to serve as a consultative and feedback mechanism from the lowest level possible to the top decision-makers and to assist in defining and formulating goals and scope of the country's food and agricultural policies, plans and programs. The law dictates that the AFCs be created in the regional, provincial, city or municipal and *barangay* level. The AFCs in all levels are composed of representatives from the government sector, the private sector or individuals and associations engaged in agricultural and fishery production, post-harvest and marketing, including credit services and farm supplies and nominees from the private sector which has been confirmed by majority of the members. The council has decided that the composition of AFCs in all levels be 60% from the private sector and 40% from the government sector.

In addition to legislative reform, three national projects have been implemented by the government over the last two decades to address the problems and constraints in the Philippine fisheries sector. These are the Asian Development Bank funded Fishery Sector Program (FSP) and Fisheries Resources Management Project (FRMP). Both projects undertook their implementation activities on a bay or gulf scale which represent a marine ecosystem covering multiple political jurisdictions (Fig. 1). Both projects undertook fisheries management at different scales (community, municipal, bay/gulf-wide), focused on governance reform, and utilized a co-management approach.

The Fisheries Sector Program loan was provided in 1989 to address such problems as overfishing, illegal and destructive fishing activities, siltation and pollution of coastal waters, weak institutional and management capabilities, rapid depletion of fisheries and marine resources, and persistent poverty among municipal fishers [20]. The program was closed in December 1995. The Program consisted of a series of policy and institutional reforms required to improve productivity, incomes, equitable distribution of returns, and the sustainable management of sector resources. The Program supported four major policy reform measures: (1) control of fishing license issuance and reforms on fishpond lease agreements (FLAs), (2) decentralization of municipal water management to local governments, (3) enactment of municipal fishery ordinances, and (4) provision of trade incentives

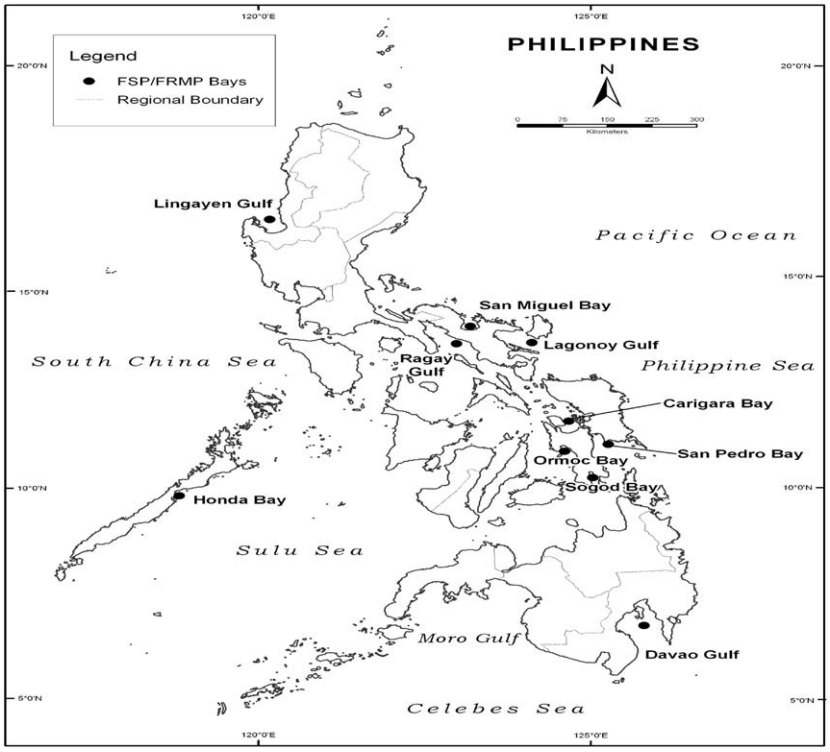

Fig. 1. Location of bays involved with the Fisheries Sector Program and/or Fisheries Resources Management Project in the Philippines.

and privatization of fishing ports. These reforms were supported by a variety of activities involving the public and private sectors, to undertake coastal community development, ecological assessment, income diversification, and law enforcement. It was envisaged that the Program would rehabilitate the ecological status of the coastal zone, reduce poverty among fishers, and improve sector productivity. Program implementation was carried out in 12 priority bays (of 26 major fishing areas). These are Manila Bay, Calauag Bay, San Miguel Bay, Tayabas Bay, Ragay Gulf, Lagonoy Gulf, Sorsogon Bay, Carigara Bay, San Pedro Bay, Ormoc Bay, Sogod Bay, and Panguil Bay.

The Program laid the foundation for cooperative, community-based resource management, and mobilized various stakeholders for participatory decision making. Policy reforms to decentralize management of municipal waters and provide preferential treatment for municipal fishers to use municipal waters were achieved with the enactment of the Local Government Code. This allowed LGUs to enact various municipal fishery ordinances to regulate and conserve fishery and marine resources, enforce fishery laws, and control illegal fishing. It also allowed LGUs to actively participate in CRM activities and to develop CRM plans suited to their needs, resource capability, and the capacity of coastal communities.

However, some provisions of the Local Government Code were not clear on how the management of bay ecosystems, which require coordinated and cooperative management by various concerned LGUs, should be carried out effectively and sustainably. This limitation was addressed by Executive Order 240, which called for the organization of bay management councils (BMCs). BMCs were formed to jointly manage the fishery and aquatic resources, and to resolve issues relating to bay-wide resource management by all concerned municipalities in a priority bay. BMCs were comprised of various stakeholders, including NGOs and mayors of the coastal municipalities bordering a bay. The performance of BMCs was mixed, with most of the BMCs ceasing to function after program completion due to lack of clear understanding of the appropriate roles of BMCs, weak leadership, and inadequate funding. There was a lack of unified bay management as BMC members were more interested in the measures concerning their own municipal waters and did not cooperate fully with others in implementing necessary resource management measures. The BMCs were subsequently replaced through a Presidential Order in 1995 to mandate the creation of fisheries and aquatic resources management councils (FARMCs) (para. 21). This institutionalized the role of fishers in CRM planning and implementation, and allowed for several cooperating LGUs to manage a bay (para. 32).

The Philippine Government launched the Fisheries Resource Management Project (FRMP) in 1998 as part of its efforts to address poverty and environmental degradation in the country [21]. The ADB loan was effective from 1998 to 2005, while the Japan Bank for International Cooperation (JBIC) loan was effective until January 2007. The long-term goals of the FRMP were to promote sustainable use of fishery resources and reduce poverty among municipal fishers. The FRMP was designed to consolidate previous efforts to improve fisheries resource management, taking into account lessons learned from the Fisheries Sector Program (FSP). The FRMP had limited its scope to municipal fishing and it had three components: (1) fisheries resource management, (2) income diversification, and (3) capacity building. FRMP covered 18 priority bays, comprising 11 bays established through the FSP and 7 new bays.

The project design envisioned that BFAR would strengthen bay management councils (BMCs) in areas covered by the earlier Fisheries Sector Program, as well as in new areas. The objective was to have unified fisheries management arrangements, through the enactment of unified fisheries ordinance by bay-wide management councils, IFARMC or the like. Complementary actions were seen as necessary to contribute to improving effectiveness and shared responsibilities such as costs and joint actions in enforcement, enhancement, protection and refugia. However, capacity building activities for the councils were limited

due to (1) more priority accorded by BFAR to fisheries resource management activities in individual local government units, and (2) BFAR's emphasis as the Project began to be implemented in 1998 on forming integrated FARMCs instead of BMCs, in accordance with the Fisheries Code of 1998. Although both types of council aim to coordinate on bay-wide resource management issues, the stakeholders are different. The principal stakeholders in BMCs are local mayors, while the principal stakeholders in integrated FARMCs are municipal fishers.

More recently, the Fisheries Improved for Sustainable Harvest (FISH) Project was initiated to conserve biological diversity in at least four biologically and economically important marine ecosystems in the Philippines. FISH is a seven year project (2003–2010) funded by the US Agency for International Development. The FISH Project supports the efforts of the DA-BFAR and LGUs to conserve coastal marine resources of the target areas. The FISH project works with stakeholders in each target area to develop an integrated fisheries and coastal ecosystem-based management plan [22].

2.2. Study sites and data collection methods

If, for the purposes of moving toward EBFM, we consider bay and gulfs in the Philippines to be marine ecosystems and then consider each as a discrete entity for the purposes of management [5], we can evaluate the governance arrangements established by legislation and projects and programs to gain insights into success and failure of these arrangements. This definition was the basis for then selecting several of the FSP and FRMP bays and gulfs for study. These bays and gulfs offered a unique opportunity to evaluate the development and implementation of fisheries and coastal resource governance arrangements at an ecosystem scale and to learn from the experience to improve fisheries management.

Of the 18 bays, 10 were chosen for study—Lingayen Gulf, Honda Bay, Davao Gulf, San Miguel Bay, Ragay Gulf, Lagonoy Gulf, Carigara Bay, San Pedro Bay, Ormoc Bay and Sogod Bay (Fig. 1). These bays were chosen based on three criteria: availability of good secondary data on governance arrangements; location and marine ecosystem representation; and whether or not a bay or gulf-wide governance structure had been developed.

Secondary data (socioeconomic, resource and ecological, institutional) on each bay or gulf was collected from FSP and FRMP project reports [20,21] and PhilFIS Document Database [23] from the Philippine Bureau of Fisheries and Aquatic Resources (BFAR). Primary data was collected through site visits to each bay and key informant interviews with individuals associated with the projects in each bay such as BFAR regional office staff, National Economic Development Agency regional staff, provincial and municipal officials, MFARMC officials, bay/gulf management council staff, university staff, and non-governmental organizations. The key informants were asked a series of questions about the governance and institutional arrangements in the bay including history, structure, problems and opportunities, and lessons learned.

3. Results and discussion

The 10 bays and gulfs studied revealed five different governance arrangements:

1. Clusters and alliances of municipalities to integrate coastal resource management (Lingayen Gulf, Sogod Bay, Lagonoy Gulf)
2. City-Wide FARMC and Clustered *Barangay* FARMCs (Puerto Princesa City, Palawan)
3. Integrated Fisheries and Aquatic Resources Management Councils (IFARMC) (San Miguel Bay, Carigara Bay, Ragay Gulf)
4. Gulf Management Council (Davao Gulf)
5. Regional IFARMC (San Pedro Bay and Leyte Gulf; Western Leyte Coast)

In addition to the ecosystem governance arrangements identified through this study, the literature revealed two other examples in the Philippines:

6. The integrated municipal council (IMC) (Banate Bay, Iloilo)
7. The LIPASECU Bay Management Council, Inc. (Pandan Bay, Antique)

A description of each governance arrangement is presented below.

3.1. Clusters and alliances of municipalities to integrate coastal resource management (CRM) (Lingayen Gulf, Sogod Bay, Lagonoy Gulf)

Lingayen Gulf: The Lingayen Gulf is located on the northeastern coast of Luzon Island with 160 km of coastline along the South China Sea. It is bordered by the provinces of Pangasinan and La Union. There are 23 municipalities surrounding the Gulf. In 1994, the Lingayen Gulf Coastal Area Management Commission was established to be an advisory board to the President and develop a resource management agenda. The Commission was dissolved in 2002 due to lack of budget and limited participation and continuing support of municipal mayors resulting from electoral changes. Following the dissolution of the Commission, overfishing and water pollution increased in the Gulf. The FRMP implemented activities in eight municipalities including coastal resource management planning and implementation and income diversification. Community organizing was conducted by clustering municipalities with common issues. While MFARMCs were established in the target municipalities, no Provincial FARMC or Integrated FARMC was established during the project.

Illegal fishing, overfishing, water pollution and aquaculture development continue to be an issue in the Gulf. In order to address these issues, four municipalities in the eastern section of Lingayen Gulf have "clustered" themselves (using provisions from RA 7160) in order to integrate their coastal resources management plans and municipal fisheries ordinances. The municipalities of Anda, Bolinao, Bani, and Alaminos (ABBA) were facing a number of common issues, including fish kills from water pollution, mariculture development, navigation, and illegal fishing. To address the issues, the municipalities developed a memorandum of agreement (MOA) in 2003 to integrate their municipal fisheries ordinances and protect and conserve their marine resources. The management structure is depicted in Fig. 2. The cluster is composed of an ABBA Task Force Group made up of municipal agricultural officers, members of Philippine National Police, fish examiners, *Bantay Dagat* (volunteer bay-watch enforcement officers) and municipal legal officers. The Group meets once a month to discuss and address these common issues and to meet with the MFARMCs representatives. The municipal governments provide a small budget for the Group. Activities of the ABBA Group include integration of law enforcement and monitoring and surveillance activities. Political will is maintained by rotating the municipal mayors to lead the Group.

The cluster of municipalities was facilitated by the Sagip Lingayen Gulf Project, a five-year conservation and development project that was implemented by the Marine Environment and Resources Foundation (MERF), Inc. with grant funding from the

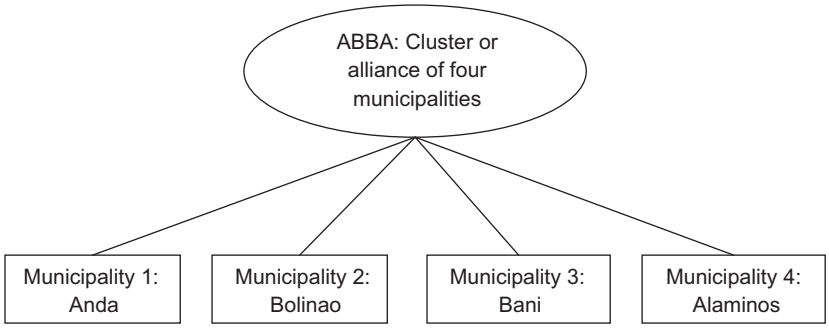

Fig. 2. Model 1: Clusters and alliances of municipalities with integrated coastal and fisheries resource management in Lingayen Gulf, Northern Philippines.

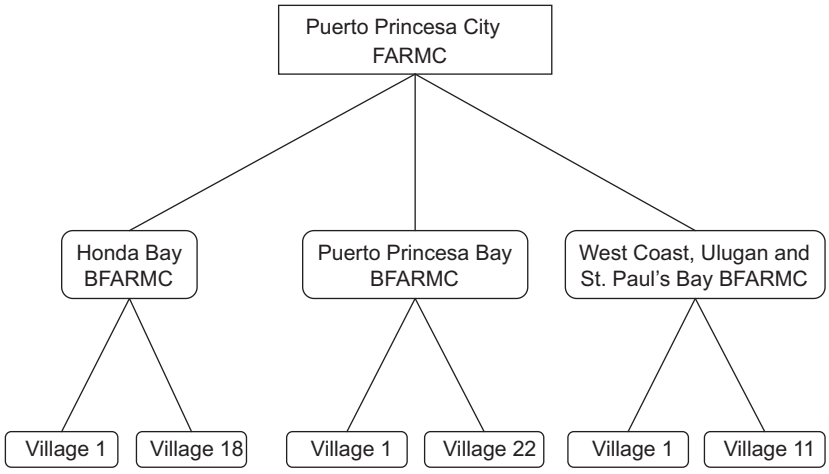

Fig. 3. Model 2: City-Wide FARMC and Clustered *Barangay* FARMCs in Puerto Princesa City, Palawan.

Government of the Netherlands. The project operated in partnership with six local government units (Province of Pangasinan and Alaminos, Bani, Bolinao and Anda in Pangasinan and San Fernando City in La Union) and their fisher communities, and BFAR, academe, and other non-governmental organizations. The overall aim of the project was "to develop and pilot coastal resource management models leading to sustainable fisheries, sustainable livelihood and water quality in Lingayen Gulf for replication and/or expansion in both the Project's service areas, and elsewhere".

Sogod Bay: Sogod Bay, on the southern coast Leyte, has 11 municipalities surrounding it. As with other bays included in the FSP, an unsuccessful bay management council was established and failed due to lack of political support and budget. To address some common concerns and issues, municipalities around the Bay have established alliances through a MOA for coastal resources management. There are currently four alliances. Each alliance has a different MOA in order to address local issues and problems. Funding for the alliance is provided through the municipal budget. The members of the alliance are representatives of the MFARMCs. The alliances meet on a quarterly basis and all alliances meet once a year. The secretariat for the four integrated alliances is at the provincial level. The municipalities have initiated a color coding scheme with a different color for boats in each municipality. There is common law enforcement and 43 fish sanctuaries have been established in the Bay.

Lagonoy Gulf: Lagonoy Gulf is located in the Bicol region. There are three provinces surrounding the Gulf. Attempts have been made to establish an IFARMC in the Gulf but this has not been successful to date. However, five municipalities, making up the first district of Albay Province (Tabaco City, Tiwi, Bacacay, Malilipot, Rapu Rapu) surrounding the Gulf have coordinated their municipal fisheries ordinances since 1998 to establish a closed season for the *siganids* fry fishery. This action was taken due to concerns about steep declines in the harvest from this fishery [24].

3.2. City-Wide FARMC and Clustered Barangay FARMCs (Puerto Princesa City, Palawan)

Puerto Princesa City is composed of 66 *barangays*. There is a City-Wide FARMC (CFARMC) whose membership is based on the City's fisheries ordinance and RA 8550. There are three clusters of *barangays* for the purpose of fisheries and coastal management: (1) Honda Bay, (2) Puerto Princesa Bay, and (3) Western Coast/Bay. The number of *barangays* by clusters is as follows: Honda Bay [18], Puerto Princesa Bay [22] and Western Coast/Bay [11] (Fig. 3).

In order to elicit a wider participation from all the *barangay* FARMCS (BFARMC), a system of "baywide representation" is being utilized. Each bay area has an elected representative among the total of 10 BFARMC chairpersons. Honda Bay, Puerto Princesa Bay and Western Coast/Bay have three, three and four representatives, respectively. All BFARMCs are active in their *barangays*, conducting meetings, as well as providing assistance in the registry of fishers and fish catch data. Not all the BFARMCs are equally active as some do not attend the citywide meetings due to the high cost of transportation or a low priority given to fishing activities by *barangay* officials. Before the passage of RA 8550, the City government had passed a fisheries ordinance which attempted to codify local policies on fisheries management. The City

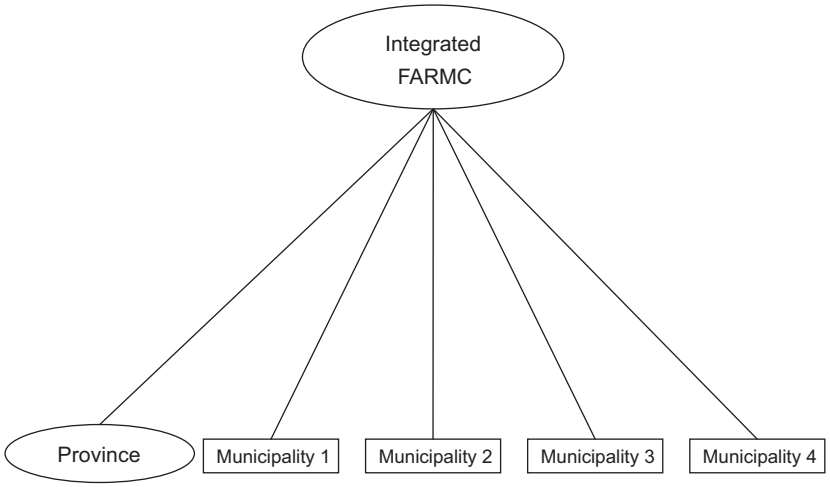

Fig. 4. Model 3: Integrated Fisheries and Aquatic Resources Management Council in San Miguel Bay, Bicol Region, Philippines.

government has also passed several ordinances establishing marine/fishery sanctuaries in Honda Bay. The recently passed Environmental Code includes fisheries and coastal zone management within the framework of the so-called CPR-conservation, protection and rehabilitation. With the establishment of several fishery/marine sanctuaries in Honda Bay, sanctuary management boards (SMBs) have been set up. FARMC members, *barangay* officials, representatives of peoples' organizations (POs) and non-government organizations form part of these SMBs. The city mayor has deputized several volunteer community paralegals from various SMBs and fishing communities in Honda Bay to assist the *Bantay Dagat* in monitoring and patrolling activities.

In Honda Bay, due to clustering of 18 BFARMCs, they have been able to address more effectively illegal fishing activities, including the intrusion of commercial fishers in the city waters. The clusters also support community organizing, environmental education, *Bantay Dagat*, mangrove reforestation and protection, and alternative livelihood programs. In the late 1990s, there was an attempt to establish Honda Bay as a protected area. In addition, there have been attempts made by both government agencies and non-government groups to form a Honda Bay-wide management body or council. Neither arrangement has been realized. Honda Bay has been identified as a Special Development Zone for Tourism and Agriculture under the Palawan Council for Sustainable Development's Environmentally Critical Areas Network.

3.3. Integrated Fisheries and Aquatic Resources Management Councils (IFARMC) (San Miguel Bay, Carigara Bay, Ragay Gulf)

As discussed above, Section 76 of the Fisheries Code or RA 8550 allows for the establishment of an Integrated Fisheries and Aquatic Resource Management Council (IFARMC). The IFARMC shall be created in bays, gulfs, lakes, rivers and dams bounded by two or more municipalities/cities. The IFARMC will prepare an integrated fishery development plan and recommend the enactment of integrated fishery ordinances. This type of council is deemed appropriate to undertake integrated coastal resource management. Moreover, IFARMCs were advocated during the FRMP implementation instead of the bay management councils.

San Miguel Bay. San Miguel Bay, situated in the Bicol region (Region V), is a large shallow estuarine fishery exploited by various fishing gear types. It is bounded by seven municipalities and two provinces. A bay-wide management initiative was first attempted in 1993 with the establishment of the San Miguel Bay Management Council (SMBMC) [25]. The SMBMC developed an integrated management plan to guide the sustainable development of the Bay's fisheries. The Council ceased operation after several years due to lack of political support by local mayors and budget and during the transition from FSP to FRMP when a different management approach was advocated. All seven municipalities surrounding San Miguel Bay currently have a MFARMC. In 2005, the IFARMC of San Miguel Bay was established under the FRMP as a policy recommendatory body to the local government units to address bay-wide issues (Fig. 4). While operating in the whole bay, the IFARMC is particularly active among the three municipalities (Cabusao, Sabang, and Tinambac) in the province of Camarines Sur. Its membership is composed of representatives from the LGU and MFARMC from each municipality. Through the IFARMC, the municipalities have integrated their coastal management plans and fisheries ordinances. There is also an integrated law enforcement team operating in the Bay. Funds for the IFARMC are provided by the municipalities. The fishers in San Miguel Bay can currently only legally fish in their home municipal waters. The Members of the IFARMC are negotiating color coding boats from each municipality and allowing the sharing of all waters in the Bay by the municipal fishers. Operation of the IFARMC comes from annual contributions from the municipalities. While many years of projects in San Miguel Bay has raised the overall awareness of people about the need for coastal resources management, political will to implement laws and strong leadership is still needed.

Carigara Bay: Carigara Bay, located in the north of Leyte Province, has a similar history of management as San Miguel Bay. In the mid-1990s, a bay management council was established but ceased operation quickly due to lack of resources from the municipalities and lack of commitment from government officials. MFARMCs were established under the FRMP. In 2005, an IFARMC was created for Carigara Bay to integrate municipal boundaries and to have a unified fisheries ordinance for the Bay. The IFARMC would coordinate law enforcement activities, provide a forum for consultation on fisheries issues, and register all boats operating in the Bay. A priority is the continued training of mayors to give a priority to fisheries and coastal resource management and provide funds for these activities from their budgets.

Ragay Gulf: Ragay Gulf is a large gulf in the southern part of Luzon, separated from the Sibuyan Sea by Bondoc Peninsula in the west. In addition to having an IFARMC, the mayors of the municipalities surrounding the Gulf have established a Ragay Gulf Resources Management Development Council. The mayors are board members of the Council. The IFARMC recommends actions to the board of the Council, and the mayors on the board

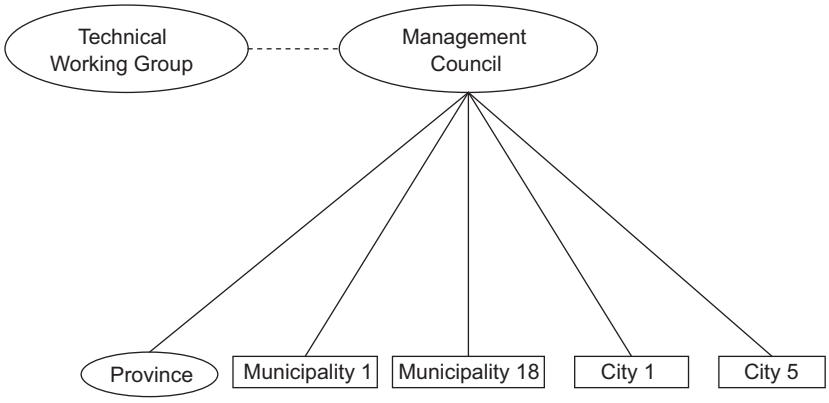

Fig. 5. Model 4: Gulf Management Council in Davao Gulf, Southern Philippines.

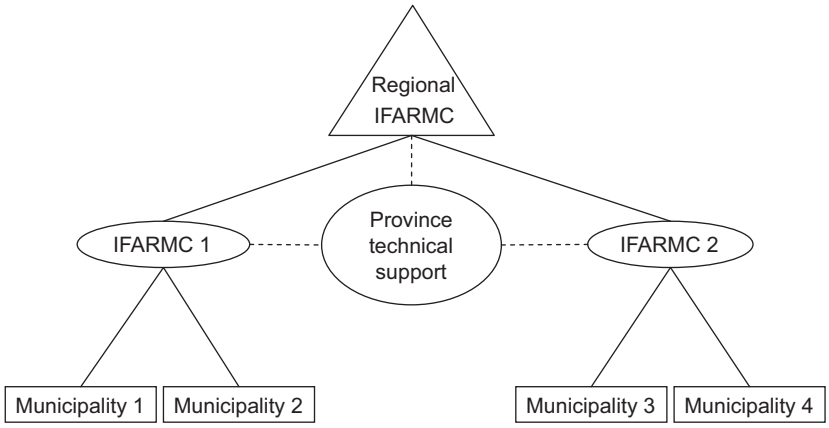

Fig. 6. Model 5: Regional IFARMC in San Pedro Bay, Leyte Gulf, Central Philippines.

make a decision on the proposed action. The Council was established by the mayors for unified socioeconomic development of the Gulf an ecosystem, beyond the political boundaries.

3.4. Gulf management Council (Davao Gulf)

The Davao Gulf Management Council (DGMC), a coordinating body organized to harmonize coastal resource management programs, projects and policies of Davao Gulf, was established in November 1999 [26]. The Davao Gulf area includes four provinces (Davao del Sur, Davao del Norte, Compostela Valley and Davao Oriental) and the City of Davao. The council is composed of five coastal cities and 18 coastal municipalities (Fig. 5). Regular members of the council are the respective mayors of the component cities and municipalities. Each of the LGUs is regularly contributing financially to the Council for its operations depending on the income class of the LGU.

DGMC has its Technical Working Group (TWG) composed of different national government agencies. The TWG, in collaboration with various experts and stakeholders of the Davao Gulf Area, developed the Framework Plan 2005–2014. The framework plan has been adopted by the Council as the official operational implementation guidelines of the DGMC in providing guidance to LGUs in the sustainable implementation of various coastal resource management programs and projects. In response to a complex set of environmental and development issues in the Gulf, the DGMC has eight program areas: habitat management, fisheries management, foreshore management, coastal tourism and water use, enterprise and livelihood development, watershed management, waste management and pollution control and mitigation, and legal arrangement and institutional development. Enabling mechanisms to effectively implement the Framework Plan include broad people's participation; capability-building; organizational strengthening; information, education and communications campaign; resource-generation; database management; research and development; and monitoring and evaluation.

3.5. Regional IFARMC (San Pedro Bay and Leyte Gulf; Western Leyte Coast)

San Pedro Bay: San Pedro Bay is located at the northwest end of Leyte Gulf, bounded on the north and east by Samar and on the east by Leyte Island. It is connected by San Juanico Strait to Carigara Bay of the Samar Sea. The largest city on the bay is Tacloban City, the capital of Leyte Province. Under the FSP, a bay management council was established in San Pedro Bay consisting of members from four municipalities and Tacloban City. After the project ended, the council ceased to operate due to lack of a budget from the LGUs, political support from the mayors, and lack of a legal basis to operate. An IFARMC was established for the Bay in 2005 under the FRMP (Fig. 6). Each of the LGUs had a MFARMC which served as members of the IFARMC. The LGUs established coordinated municipal fisheries ordinances. Since law enforcement is a priority for the IFARMC, a law enforcement team from the LGUs was established and meets quarterly. Financial support for the IFARMC comes from the municipalities and BFAR's Region 8 office. The latter provides technical support and personnel to coordinate fisheries management efforts. The

mayors still have the power for the IFARMC and their political will is a big issue for sustainability of the IFARMC.

In addition to the IFARMC in San Pedro Bay, the Region 8 BFAR office has worked to coordinate the municipalities surrounding Leyte Gulf into a Gulf-wide IFARMC.

Western Leyte Coast: The western coast of Leyte is open (unlike the bays and gulfs discussed previously) facing the Camotes Sea. MFARMCs have been established in the six municipalities from Baybay to Matalom. An IFARMC has been established along this coast. Assistance to establish the IFARMC came from a Philippine non-governmental organization which specialized in fisheries and coastal resource management.

3.6. The integrated municipal council (IMC) (Banate Bay, Iloilo)

The integrated municipal council (IMC) has been established by several municipalities to manage large bodies of water in which these municipalities have jurisdiction. There is an advantage in having an IMC because several municipalities can pool their meager funds in protecting their fishery resources, and eliminate boundary disputes because their municipal waters are combined together and treated as a single management unit.

The 1315 Ha Banate Bay is a fishing ground located in the province of Iloilo in Western Visayas [27,28]. The Banate Bay IMC was initiated to address the problems of overexploitation of fishery resources, destruction of coastal habitats, illegal fishing activities, pollution, and poverty of sustenance fishers. Realizing that only a concerted effort could save the bay, the three municipal governments surrounding the Bay forged an inter-LGU partnership on February 28, 1996. Their collaboration was formally known as the Banate Bay Resource Management Council, Inc. (BBRMCI). The three municipalities initially contributed Php100,000.00 and two personnel each to compose the Council's full-time staff.

As agreed, BBRMCI had the sole power to regulate, protect, and rehabilitate Banate Bay. Nineteen Barangay Fisheries and Aquatic Resource Management Councils (BFARMCs) and 10 fisherfolk associations were organized. Around 78 fish wardens were deputized. The three municipalities revised their fishery ordinances and paved the way for uniform law enforcement. "Closed fishing season" was strictly enforced. All illegal structures in the major rivers were dismantled. BBRMCI and the BFARMCs successfully lobbied for two fish sanctuaries to be established. BBRMCI facilitated the release of Php1.5 M from the Department of Agriculture for livelihood projects benefiting 247 fisherfolk, especially those who were adversely affected by the strict enforcement of fishery laws.

The success of the Banate Bay IMC could be attributed to factors such as active support of its mayors, the quality of leadership in the council, and multi-sectoral partnerships made by the council. A major challenge in the survival of the IMC in the Philippines is the election of mayors every three years. This regular political exercise could cause the demise of the IMC if the mayors could not appreciate the need for it.

3.7. The LIPASECU Bay management council, Inc. (Pandan Bay, Antique)

Located on the northwestern part of Panay Island, central Philippines, LIPASECU (Libertad, Pandan, Sebaste, Culasi) consists of four contiguous coastal municipalities in the province of Antique. The four municipalities used to independently regulate their coastal waters despite sharing the same resource base—the Pandan Bay. A series of inter-municipal consultations led to the formation of LIPASECU Bay Management Council in 1997 [29,30]. The Council was patterned after BBRMCI, an LGU-initiated CRM program in the Province of Iloilo. Each municipality committed to provide PhP100,000 per year for the operation and maintenance of the Council, plus the salary of the employees running the office. LIPASECU became a venue for planning and implementing coastal resource management of Pandan Bay for the benefit of the marginalized fishers and other sectors of the community. From 16 original members, the Council's composition increased to 32 in 2001.

LIPASECU was able to formulate an Integrated Coastal Resource Management Plan and establish 17 marine protected areas. The Council provides a venue for airing concerns and discussing conflicts affecting the four municipalities. It is able to mobilize fishers and coastal communities to highlight issues in fisheries, enforce fishery laws, and generate support for fish wardens. LIPASECU organized a composite team within each municipality with patrol boats equipped with radio telecommunication connected to LIPASECU headquarters.

4. Integrated Fisheries Management Unit Scheme

In 2008, the BFAR issued Fisheries Office Order no. 217, Adoption and Implementation of the Integrated Fisheries Management Unit (IFMU) Scheme. This is a governance approach to fisheries management designed to address the mismatch between

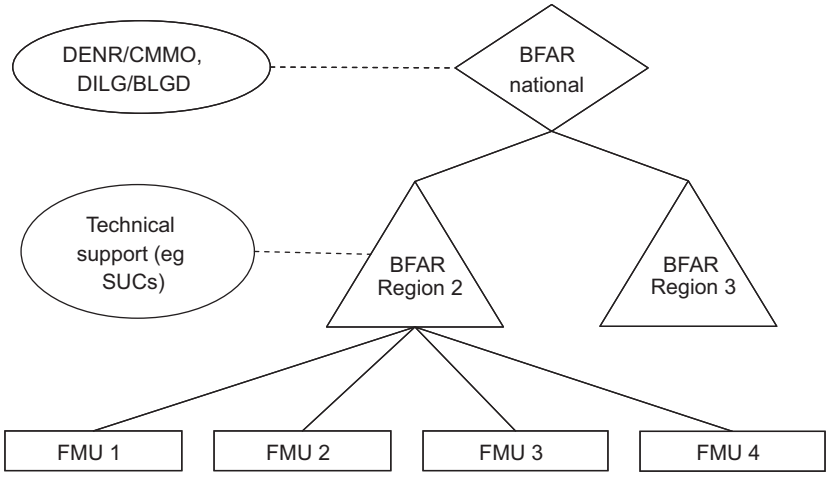

Fig. 7. Model 6: Management structure for integrated fisheries management units.

governance jurisdiction and the habitat of fish stock, essentially ecosystem-based fisheries management. The idea is to address the challenge of effective fisheries governance by creating institutions and practical management arrangements to coordinate and manage conflicting claims for access to resources and markets.

The IFMUs can be a cluster of municipalities, coordinated at the provincial level and with technical and information support by the BFAR regional office. State universities and colleges (SUCs) in the region, via the BFAR Zonal Centers, can also be tapped to provide technical support for the IFMUs. This scheme could be established in the 15 BFAR regional offices. At the national level, BFAR needs to establish a national coordinating office including linkages with appropriate Bureaus of the DENR, Department of Interior and Local Government (DILG) and National Economic Development Agency (NEDA) to support the IFMUs. A proposed structure for the IFMUs is presented in Fig. 7. The five models presented earlier are varying forms of an IFMU.

5. Management implications

Operationalizing EBFM continues to be a challenge. This is especially true in tropical developing countries where resources and capacity for marine resources management in general—and fisheries management in particular—are limited. This situation is mirrored in many countries in Southeast Asia where the responsibility and authority for the management of nearshore fisheries resources have been decentralized to the local governments. In addition, there is often confusion among fisheries managers about which, of the many new resource management approaches, they should be using—co-management, adaptive management, integrated coastal management, marine protected areas, EBFM. There are no clear guidelines or grounded experience available for managers to utilize EBFM. However, as has become clear from the dismal state of fisheries management in the Southeast Asian region, there is a real need for managing many nearshore fisheries at scales above the site or community level.

The Philippines continues to innovate in fisheries management, showing leadership in developing and applying new approaches such as community-based coastal resource management in the 1980s, to co-management in the 1990s, to integrated fisheries management and governance in the 2000s. As has been shown in this paper, legislation and policies and experience from projects has provided opportunities for innovation and cooperation and provided a foundation for utilizing EBFM for managing the country's nearshore fisheries. Many LGUs in the Philippines have shown that they are capable of, creative and responsive to the needs of their constituencies and resource management. While EBFM might not have been the explicitly-stated objective of these governance arrangements, the results have been improved fisheries management at an ecosystem and multi-jurisdictional scale. This is not to say that it has always been easy or successful. Many challenges exist, including that a number of the initiatives were project-based, a challenge for sustainability and continuity. Other challenges include: (1) LGU executives having the political will to play an important role in coastal resource and fisheries management; (2) improving technical capacity of the LGU staff given their diversity and level of awareness, including training and cross visits; (3) building mechanisms to ensure sustainability and continuity given the three-year tenure of local government unit executives; (4) clear delineation of municipal waters; (5) support for enforcement; (6) financial support from local governments for multi-jurisdictional management efforts; and (7) addressing data/information needs to support fisheries management.

Experience shows that EBFM can build on existing management approaches (community-based management, co-management, integrated fisheries management) that are already being utilized. EBFM can be "scaled-up" from existing site or localized management to address broader ecosystem management needs and operate at multiple political jurisdictions. Several models have been presented in this paper of "clustering" of multiple local government units to be able to operate and manage fisheries resources at ecosystem scales. Experience in the Philippines shows that the operationalization of EBFM may best be undertaken by working with and complementing existing governance structures. The models and experience from the Philippines seem applicable to nearshore EBFM in other Southeast Asian countries where decentralization of fisheries management has occurred [31].

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