The Ecotourism-Based Administration and Development of Pandin Lake, San Pablo City, Philippines[1]

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This study assesses the administration of Pandin Lake for ecotourism development. Premised on ecotourism's benefits to the lake (specifically, in providing livelihood to residents and in ensuring the conservation of the natural resource), the paper contends that the ecotourism in Pandin Lake evolved completely due to a local community initiative, without the involvement of its two administrative agencies— the Laguna Lake Development Authority (LLDA) and the City Government of San Pablo City. It further argues that in sustaining the success of ecotourism and in dealing with the current issues in Pandin Lake (particularly, the need for a zoning development plan, the need to further develop the lake for tourism and the need to address the threat on the ecotourism enterprise), the local community organization, Samahang Mangingisda ng Lawa ng Pandin (SMLP), needs the intervention and commitment of the LLDA and the City Government. This study addresses the dearth in lake literature in the Philippines – a field dominated by natural science-based studies such as in limnology and aquaculture, and overwhelmingly concentrated on big lakes. The paper focuses on the area of development-governance of a small lake in the country.

Keywords: Administration, Development, Ecotourism, Pandin Lake, Philippines and Small Lake

1 This study is part of a long-term research project of documenting and conducting development studies on small lakes in the country.

INTRODUCTION

Conceptualized in 2003, the Pandin Lake Tour project gradually transformed into a full-fledged ecotourism enterprise. Managed by the local community organization, Samahang Mangingisda ng Lawa ng Pandin (SMLP), the ecotourism enterprise in Pandin Lake has provided residents a steady source of income, has empowered the locals (especially the women who have played an active role in the formation of the ecotourism enterprise as well as in its present-day operations), and has administered the conservation of the water resource. SMLP's efforts have resulted in Pandin Lake being consistently regarded as the best managed and the cleanest among the seven crater lakes of San Pablo.[2] With these achievements, Pandin Lake has become a premier tourist destination in the city (rivaling Sampaloc Lake[3]) and a potential model of sustainable development for a small lake in the Philippines.

Local development programs are typically a function of the local government unit or the specialized agency created to manage the natural resource. However, ecotourism in Pandin Lake developed unconventionally since it evolved mainly despite the absence of government involvement. In particular, the ecotourism project was established without any development plan or financial support from the two administrative agencies of Pandin Lake, the LLDA and the City Government. Taking off from this, the study assessed the ecotourism administration and development that transpired in Pandin Lake. The study proceeded to explain the following: first, the importance of addressing the shortfall in administrative-development studies and small-lake studies in the Philippines; second, the current status and administration of Pandin Lake, a small lake; third, the development of ecotourism in Pandin Lake; and finally, issues threatening the modest gains of the ecotourism enterprise and why it is critical for the administrative agencies to be involved.

STUDYING PHILIPPINE LAKES, SMALL LAKES AND PANDIN LAKE[4]

Since water is essential to maintain life, lakes are undeniably critical resources for human survival and well-being. Lakes are estimated to contain over ninety percent of the liquid freshwater on the earth's surface (Shiklomanov,

2 Together with its twin lake— Yambo Lake.
3 Sampaloc Lake is traditionally the tourism emblem of San Pablo City. The lake is located within the city proper and the biggest among the seven lakes of San Pablo.
4 Portions of this section were derived from the previous works of the author on Philippine lakes.

1993; ILEC, 2007; Rast, 2009; Nakamura & Rast 2011, 2012). These lakes provide mankind's needs from the basic – nourishment and transportation – to industrial-agricultural uses such as irrigation, fisheries, flood and drought management, and hydroelectric power. Humans also value lakes for other functions: tourism, recreation, religious, and historical values. In addition, lakes provide life-supporting services to the ecosystem through climate mediation, nutrient cycling, and preservation of biodiversity.

Through the years, human impacts such as population growth, intensive food production, industrial development and massive urbanization have become direct threats, bringing degradation to many lakes around the world. The existence of many lakes is put at risk by eutrophication, acidification, toxic contamination, water-level changes, salinization, siltation, overfishing, and exotic species/weed infestation (Kira, 1997; Bronmark & Hansson, 2002; World Lake Vision Committee, 2003; ILEC, 2005). This global trend has been confirmed by the Global Environment Facility-Lake Basin Management Initiative (GEF-LBMI) study of 28 major lakes around the world from 2003 to 2005.[5] Similar ecological threats endanger many lakes in the Philippines including organic pollution, high concentration of heavy metals, organophosphates and organochlorines, high sedimentation and oil contamination (Malayang, *et al.*, 2002). This was also reported during the First National Congress on Philippine Lakes held in 2003 (Cuvin-Aralan *et al.*, 2005). The Second National Congress on Philippine Lakes held in 2011 body declared that lakes in the country remain vulnerable despite incremental improvements (LakeCon2011, 2011).

Under the backdrop of deteriorating conditions, lake studies in the country have been increasing through the years. However, most of the scholarly works were natural-science-based, particularly limnology and aquaculture studies, and are heavily concentrated on the big lakes, namely Laguna de Bay, Taal Lake, Naujan Lake, Lake Lanao, Lake Mainit, Lake Buluan, Lake Buhi and Lake Bato[6] (e.g. Pantastico & Baldia, 1981; Petersen & Carlos, 1984; Santiago, 1988; Cardenas *et al.,* 1988; Manalili & Guerrero, 1995; Fellizar, 1995; Platon, 2001; Guerrero, 2001; Araullo,

5 The 28 lakes studied: Aral Sea, Baikal, Baringo, Bhoj Wetland, Biwa, Chad, Champlain, Chilika Lagoon, Cocibolca/ Nicaragua, Constance, Dianchi, Great Lakes (N. American), Issyk-Kul, Kariba Reservoir, Laguna de Bay, Malawi/ Nyasa, Naivasha, Nakuru, Ohrid, Peipsi/Chudskoe, Sevan, Tanganyika, Titicaca, Toba, Tonle Sap, Tucurui Reservoir, Victoria, and Xingkai/Khanka.

6 Laguna de Bay (93,000 ha), Lake Taal (23, 420 ha), Lake Naujan (8,125 ha), Lake Lanao (34,000 ha), Lake Mainit (17,340 ha), Lake Buluan (6,134 ha), Lake Buhi (1,707 ha) and Lake Bato (2,810 ha).

2001; Mercene-Mutia, 2001; Zafaralla, 2001; Siringan & Jaraula, 2005; Roa *et al.*, 2005; Guerrero 2005).[7] This highlights the scarcity of scholarly outputs in Philippine lake studies on two areas: one, on social-science-based, particularly administrative-development studies; and two, on small-lake research (i.e. lakes with a surface area of only 200 hectares or less) (Brillo 2015a).[8]

A significant number of administrative-development studies and small-lake studies are necessary to address this scholarly imbalance. To enhance better understanding of issues and problems in water resource management and conservation, administrative-development studies must also progress along with natural science-based studies. The two perspectives are essential in clarifying the complexities and in pointing out the appropriate solutions to water resource issues and problems. While natural science-based studies have advanced steadily, administrative-development studies have yet to move forward and deal with the shortfall in scholarship. Not engaging both perspectives can pose barriers to attaining more integrative analyses and resolutions to water resource concerns.

Small lakes comprised the majority of the existing lakes in the country (around 70 percent), yet little information was written about them as shown by the very few lists of such lakes that exist. The Philippine Council for Aquaculture and Marine Research and Development (PCAMRD) revealed only 72 known lakes (in Guerrero, 2001); this list did not include many small lakes and many ones on the list need to be verified. The World Lake Database of the International Lake Environment Committee Foundation (ILEC) registered only the five major Philippine lakes and no small lake.[9] The LakeNet Global Lake Database[10] and the Wikipedia's list of Philippine lakes[11] recorded only 42 and 94 lakes, respectively, in which a substantial number of small lakes were unaccounted for. The Philippine Lakes Network (PlaNet), which was conceived in LakeCon2003 to comprehensively supply data on Philippine lakes, still had to take off and account for small lakes.[12] This lack of

7 The most extensive studies are on Laguna de Bay.

8 The author arrived at the '200 hectares or less' threshold by surveying the sizes of the least-studied lakes in the country.

9 Listed lakes: Lake Bato, Lake Buhi, Laguna de Bay, Lake Lanao and Lake Taal (http://wldb.ilec.or.jp/LakeListCountryCode.asp?CountryCode=PH&RoutePrm=0%3A%3B6%3Aload%3B).

10 http://www.worldlakes.org/searchlakes.asp?countryid=461&Submit2=Search

11 http://en.wikipedia.org/wiki/List_of_lakes_of_the_Philippines

12 The key proponents of PLaNet, Dr. Raymundo Punongbayan, Dr. Norman Tungol and Dr. Jessie Daligdig, died in a tragic helicopter crash in 2005.

information on small lakes was due to (a) the perception that they were less important compared to large lakes. This led to tangential peripheral attention from government agencies, private-funding institutions and scholars, and (b) the small lakes' geographical remoteness which means more resources required to study them (Brillo 2015b; Brillo 2015c).

There are three reasons why it is vital to take up the challenge of addressing the deficit in small lakes studies: (1) a shorter time span for ecological degradation to become irreparable and permanent; (2) the necessity of information required to avert deterioration; and (3) the need to document the water resource for posterity. First, small lakes are inherently more fragile and vulnerable to environmental degradation compared to big lakes. Due to their physical size, small lakes have reduced absorptive capacity to neutralize pollutants and these lakes reach ecological irreversibility faster. Second, critical information is required if the precarious conditions of small lakes are to be improved. Expansion of the knowledge base is fundamental in properly managing and preserving the natural resource. Third, small lakes must be documented for future generations given that while all lakes eventually die, small lakes perish faster than big lakes (Brillo 2015b; Brillo 2015c). It is especially important to study small lakes in the Philippines because of their vast number and the role they play in improving impoverished conditions of many lakeside communities through aquaculture and ecotourism.

The above-mentioned gap in administrative development and small Philippine lake studies, and the importance of addressing such gap brought about this study on Pandin Lake, with the objective of documenting the small lake and assessing its administrative and ecotourism development. Except for news articles and internet blogs,[13] there are few scholarly materials on Pandin Lake, especially in areas of management and development (in Guerrero, 2001; LakeCon2011, 2011). Expectedly, the few materials found are studies in limnology (specifically water quality assessment) and aquaculture (LLDA, 2005; LLDA, 2008; Zafaralla, 2010).[14] Furthermore, explaining and sharing the success story of ecotourism in Pandin Lake is probably the best impetus in precipitating and influencing the development-conservation of many other small lakes in the country.

13 Pandin Lake is probably the most blogged-about lake in the country.

14 The two written works on ecotourism in Pandin Lake are unpublished student reports (see Abao E. et al. 2010 and Atiqah B. J. et al. 2012).

THE CURRENT STATUS AND ADMINISTRATION OF PANDIN LAKE[15]

Pandin Lake is located in Barangay Santo Angel, San Pablo City[16] and is one of the city's seven crater lakes.[17] With a surface area of only 24 hectares, it is considered a small lake (LLDA, 2005). It is about eight kilometers from the city proper, and is accessible through an entry path via Werner Schetelig Avenue in Barangay Santo Angel. Pandin Lake is shaped like a circle and is considered a catchment area of Mount San Cristobal, just like the other six crater lakes. The lake is widely believed to be volcanic in origin, formed through a phreatic eruption when shallow lava from Mount San Cristobal flowed into groundwater causing an explosion that resulted in a crater-like depression (LLDA, 2008). The lake's water comes from rainfall, surface runoff, and surrounding natural springs; it discharges through seepage, evaporation, and outflow to Palakpakin Lake via a Prinsa creek, the lake's only outlet.

The practice of tilapia cage farming spread to the seven crater lakes after the LLDA successfully introduced it in Laguna de Bay in 1974 (Radan 1977; MNR 1982). This began with Bunot Lake in 1976. However, unlike in the other crater lakes where tilapia cage farming became extensive, aquaculture in Pandin Lake was limited. This was largely due to Pandin Lake being oligotropic— poor in nutrients, low in organic matter and high in dissolved oxygen level (e.g. its phytoplankton counts were considerably low compared to the rest of the crater lakes). This condition prolongs the culture period of fish stocks and requires more feeding which, in turn, makes fish farming more costly (LLDA, 2005). The recent efforts by lake residents and members of the SMLP to abide by the 10 percent limit rule on the total area allotted for fish structures on the lake which was prescribed by the Philippine Fisheries Code (see Republic Act [RA] 8550, section 51) served as another barrier to aquaculture expansion. In 2005, the LLDA reported that only three percent of Pandin Lake contained aquaculture structures. In 2013, the Provincial Government of Laguna claimed that there were only 14 registered fish pen operators in the lake (LLDA, 2005; Provincial Government of Laguna, 2013). The insignificant number of fish farming operations has allowed Pandin

15 Portions of this section were derived from the previous works of the author on Philippine lakes.
16 Pandin Lake and Yambo Lake are considered twin lakes.
17 The seven lakes are Sampaloc (104 ha), Bunot (30.5 ha), Calibato (43 ha), Mohicap (22.89 ha), Palakpakin (47.98 ha), Pandin (24 ha), and Yambo (30.5 ha).

Lake to avoid the many problems associated with proliferation of fish cages common to the seven crater lakes (e.g. water pollution, illegal settlements, and algal blooms).

Pandin Lake is governed by a multitude of overlapping laws and is managed by the LLDA and the City Government of San Pablo.The mandate of the LLDA was derived from The Laguna Lake Development Authority Act of 1966 (as amended by Presidential Decree 813, October 1975) or RA 4850, the main law in the administration of Laguna de Bay— the largest lake in the country, with a watershed area which includes the seven crater lakes of San Pablo City. RA 4850 established the LLDA and designated it as the main agency to supervise and manage the water bodies in the Laguna de Bay region (see RA 4850, section 1 and section 4).[18] It is the primary responsibility of the LLDA to promote the development of the Laguna de Bay region, while ensuring environmental management and control, preserving of the quality of life and ecological systems, and preventing undue ecological disturbance, deterioration, and pollution (LLDA, 2005).

Executive Order No. 927, issued by President F. Marcos in December 1983, gave the LLDA exclusive rights over the lakes in the Laguna de Bay region. In this arrangement, the LLDA had principal concern over Laguna de Bay while its jurisdiction over the seven crater lakes as part of the watershed was incidental. The disadvantage of this administrative arrangement was that the attention and resources of the LLDA were focused on Laguna de Bay. The small lakes within the region— the seven crater lakes and Tadlac Lake— only received marginal consideration.

The mandate of the City Government, on the other hand, came from The Local Government Code of 1991 or RA 7160, which had given the local government unit the authority over Pandin Lake – its municipal water. There was a "coordinative-supplementary" arrangement between the LLDA and the City Government as RA 4850 conferred the administration of Pandin Lake to the LLDA while RA 7160 bestowed the City Government territorial jurisdiction. This was formalized in a Memorandum of Agreement (MOA) signed by the LLDA and the City Governments of Laguna in 1997.[19] The LLDA was in charge of overall

18 The Laguna de Bay region includes the Provinces of Rizal and Laguna; the Cities of San Pablo, Pasay, Caloocan, Quezon, Manila and Tagaytay; the Towns of Tanauan. Sto. Tomas and Malvar in Batangas Province, the Towns of Silang and Carmona in Cavite Province; the Town of Lucban in Quezon Province, and the Cities of Marikina, Pasig, Taguig, Muntinlupa, and Pateros in Metro Manila.

19 MOA was signed by the LLDA General Manager, the Governor of Laguna and the Mayors of San Pablo City, Nagacarlan, and Rizal. Nagcarlan and Rizal towns have area jurisdiction over a part of Yambo Lake and Calibato Lake, respectively.

management, laid down the comprehensive development framework, and had the authority to approve plans and projects submitted by the City Government. Meanwhile, the City Government developed plans and projects to implement the LLDA's strategy, enacted the necessary ordinances, and enforced LLDA's regulations through the police force and the barangay units. This tactical role gave the City Government leverage over the LLDA's supposedly higher authority, as enforcement of the latter's regulatory actions on the seven crater lakes were almost always dependent on the former's cooperation and assistance. Problems arose when the City Government was unwilling to enforce LLDA's directives (e.g. demolition of illegal settlers) or when the LLDA delayed its decision over projects submitted by the City Government.

The LLDA and the City Government also utilized the Fisheries and Aquatic Resources Management Council (FARMC) in its administration of the seven crater lakes. The council was the principal organization mandated by law, specifically the Philippine Fisheries Code of 1998 or RA 8550, to assist government agencies in the management, utilization, and preservation of the water resources throughout the country. The FARMCs were created from the national level to cities and municipalities and set up locally by fisherfolk organizations and NGOs in the locality with the assistance of the government agencies. In the Laguna de Bay region, FARMCs' formation and supervision, which according to the Philippine Fisheries Code is under the Department of Agriculture, was devolved to the LLDA in recognition of its exclusive jurisdiction. The Philippine Fisheries Code also guaranteed the organization's funding (see section 79) and provided that the FARMC be multi-sectoral in its composition (see section 75). In Pandin Lake, however, the membership of FARMC lacked diversity, as its organization was mainly led by and consists of fisherfolks and lake residents, particularly members of the Samahang Mangingisda ng Lawa ng Pandin (SMLP). FARMC is also limited in funding, with its leaders often complaining of inadequate funds to effectively execute and sustain the responsibilities of the organization.

Besides the Philippine Fisheries Code, the two other laws that were relevant on the management and development of Pandin Lake were the Philippine Clean Water Act of 2004 or RA 9275 and the Tourism Act of 2009 or RA 9593. While, in principle, the laws balance and complement each other, these are also a source of divergence on the ground since each

statute holds disparate programs over the utilization of the water resource. In particular, the Philippine Clean Water Act underscores the preservation of the water resource; the Tourism Act promotes ecotourism for socio-economic development, while the Philippine Fisheries Code advances the interest of the fisherfolks and the fishing industry. The proponents of each law competed and negotiated over the utilization of the lake. Consequently, the plans, programs, and projects in Pandin Lake were drawn within the range of these laws and the interlocking interests they represent.

THE ECOTOURISM DEVELOPMENT IN PANDIN LAKE

With its limited aquaculture and clean water, Pandin Lake has long been held as ideal for tourism development. Even the LLDA has suggested the suitability of the lake for ecotourism development (LLDA, 2005). Ecotourism was deemed as the most viable alternative in providing decent livelihood to the mostly poor residents of the lake and in ensuring the conservation of the natural resource. The local fisherfolks were also less resistant to develop ecotourism in Pandin Lake since fish farming was not as lucrative in the lake compared to the other crater lakes in San Pablo City where aquaculture was extensive. One would expect the swift and smooth progress of ecotourism in Pandin Lake with the above favorable conditions; however, ecotourism development took time to materialize.

The LLDA's and the City Government's preference for Sampaloc Lake's development and failure to jump-start any development initiative for Pandin Lake were the early hindrance to ecotourism development in Pandin Lake. The bias on Sampaloc Lake was anchored on its status as the premier lake and long held trademark of San Pablo City. In 2009, the LLDA and the City Government, through the Short-Term Eco-Tourism Development Plan of the city, had the understanding that Sampaloc Lake would be prioritized and would serve as the model for the tourism development of the other crater lakes (San Pablo City Tourism Council, 2008). However, there has not been much progress in this endeavor. For example, no move has been observed since early 2000s to completely relocate illegal residents around the lake and get rid of the illegal structures in the area.[20] Sampaloc Lake also lacked a zoning-development plan which

20 Approximately two-thirds of Sampaloc Lake's bank is still occupied by illegal settlers/structures and around 100 families still need to be relocated.

was necessary to facilitate development in the lake (Brillo, 2015d). These unsettled issues significantly impacted Pandin Lake and the rest of the crater lakes, because unless these are resolved, the government agencies will continue to focus their efforts on Sampaloc Lake.

With no support from the LLDA and the City Government, ecotourism in Pandin Lake evolved mainly as an endogenous initiative spurred on by non-lucrative fish farming in the lake and the exposure to the citizen-initiated movement to save Sampaloc Lake in the early 2000. The latter underscored to Pandin Lake residents and to local environmentalists the pressing need to safeguard the water resource and prevent it from suffering the fate of Sampaloc Lake. Under this context, the members of the local environmentalist group— Pundasyon ng Kalikasan (Foundation of the Environment)— took the initiative to help in the conservation of the lake.[21] A dialogue between the Foundation and the lake residents took place in which the latter, specifically the wives of fishermen, appealed for assistance in finding work. In response, the Foundation initiated training activities, particularly gardening and soap making, designed to help the residents earn extra income. The Foundation had expected that by introducing alternative sources of livelihood to the residents, they would restrain them from over exploiting the lake. However, except for establishing the link between the lake residents and the Foundation, the initiative had limited success. A key reason was that many residents, especially the men, were distrustful of the assistance provided by the Foundation, after having been exposed to politicians and rich people who did not fulfill their promises to help. The residents were also suspicious of the Foundation's motives since the members came from well-off families. This distrust was evident when many residents (mostly men) did not support the training activities and did not sign the memorandum of agreement between the Foundation and the lake residents.

In 2003, a year after the unsuccessful training activities, the link between the locals and the Foundation was re-established. A group of mostly women residents of Pandin Lake approached the Foundation with the concept of the Pandin Lake Tour project. The Foundation helped the lake residents launch the project by advising them on how to organize and manage the enterprise, seek initial capitalization, and promote/market the

21 Pundasyon ng Kalikasan was one of the first groups to call for the City Government and the LLDA to take action and save Sampaloc Lake.

endeavor.[22] From the modest beginning of offering raft ride, native foods,[23] and the lake's scenic beauty, the Pandin Lake Tour project gradually transformed into a full-fledged enterprise, as local and foreign tourists kept coming over the years. In 2005, buoyed by the success of their project, the locals decided to formally organize themselves by establishing the SMLP to directly manage the ecotourism enterprise. At present, the SMLP's ecotourism success in Pandin Lake is well-acknowledged on three aspects: one, in operating an income-generating enterprise; two, in safeguarding the natural resource; and three, in empowering the locals, especially the women who are actively involved in the management and operation of the enterprise.

THE DEVELOPMENT ISSUE: ADMINISTRATIVE AGENCIES' INVOLVEMENT IN PANDIN LAKE

The central issue in Pandin Lake's development was the absence of the LLDA and the City Government in the ecotourism enterprise's conceptualization and development. These agencies were also not involved in improving the ecotourism enterprise's operations as the suggestions for improvement came from academic studies (Abao, *et al.,* 2010 and Atiqah *et al*., 2012). However, the administrative agencies' involvement is imperative to sustain the success in ecotourism and in the conservation of the lake. The LLDA and the City Government must now move in to assist the SMLP in dealing with pressing issues in the Pandin Lake; specifically (1) ensuring that the lake has a zoning-development plan, (2) transforming the lake into a full-fledged tourist hub, and (3) dealing with the brewing threat to the viability of the ecotourism enterprise. Authority and resources are required to resolve these issues: these are two things that SMLP does not have which the two agencies can provide and thus the need to involve them.

The formulation of the zoning-development plan has been a principal item on the agenda in forums on the seven crater lakes since the early 2000s. The LLDA and the City Government have recognized the need for such a plan; the former had acknowledged this in its 2005 water quality report in Pandin Lake, and the latter in its 2014 citizen's charter report. A zoning-development plan is a basic requirement, critical to the administration, manage the of

22 Mr. Amando Marino and Ms. Beatriz "Patis" Tesoro were most instrumental in this undertaking.

23 Their usual lunch package: grilled tilapia, fern salad, small shrimps cooked in coconut milk, rice wrapped in leaves, and fresh coconut juice at P180 per person.

use, and protection of Pandin Lake. The plan serves as the map to which the development initiatives and projects in the lake must conform in order for these initiatives and projects to be systematic, coherent, and effective. It is the first step in the administration of the water resource, as it gives guidance to succeeding plans and precipitates subsequent actions. The plan also provides the direction and the extent of progress that may be allowed in the lake.

As of this study, the LLDA and the City Government had signified their intention to develop a zoning-development plan. The LLDA had declared that the agency, on its own initiative, would develop such a plan for Pandin Lake by December 2014. The City Government had announced that its Tourism Office would spearhead the creation of a Technical Working Group that would formulate a Tourism Master Development Plan of the City by October 2014. Though the Tourism Master Development Plan was broader in scope and technically not a zoning-development plan for Pandin Lake, it would facilitate the development of a zoning-development plan. The actions of the LLDA and the City Government were commendable, but it wa yet too early to tell (especially with the precedence of losing steam before the targets are achieved) if this would result in concrete outcome— a completed, promulgated, and implemented zoning development plan.

The transformation of Pandin Lake into a full-fledged tourist destination is another issue. Despite years of ecotourism success, Pandin Lake was still underdeveloped, particularly in terms of the essential facilities and infrastructure required for a first-rate tourist destination. Among the immediate needs were (1) a well-developed road and parking space, (2) a peripheral trail around the lake (and into Yambo Lake, its twin lake), (3) a convention center and rooms, and (4) electricity and water supply in the area. Evidently, these needs were beyond the capacity of the SMLP's ecotourism enterprise to deliver, as they entailed huge capital investments but were within the capability of the LLDA and the City Government to provide. Thus, the agencies' involvement was critical if the ecotourism success in Pandin Lake will be expanded and further developed.

The third issue was the potential ownership of land in Pandin Lake area ending up with a single entity if a businessman's efforts to buy most of the land leading to and around the lake are successful. The LLDA and the City Government must intervene and address this, since the "monopolization" of land (which currently is about a third of the surrounding area and covers the entire entry point to the lake) will lead to accessibility issues and constrain further

development of Pandin Lake, thus threatening the viability of the ecotourism enterprise. As of this study, the landowner had reluctantly allowed access to the traditional route to the lake (which divides and runs across his land). This right of way issue must not be left to the discretion of the land owner but must be guaranteed and legally fortified by the lake's administrative agencies, either by negotiating with the owner, encumbering the title or outright purchasing of the private land. Moreover, if the rumor was true that the businessman planned to put up a high-class resort in the lake, then the assistance from the LLDA and the City Government would be more indispensable, particularly in preparing the SMLP's enterprise for future challenges posed by a big business moving in to Pandin Lake.

CONCLUSION

Ecotourism in Pandin Lake evolved wholly as a local community initiative instead of the conventional government-driven development. Aware of the need to preserve the natural resource and for an alternative to fish farming as a source of income, lake residents, supported by a local environmentalist group—Pundasyon ng Kalikasan (Foundation of the Environment—established a financially viable ecotourism enterprise. Through the years, ecotourism in Pandin Lake has brought many benefits to its people particularly in a decent livelihood and the conservation of their small lake. Overall, the experience in Pandin Lake illustrated that by cooperating and taking actions, the locals (sans government support) can be principal drivers of development and can empower themselves to manage the natural resource. With this lesson, the ecotourism success in Pandin Lake is a good template for the sustainable development of the many small lakes in the country.

The potential of SMLP's ecotourism enterprise to grow and expand is threatened by the lack of a zoning-development plan, the inability of SMLP to transform the lake into a fully-developed tourist destination, and the ownership of land leading to and around the lake. Resolving these issues require resources that only the LLDA and the City Government can supply. If these government agencies continue to ignore these pressing issues, SMLP's achievements on Pandin Lake ecotourism would be wasted.

In closing, the study addressed the lacuna in literature in Philippine lake studies— the lack of studies under development-governance area, as the field is dominated by limnology and aquaculture studies. The study also fills

the gap in literature on small lakes as scholarly outputs were overwhelmingly concentrated on big lakes. Such objective was achieved by studying how Pandin Lake ecotourism evolved, developed, and managed. Two key agenda were advanced in this article: one, studies in management and development of lakes must move forward and engage the studies in limnology and aquaculture; and two, studies on small lakes are imperative since they are pervasive in the country and crucial for local development. These agenda are interconnected and critical. To get a complete picture of the plight of lakes in the country, small lakes must be accounted for. To meaningfully improve the conditions of lakes in the country, both the development-governance-based studies and limnology-aquaculture-based research must progress side by side. With these in mind, the study hopes to set off more studies on the development-governance aspects of lakes and on small lakes in the country.

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In situ Temperature Profile of Shallow Reef Communities in Negros and Apo Island: 2013-2014

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Coral reefs provide a wide variety of ecosystem services and goods that benefit humankind. However, the survival and health of reefs are threatened by natural and anthropogenic factors such as climate change and pollution. Increased seawater temperature often results in bleaching of certain coral species. This study aimed at profiling in situ temperature of shallow reef communities in Apo I. and Sibulan, Negros I. using data loggers programmed to record hourly. Results for Apo showed temperature peaked in the months of May, June, and July. For Sibulan site, peaks were observed in May, June, and September. The lowest temperature for both sites was observed in February. Comparison with satellite-derived sea surface temperatures (SST) for the Bohol Sea indicated Apo Island recorded lower temperatures (>0.5°C) except for the months of October, November, and December whereas in Sibulan site, logger-derived temperature recordings were mostly higher by <0.5 °C in the months of March, May, October, November, December, and February. Between sites, variation may be explained by differences in coastal profiles, depths of reefs, and influences of different water current systems. Variation from satellite-derived data may be due to depth differences since the latter were taken only from the surface. Continuous in situ temperature monitoring is recommended to provide a more localized profile especially in this period of changing climate.

Keywords: in situ temperature, Negros I., Apo I., Sibulan, PHERNet, coral bleaching