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Analysis of the Integrated Water Resource Management in a Water Quality Management Area in the Philippines: The Case of Meycauayan-Marilao-Obando River System

ABSTRACT

This research evaluates the implementation and management of the Meycauayan-Marilao-Obando River System Water Quality Management Area (MMORS WQMA) in reference to the pillars of Integrated Water Resource Management (IWRM) using a multi-method approach. Research participants include representatives from regional regulatory agencies and local government units of seven cities and municipalities along the river system. Aside from ecosystem, institutional and socio-political drivers, the designation of MMORS as a WQMA was influenced by the shared common interest and endorsement of local stakeholders including financial support from international agencies. Also, an enabling policy environment that reflects IWRM pillars helped in the creation of MMORS WQMA. However, disparities in WQMA Governing Board (GB)'s and the local government units' (LGUs) level of awareness and actual level of implementation of functions are observed, hence, the need for integration. The lack of a guiding system or framework in monitoring, evaluation and information management hinders better integration among the different agencies and LGUs in the MMO WQMA GB. Also, lack of financial, human and technical resources limit performance of the GB. Improving mechanisms may include approval of the National Water Quality Management Fund; development of financial and annual plans (with short-term targets), collaboration among GB members and capacity-building.

Key words: *Philippine Clean Water Act (CWA) of 2004, water governance, Water Quality Management Area Governing Board*

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INTRODUCTION

Water is an important resource and capital in a social-ecological system. However, it is also vulnerable to a number of socio-economic and ecological changes that affects water management options (*Hassing et al. 2009*).

In the Philippines, as early as 1996, the Environmental Management Bureau of Department of Environment and Natural Resources already identified that almost half of the classified rivers did not meet the standards for their most beneficial use and are polluted from domestic, industrial and agricultural sources (EMB-*DENR 2004*). There are 50 out of the 427 rivers in the country considered "biologically dead" (*Gaylican 2007*). This limits water availability to communities specifically for drinking water, irrigation for farms, aquaculture areas, among others. In addition, 31% of all illnesses in the country are attributed to polluted waters (*EMB-DENR 2004*). An average of 55 Filipinos per day suffer from diseases attributed to poor sanitation and poor water quality (*Paragas 2012*).

Two major challenges in managing water bodies are its multiple and often conflicting uses and multi-area coverage. Most water bodies are shared by various stakeholders with diverse predominant practices regarding water use. Also, seldom do a water body like river or lake have one political unit that covers it and is usually bounded by multiple local government units. Activities in the upstream and downstream areas including land-based changes affect the water quality. As a response to growing concern to the local water quality issues, the Philippines put together a comprehensive strategy to protect water quality through the enactment ofthe Republic Act (RA) No. 9275, known as Philippine Clean Water Act (CWA) of 2004. The country is one of the five Southeast Asian countries that have developed a national water resource policy (*Paragas 2012*). The Philippines' CWA aims to "protect the country's water bodies from pollution from land based sources (industries and commercial establishments, agriculture and community/ household activities). It also provides for a comprehensive and integrated strategy to prevent and minimize pollution through a multi-sectoral and participatory approach involving all the stakeholders" (*EMB-DENR 2004*). This

comprehensive national water resource policy aims to integrate efforts to develop and manage water as well as land-based resources guided by Integrated Water Resource Management (IWRM) and Sustainable Development frameworks.

One of the features of the Philippine Clean Water Act is the creation of the Water Quality Management Area (WQMA). This is to address the complex and multi-level management challenges of managing a water body like a freshwater river. This specific provision is in line with the international IWRM principles and Philippine IWRM Plan Framework of 2006. One of the objectives of the 2006 plan is to help promote 'coordinated development and management of water, land and related resources' (*Global Water Partnership 2000*). The declaration of a water body to a WQMA area should satisfy four conditions: the use of appropriate physiographic unit; water quality of water body is affected; shares common interest, program, prospects, problems; intensity of pollution problem as it impacts on public health at the regional level (*Acorda-Cuevas 2007*). As of 2013, there are 17 designated WQMAs in the Philippines - since the enactment of the Clean Water Act (CWA) in 2004 (www.denr.gov.ph).

Despite the merits of IWRM, several studies have identified limitations and challenges in its local implementation. Some of the challenges identified in IWRM implementation are overlap of functions among agencies and organizations; weak institutions; and difficulty in integrating multiple and conflicting priorities in a water resource area. (*Horlemann and Dombrowsky 2012, Quevauviller 2010, Biswas 2004, Agyenim and Gupta 2012*).

This paper set out to review the WQMA management and the application of IWRM principles in these WQMA areas. The Meycauayan-Marilao-Obando River System (MMORS) is the selected case site for the research, being one of the first WQMAs to be designated in the Philippines. Specifically, this research aimed to: identify the factors and initial conditions that resulted to the designation of a water body as a WQMA; analyze the IWRM Structure in the MMO WQMA; analyze how the IWRM structure affects the management of the water body; assess the factors affecting the performance of the WQMA Governing Board (GB) in achieving its goal in the rehabilitation and management of the WQMA; and recommend policy improvements in the Philippine Clean Water Act and its implementing rules and regulation based on the results of the study.

The researchers argue that the lessons and insights from this study could be an input in the management in other WQMA areas and the implementation of the CWA and IWRM principles in the country. This study is significant in three aspects: first, this was the first attempt to review the management of the WQMA in reference to the CWA specifically the designation of WQMAs, the performance of the Governing Boards (GB) under the WQMA and its implication in the rehabilitation and management of the identified water resource since its implementation in 2004. Second, it will build on the literature assessing the implementation of the IWRM in developing countries like the Philippines. Lastly, this study is relevant in recognizing the importance of water as a resource and the importance of the ecosystem services it provides particularly in this time of rapid global and local environmental and social changes brought about by climate change, globalization and development.

METHODOLOGY

Conceptual Framework of the Study

The conceptual framework is adapted from the IWRM pillars and structure (*Hassing et al 2009*) and sustainable development framework (**Figure 1**). The Philippine government enacted the CWA (R.A. 9375) to address water quality issues from pollution and to integrate water management (*Cabading 2008*). Aside from pollution, the Philippine government recognizing the threat of climate change to vulnerable communities and water resources developed the Climate Change Adaptation Strategy on Water Management aligned with the IWRM Plan Framework. The designation of a WQMA is one of the management strategies identified under the national policy to consolidate and maximize the resources to manage and protect water resources in a given area. There are several conditions set under the national policy on identifying and designating an area as a WQMA. For this study, aside from the ecosystem drivers, there are institutional and socio-political drivers which helped the designation of the area as a WQMA (**Figure 1**). Institutional drivers are existing clean up activities and local rehabilitation programs. Socio-political drivers are stakeholders' engagement and commitment in the management of the water body.

During the designation of a water body as WQMA, a GB will be formed to coordinate the MMO WQMA management. The WQMA management is affected by first, the IWRM structure and framework. IWRM is a "process that promotes the coordinated development and management of water, land and related resources, in order to maximize the economic, social welfare in an equitable manner without compromising the sustainability of vital ecosystem"(*Global Water Partnership 2000*). The IWRM structure has three pillars – an enabling environment, an

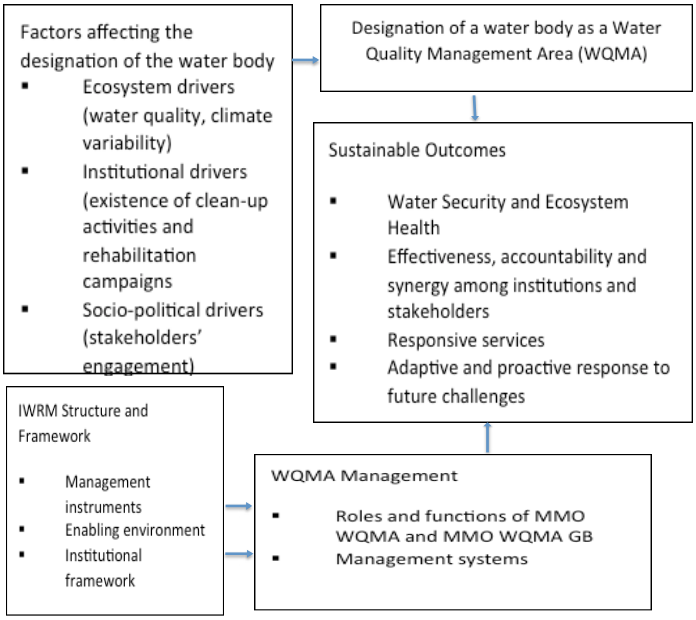

Figure 1. Conceptual framework of the study (lifted with permission from the research report of *Visco et al., 2014*).

institutional framework and management instrument (*Hassing et al. 2009*, **Figure 2**).

The above mentioned IWRM components were integrated in the research's conceptual framework (Figure 1) as IWRM structure in order to understand and assess the WQMA management specifically the management instruments (what are the forms of assessment? What information and how information flows?); enabling environment (what are the policies that supports the MMO WQMA and the implementation of its plan at the local level?); and the institutional framework (what are the partnership arrangements of the MMO WQMA among its members and with external partners and the community? What is the relationship between central agencies and local agencies?).

The IWRM structure, it is argued, affects the MMO WQMA management specifically the performance of the roles and functions of the members and the implementation of the management systems. The CWA and the policy document designating MMORS as a WQMA stipulated the specific roles and function of the MMO WQMA GB members. The MMO WQMA management system in the research's conceptual framework would include MMO WQMA plan communication and implementation; MMO WQMA meetings; local policies to support the MMO WQMA initiatives; fund management; stakeholder participation; monitoring and evaluation and information management.

The National Water Resources Board (NWRB) has identified a number of challenges in the implementation of

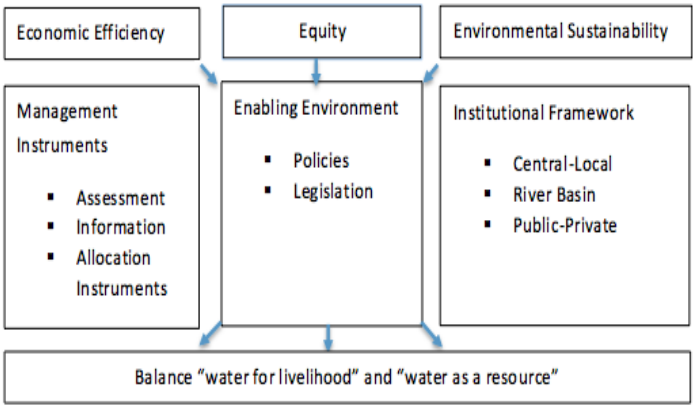

Figure 2. Integrated Water Resource Management Components (*Hassing et al. 2009*).

IWRM in the Philippines which includes lack of investment/ financial support and technical capacity at the local level, lack of effective coordination due to fragmentation, lack of champions for integration, lack of science based information to guide planning and policy development, limited awareness and capacity building that leads to unsustainable projects and programs (*Paragas 2012*). These initial issues were checked whether it applies at the local context of the MMO WQMA.

The sustainable outcomes identified in the conceptual framework (**Figure 1**) are based on the National IWRM Framework Plan of the Philippines drafted in 2006. These outcomes were developed in congruence to the IWRM principles of efficiency, equity and sustainability. The Philippine Clean Water Act and the designation of WQMAs are framed using the IWRM pillars and were designed to contribute to the implementation of the IWRM sustainable outcomes.

Research Locale

The MMORS is a 52 km river that covers a land area of 130 km^2 , inhabited with a population of 1.36 M across seven municipalities and cities (*CTI Engineering International Co. Ltd. 2011 (CTI Engineering International Co. Ltd. 2011; Japan International Cooperation Agency 2011*) (**Figure 3**). Although the river system was classified as Class C waters beneficial for fishery production, recreational and industrial water supply, the river system is polluted by household, agricultural and industrial wastes (from small and medium scale industries). These pollutants, especially the heavy metals, pose significant health risk to surrounding communities that uses the riverwater for fish ponds, bathing and swimming. As a result, the MMORS was included in the "World's Worst Polluted Places" report of Blacksmith Institute, an international non-government organization (NGO) that identifies polluted places that

Figure 3. Location of Meycauayan-Marilao-Obando River System Water Quality Management Area (MMORS WQMA) (*David 2011*).

pose significant health risks to communities in developing countries (Blacksmith Institute 2007).

MMORS eventually drains into Manila Bay. The bay, 'an ocean portal to the Philippines' epicenter for government, economy and industry…and a setting for a landmark case in environmental protection' is the subject of the continuing mandamus decision of the Supreme Court– mandating twelve government agencies to prioritize the clean-up of Manila Bay (*De Castro 2010*).

The research employed the case study approach in order to examine closely the institutional processes, systems and dynamics in MMORS water quality management area. This is because the MMORS is one of the first WQMAs designated by the government in 2008. Furthermore, it has already a number of years of experience and implementation work compared to the other newly established WQMAs.

Methods of Data Collection

Site visits and courtesy calls to the WQMA areas and meetings with the WQMA GB respectively, were conducted to introduce the research, the researchers and the expected output of the study. In 10 April 2014 MMO WQMA GB meeting, the research proposal was presented by the team to secure approval of the MMO WQMA GB and to gather inputs and comments regarding the research design and the content of the questionnaire. A resolution for the endorsement of the research in MMORS was approved during the meeting.

Document review was conducted to guide the researchers in the development of the interview schedules and serves as input to the research discussion. Reviewed documents include the policy declaring the water body as WQMA, minutes of the WQMA GB meetings, WQMA action plans, progress reports of each agency/organization and local government unit from the EMB-DENR Region 3 (WQMA GB secretariat), local policies pertaining to environmental management and WQMA. Only five out of seven LGUs provided a list of policies that were reviewed in this study. More so, literatures on initial assessment of the IWRM implementation at the global and local level and implementation of the Philippine CWA were reviewed.

Both qualitative and quantitative methods were employed in this case study. Qualitative method employed was focus group discussion (FGD) and key Informant interview (KII). The FGD was conducted to identify how the different stakeholders and sectors analyze or understand the different WQMA concepts, its dynamics and progress. The FGD was conducted in 23 April 2014 during one of the regular MMO WQMA GB meeting. It was implemented in a workshop type and made use of a semi-structured FGD guide; with the research team as main facilitator and the Blacksmith Institute Project Officers and research assistants as documenters.

The MMO WQMA GB members were divided into five groups (information management, monitoring and evaluation, stakeholder participation, fund management and WQMA management) in order to better facilitate the discussion. The main points of discussion include over-all assessment rating, justification, challenges and limitations, and solutions implemented. The Asean University Network (AUN) Quality Assurance (QA) self-assessment ratings (*Chuan n.d.*), listed below was employed for rating (**Table 1**).

The research is limited to the MMO WQMA members who attended the MMO WQMA GB meeting including representatives from the EMB-DENR Region 3, Bureau of Fisheries and Aquatic Resources (BFAR), DOST, Department of Interior and Local Government (DILG), Housing and Land Use Regulatory Board (HLURB) and Local government units (LGUs) from Valenzuela, San Jose Del Monte, Meycauayan. Only eight out of 25 MMO WQMA organizations and agencies were represented.

To supplement the FGD, a survey questionnaire was distributed to key representatives of the MMO WQMA GB

Table 1. Asean University Network (AUN) Quality Assurance (QA) self-assessment ratings (*Chuan n.d.*).

Numerical rating	Justification
1 -	absolutely inadequate; immediate improvements must be made
2 -	inadequate, improvements necessary
3 -	inadequate, but minor improvements will make it adequate
4 -	adequate as expected (meeting the Clean Water Act Implementing Rules and Regulation -CWA IRR, CWA Framework)
5 -	better than adequate (exceeding the CWA IRR, CWA Framework)
6 -	examples of best practices
7 -	excellent (leading practices in Integrated Water Quality Management -IWQM)

Table 2. The 7-point scoring scale of the Asean University Network Quality Assurance (AUN-QA) (*Chuan n.d.*).

Numerical Rating	Level of Awareness	Level of Implementation
1	unaware, never heard or knew of this	absolutely inadequate; immediate improvements must be made
2	slightly aware, no supporting orientation or documents provided	inadequate, improvements necessary
3	slightly aware, some supporting documents provided	inadequate, but minor improvements will make it adequate
4	aware, additional documents needed and orientation/training on going	adequate as expected (meeting the CWA IRR, CWA Framework)
5	aware, additional orientation/training needed	better than adequate (exceeding the CWA IRR, CWA Framework)
6	aware, complete documents and orientation/ trainings provided but still need to clarify some things/details	examples of best practices
7	Fully aware; supported by complete documents and orientation/trainings	excellent (leading practices in IWQM)

members that participated in the 24 April 2014 workshop. The questionnaire covered the following: profile of the respondent; assessment on the level of awareness and implementation of the functions of the MMO WQMA and its specific members; past and current initiatives of the member organization and agency; MMO WQMA Plans; MMO WQMA Meetings; Local Policies for MMORS Rehabilitation and Clean up; Fund Management; (viii) Stakeholder Participation; Monitoring and Evaluation; and Information Management. For the assessment of the levels of awareness and implementation, the 7 point scoring scale of the Asean University Network Quality Assurance (AUN-QA) (*Chuan n.d.*) was adopted (**Table 2**).

The key informant interviews were conducted in 14 July 2014. Key informant included EMB-DENR Region III, who is the Technical Secretariat and Chair of the MMO WQMA GB; Regional Director of Department of Science and Technology (DOST) Region III, Municipal Planning and Development Office representative of Marilao and Officer-in-charge of the City Environment and Natural Resources Office (CENRO) of Meycauayan City.

Methods of Data Analysis and Presentation

For the FGD and workshop results, the matrices prepared by each group as a response to the points for discussion was presented to the plenary for the inputs of the GB was consolidated and transcribed for analysis, including the comments during the group discussion. Consolidation and transcription for analysis were also conducted for the KII.

For the survey, the answers were tabulated and consolidated in a MS Excel worksheet. The mode of their ratings were used in the analysis and are presented in tabular and graphical form. The results of the FGD, survey and KII together with the review of the literature were used to evaluate the implementation and management of the MMO WQMA in relation to the Philippine CWA and IWRM principles.

Results and Discussion

Factors Affecting the Designation of the MMO WQMA

Ecosystem Drivers. One of the complex challenges the country faces today is the deteriorating quality of its water bodies due to domestic, industrial/commercial and agricultural wastes dumped indiscriminately. Almost half of the rivers in the Philippines, as early as 1996, did not pass water quality standards (*EMB-DENR 2004*). This

poses significant risks to the economy and public health. There is a declining availability of clean water per capita from 1,900 to 1,500 m^3 yr^{-1} from 2000 to 2010 as a result about 55 person die per day due to diseases as a result of poor sanitation and water borne diseases (*Paragas 2012*). Aside from poor water quality, climate variability is exerting a pressure to dwindling water resources. Extreme events could result to drought or shortage of water while flooding and water related disasters are significant hazards to communities. The Philippines is identified as one of the most vulnerable countries for climate change due to our geographical location and archipelagic nature exposing a long coast to possible storm surges and tsunamis. This is compounded by the ground subsidence in major cities due to over-extraction of ground water (*Lagmay 2011*).

In the case of the MMORS, river quality monitoring results since 2005, showed that aside from organic pollution, there were exceedances of heavy metal that may pose significant health risks to surrounding communities that depend on the river system. Heavy metal pollution came from used jewelry smelting, tanneries, used lead acid battery recycling and other industries dealing with heavy metals commonly located in the upstream area of the river system (*Blacksmith Institute 2009; Alfafara et al.2012*). The river system is home to a thriving aquaculture industry which used contaminated river water for their fish ponds. Fish catch in the river system has significantly reduced through the years from a minimum of 2 kg of catch per small scale fisher to only 0.5 kg per day in recent years (*Mendoza et al. 2012; Visco et al.2014*).

Provided these conditions, MMORS fits under the provision of the policy for the designation of a WQMA – "The water body has water quality problems, sources of pollution and shall share similar hydrological, hydrogeological, meteorological or geographic conditions which affect the physicochemical, biological, and bacteriological reactions and diffusions of pollutants in the water bodies (*Acorda-Cuevas 2008*)".

Institutional Drivers. *Malayang III* (*2004*) argues that "water governance is a complex of institutional dynamics of power and water management – a construction of interacting array of influences of water institutions over the decisions and actions to develop, conserve, or utilize the resource" (*Malayang III 2004*). In the Philippines, numerous national, regional and local institutions are mandated to manage water resources even before the enactment of the Philippine Clean Water Act in 2004 (*Elazegui 2004*). The institutions functions ranges from water uses management, watershed management and water quality monitoring (*Elazegui 2004*). As early as 1974, the Philippine government created the National Water Resources Council (NWRC) to 'coordinate 20 ministries, government corporations and bureaus concerned with water resources development and usage'(*Cablayan and Ticao 1985*). In addition, water utilities administrations were localized through the Presidential Decree 198 (PD 198) Creation of Local water utilities administration and provincial water utilities in 1973. In the 1980s, the major approach to development and management is the Integrated Area Development (IAD) and Transbasin schemes (ibid.). However, these initiatives focused on infrastructure development such as irrigation, flood control and drainage, transport development, development of water supply facilities like hydropower plants.

The problems encountered in water resources planning, development and management such as inadequate and inaccurate data, social problems, watershed conservation problems and inadequate cost recovery led to more programs that strengthens stakeholder participation and integrated approaches (*Cablayan and Ticao 1985*). Decentralization to encourage more bottom up planning and development has been promoted through the Local Government Code (RA 7160) of 1991. RA 7160 provided more autonomy and devolved major development functions to the local government units. At the main national government agency, the reorganization of the DENR was facilitated through the Executive Order No. 192 in June 10, 1987. The institutionalization of decentralization of functions and authority in the department occurred through transforming former line bureaus to staff bureaus and transferring most of the line functions to the regional and field offices (*Department of Environment and Natural Resources 2014*).

Thus, these institutions already has the mandate, legitimacy, scale and resources for water resource management, which are requirements for water governance (*Malayang III 2004*). The concern is the degree of collaboration among these institutions, which may have overlapping and distinct concerns and dynamics.

Socio-political Drivers. Clean up and rehabilitation campaigns including Heal the Meycauayan River (2003), Marilao River Council (2004), and MMORS Stakeholder's Group (2005) have already been articulated by the respondents to have been implemented since 2003. These campaigns are commonly led and mobilized by the local government units as a response to the growing local concern about the water quality of the MMORS. Also, the respondents identified several projects and programs that their office have been involved with prior the designation of the MMORS as WQMA. Involvement includes providing technical assistance, conduct of research and water

quality monitoring, information and education campaigns, formation of monitoring teams (Bantay Ilog), monitoring of sewage management, bamboo planting and development of compliance plan on resettlement and land use and zoning ordinances.

After the inclusion of MMORS in the "World's Worst Polluted Places" report in 2007 (*Blacksmith Institute 2007*), there has been increase media exposure and mobilized public pressure to clean up the MMORS. International development agencies such as Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), United States Agency for International Development (USAID) through DENR and corporate foundations such as Coca-Cola Foundation through Blacksmith Institute provided grant support to conduct baseline studies, stakeholders' meetings and workshops needed to complete the process of designating MMORS as a WQMA. For the assessment alone of a WQMA, it requires a minimum of PhP 800,000 to 1 M (US$ 17,778–22,222) (*Torres 2014* (*pers. comm.*)). Thus, the counterpart fund support of the international agencies provide impetus to start and complete the process required for the WQMA designation.

The ecosystem, institutional and socio-political factors discussed above supported the designation of the MMORS as a WQMA. Republic Act (RA) 9275, known as The Philippine CWA identifies various provisions required for the designation of a WQMA which the case of the MMORS has met – poor water quality that needs immediate water quality management intervention and common interests, programs and projects on a water resource. The technical and financial support including the endorsement of the local stakeholders helped fast track the designation of the area as WQMA which requires numerous process and documents – stakeholder mobilization, water quality monitoring results, and technical capacity building with regional and local institutions (Procedural Manual for the Designation of WQMA, DENR Memorandum Circular No 2009-15 series of 2009) as the process of designating a water body as WQMA, according to EMB-DENR R3, requires time, financial and human resources.

Without the support accorded to the MMORS WQMA, the completion of the steps in the procedure for the designation and re-designation of WQMA would usually entail more than a year to a maximum of three years. This is because of the following constraints (*Torres 2014* (*pers. comm.*)): difficulty in scheduling meetings of the would-be WQMA GB; limited human resources of EMB-DENR; and delayed release of finances from DENR Central Office. Aside from the designation of MMORS as WQMA, the ten year water quality management action plan was developed with assistance from JICA. This is in compliance with Rule 19.3 of the IRR of the CWA (DENR A.O. No. 2005-10).

Analysis of the IWRM Structure and How it Affects MMO WQMA management

IWRM is the major concept that helped framed the Philippine CWA (RA 9275) by employing the three pillars of IWRM – enabling environment, an institutional framework and management instruments described by *Hassing et al.* (*2009*). In this research, enabling environment would mean the presence of appropriate legislation, approaches and strategies to promote sustainable water resources and development. Institutional framework means the approaches and systems are in place in coordinated institutions to implement these legislation and policies. Management instruments include monitoring and evaluation and information systems that facilitate planning of institutions and implementation of their functions in the rehabilitation and management of MMORS WQMA.

Enabling environment. The policy environment for the implementation of the IWRM in the Philippines is in place. These policies and framework include the Philippine CWA, Philippine IWRM Plan Framework of 2006, Philippine Development Plan 2011-2016, Climate Change Adaptation Strategy on Water management aligned with the IWRM Plan Framework (Hassing et al. 2009, Elazegui 2004). The Philippine CWA serves as the main policy as well as the regulatory framework for water quality management in the country. Other laws and regulations pertinent to CWA implementation include: PD 865, 1995 IRR and 2004 Supplemental IRR, code of Sanitation; PD 984 (1976), Pollution control Law; RA 7160 (1991) Local Government Code; RA 6969 (1990), 1992 IRR, Toxic and Hazardous Waste Law; PD 1586 (1978), 2003 IRR, Environmental Impact Statement System; PD 1152 (1978) Philippine environment Code; PD 198 (1973) Creation of Local water utilities administration and Provincial water utilities; RA 6234 (1971) creation of Metropolitan Waterworks and sewerage system; and PD 1067 (1977) National Building Code.

Since the designation of the MMORS as WQMA, series of GB meetings were conducted to discuss and articulate resolutions that will directly support the management of WQMA to control and address pollution. A total of 12 MMORS WQMA Board resolutions were created since 2008; and enacted from 2010 to present. For a period of five years, the year 2010 and 2013 has the highest number of approved resolutions. Half (6 out of 12) of these resolutions (Resolutions Nos.1,2,3 Series of 2010; Resolution Nos.1,2 Series of 2011 and Resolution No. 2

Series of 2013) focus on the structure of the WQMA GB and the designation of key actors, who will be important decision-makers in the implementation of the 10-year Action Plan. Also, these include the formation of the multi-sectoral group, adoption of the vision, mission, goals and logo of the MMORS WQMA, and creation of an interim Technical Secretariat.

Approval and endorsement of concrete projects were the theme of 4 out of 12 board resolutions (Resolutions No. 4 Series of 2010; Resolution No. 1 Series of 2012; Resolution Nos. 1 and 3, Series of 2013). Two resolutions focused on submitting the 10 year action plan to the DENR Central office and review of the compliance to the Solid Waste Management policy (Resolution No. 3, Series of 2011 and Resolution No. 4 Series of 2013).

Most of the local policies focus on actual environmental projects on solid waste management and smoke belching. Although land based sources of pollution should also be prioritized and is important in looking at the environmental pollution issue integratively, water resource management was not highlighted in the enacted policies (**Table 3**). The next major themes of the LGU environmental policies focused on organizational structure and providing authority for the local chief executive to approve and manage funds for environmental projects.

San Jose Del Monte has the most number of local policies enacted in relation to environmental and water resources management (**Table 3**). The formation of task force (San Jose Del Monte) and creation of the CENRO produced the necessary institutional structure to implement environmental resources management. Only Marilao formally endorsed the creation of the MMO WQMA and officially acknowledged its involvement to the MMO WQMA GB.

Since the implementing rules and regulations for the Area Water Quality Management Fund (AWQMF) is still not in place, the MMO WQMA GB is exploring other avenues to source out potential funding. This is reflected in Resolution No. 1, Series of 2012 (Resolution endorsing to the Hon. DENR Secretary Ramon JP Paje, for funding through the World Bank/Global Environment Facility, the identified priority projects in the MMORS WQMA) endorsing the priority projects of the MMORS WQMA to be incorporated in the proposed Manila Bay Integrated Water Quality Project.

The policies to provide authority to the local chief executive to manage projects and secure funds for MMO WQMA initiatives could show the non-integration of MMO WQMA projects and funds in the regular LGU budget and government financing since the national policy for the National/Area Water Quality Management Fund (N/AWQMF) is still not approved. Thus, LGUs are being creative on how to secure funds and continually support their involvement in the MMO WQMA initiatives. Although the national government and international development agencies provided initial funds required for the designation of the MMO WQMA, invested in the Septage Treatment Facility (STP), and supporting the operational expenses of the Technical Secretariat. It is crucial that the guidelines in order to secure and manage the AWQMF including capacity building of LGUs be in place as this will help sustain the financial support for initiatives in the MMO WQMA.

Management instruments. One key management instrument of the MMO WQMA is the drafted ten year action plan. All key informants and FGD participants noted that they were part of the formulation of the 10-year action plan in 2008. However, the crafting of the plan has been viewed as technically driven and as a mandatory requirement rather than an endeavor/initiative which emanates from the local stakeholders. The 10-year action plan is part of the JICA supported project to build the capacity of local stakeholders in water quality management. In addition, based on the key informants only three agencies and LGUs were able to echo and explain the 10-year action plan to their constituent office, agency and department. Although, a MMO WQMA GB resolution was passed in 2013 to support the review of the 10-year action plan focusing on solid waste management; the limited re-echoing might have affected the integration of the 10-year action plan in local development plans and department priority projects. The presence or absence of systems in the MMORS WQMA

Table 3. Themes of LGU environmental policies in relation to MMO WQMA.

Themes	Marilao	Sta. Maria	San Jose Del Monte	Valenzuela	Caloocan	Meycauayan
Organizational structure	1		1	1		
WQMA Endorsement	1					
Local chief executive authority to approve project, secure funds and/or release funds for projects	1	1	1			6
Environmental code and framework		1	1			
Actual projects including penalties			3	2	1	4

is also assessed as part of the management instruments. MMO WQMA does not have a formal monitoring, information and evaluation system except for the regular water quality monitoring activities headed by EMB-DENT Region 3 and National Capital Region (NCR) at the river basin level and the LGUs at the local area level, respectively. According to a key informant, not all representatives of the multi-sectoral group who is in charge of sampling are present in every sampling collection. The lack of a third party monitoring system and absence of regular heavy metal monitoring were also identified as issues in monitoring since this affects the credibility of the monitoring results including the review of effectiveness of initiatives to rehabilitate the river system. EMB-DENR Region 3 shared that the lack of human and financial resources limit this activity for the MMO WQMA.

The lack of a formal information system framework affects the flow of information. There are no regular feedback mechanisms on progress reports and river quality monitoring results and these limit functionality in guiding WQMA policy and program development and project assessment. The LGUs present during the FGD and KII articulated that there are too many reports required from them and sometimes these are overlapping or redundant. However, not all results of the consolidated analysis are reported back to the local level for policy and program guidance.

Institutional framework. The national, regional and local institutions that are involved in water resource management were identified as part of the WQMA GB under The Philippine CWA and the policy designating MMORS. However, based on the experience of MMOR WQMA GB, the inclusion of Department of Interior and Local Government (DILG) and Housing and Land Use Regulatory Board (HLURB) are necessary. DILG is the main national agency that is coordinating the local government units, thus their inclusion in the WQMA GB will help mobilize LGUs and consolidate or systematize numerous reports already required from the LGUs, according to the FGD participants. One of the action points in the work plan of the MMORS WQMA is the relocation of households living within the 5 m river easement. According to the MMO WQMA GB members present during the FGD, the engagement of the HLURB in the MMO WQMA will help prioritize and capacitate the LGUs in land use and relocation.

Like HLURB, the specific roles and functions of each institutions involved in the MMO WQMA GB are clearly spelled out in the policy instrument designating MMORS as WQMA. This may help identify accountability, however,the challenge is still to ensure collaboration and avoid fragmentation among the institutions and organizations (*Agyenim and Gupta 2012, Elazegui 2004* and *Paragas 2012*) comprising the MMO WQMA GB.

Factors Affecting the Performance of MMO WQMA GB

Level of awareness and implementation of MMO WQMA GB functions and roles. The eight key representatives of LGUS and regulatory agencies who are members of the MMO WQMA GB last April 2014 revealed that they generally perceived that they are aware of their functions and roles. Furthermore, they also perceived that they are implementing what is required of them as members of the MMO WQMA GB. However, looking at their specific functions, there are some slight differences. The respondents shared that they are fully aware of their functions to monitor compliance (7), coordinate activities (7), submit progress report to WQMA (5.5) and develop a compliance plan (5). However, they perceived that the level of implementation needs minor improvements (3.5, 4, 3.5, 3.5, respectively). The respondents, on the other hand, perceived that they are implementing projects to address non-point sources of pollution (6), developing policies to address water concerns (5) and publishing regular WQ status (4.5). Although, they perceived that they need additional documents and trainings on these aspects (4, 5, 4, respectively, **Figure 4**).

Each key sector was asked of their assessment on their level of awareness and implementation of their specific functions in the MMO WQMA GB. The LGU respondents

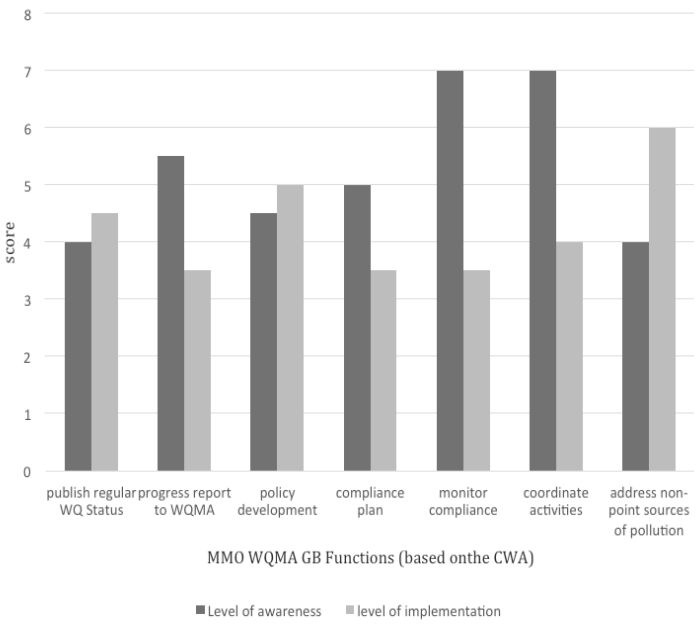

Figure 4. Assessment of the level of awareness and implementation of the MMO WQMA GB functions.

claimed that they are aware of their functions as members of the MQMA. Respondents also claimed that they are implementing what is required of them and perform their roles to help in the management and rehabilitation of the MMORS. Furthermore, they also perceived that they are adequately implementing their contingency plan (6), participating in water quality protection and rehabilitation efforts (6), aligning their programs and policies to the WQMA framework (6), developing local ordinances for WQ (5.5) and providing resources (land, tax and fees) for septage and sewerage programs (5). However, they identified that they need additional materials and trainings for them to become more equip in their functions and activities expected of them (**Figure 5**).

The representatives from the regulatory agencies like Department of Agriculture (DA), DOST and DILG were also asked to assess their level of awareness and implementation of their respective agencies' specific role under the MMO WQMA. Both respondents from DA and DOST perceived that they are aware of their specific functions (6,4) and adequately implemented these functions (7,5). The representative from DILG shared that they need additional documents pertaining to the MMO WQMA (4,4). DILG is one of the newest members of the MMO WQMA Board and officially became MMO WQMA GB member in 2013.

Management systems. The management systems of the MMO WQMA GB considered for this objective include WQMA management structure and policies, fund management, stakeholder participation, information management, and monitoring and evaluation system.

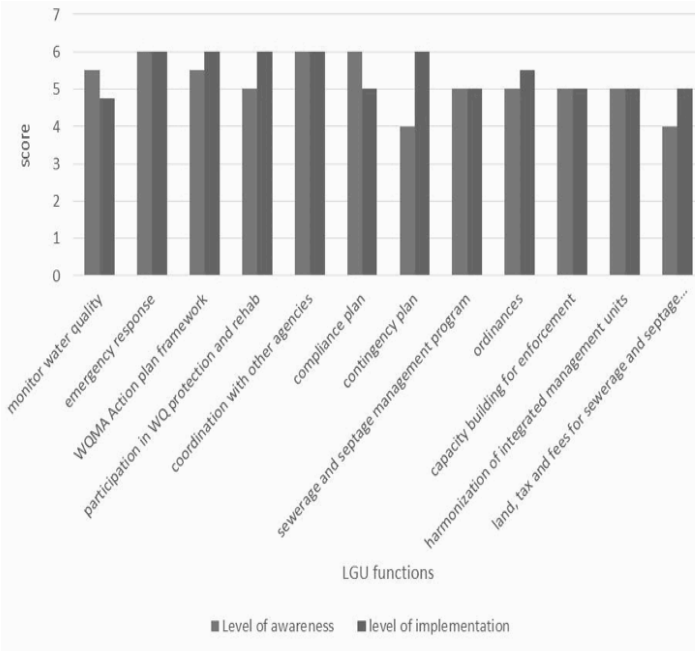

Figure 5. Assessment on the level of awareness and implementation of MMO WQMA LGU roles and functions.

The MMO WQMA GB is headed by EMB-DENR Region 3 and EMB-DENR NCR since the MMORS cover both Region 3 local government units and NCR based cities (Valenzuela and Caloocan). EMB-DENR Region 3 serves as Technical Secretariat. However, being the Technical Secretariat, EMB-DENR Region 3 also serves as the main coordinating body of the governing board. The Provincial Governor of Bulacan serves as the co-chair. Other members of the MMO WQMA GB include the local government units, regional regulatory agencies, and representatives from the business sector, civil society and academe.

According to the respondents, regular meetings vary from monthly (3 out of 8) to quarterly meetings (4 out of 8) depending on the need. The usual meeting agenda are updates on integrated and local initiatives for the MMORS rehabilitation (6) and clean up and approval of resolutions and projects (4). Majority (7 out of 8 respondents) shared that they are actively participating and attending the meetings. Although the local chief executives or directors of the LGUs and agencies are the permanent MMO WQMA GB members, it is usually the alternate - technical officer or most often the technical staff who attends the meetings.

Re-echoing of agreements during the MMO WQMA meeting are done through submission of activity reports and presentation of updates during department or unit meetings. This was identified as problematic since technical staff cannot usually decide for their organization, thus approvals of resolution and projects would take time since it has to be reported back to the local chief executive or technical officer-in-charge. It was also shared by the participants that they noticed a decreasing number of attendees per meeting. They identified that this may be due to (1) short notice in sending out invitation for the meetings; (2) non-prioritization of MMO WQMA functions due to other pressing concerns at the local or agency level; and (3) others may perceive that MMO WQMA is only performing for compliance rather than achieving its goals of river rehabilitation and clean-up. During the FGD, the participants rated the MMO WQMA management 3 (inadequate, but minor improvements will make it adequate). They shared that there policies and plans are in placed but implementation is still lacking. Given the complex and interrelated concerns in water quality management and rehabilitation, the respondents shared that there is a need to prioritize projects.

In terms of fund management, the FGD participants shared that this is inadequate and improvements are

necessary (2). There is no dedicated fund for the MMO WQMA except for the operations and coordination of the Technical Secretariat (EMB-DENR R3). Various local government units (including Provincial Governor and Mayors of the member municipalities and cities) have contributed in the implementation of actual projects. However, this is still based on the discretion of the local chief executives. Project support from international development agencies and donors have been provided specifically from the ADB, Green Cross Switzerland and Coca-Cola Foundation through Blacksmith Institute for the implementation of baseline studies (river quality monitoring, community perception, industry mass balance, etc.) and pilot testing of cost effective technologies from 2008-2010 (*Blacksmith Institute May 2009*). The JICA implemented a Technical Cooperation Project with the Philippine Government entitled "Capacity Development Project on Water Quality Management" from 2006-2010 (*Japan International Cooperation Agency 2005*). One of pilot areas for the project is the MMORS in Region 3, Philippines. The project outputs include the development of policies, guidelines and manual in the designation of water quality management areas, water quality, water quality management funds, among others. These projects paved the way for the designation of the MMORS as WQMA.

Under the Philippine CWA, a National Water Quality Management Fund (NWQMF) and AWQMF will help finance clean up and rehabilitation efforts in the designated WQMA. In 2006, the Asian Environmental Compliance and Enforcement Network (AECEN) together with DENR implemented a project funded by USAID to develop administrative orders, guidelines and manual for the said funds (*AECEN 2010*). The NWQMF will come from fines for violators as ordered by the Philippine Adjudication Board (PAB) and permit fees. The AWQMF will be sourced from fines and penalties from waste water discharge fees. However, based on an email correspondence with AECEN (*S,Teoh, personal communication, May 17, 2013*) Congress has yet to approve of the policy stipulating the guidelines and implementing rules and regulations about the funds. The funds from the fines and penalties have already been collected but is been on hold by the Department of Budget and Management (DBM) pending approval of the policy on the use of the NWQMF and AWQMF. Thus, funds and potential donors are coursed through member organizations funding specific projects or each member source out their funds from their department or LGU budget, which could be at times, difficult to access. This is not unique to the MMO WQMA, in a review of the implementation of IWRM in different countries, empowering local collaborative initiatives could be challenging if it is 'not accompanied by the devolution of power, training and budget' (*Agyenim and Gupta 2012*).

The FGD participants assessed that stakeholder participation in the MMO WQMA is inadequate but minor improvements could be done to make it adequate (3). The participants shared that participation of the civil society and media is lacking. However, the participation of the media could be a 'double edged sword' for the MMO WQMA GB since the media might help promote awareness about the area and its initiative, it could also 'hype' issues. Nevertheless, the group identified the important role of media in information dissemination and advocacies. There is no active member from the civil society group which may be due to lack of awareness of the MMO WQMA activities and initiatives. The FGD participants also shared that not all sectors and members are active in the MMO WQMA meetings and activities.

Information management is a critical aspect of integrated management and coordination of multiple stakeholders. However, the FGD participants viewed that the MMO WQMA information management needs to be improved since there is lack of a consolidated information management system. This results to overlapping schedule of activities among the members and their agencies, which may have contributed to their non-participation in some of the MMO WQMA activities. According to the DILG representatives, electronic copies of the data and reports of the LGUs were already submitted to their office but the consolidation is not yet complete. The LGUs shared that there are just too many reports requested by different government agencies, however, consolidating and analysis of the specific reports are not well communicated back. Lack of humanpower and funds to support information management were identified as primary limitations by the line agencies.

In order to concretely assess the performance and accomplishments of the MMO WQMA, a strong monitoring and evaluation system should be in placed. However, based on the respondents, there is a need to improve the M&E system of the MMO WQMA. There are no or the participants are not aware if there is an existing M&E framework in place. DENR EMB R3, being the technical secretariat of the MMO WQMA GB, is identified to be the lead agency for M&E. However, human resources and finance to support M&E is also a challenge.

Integration has been widely accepted by researchers and practitioners in the international community. It is no longer the question of why 'but how and what' to integrate (*Newell et al. 2005*). The implementation and integration of multiple concerns, complex issues and systems are

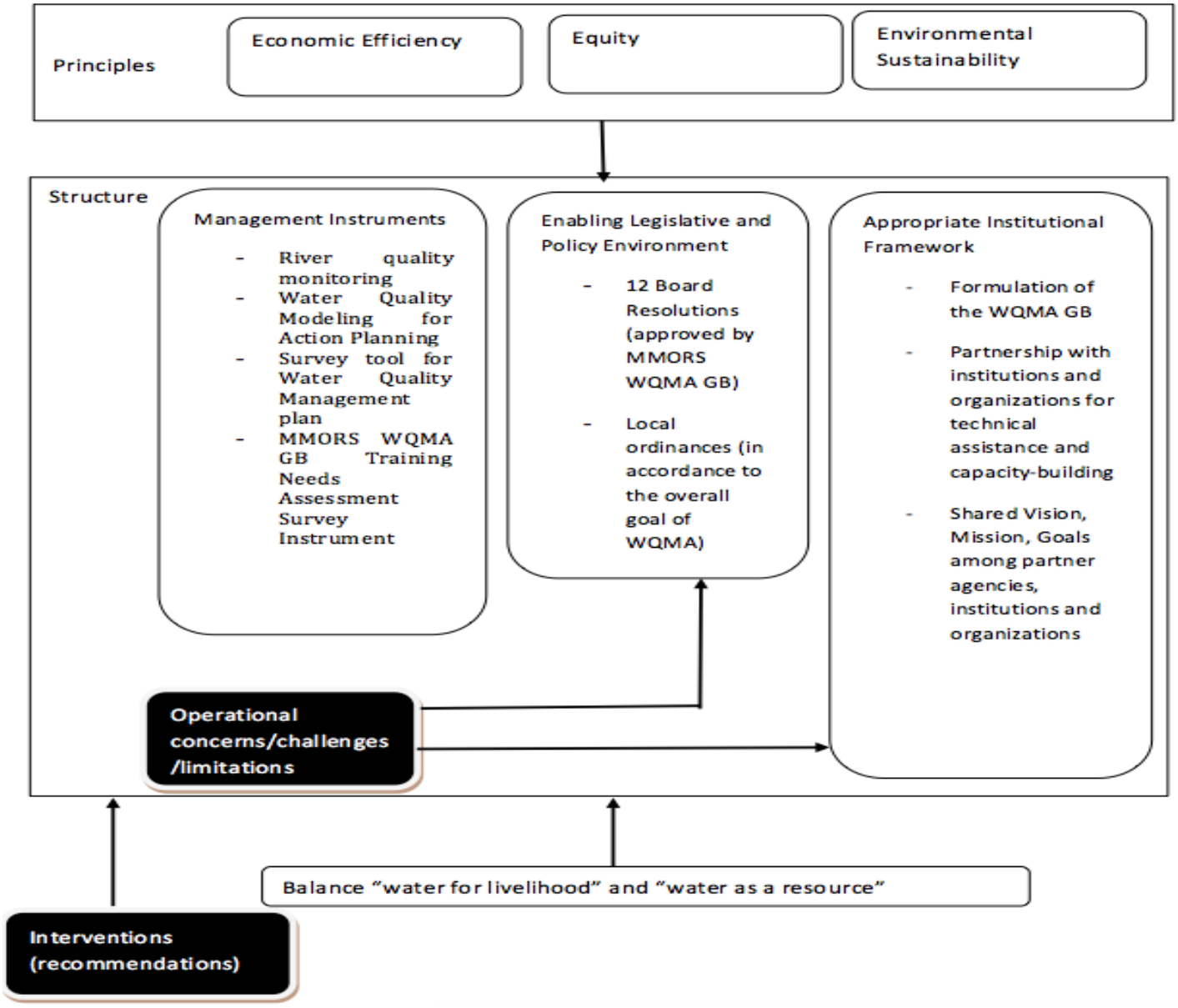

Figure 6. Summary of the IWRM components present in MMO WQMA which affect the WQMA management (IWRM framework adapted and modified from Hassing et al., 2009) ((lifted with permission from the research report of Visco et al., 2014).

key challenges in integrated water resource management which is the basic framework of the WQMA and CWA. It is resource and capital intensive (funds, technical expertise and infrastructure) (*Agyenim and Gupta 2012*) and would require support on these aspects.

The localized IWRM of MMO WQMA shows the relationships among the drivers and conditions present that can facilitate the achievement of a balance for water as a "livelihood" and for water as a "resource" (**Figure 6**). This modified framework of MMO WQMA incorporated the concepts of operational challenges/ constraints and the "would-be needed" interventions that will require sustained resources and participation of different stakeholders.

CONCLUSION AND RECOMMENDATION

The factors that resulted to the designation of MMORS as WQMA were first, due to that state of the ecosystem. The river was found to be heavily polluted, both from organic and heavy metal pollution that pose significant health risks to surrounding communities that depend on the water system. The second is institutional driver. The country has has numerous local, national and regional institutions that are mandated to manage the country's water resources. It was reinforced with the enactment of the Philippine Clean Water Act (CWA) of 2004. Equally important factor is the socio-political driver. The MMORS was included as one of the "World's Worst Polluted Places in 2007, local, national,

regional and international organizations work to address this problem.

The three pillars IWRM namely, enabling environment, management instruments and institutional framework affects MMO WQMA management. In this case, the systems are in placed to implement laws and policies to ensure sustainable water resources. For the management instruments, however, a harmonized and institutionalized monitoring and evaluation (M & E) framework and system of WQMA needs to be established.

The institutionalization of M & E system of WQMA to determine how far they have achieved in their ten-year action plan is just one of the concerns that needs to be addressed. It was found out in the factors affecting the performance of the MMO WQMA Board that while the Board members believed that they are aware of their functions and roles as Board member, they also admitted that they need more materials and trainings to better equip them of their functions.

In the light of these conclusions, the following recommendations were made:

Ecosystem drivers and enabling environment

The rehabilitation of the MMORS by designating it as a WQMA requires full implementation of integration, with emphasis on normative and strategic considerations, stakeholder participation, non-technical description, and integration of multi-disciplinary and interdisciplinary frameworks for global and national water resource management (*Mitchell 2006, Hassing et al. 2009 and Elazegui 2004*).

Declaring a water body as a WQMA because of the intensity of pollution problems, among others is a reactive approach of adaptation. Thus, it is recommended that EMB-DENR consider and give equal priority to other water bodies (classified as AA; with good water quality and existing conservation or management initiatives) to be designated as WQMA. In doing so, the employment of a proactive approach in managing the water resource will prevent other possible problems that may stem-out from water pollution.

In addition, it was learned in this study that identifying the operational concerns and capacities at the ground level are very important in the management of the WQMA. These should be given consideration so that the corresponding interventions are based on the needs and capacities of the stakeholders involved.

Institutional Arrangements

The central-local integration should also be strengthened to encourage stakeholder participation in the rehabilitation activities. Also, it is recommended for a regular reporting of the river water quality monitoring results and other science-based information to the LGUs. The presence of feedback, either reinforcing or regulating, serves as a basis on their performance of the rehabilitation initiatives in their area. Through regular feedbacks, the local stakeholders are assured of sustained efforts regarding river rehabilitation and continuous commitment of the institutions involved. This will strengthen the enabling environment that is present in the WQMA. Also, it is recommended that regular success stories and best practices on WQMA management be presented during WQMA meetings to increase the motivation of the stakeholders. Through these mechanisms, the partnership between the EMB-DENR Region 3 and the stakeholders is strengthened.

Management Systems

It was found out that not one of the respondents is aware of the monitoring and evaluation system done by the DENR-EMB Region 3. Recommendations to improve this system include formation of a dedicated technical secretariat to focus on coordination work in MMO WQMA like the structure of the Pasig River Rehabilitation Council; and development of a formal monitoring, information and evaluation system and framework to set the forms and schedules, structure information flow and feedback system and identify point persons for accountability, among others.

Capacity Building

There is a disparity between the WQMA GB's level of awareness on their functions and their actual level of implementation. These disparities of their functions and their actual implementation on both the WQMA GB and LGUs show that these groups need to be more involved and active in their respective functions to ensure the success of MMO WQMA. The MMO WQMA GB performance is affected by the following factors: lack of resource and capital (funds, human and technical resource) and lack of M&E management framework, system and database which includes communication and information guidelines/ system. First, there is a need to prioritize and advocate for the final approval of the NWQMF and AWQMF guidelines at the Congress. Also, it will be very beneficial if funds may be allotted to programs that capacitate the LGUs with regards to proposal development that are compliant to different funding.

Second, the MMO WQMA should develop a financial and annual plan with short term targets. This could help the MMO WQMA assess their performance, guide their activities, and serve as motivation or milestones upon accomplishments. Third, the MMO WQMA GB meetings should also serve as a venue for all agencies and LGUs to discuss and plan approaches on how to consolidate and systematize multiple reports required by different agencies. Fourth, the MMO WQMA GB should strengthen its communication framework and program.

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