

## The Case of Yambo Lake of San Pablo City, Nagcarlan and Rizal, Laguna, Philippines

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**Abstract:** Premised on the lack of development studies on lakes (as the field is dominated by limnology and aquaculture studies), the scarcity of small-lake studies (as the field is heavily concentrated on big-lake studies) and the absence of operationalized description of small lakes (as there is no existing definition of small lakes in the country), this study assesses the intricacies of the administration and development of Yambo Lake, a small transboundary lake. The study shows that despite existing favorable conditions, development is progressing slowly in Yambo Lake aquaculture has significantly declined and organized tourism is only just evolving. It contends that the administrative agencies (i.e., the Laguna Lake Development Authority, the City Government of San Pablo, the Local Governments of Nagcarlan and Rizal, Laguna) must now accelerate their collaboration to have a zoning-development plan (as it is crucial for the proper and efficient management of the lake) and institutionalized ecotourism (as it is critical to expand livelihood opportunities of the locals and enhance their community).

**Key words:** Development, Philippines, lake, small lake, transboundary lake, Yambo lake

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### INTRODUCTION

Yambo Lake is one of the seven crater lakes of San Pablo City (namely, Sampaloc (106 ha), Bunot (30.5 ha), Palakpakin (47.98 ha), Pandin (24 ha), Yambo (30.5 ha), Mohicap (22.89 ha) and Calibato (43 ha) (Fig. 1). This small lake is a transboundary lake since it is shared by three municipalities: Nagcarlan, Rizal and San Pablo City. Among the seven crater lakes, Yambo Lake is considered the most well-preserved lake as it is least ecologically threatened. As a natural resource, the lake has promising attributes for development such as clean water, natural scenic beauty, few fish pens/cages, virtually no informal settlements, accessible by vehicle and has a local organization that looks after its protection. Yet, these favorable features have not hastened the flow of development into Yambo Lake. Except for the construction of a road leading to the lake and the limitation on fish farms, there have been few initiatives introduced over the years to develop the lake's potentials. Currently, the lake's aquaculture and tourism industries are dwindling and underutilized, respectively. Development studies are also lacking in the lake. The progress is slow despite Yambo Lake's administrative agencies' recent attempt to create an overall development plan for the lake and the unprecedented success in ecotourism of its nearby twin lake Pandin Lake.

Given the above premises, this study examines the intricacies of the administration and development of Yambo Lake. In particular, the study contends that the

lake's administrative agencies the Laguna Lake Development Authority (LLDA), the City Government of San Pablo, the Local Government of Nagcarlan and the Local Government of Rizal must accelerate the crafting of a zoning-development plan and must help to institutionalize ecotourism. The former is crucial in the management and conservation of the lake and the latter is indispensable in developing the community and expanding work opportunities for the locals. The article proceeds to discuss the following: firstly, a review of literature on Philippine lake studies, development studies and small lakes; secondly, the present situation in Yambo Lake; thirdly, its administrative dynamics and lastly, the key development issues in the lake. In its totality, the article addresses the existing scholarly gap in Philippine lake studies. Specifically, the scarcity of development studies on small lakes in the country by documenting and exploring the development trajectory of Yambo Lake and the absence of existing operationalized description of small lakes in literature by defining small lakes as lakes with a surface area of only 200 ha or less (this definition was subjectively arrived at after surveying the sizes of the "minor" and least-studied lakes in the country) (Brillo, 2015a, b) (Fig. 1).

**Development Studies on Philippine small lakes:** Over the years, lakes have served human needs in various ways from the basics like as drinking water and source of food and transportation to more complex uses such as fish farming, agricultural irrigation, flood control and



Fig. 1: Yambo Lake and the Other Crater Lakes of San Pablo City

hydroelectric power. The importance of the water resource is underscored by the fact that over 90% of the liquid freshwater on the earth's surface is contained on lakes (Shiklomanov, 1993; International Lake Environment Committee, 2007; Nakamura and Rast, 2011, 2012). Lakes are also crucial to the preservation of the global biodiversity and ecosystem since they are a habitat for a variety of flora and fauna and are critical in natural processes such as climate mediation and nutrient cycling. Conversely, human activities such as food production, increasing population, settlement, urbanization and industrialization have degraded the water resource. Presently, many lakes around the world suffer from problems such as eutrophication, acidification, toxic contamination, water-level changes, salinization, siltation, overfishing and exotic species/weed infestation (Kira, 1997; ILEC, 2005). For instance, the Global Environment Facility-Lake Basin Management Initiative's (GEF-LBMI) study of 28 major lakes around the world from 2003-2005 concluded that the condition of many lakes is not improving (LakeCon, 2011).

The situation is similar in the Philippines since the condition of many lakes in the country remains threatened. The First National Congress on Philippine Lakes held in 2003 conceded that many lakes in the country are suffering from environmental degradation. The Second National Congress on Philippine Lakes held in 2011 acknowledged that despite incremental improvements, many lakes in the country remain

susceptible to ecological decline (LakeCon, 2011). Under this backdrop, the literature on Philippine lake studies has been gradually increasing through the years. However, the overwhelming majority of the literature is studies from the natural sciences and on big lakes (Brillo, 2015a). A recent survey of Philippine lake studies revealed that: 77% of the scholarly materials are classified under the natural sciences and only 23% under the social sciences and 80% of the scholarly materials are studies on big lakes and only 8.7% on small lakes (Brillo, 2015b). The natural science studies are mainly about limnology and aquaculture and the big lake studies are overwhelmingly concentrated on the largest lakes in the country (e.g., Laguna de Bay, Taal Lake, Lanao Lake and Buhi Lake). On the whole, this suggests that the literature in Philippine lake studies is scarce on two areas: social science studies, especially development studies (as well as governance, socioeconomic and cultural studies) and small lake studies, specifically lakes with a surface area of 200 hectare or less.

To address the gap in literature, development studies (and the other fields in the social sciences) and small lake studies must progress to match the advances in the natural sciences and big lake studies. The number of development studies (and the rest of the social sciences) must increase to complement limnology and aquaculture studies. Since, biophysical-environmental problems and socio-economic-governance problems are intertwined and cannot be effectively addressed in isolation, more

development studies will result in a better understanding of the multitude of issues confronting lakes in turn leading to better solutions to such issues. Meanwhile, small lakes studies must make significant gains to expand the knowledge base on Philippine lakes and to document their existence as small lakes are extensive all over the country yet little is known or written about them (Brillo, 2016). Small lakes are least studied since they are usually deemed to have minimal economic value which translates to tangential interest from government agencies, private-funding institutions and scholars (Brillo, 2015b; Brillo, 2016).

It is important to study small lakes because of the following: the shorter time line on irreversibility of any ecological degradation; the necessity of information needed for salvaging them; their link to other natural resources and the need to document the natural resource for posterity (Brillo, 2016). The first refers to the inherent physical feature of small lakes being naturally more fragile and vulnerable to environmental deterioration. Other things being equal (and compared to big lakes) their small size equates to less absorptive capacity in neutralizing pollutants and shorter time to reach the point of any ecological damage being irreversible. The second refers to the need for critical information needed to improve the condition of small lakes. Reliable and substantive knowledge is the starting point in the long process of properly managing and protecting the water resource. The third refers to the ecological connection since many small lakes are integral components of the system of other natural resources, particularly river system and big lakes' watershed. Consequently, addressing the problems of other systems would require knowing essential information about small lakes. The fourth refers to the need to record the existence of small lakes in the country. In time, lakes eventually become extinct, usually through loss of its water, infilling by sediments and other materials or succession (Choinski and Ptak, 2009; Downing, 2010) but small lakes usually "die" at a much faster rate than big lakes (some small lakes in the country may be lost in just a few decades, like Manlalayes Lake (the twin lake of Gunao/Gunaw Lake in Dolores, Quezon) which dried out a few years ago before anyone was able to document its existence (Brillo, 2015a).

Development studies on small lakes in the Philippines are important since the many lakes in the country are usually surrounded by impoverished communities. In the context of development defined as progress or growth that is inclusive and sustainable, developing small lakes in essence is about improving the

living conditions of small lake inhabitants (so as to help make development inclusive, extending to local areas) and ensuring the conservation of the water resource (so as to make development sustainable in the long term). Anchored on this premise, this study directly addresses the identified lacuna in Philippine lake studies by assessing the development in a small lake located in San Pablo City Yambo Lake. Consistent with the gap in the literature, scholarly works on Yambo Lake are scarce (Brillo, 2015a; Guerrero, 2001) and the only published materials found on the lake are the water quality assessments of the LLDA.

**The status of Yambo Lake:** Yambo Lake is a small transboundary lake situated in Barangay Sulsugin, Nagcarlan, Barangay Antipolo, Rizal and Barangay San Lorenzo, San Pablo City. Around two thirds of the lake's area is within the jurisdiction of San Pablo City (as Yambo Lake is considered one of the seven crater lakes of the City) and the remaining area in the northeast side of the lake is shared by Nagcarlan and Rizal towns. Nagcarlan covers only a small portion of Yambo Lake but its location is strategic since the only road leading to the lake and the area with most residents are within its territory. Yambo Lake is accessible via Barangay Yukos-Palayan-Sulsugin road which runs from Nagcarlan town proper to the northwest tip of the lake and via Barangay Sto Angel in San Pablo which has a foot trail from Pandin Lake, its twin lake. By road, the lake is around 23 km from city plaza of San Pablo (via Werner Schetelig avenue and Rizal-Nagcarlan road) to the main entrance of the lake in Barangay Sulsugin, Nagcarlan.

As natural resource, Yambo Lake is circular shaped and considered a catchment area of Mount San Cristobal, a feature shared with all the seven crater lakes. The lake is widely believed to be volcanic in origin which was formed through a phreatic eruption when shallow lava from Mount San Cristobal reached groundwater causing an explosion that resulted in a crater-like depression. Yambo Lake has a surface area of 30.5 ha, an elevation of around 160 m and an average water depth of 38 m. The lake discharges water through seepage and evaporation and its water sources are rainfall, surface runoff and inflow from "Kali-e" Creek (the creek is locally known by this name) which emanates from Mount Mabilog. Among the seven crater lakes, Yambo Lake is distinct since it is the only one without a water outlet and inflowing natural springs around it. One consequence of this is that the size (i.e., surface water area) of Yambo Lake varies significantly during summer (when it shrinks) and rainy season (when it expands), compared to the other crater lakes.



Fig. 2: Satellite Photo of the Fish Pens/Cages in Yambo Lake

In the past, Yambo Lake was principally utilized for aquaculture, particularly tilapia farming via floating pens/cages. In the seven crater lakes, aquaculture was first introduced in Bunot Lake in 1976 after the successful introduction of tilapia pen/cage farming in Laguna de Bay by the LLDA in 1974 (Radan, 1977). In time, tilapia pen/cage farming spread to Yambo Lake and the other crater lakes, becoming an integral feature of the lakes. Tilapia pen/cage farming extensively expanded in the lake over the years and reached its peak in the 1990s; even breaching the 10% allowable area allocation for aquaculture operation in the lake pursuant to the Fisheries Code of the Philippines (Republic Act (RA) 8550, Section 51). This condition has led to the lake's water quality degradation, fish kills (Fish kills in the seven crater lakes are also related to upwelling or overturning, an ecological phenomenon usually occurring in the cold months, (i.e., December to February) where the bottom water of the lake which is usually loaded with toxic substances (e.g., hydrogen sulfides and ammonia) is brought up to the surface, resulting in substantial fish kills (Araullo, 2001) and an excessive proliferation of hyacinths as there was a time when they covered almost the entire lake.

At present, the number of fish pens/cages has considerably dwindled in Yambo Lake (Fig. 2). Since the 2000s many fish farm operators have discontinued operations which over the years have resulted in the

substantial reduction of fish pens/cages in the lake. This decline is attributable to two factors: the lake's water quality being oligotrophic (Together with its twin lake Pandin Lake) low nutrient supplies, high dissolved oxygen level and containing little organic matter which translates to slower fish growth and the high cost of feeds which makes fish farming too costly to sustain and risky to continue operating as its profitability is no longer certain. In 2012, the Provincial Government of Laguna reported that Yambo Lake has only 3 registered fish pen/cage operators. At the moment, the number of fish pens/cages existing in the lake is only about a dozen which makes it within the 10% threshold of the Fisheries Code and the lowest number among the seven crater lakes.

Yambo Lake is not burdened with over-expansion of aquaculture and existence of informal settlers. Compared to the other crater lakes, the man-made structures along the banks of Yambo Lake are currently nominal. This favorable condition has freed the lake from problems associated with significant presence of informal settlers, particularly pollution from domestic wastes and discharges. Thus, Yambo Lake has been regarded as the most well- preserved lake among the seven crater lakes. This distinction is evident in the water quality evaluation on Yambo Lake. In the 2002-2005 report of the LLDA, the agency concluded that the lake has the best water quality

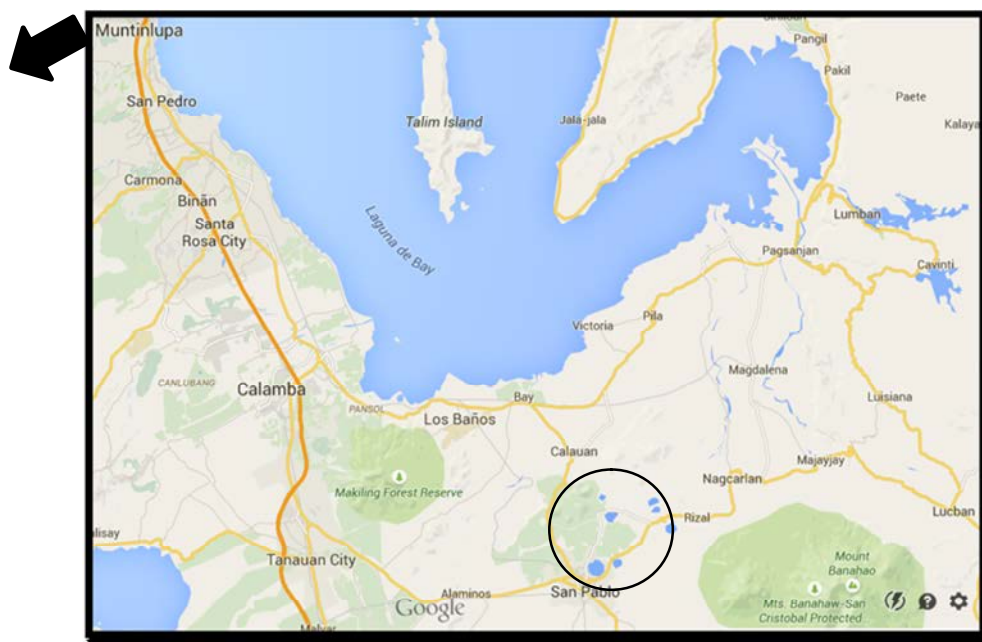


Fig. 3: The Seven Crater Lakes of San Pablo City and Laguna de Bay

among the seven crater lakes. In the 2006-2008 report of the LLDA, Yambo Lake consistently registered good results (The analyses are based on the Class C classification of the Department of Environment and Natural Resources (DENR) on fresh surface water (DENR, 1990: Administrative Order no. 34 series of 1990, Section 68 Paragraph A). Class C means that lake waters can be used as: fishery water (2) recreational water (class 2) and industrial water supply (class 1)) it conformed to the pH criterion; it passed the dissolve oxygen criterion; it complied with the biochemical oxygen demand criterion; it conformed to the ammonia criterion (This is based on the criterion set by the Environmental Study Board in 1973) it passed the phosphate concentration criterion; it registered the lowest reading for total dissolved solids levels and it conformed to the total coliform and fecal coliform counts. Summing up, Yambo Lake has the finest water quality in terms of the physico-chemical and bacteriological parameters among the seven crater lakes.

**The Administrative agencies of Yambo Lake (Portions of this section were derived from the previous works of the author on small lakes in the Philippines):** The administration and development of Yambo Lake involves a multitude of overlapping-correlated major laws (i.e., the Laguna Lake Development Authority Act of 1966 or RA 4850; the Local Government Code of 1991 or RA 7160; the Philippine Fisheries Code of 1998 or RA 8550 and the Tourism Act of 2009 or RA 9593) and four key

government agencies (i.e., the LLDA, the City Government of San Pablo, the Local Government of Rizal and Local Government of Nagcarlan).

The authority of the LLDA comes from RA 4850 (as amended by Presidential Decree 813, October 1975) which is the principal law in the administration of Laguna de Bay (the country's largest lake) and its watershed area (which includes the seven crater lakes of San Pablo City) (Fig. 3). RA 4850 created the LLDA and mandated it as the main agency in supervising and managing the water bodies in the Laguna de Bay region (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) (RA 4850, Section 1 and Section 4). In particular, the LLDA has the primary responsibility to promote the development of the Laguna de Bay region while providing for environmental management and control, preservation of the quality of life and ecological systems and the prevention of undue ecological disturbance, deterioration and pollution. The LLDA's mandate was strengthened by Executive Order no. 927 issued by then President F. Marcos in December 1983 which gave the agency the exclusive water rights over the lakes in the Laguna de Bay region. This reinforces the arrangement that Laguna de

Bay is the principal concern of the LLDA while its jurisdiction over the seven crater lakes is incidental, being components of the watershed of the Laguna de Bay region. On the ground, however, this setup usually translates to Laguna de Bay monopolizing the attention and limited resources of the LLDA while the seven crater lakes take only peripheral consideration. This reality is discernable in the LLDA's annual reports from 2009-2013 which never featured or allotted a section for the seven crater lakes (In the LLDA's 2013 annual report, the seven crater lakes were merely cited on the table for clean-up activities under the river rehabilitation program).

The mandate of the City Government of San Pablo, the Local Government of Nagcarlan and the Local Government of Rizal comes from RA 7160 which gives them the authority over Yambo Lake being municipal water. Since RA 4850 confers the administration of Yambo Lake to the LLDA while RA 7160 bestows the local government units the territorial jurisdiction, this implies "coordinative-supplementary" setup between the government agencies. On one hand, the LLDA lays down the comprehensive development framework and approve/disapprove the plans and projects submitted to it by the local government units and on the other hand, the local government units initiate programs and legislate ordinances to support the overall development strategy of the LLDA. This administrative arrangement was formalized in a Memorandum of Agreement (MOA) signed by the LLDA and the three local government units in 1997.

On regulations, the LLDA takes the supervising role and the local government units take the execution responsibilities. The local government units principally enforce the regulations on the lake since it controls the local police and the barangay units. In the seven crater lakes, this role was demonstrated when the City Government of San Pablo carried out the demolition of illegal structures in Sampaloc Lake in the early 2000s. This capacity gives the local government units some leverage over the "higher" authority of the LLDA as the latter's regulatory actions on the seven crater lakes are almost always dependent on the formers' support and assistance. In practice, the administrative arrangement's downside is when the LLDA procrastinates in deciding on plans or projects submitted by the local government units (e.g., zoning-development plan proposals on Sampaloc Lake) and when the local government units oppose or become reluctant in enforcing the directives of the LLDA (e.g., demolition of illegal fish pens/cages and structures in Bunot Lake).

In administering Yambo Lake, the LLDA and the local government units make use of the Fisheries and Aquatic Resources Management Council (FARMC). The FARMC is a principal organization mandated by RA 8550 (The precursor law of the Philippine Fisheries Code is Executive Order (EO) 240 issued in 1995 which instigated the formation of the Fisheries and Aquatic Resources Management Committees (FARMCs) nationwide) to assist government agencies in the management, development, utilization and conservation of the water resource throughout the country. The FARMCs are established from the national level to municipalities and formed locally by fisherfolk organizations/cooperatives and NGOs in the locality with the assistance of the government agencies. In the Laguna de Bay region, FARMCs' formation, sustenance and supervision which by 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 mandates that the FARMC be multi-representative in its composition and guarantees the organization's funding. However, the experience in seven crater lakes shows that local FARMC lacks diversity as the organization is mainly led by and composed of fisherfolk residents. The FARMC also lacks funding as its leaders have often complained that the funds allocated to them are inadequate to effectively and sustainably carry out the responsibilities of the organization. In Yambo Lake, the local FARMC of Nagcarlan (i.e., Samahan ng Maliliit Mangingisda ng Lawa ng Yambo (SMMLY), translates to Organization of Small Time Fishermen of Yambo Lake) is assisted by the local Bantay Lawa (or Guardians of the Lake). Bantay Lawa is a community-based, volunteer organization that works with the administrative agencies, especially in providing security and patrolling the lake. In the seven crater lakes, the Bantay Lawa volunteers receive an allowance from the Provincial Government and their membership usually overlaps with the local FARMC. So far, the local FARMC and Bantay Lawa have adequately managed Yambo Lake (as it is the most well-kept lake among the seven crater lakes) and plays the leading role in the on-going process of organizing and developing the lake for tourism.

Beyond RA 4850, 7160 and 8550, the other major law that has direct bearing on the development of Yambo Lake is RA 9593. The law recognizes tourism as an engine of the national economy, specifically in promoting socio-economic development in the country. Accordingly, tourism has been emphasised as a key economic driver by the local government units. In the seven crater lakes, ecotourism has been identified by the administrative agencies and the stakeholders as a promising

development strategy. In general, ecotourism is underscored in small lakes since they are typically surrounded by impoverished communities and the potential of aquaculture is constrained by the 10% rule on fish pens/cages (which limits their expansion) and the possible detrimental effects on the water resource (especially the long term effect of commercial fish feeds). In Yambo Lake, the expansion of aquaculture is further constrained by the oligotrophic water of the lake which usually slows fish growth. Combined, these attributes make ecotourism as the most viable alternative for developing Yambo Lake. In principle, the administrative agencies, from the LLDA to City Government of San Pablo, the Local Government of Nagcarlan and the Local Government of Rizal, all agree to develop ecotourism in Yambo Lake; in spite of this, ecotourism development is still very much wanting in the small lake at present (So far, among the seven crater lakes, only Pandin Lake has made significant progress in ecotourism).

All in all, these laws the Laguna Lake Development Authority Act, the Local Government Code, the Philippine Fisheries Code and the Tourism Act are interlinked and supplementary to each other, particularly in dealing with the management, development and conservation of the water resource. Conversely, these laws are also a source of discord since each statute advances distinct agenda over the utilization of the lake; as the advocates and constituents of each law compete and negotiate over how the water resource is to be apportioned (e.g., the perennial tourism versus aquaculture conflict on the seven crater lakes). Consequently, the initiatives, plans and programs in Yambo Lake and the other crater lakes will have to be framed within the scope that these laws and the intertwined interests they represent.

## **DEVELOPMENT ISSUES IN YAMBO LAKE**

Among the seven crater lakes, Yambo Lake is in the best position for development. The lake has the least number of fish pens/cages has virtually no problem with informal settlers and illegal structures along its banks has the best water quality and (except for Sampaloc Lake) the only one with a concrete road leading directly to it. On top of these, Yambo Lake's beautiful scenery rivals any other small lakes in the country. Yet, development efforts have not come into the lake for a long time. No sustained development programs or actions have been instituted in Yambo Lake by its administrative agencies. The LLDA's involvement in the lake is mainly confined to its routine tasks of conducting water quality monitoring and steering the cleaning of the lake (through the local FARMC and

Bantay Lawa) and the Local Government of Nagcarlan's main accomplishment is the construction and cementing of the barangay road going to the lake (In partnership with the Office of the Third Congressional District which provided the funds). The City Government of San Pablo and the Local Government of Rizal have minimal involvement in Yambo Lake as the former is focused on developing Sampaloc Lake and the latter is preoccupied with developing Tayak Hill.

In the past, the LLDA's actions on the seven crater lakes have been hampered by inadequate personnel as the agency's resources are primarily directed to Laguna de Bay, its principal concern. For instance, usually a single individual is assigned by the agency for surveillance and monitoring of the seven crater lakes which only conducts quarterly visits/inspections in a year on each lake. The LLDA also underwent frequent turnover of leadership which resulted in changing priorities (as the agency had four different General Managers from 2005-2013). For instance in Tadalac Lake, the LLDA was not able to complete the formulation of its zoning-development in 2001 mainly due to the change in leadership which in turn, shifted the priority of the agency (Borja, 2008). On the part of local government units, their lack of actions in the seven crater lakes has often been blamed on insufficient funds due to budgetary difficulties. For instance in Sampaloc Lake, the City Government of San Pablo was not able to complete the relocation-housing program in the 2000s due to financial constraints.

The lack of a zoning-development plan is a key development issue in Yambo Lake. Early on, the need for zoning-development plan for each of the seven crater lakes has been consistently acknowledged by the administrative agencies. A zoning-development plan is basic since it is necessary for the management, utilization and conservation of a lake. The plan is the first step in the administration and development of the lake since it serves as the overall framework for initiatives, projects and programs as well as precipitates succeeding actions in the lake. In the seven crater lakes, the zoning-development plan would ensure that their development is strategically coordinated and supplementary to each other, particularly taking notice of the distinct feature and similarities/differences of each lake. The plan is also essential in guaranteeing that no crater lake is developmentally left behind, especially considering that all of them are equally ecologically threatened. Moreover, the crafting of a zoning-development plan also is empowering (since the process gives locals a forum to influence and engage administrative agencies) and entails minimal pecuniary cost (since developing it mainly requires time and effort rather than funds).



After completing Pandin Lake's zoning-development plan, the LLDA has taken the preliminary actions to develop one for Yambo Lake. The LLDA and the local government units have convened workshops to help lake residents, the local FARMC and other stakeholders in crafting a zoning-development plan for the lake. The administrative agencies' long-awaited move to instigate the formulation of a zoning-development plan is encouraging and hopefully is carried through unlike previous development actions that stalled after initiation (e.g., the formulation of a zoning-development plan in Tadlak Lake and relocation-housing program in Sampaloc Lake). A key factor working for Yambo Lake is that (like in Pandin Lake and unlike in the other crater lakes) it has substantially fewer problems (such as excessive presence of aquaculture, illegal fish farms and informal settlers in other crater lakes) which can hinder and/or complicate the formulation process of a zoning-development plan. Incidentally, the move to have a zoning-development plan also has compelled the administrative agencies (i.e., the LLDA, the City Government of San Pablo, the Local Government of Nagcarlan and the Local Government of Rizal) to come together in a single endeavour to discuss and share their vision and strategy which is indispensable for bringing progress to a transboundary lake.

The other principal development issue in Yambo Lake is the promotion and institutionalization of its tourism. Traditionally, Yambo Lake has been utilized for recreation and tourism as the lake is suitable for picnics and swimming because of its clean water and natural scenery. This utilization was enhanced with the completion of the road construction in Barangay Sulsugin, Nagcarlan in 2002 which improved access to the lake and opened it up for tourism development. The potential of the lake for tourism, specifically ecotourism development has been considered by the LLDA, the Local Government of Nagcarlan and the City Government of San Pablo City in the past. Ecotourism in Yambo Lake (and the other crater lakes) was underscored when the success of ecotourism in Pandin Lake (its twin lake) became well-recognized. The story of Pandin Lake showed how ecotourism benefits the locality, particularly in creating alternative source of livelihood for the lake inhabitants. Both Pandin Lake and Yambo Lake are superb tourist destinations and are proximate to each other, separated only by a ridge. Yet, in terms of tourist arrivals and generated earnings/employments, Pandin Lake considerably outpaces Yambo Lake and the other crater lakes (including Sampaloc Lake (the premier lake in San Pablo City) and the other tourist destinations in the city). So far, ecotourism in Yambo Lake is in its nascent stage as the local tourism is

just starting to fully evolve and organize. The tourism operation in the lake is currently being handled by the members of the local FARMC (i.e., smmly) and Bantay Lawa which perform the basic organizational functions and services (e.g., providing information/security and recording tourist arrivals).

The most efficient way to accelerate tourism development in Yambo Lake is by tapping directly into the ecotourism success of Pandin Lake. This strategy can be done by institutionalizing the link between Yambo Lake and Pandin Lake, particularly by establishing a well-developed passageway that connects the two lakes to enhance tourist accessibility and flow from the latter to the former. At present, the main entry points of the two lakes (as Pandin Lake is in Barangay Sto Angel, San Pablo City and Yambo Lake is in Barangay Sulsugin, Nagcarlan) are at the opposite ends of each other (which substantially lengthens the distance and time in traveling to both lakes) and the current foot trail that traverses the ridge separating them is undeveloped (i.e., poorly maintained, lacks directional signs and runs through privately-owned lands). In instituting the link, the Local Government of Nagcarlan and the City Government of San Pablo, together with their respective local FARMCs, need to cooperate and work together. Firstly, a complementary tourism program must be developed by both local government units and the two local FARMCs to institutionalize the linkage. Secondly, on the part of San Pablo City: the City Government must agree to access and help procure the right of way from private land owners since most of the land where the trail passes (going to Yambo Lake on Nagcarlan's side) is situated within its jurisdiction and the local FARMC of Pandin Lake needs to agree to "share" its tourists by encouraging them to visit the nearby Yambo Lake. Thirdly, on the part of Nagcarlan, the Local Government (as the de facto lead local government unit in Yambo Lake) and its local FARMC must take serious efforts in: promoting and marketing Yambo Lake, especially in social and mass media (This can be patterned to the all-out advertising and marketing strategy of The Local Government of Rizal in promoting Tayak Hill as its main tourist destination) providing the basic infrastructure facilities for tourism (e.g., directional signs, stopover sites/areas and restrooms); improving the organizational capability of the locals in operating an ecotourism enterprise (such as organizing lake tour, rafting trips and safety measures) and developing a tourism package that integrates Yambo Lake with the other tourist destinations in their locality such as Bunga Falls, Underground Cemetery and Mount Mabilog.



## CONCLUSION

Yambo Lake, one of the seven crater lakes of San Pablo City, is a small transboundary lake as its area is less than 200 ha and is situated in two other localities Rizal and Nagcarlan, Laguna. Being a small lake, Yambo Lake is little studied, especially on its development aspect. Being a transboundary lake, management and development of Yambo Lake is more intricate since in principle, the three local government units and its principal administrative agency the LLDA must collaborate. This situation is compounded since the administration of the lake is governed by four interlocking major laws (i.e., RA 4850, RA 7160, RA 8550 and RA 9593) which represent distinct interests. Despite these handicaps, Yambo Lake enjoys favorable conditions for development as it is the most well-preserved among the seven crater lakes. The lake has the finest water quality, an enticing natural scenery and does not suffer from problems associated with over expansion of fish pens/cages and presence of informal settlers and illegal structures. The lake also has an existing and operating local organization (i.e., SMMLY-Bantay Lawa) and is accessible as a paved road leads to its entrance. Despite all these, development is progressing slowly in Yambo Lake aquaculture has significantly declined over the years and organized tourism is only just emerging. With these, the administrative agencies must now accelerate the move to have a zoning-development plan (as it is basic for the proper and efficient management of the lake) and to promote and develop ecotourism (as it is essential to increase livelihood opportunities for the locals and to enhance their community).

In closing, this article directly addressed the identified gap in literature by conducting an assessment on the development trajectory of a small lake in the country. In particular, the study documented and examined the administration and development issues in Yambo Lake. Overall, the work pressed forward two key aspects in the study of Philippine lakes. One, development studies (including governance, socio-economic, history and cultural studies) on lakes in the country must progress to augment the advances in limnology and aquaculture studies. Two, small lakes studies in the country are imperative because they are numerous and are surrounded by mostly impoverished communities. The two aspects are intertwined and indispensable, particularly in improving the living conditions of small-lake inhabitants and ensuring better management and conservation of the natural resource. In ending, this study makes a small contribution to the literature on Philippine lakes since there are still lots of

small lakes in the country that need to be documented and examined, it serves as baseline information for other studies on Yambo Lake in particular and on small lakes in general.

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