Lake Lanao Brief
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1. INTRODUCTION

Lake Lanao is located in the Province of Lanao del Sur, Autonomous Region in Muslim Mindanao (ARMM), Philippines. It is one of the 17 ancient lakes of the world2 and used to be home to 18 endemic fish species,3 a special kind of fish that only existed in Lake Lanao. It is also the ancestral domain of the Meranao people and is the heart of the people’s spiritual, cultural, social, political and economic life.

It is the largest freshwater lake4 in the Philippines and vital to the economic development of the communities around its shorelines, the island of Mindanao and the entire country, being the major source of hydropower. Along the Agus River, the only outlet of the lake, are six hydroelectric powerplants arranged in a cascading series. The powerplants are owned and operated by the National Power Corporation (NPC). Altogether, the Agus grid generates an installed capacity of 727.1 megawatts (MW) of electricity, providing about 60% of the total electricity needs of the people of Mindanao. At present, Agus-3, the 7th in the Agus river power development plan, is under construction with a designed capacity of 225 MW. Once completed and operational, the Agus Grid will significantly contribute to the national grid.

The watershed around the lake and along its associated rivers has suffered from illegal and unsustainable forestland activities and neglect from mandated agencies over the years. As a result, the water flowing into and from the lake has been reduced drastically. Soil erosion, agricultural run-off and sewage have also contributed greatly to the deterioration of water quality in the lake. Almost ninety percent of the endemic fish species in the lake have disappeared.

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1 Mr. Naga is also the Coordinator of Lanao del Sur’s Integrated Ecosystem Management Program.
2 www.worldlakes.org.
4 Laguna de Bay is not a freshwater lake because of salt water intrusion due to the backflow of the Pasig River when the lake level becomes lower than that of Manila Bay. At extreme backflow condition, saline water can reach the Central Bay and up to the East Bay. Lake Lanao has no saltwater intrusion. Adelina C. Santos-Borja, Chief, Research and Development and Division Head, Carbon Finance Unit, Laguna Lake Development Authority. Member, Scientific Committee, International Lake Environment Committee Foundation, Japan.
The clamor for the protection and conservation of Lake Lanao and its environs arose in the latter part of 1990 as a result of the proposed commissioning and operation of the Agus-1 hydroelectric power plant. The project will, for the first time, make the lake as a direct reservoir of the series of seven power projects along the Agus River. Previously, the supply of water for energy generation was solely limited to the natural discharge of the river, the only outlet of the lake.

At present, the only industrial use of the lake is for power generation. In order to regulate and sustain the water flowing into the hydroelectric plants, the water level in the lake is controlled. The fluctuation in the water level by a combination of natural and human factors has resulted in the disruption of the lake’s ecological balance.

The term Lake Lanao is a redundancy of words because "Lanao" is merely a corruption of Ranao, a Meranao word for lake. To this people, this abundantly endowed body of fresh water has always been called Ranao, the Lake. The etymology of the resulting "Lake Lake" is an unhappy legacy from our colonial past. It is more accurate to use "the Lake" than "Lake Lanao." This special terminology is adopted in this report.

The attachment of the Meranao to the Lake is ingrained in his psyche: his identity and ethnicity are both derived from the same word for the lake. Perhaps a more succinct description of this relationship between a people and their watering place, so to speak, is this provided by an American writer:

"... To the lake they have bound their identity: in their own eyes and in the eyes of the outsiders they are Maranaos, the People of the Lake. On its shores they established their villages and towns and built their mosques, with its water they purify themselves for prayer, in its wetlands they cultivate their rice, from its depths they gather fish, across its spans they transport goods and people, from it they take water for drinking and cleaning. Each boulder and island in the lake, each hill and valley in the land surrounding it, is woven into the legends and epics of the people. And each Maranao can willingly trace his ancestry to the original pat-a-phangampong - four encampments on the lake, and their mythical founders. Thus it is with some justification and no little pride that the Maranaos consider the Lake Lanao "Our Lake."5

According to Dioscoro S. Rabor and Lina Florendo-Rabor, the Lake system is the ecological source of life and progress for the Maranao.6 His domestic life revolves around and depends much on the bounties of the Lake. His simple ways have been helpful in the proper husbandry of this divine gift - until the need for energy intrudes into this relationship of man and nature.

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Even the law is supportive of the Maranao in his control and use of the Lake. The Water Code of the Philippines\(^7\) has prioritized the use of the country's water resource according to this order of preference: domestic and municipal use; irrigation; power generation; fisheries; livestock raising; industrial use; and other uses.

Since the time of his arrival to the region in the remote past, the Meranao has adopted the Lake for practically all these usages, but mostly and basically for domestic purposes, in peaceful living and without any obstacle. This deep-seated attachment helps to explain the general attitude of suspicion that the Meranao displays toward any form of incursion to the Lake.

## 2. DESCRIPTION OF THE LAKE

### 2.1 Basic Information

**2.1.1 Name:** Lake Lanao. It is also called Ranao by natives and other tribes that have lived within the communities surrounding the lake.

**2.1.2 LOCATION:** Lake Lanao is located in the Province of Lanao del Sur, Autonomous Region in Muslim Mindanao, Philippines.

- **2.1.2.1 Latitude:** 7º51’22.19” N
- **2.1.2.2 Longitude:** 124º14’59.33” E
- **2.1.2.3 Elevation:** 702 masl
- **2.1.2.4 Riparian countries and sub-national jurisdictions:** The Lake and its environs are solely within the Province of Lanao del Sur.

### 2.1.3 ORIGIN

It has been theorized that the Lake developed as a result of volcanic activity arising from tectonic movements. The formation of the basin could have resulted from depressed fault blocks caused by the movement of the underlying magma. According to Dr. Raymundo Punongbayan, director of the Philippine Institute of Volcanology and Seismology, the volcanic origin of the Lake is evident from a geomorphological evaluation of the basin landform and its surrounding orography using imaging developed by remote-sensing satellite.\(^8\) This event which resulted into the formation of the Lake might have occurred during the late Tertiary Period according to David G. Frey of the Indiana University in Bloomington. Professor Frey headed the team

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\(^7\) PD 1067 promulgated 31 December 1976.

\(^8\) Dr. Raymundo Punongbayan showed an imaging of the Lake area indicating several crisscrossing fault lines to the Task Force during his oral testimony.
which conducted an extensive limnological study of the Lake in 1967-68 while on assignment at the Mindanao State University as a Ford Foundation consultant. The Tertiary Period is a geologic time division that ended about 10,000,000 years ago. Hence, the Lake might have been 10 million years old.

Frey also mentioned that G.E. Hutchinson, author of the multi-volume, *A Treatise on Limnology*, listed the Lake as one of the best examples of lakes formed by a lava dam.

### 2.1.4 Basin and/or watershed Maps

#### 2.4.1 Major inflowing

![Figure 2. River Basin and Sub-Watersheds](image)

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2.1.5 Basin Demography, Maps

Figure 3. River Basin and Barangays

2.1.6 Landscape and Waterscape

Figure 4. Aerial Photo of Marawi City
2.2 Morphology

The Lake can be roughly fitted to a right triangle with the Basak Area, or lowland plains, to the right of the upright leg, the Masiu-Ganassi line forming the base, and the Marawi-Ganassi line the hypotenuse. A line joining Balindong and Tamparan will divide the Lake into a shallow north (maximum depth of 55 meters) and a deep south (55 meters deep and greater).

Based on Frey's bathymetric survey, the deepest part of the Lake is offshore of Binidayan and Tugaya, just east of Balet Maito ("Smaller Island") with a reading of approximately 112 meters when the water surface was at elevation 701.89 meters above sea-level.

One kilometer away from the shoreline at Marawi is only 10 meters deep; a similar distance at Ramain is 20 meters deep. Using this one-kilometer offshore distance gives the following approximate depths at other lake shore towns: Molundo 20 meters, Taraka and Tamparan 40 meters, Masiu 60 meters, Lumbatan 93 meters, Binidayan 110 meters, Ganassi 45 meters, Bacolod 95 meters, Tugaya 90 meters, Balindong 45 meters, and Marantao 35 meters.

The Lake has a surface area of 354.60 square kilometers (35,468 hectares), according to a field survey and planimetry measurement conducted for the Bureau of Public Highways in 1968. It has a pondage volume of 21.254 cubic kilometers (21,254,000,000 cubic meters). Its mean depth (volume/area) is 60 meters. It had an average annual discharge at Agus River of 3.349 cubic kilometers (3,349,589,760 cubic meters) and an average annual inflow from its tributaries of 3.343 cubic kilometers (3,343,991,040 cubic meters) during the period 1950-1977 when there was free-flow. In 1978 the regulation dam at the mouth of Agus River started operation and there was controlled discharge. The corresponding regulated discharge and free inflow for the period 1978-1989 are 2.708 and 2.687 cubic kilometers, respectively.10

2.2 Water Balance

The completion of the regulation dam in 1978 has altered the natural flow regime of Agus River and the hydrology of the Lake. The changes are evident in the hydrographic statistics summarized in the next paragraphs relating to the behavior of the water level and amounts of inflow and outflow before and after the installation of the regulatory structure.

The year-end average water elevation was 701.49 meters during the period 1950-77. With the regulated discharge, the average water elevation was 700.91 meters during the period 1978-89.

The lowest level recorded during the period 1950-77 was 700.01 meters in 1973. The highest was 702.92 meters in 1955. The greatest fluctuation of the water level was 2.02 meters in 1955. After the dam, the lowest level occurred in 1979 at 699.25 meters, the highest in 1981 at 701.96 meters with the maximum fluctuation in 1979 at 2.59 meters.

The replacement or flushing period (volume/discharge) is 7 years and 4 months based on unregulated (natural) outflow.

2.3 Climate

Humid tropical climate with the rainfall more or less evenly distributed throughout the year (Type IV). The average annual rainfall varies from 2,864 to 2,890 mm, and the mean monthly temperatures vary between a maximum of 27.6°C and a minimum of 22.2°C.

Table 1. Climatological Data for the Lake Basin Region

| Number of rainy days in a year | 153 |
| Wind speed (mps) and main direction | 2-3.4 SW |
| Cloudiness (Octa) | 5-8 |
| Evaporation (mm/day) (open pan method, assumed basin area of 1,933 sq. km.; low in June and high in March) | 1-5 |
| Evapo-transpiration (mm/month) (derived from evaporation data using empirical coefficient of 0.85; high in August and low in December) | 42-84 |
| Temperature range (EC) (high in April and May and low in December through February) | 17.8-27.8 |
| Relative humidity range (%) (low in May and high in January) | 81.7-89.4 |

2.4 State of Ecosystem

The ecological health of Lake Lanao has been categorized in an alarming stage. However, no updated studies have been done. The often cited reasons were the unstable peace and order condition in the area. Local government officials and
the populace denied these assumptions saying Lanao del Sur is no different from any other province in the Philippines. In terms of crime rate statistics, Lanao del Sur and Marawi City are among the lowest recorded in a report published by the Philippine National Police some years ago.

The Philippines is one of the 17 megadiversity countries, with more than 52,000 species, of which more than half are found nowhere else in the world. Consequently, the Philippine biodiversity forms part of the global heritage. Lake Lanao Watershed is an important biodiversity site in the Philippines that is of global significance. It was established under Proclamation No. 871 in 1992 and has an area of about 180,460 ha. Lake Lanao is considered one of the largest and deepest freshwater lakes in the country covering an area of 35,250 hectares with a maximum depth of 112 meters and mean depth of 60.2 meters. The lake is home to 18 endemic species of freshwater fish and supports a large number of waterfowls. Among other species, the lake is home to the native cyprinids consisting of 20 species of the genus *Barbodes* and several genera — *Mandibularca*, *Spratellicypris*, *Cepahlokompus* and *Capatulus*. These species are accordingly under threat by the introduction of predatory marine species such as white goby. In 2006, the Mindanao State University discovered massive algae contamination which was initially thought to have been caused by poor sewage and agricultural waste management but was later attributed to indiscriminate logging, extensive land use and farming. Though the watershed does not have a good baseline data for biodiversity, it was reported that in two barangays that were surveyed during the preparation of the Integrated Development Plan of the Watershed, 27 species of trees, shrubs, and vines were observed while 41 medicinal plant species were recorded. Likewise, available information also shows that there are six (6) bird species in the watershed. Among them are the *Halikyon chloris* (white collared kingfisher), *Corvus enea* (slender bird crow, and the *Dubulens ibis coromandus* (cattle egret).  

All of Lake Lanao watershed is located within the province of Lanao del Sur. The lake is fed by four rivers. Agus river serves as its only outlet and flows northwards into Iligan Bay via two channels: one over the Maria Cristina Falls and the other over the Linamon Falls. The hydroelectric power plants in the watershed reserve supply 70% of the power requirements of Mindanao. Although it has not acquired yet the status of a fully protected area, it is itself a key biodiversity area\(^1\) (KBA 109). The watershed contains or overlaps with two Key Biodiversity Areas, namely Munai/Tambo (KBA 108) cutting across Lanao del Norte and Lanao del Sur and Mt Piagayungan (KBA 110) which traverses North Cotabato, Maguindanao and Lanao del Sur.

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\(^1\) ADB INREM, 2009

\(^2\) The goal of KBA approach is to identify, document, and protect networks of sites that are critical for the conservation of globally important biodiversity; KBAs are identified using simple, standard criteria based on the conservation planning principles of vulnerability and irreplaceability (Conservation International, DENR-PAWB, & Haribon Foundation, 2006). The KBA approach has been adopted by the Philippine government.
2.5 Physical Characteristics

A study conducted by William M. Lewis, Jr. “The Thermal Regime of Lake Lanao (Philippines)” and its Theoretical Implications for Tropical Lakes has the following abstract: A study of temperature profiles, climatic records, and chemical data for Lake Lanao, a low-altitude tropical lake, over 14 months shows that the annual pattern of heat distribution depends partly on a seasonal air temperature minimum and partly on nonseasonal climatic changes. The lake circulated during January and February at the time of seasonal cooling, was intermittently stable during March and April, and was stratified during all other months. During stratification the principal thermocline achieved equilibrium with storm winds at 40 - 50 meters. Secondary and tertiary thermoclines repeatedly split the epilimnion into an upper turbulent layer and a lower stagnant layer for periods up to 2 months, but were displaced or dissipated at irregular intervals by storms. The term *atelomixis* is proposed to denote the mixing of chemically divergent layers during stratification.

Changes in the shape of thermal profiles in Lake Lanao include sharpening of thermoclines by wind and convection, smearing of thermoclines by internal

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water movements, unstable thermal inversions due to cooling at the surface, and stable thermal inversions on the bottom that result from heat retention during cool weather.

The study was done in 1970 – 1971 and findings may not be relevant today on the current environmental status of the lake.

2.6 Chemical Data

Documents widely circulated by DENR and NPC has identified Lake Lanao as “Class C”. The group Save Lake Lanao Movement, Inc. (SALLAM) has questioned the said classification being familiar with the required parameters and methods. Upon persistent queries and verification from the DENRs EMB, they have admitted that there were no classification tests done on Lake Lanao. A classification tests have been scheduled before the end of 2010 until the last quarter of 2011.

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2.7 Biotic Data (Main Species, Exotic Species, Productivity Changes over Time)

Lake Lanao is of great limnological interest. The fauna includes many species of fishes and invertebrates which are endemic to the lake, and presents an outstanding opportunity for research on evolution in the Cyprinids. There are about twenty species of Cyprinidae endemic to the lake including *Puntius (Barbodes) tamarus*, *P. baolan*, *P. binotatus*, *P.clemensi*, *P. diza*, *P. flavifucus*, *P. katolo*, *P. lanaoensis*, *P. lindog*, *P. manalak*, *P. sirang*, *P.tras*, *P. tumba*, *Cephalocampus pachychilus*, *Mandibularca resinus*, *Osphatulus trunculatus*, *O. palaemophagus* and *Strattelecypris palata*. Other fishes occurring in the lake include species of Silurid, Anabantid, Anguillid, Ophiocephalid, Centrarchid and Chanid, but many of these have been introduced.

The lake supports large numbers of waterfowl, particularly Ardeidae, Anatidae and Rallidae. Counts have included:

- over 500 bitterns *Ixobrychus* spp
- 500 egrets *Egretia* spp
- 50 *Ardea purpurea*
- 200 *Porphyrio porphyrio*
- 200 *Fulica atra*
- 100 *Gallinago* spp

and smaller numbers of *Gallicrex cinerea* and *Gallinula chloropus*. Mammals occurring in the area include the wild pig *Sus celebensis* and deer *Cervus* sp.14

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William M. Lewis, Jr. did extensive studies on the Zooplanktons and Phytoplanktons in Lake Lanao. These studies are being attached to this brief for ready reference.

2.8 State of the Lake Basin

Lake Lanao is the largest freshwater lake in the Philippines. It is a large, oligotrophic, freshwater lake, formed by the tectonic volcanic damming of a basin between two mountain ranges and the collapse of a large volcano. This IBA includes the lake itself and some extensive forest cover on its south and southeast shorelines. Some of the higher altitude forests of the Lake Lanao Watershed are included in the Butig Mountains (PH099) and Mt Piagayungan (PH098). There are extensive reed beds around the edges of the lake, and large areas of Eichhornia crassipes and other aquatic vegetation on the lake surface. Most of the surrounding areas have been cleared for agriculture but there is still some primary lowland dipterocarp forest on the nearby Sacred Mountain, and there are patches of secondary dipterocarp forest at Wao. The lake serves as a reservoir for the generation of hydroelectric power on the Agus River, which generates 70% of the electricity used by the people of Mindanao. It supports a major fishery, and is important for recreational activities including boating, swimming and sport fishing. There are several towns and many villages around it, and a Mindanao State University campus is situated there.

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A watershed area (Proclamation 871 dated 26 February 1992) naturally sustains the Lake. The terrestrial watershed has its greatest concentration at the eastern and southeastern part of the basin where the four great tributaries, Masiu, Taraka, Gata and Ramain rivers, derive their sources. The vast riceland of the Basak area is located on this section of the watershed. The southern, western and northern sections of the watershed contribute a marginal role in the maintenance and operation of hydrological processes.
3. MANAGEMENT OF THE LAKE AND ITS BASIN

Following the proclamation of the Lake Lanao Watershed reservation, the President created the Lake Lanao Watershed Protection and Development Council (LLWPDC). The Council is headed by the Department of Environment and Natural Resources (DENR) Secretary, with the President of National Power Corporation (NPC) as vice-chair. Council members include: Armed Forces of the Philippines (AFP) Chief of Staff, Autonomous Region in Muslim Mindanao (ARMM) Governor, President of the Save Lake Lanao Movement (SALLAM), President of Mindanao State University (MSU), President of the Philippine Chamber of Commerce and Industry (PCCI), and President of the Mindanao Association of Electric Cooperatives (MAEC). In March 2007, the President added the following members: Governors of Lanao del Sur and Lanao del Norte, and the Mayor of Marawi City.16

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15 Memorandum Order No. 421 (1992)
16 Memorandum Order No. 242 (6 Mar 2007)
The Council has not met regularly perhaps due to the incompatible schedules of the high-level membership. A major output of the Council was the approval of an Integrated Development Plan (IDP) in 2003. The plan required an investment of Php 2.8 Billion in five years. It is not clear where the funds are to be sourced. The IDP has not been implemented as designed.

Despite the Lake being outside the jurisdiction of the ARMM, the Regional Legislative Assembly created a Lake Lanao Development Authority.\(^{17}\) There is some doubt if the regional law creating an Authority actually took effect in 1999. Most of the members of the TWG were unaware of the law. However, it is clear that the Authority was never activated and exists only on paper.

The Protected Areas and Wildlife Bureau (PAWB) of DENR is the agency primarily tasked with overseeing the management of NIPAS component areas. However, up to this day, PAWB has not made any significant steps to integrate Lake Lanao Watershed into the NIPAS System. In a conversation with PAWB officials, it appears that the agency has relied on Presidential initiatives in the area, most recently, the 2007 Proclamation reinforcing the Council with additional members.

The NPC has been the driving force in the Council. As part of its commitment, NPC allocated P10 Million for reforestation and watershed rehabilitation activities. However, these activities were limited to the Agus River and western side of the lake, where NPC had existing management agreements with DENR and DENR-ARMM. In talks with NPC, it became clear that when NPC speaks of watershed management in Lake Lanao, it only refers to the northern Agus watershed area (around 13,700 hectares) and western portion of the lake (around 29,400 hectares). NPC has an existing MOA with DENR on the northern Agus area and with DENR-ARMM for the western watershed areas. The combined area where NPC concentrates is dwarfed by the total watershed area of around 194,000 hectares.

4. MAJOR “IMPACT STORIES” OF THE LAKE

The clamor for the protection and preservation of Lake Lanao arose in the latter part of 1990 as a result of the proposed operation of Agus-1 Hydroelectric Power Plant. The commissioning of this project will, for the first time, make Lake Lanao as a direct reservoir of the series of seven power projects along Agus River. Previously the supply of water for energy generation was solely limited to the natural discharge of the river, the only outlet of the Lake.

The impending commissioning (1991) has brought widespread expression of doubt, apprehension and suspicion from practically every sector of the community. Agencies of the government directly involved in the affairs of the Maranaos and the Muslims expressed their concern in support of the move to stop the commissioning of the project. Those in the public service who appeared personally during the hearing

\(^{17}\) Muslim Mindanao Autonomy Act No. 93 (1999)
sessions at the premises of the Senate to voice their misgiving on the integrity of the power plant were representatives of the Autonomous Region of Muslim Mindanao, Office on Muslim Affairs, the province of Lanao del Sur, the city of Marawi, the municipalities of Bubong, Ditsaan-Ramain, and Buadi-Poso Buntong, and the League of Municipal Mayors of Lanao del Sur.

The Save Lake Lanao Movement (SALLAM), whose leadership includes prominent members of the ulama and the profession, provided articulate representation in behalf of several private organizations opposing the opening of the project.

Before October 1990, the National Power Corporation had been operating its five hydroelectric power plants along Agus River without any significant problem or serious opposition on the part of the community. The cases of hostage-taking, including the unfortunate killing of some persons connected with the National Power Corporation, generally involved former employees who, rightly or wrongly, took the law unto their hands to redress some grievances related to their employment. These isolated incidents may therefore be considered as arising from administrative oversight. Both the National Power Corporation and the community denounced the crimes in similar vehemence.

But starting that month, a concerted action was launched to oppose the operation of Agus-1 Hydroelectric Power plant, the sixth and latest in a series of seven power projects planned along Agus River to tap the Lake Lanao resource. Spearheaded by a new group, the Save Lake Lanao Movement18 (SALLAM), the general participation of all sectors of the community was mobilized to prevent the National Power Corporation from commissioning its nearly completed power plant. The public outcry against this particular project had reached the highest levels of the government. On one level, the Senate through its Committee on Mindanao Affairs under the chairmanship of Senator Aquilino Pimentel, Jr., created the Task Force on Agus-1 to look into the various aspects of the problem. On the other, President Cory Aquino directed the temporary suspension of the project commissioning until such time that the people were "clarified on their complaint and misgiving." The Task Force came up with recommendations that resulted in the issuances of the following:

1. Environmental Compliance Certificate (ECC), dated 14 January 1992, for the Agus grid hydroelectric powerplants
2. Proclamation No. 871, dated 26 February 1992, declaring the Lake Lanao Watershed Reservation as a protected area
3. Memorandum Order No. 421, dated 25 March 1992, as amended by Memorandum Order No. 242 dated 6 March 2007, creating the Lake Lanao Watershed Protection and Development Council (LLWPDC)

18 The Save Lake Lanao Movement (SALLAM) is a multi-sectoral organization composed of thirty-five (35) incorporators and fifteen (15) Board of Trustees (BOT) from all over Lanao del Sur. It is based in Marawi City with membership ranging from professionals, politicians, religious and traditional leaders and sectoral organizations. It was loosely organized in late 1989 and was only formally incorporated, through registration at the Securities and Exchange Commission (SEC), CN200525464 dated 3 February 2005.
These issuances served now as the main battle cry of every organization or agency involved in the protection and conservation of Lake Lanao.

Mindanao is an island with rich natural resources. The people need support, financial, technical as well as political so that they will be able to harness such resources to improve their total quality of life. For instance, it is not clear how the Maranao have ever benefited from the fruits of development brought about by Lake Lanao which is the source of hydroelectric power for the many plants, industries, and corporations in Mindanao. (The height of irony is that many Maranao communities do not have power connections. Many Maranao households continue to live in the dark!) There is a need to put the brakes on development aggression for multinationals where the local people are always left at a disadvantage position.¹⁹

The Organisation of Islamic Conference (OIC) General Secretariat is still concerned over the persistent environmental impacts that affect 1.2 million Maranao Muslims living around Lake Lanao whose water resources feed the Agus hydroelectric power plants. Reports received by the General Secretariat have confirmed that this plant is causing hazardous environmental pollution. These plants have caused widespread poverty among the Maranao due to the construction of dams by the government, which has resulted in the flooding of farmlands and the spread of diseases as a result of the pollution and contamination of the lake waters at the hands of the state-owned National Power Corporation (NPC), despite a court order that has not been implemented by the government. The Maranao still await the implementation of the court order and the abovementioned plant to honor its obligations under the Environmental Compliance Certificate (ECC), which has been signed by the two parties in order to build irrigation projects and pay comprehensive damages to displaced Maranao Muslims.²⁰

5. MAJOR LAKE BASIN GOVERNANCE ISSUES

Lake Lanao and most of the surrounding watershed is located in the Province of Lanao del Sur, which is part of the Autonomous Region in Muslim Mindanao. The lake is surrounded by 18 municipalities and Marawi City. Two of the Agus powerplants are located within the province, while the other four are in Lanao del Norte. Lanao del Norte is not included in ARMM.

Under the Organic Act of ARMM (as amended), the Regional Government has jurisdiction over forestlands and waters within ARMM, with the exception of

declared watersheds.\textsuperscript{21} Prior to the Organic Act, on February 26, 1992, the President issued a proclamation declaring the Lake Lanao area as a watershed reservation.\textsuperscript{22} The proclamation effectively excluded the Lake Lanao Watershed from the jurisdiction of the ARMM.

In June 1992, Congress passed the National Integrated Protected Areas Act (NIPAS). Under NIPAS, all declared watersheds were included as initial components of the protected areas system.\textsuperscript{23} The proclamation came before NIPAS and therefore, Lake Lanao Watershed is technically a protected area under the NIPAS system. Under NIPAS, Lake Lanao was to continue being governed under existing laws, rules and regulations. No law has since been passed reaffirming the status of Lake Lanao Watershed as a NIPAS protected area, nor has it been disestablished under the System.

NPC claims that it has complete jurisdiction and control over watersheds surrounding its powerplants and energy sources based on its charter.\textsuperscript{24} It is debatable whether NPC has actual control over the area. A memorandum order issued by the President following the proclamation in 1992 recognized DENR as lead agency, not NPC (discussed further below). NPC, in fact, entered into agreements with DENR and DENR-ARMM to manage portions of the watershed, recognizing the administrative jurisdiction of these agencies.

**BENEFITS FROM USE OF LAKE WATERS FOR HYDROPOWER**

The lake communities are entitled to benefit from the use of lake waters for power generation. Under the Local Government Code, host local governments shall receive 1% of gross sales of government owned or controlled corporations engaged in the utilization and development of the national wealth in the area.\textsuperscript{25} This applies to NPC’s use of the waters of the lake to generate electricity. Under the energy laws, local communities are also entitled to direct benefits from the use of energy sources, such as water for hydroelectric power generation.\textsuperscript{26}

\textsuperscript{21} Republic Act No. 9054, Article XII, Sec. 5. Use, Development of Mines, Minerals and Other Natural Resources; Revenue Sharing; Exceptions. – (a) Regional Supervision and Control. The control and supervision over exploration, utilization, development, and protection of the mines and minerals and other natural resources within the autonomous region are hereby vested in the Regional Government in accordance with the Constitution and the pertinent provisions of this Organic Act except for the strategic minerals such as uranium, petroleum, and other fossil fuels, mineral oils, all sources of potential energy, as well as national reserves and aquatic parks, forest and watershed reservations already delimited by authority of the central government or national government and those that may be defined by an Act of Congress within (1) year from effectivity of this Organic Act.

\textsuperscript{22} Presidential Proclamation No. 871 (1992).

\textsuperscript{23} Republic Act No. 7586, Sec. 5 (a). xxx All areas or islands in the Philippines proclaimed, designated or set aside, pursuant to a law, presidential decree, presidential proclamation or executive order as national park, game refuge, bird and wildlife sanctuary, wilderness area, strict nature reserve, watershed, mangrove reserve, fish sanctuary, natural and historical landmark, protected and managed landscape/seascape as well as identified virgin forests before the effectivity of this Act are hereby designated as initial components of the System. The initial components of the System shall be governed by existing laws, rules and regulations, not inconsistent with this Act. xxx

\textsuperscript{24} Republic Act No. 6395 (1971).


\textsuperscript{26} Republic Act No. 7638 (DOE law), Sec. 5 (i) provides that the DOE shall “Devise ways and means of giving direct benefits to the province, city, or municipality, especially the community and people affected,
A portion of the benefits to local communities is intended for watershed management. Specifically, twenty five percent of one centavo per kilowatt-hour (P 0.0025/kWh) of the total electricity sales as a reforestation, watershed management, health and/or environment enhancement fund (RWMHEEF).²⁷

Notably, under EPIRA, a portion of the universal charge collected from all power users nationwide is designated as an environmental charge, amounting to P0.0025 per kilowatt-hour sales, and intended for the rehabilitation and maintenance of watershed areas.²⁸ These benefits have yet to be availed of by its intended beneficiaries.

6. KEY CHALLENGES TO LAKE GOVERNANCE

The lack of an appropriate institutional framework to address issues of development and management of water and related resources is one of the most critical issues confronting the Philippine water sector.²⁹

The geographical location of Lake Lanao and its watershed resulted into neglect from mandated agencies that led to its current critical state of environmental degradation:

- Technically, a protected area but DENR has made no effort to include it in priority protected areas;
- Jurisdictionally under ARMM, but its status as protected area removes it from the direct responsibility of the DENR-ARMM; and
- Previous national and regional management approaches have not been effective and access to financial resources under the EPIRA intended for watershed management is difficult because of lack of information and vagueness in procedures.

The key management considerations needed to effectively protect and conserve Lake Lanao and its watershed include:

- Capacity for integrated and science-based planning;
- Authority to regulate resource uses and development activities, consistent with the management plan;
- Capacity to monitor activities in the area and enforce management rules;
- Capacity to involve stakeholders in management activities; and

and equitable and preferential benefit to the region that hosts the energy resource and/or the energy-generating facility xxx.” DOE has been implementing this through its Energy Regulation No. 1-94, as incorporated in the Implementing Rules and Regulations of the Electric Power Industry Reform Act (R.A. No. 9136).

²⁷ EPIRA IRR, Rule 29 (A) Sec. 4 (a) (i) (3).
²⁸ EPIRA Sec. 34 (d): An environmental charge equivalent to one-fourth of one centavo per kilowatt-hour (P0.0025/kWh), which shall accrue to an environmental fund to be used solely for watershed rehabilitation and management. Said fund shall be managed by NPC under existing arrangements.
Ability to sustain management activities from a reliable and sufficient funding mechanism.

Taking into consideration that Lake Lanao and its watershed is under the jurisdiction of the national government, and that the LLWPDC created by the President has not been as effective as expected, the most feasible option is a tri-partite co-management agreement among DENR, ARMM and the Province of Lanao del Sur. ARMM will appreciate national recognition of its role in managing a critical habitat in the region, even though the lake is strictly outside of its jurisdiction. The agreement must oblige the Province and DENR to share the responsibility of reviewing and revising the integrated development plan, regulating resource use and development activities and conducting enforcement actions against violators of environmental laws. The Co-management framework is consistent with the policy of DENR in devolving watershed management functions.

However, the co-management arrangement cannot fully control the arbitrariness in the use of the local government share in the exploitation of national wealth and the 1-94 funds administered by the Department of Energy (DOE). Because these are entitlements given to the local government units, they have full discretion on the priority of use for the funds.

DENR must decide either to:

1) disestablish Lake Lanao and its watershed as a protected area, so that Local Government Units (LGUs) can take the lead in managing the area in coordination with the ARMM Regional Government, under the principle of devolution, or
2) fully implement NIPAS by convening the Protected Area Management Board (PAMB), but to follow the current trend in protected area management where local governments are granted significant roles in managing the protected area.

A review of the following newly enacted laws, Republic Act 9996 and Republic Act 9997, would be appropriate at this point in time. Some provisions of these laws may pave the way in untangling the dilemma currently obtaining in the protection and conservation of Lake Lanao and its watershed.

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32 Republic Act No. 7638 (DOE law), Sec. 5 (i) provides that the DOE shall “Devise ways and means of giving direct benefits to the province, city, or municipality, especially the community and people affected, and equitable and preferential benefit to the region that hosts the energy resource and/or the energy-generating facility xxx.” DOE has been implementing this through its Energy Regulation No. 1-94, as incorporated in the Implementing Rules and Regulations of the Electric Power Industry Reform Act (R.A. No. 9136).
33 Republic Act No. 9996 “AN ACT CREATING THE MINDANAO DEVELOPMENT AUTHORITY (MinDA), DEFINING ITS POWERS AND FUNCTIONS, PROVIDING FUNDS THEREFOR AND FOR OTHER PURPOSES” (2009); Republic Act No. 9997 “AN ACT CREATING THE NATIONAL COMMISSION ON MUSLIM FILIPINOS (NCMF), DEFINING ITS POWERS, FUNCTIONS AND RESPONSIBILITIES AND APPROPRIATING FUNDS THEREFOR AND FOR OTHER PURPOSES” (2009).
7. REFERENCES


