

Restoration and Enhancement of Fisheries in Philippine Lakes and Reservoirs

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Abstract

Inland water resources of the Philippines host some 348 freshwater fishes, of which 16% are endemic and 56% indigenous (Fishbase 2013). Although production from inland capture fisheries accounts for only 7.8% of the total fish production (BFAR Fisheries Profile, 2012) it plays a significant role in providing livelihood to small fisherfolks and source of fish protein to the rural landlocked areas. With proper intervention and the application of scientific approach to fish stocking, production from these resources could be increased. The Bureau of Fisheries and Aquatic Resources (BFAR) implements a National Program on the Fisheries Enhancement of Inland Waters, which aims to enhance fish production in 36 lakes and reservoirs in the sixteen regions of the country. The Program includes water quality and productivity profiling; social preparation and capacity building; habitat restoration and fisheries enhancement through the establishment of habitat structures; and culture-based open water fisheries. In support of the Program, the BFAR-National inland Fisheries Technology Center conducts research and rehabilitation measures for indigenous species like the *Leiopotherapon plumbeus*, *Anabas testudineus*, *Clarias macrocephalus* and *Ophicephalus striatus*. A component of the Program is the development of a network of private hatcheries to sustain the fingerling requirements. A prototype model of the Program is the successful physical restoration and the reconstruction of fisheries in the 7-hectare Dagatan Lake. Through collaborative efforts to pool funds and resources; mobilization of the local communities and the application of technical tools; the lake was restored to its natural condition and its fisheries reconstructed through managed open water stocking.

Key words: inland water resources, freshwater fishes, scientific approach to fish stocking, lakes and reservoirs, habitat restoration, fisheries enhancement, culture-based open water fisheries, indigenous species, hatcheries

Introduction

The inland freshwater resources of the Philippines consist of 106,328 ha of swamplands; 200,000 ha lakes, 19,000 ha reservoirs and 31,000 rivers. These resources host some 340 freshwater fishes (Fishbase, 2015), 16% of which are endemic, 56% indigenous, and 28% are exotic. As a traditional activity in inland waters, fish capture plays a significant role in providing livelihoods to small fisherfolks and source of fish

protein to the rural landlocked areas. Worldwide, inland capture fisheries accounts for 7.8% of the total fish production. An analysis of the inland fisheries production trend (**Fig. 1**) showed that from 2008 to 2012, production has stagnated to 180,000 metric tons (MT) falling short of the FAO estimated predictive yield of about 250,000 MT for freshwater resources.

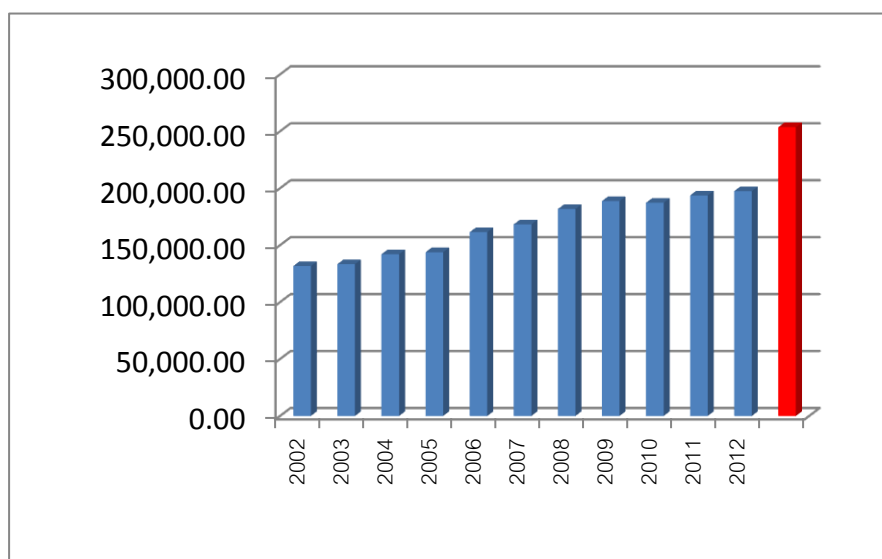


Fig. 1. Production trend in inland capture fisheries (in metric tons)

Philippines National Inland Fisheries Enhancement Program

The Philippine Bureau of Fisheries and Aquatic Resources (BFAR) has been implementing a National Program on the Fisheries Enhancement of Inland Waters, covering 36 minor lakes and 320 small reservoirs in the 16 regions of the country (**Fig. 2**). This Program aims to rehabilitate/restore the physical conditions of minor lakes and reservoirs; enhance the fisheries; and repopulate the indigenous species in support of biodiversity conservation, poverty alleviation and food sufficiency. The Program has five major components, namely: (1) **Social Preparation and Capacity Building** which include organization of management teams (regional focal persons) and strengthening of the fisherfolk beneficiaries; (2) **Resource Profiling** (Validation of Project Sites, Upgrading of Regional Water Quality Laboratories, Water Quality and Productivity Profiling); (3) **Habitat Restoration** (e.g. clearing of aquatic weeds, buffer zone rehabilitation, , monitoring and evaluation); (4) **Rationalized Fisheries Enhancement** (using food base approach to pen water stocking through establishment of habitat structures as specific management areas (in coordination with local government units) and culture-based open water fisheries; and (5) **Monitoring and Evaluation** (fish production/catch survey).

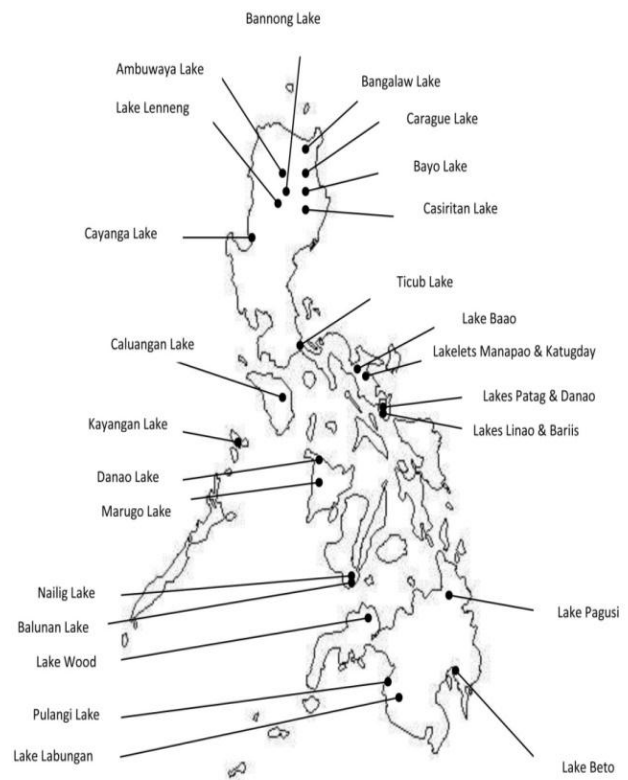


Fig. 2. Map of the Philippines showing the location of priority lakes for the National Inland Fisheries Enhancement Program

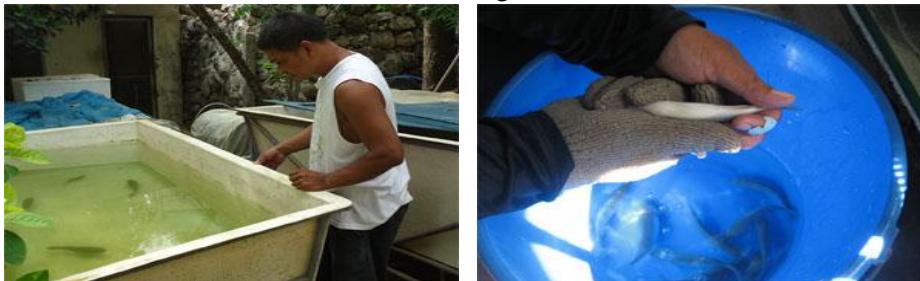
On-going Inland Fisheries Enhancement Activities

Table 1 shows the ongoing inland fisheries enhancement activities under the National Inland Fisheries Enhancement Program. Some constraints and challenges have been encountered during the conduct of the enhancement activities. These include the need to: harmonize the legal and juridical mandates between BFAR and the

local government units (LGUs), enhance the management skills of fisherfolks as these are still very inadequate, ensure sufficient supply of fingerlings, establish the source of indigenous species, and improve the accessibility of the pilot sites.

Strategies and Interventions

- ☉ Establishment of a national center for indigenous fishes







- ☉ Establishment of gene bank for commercially important indigenous fishes.
- ☉ Development of breeding protocols for low trophic species
- ☉ Repopulation, management and conservation of indigenous fishes



- Development of a network of satellite regional government hatcheries and private hatcheries to supply the fingerling requirements



Table 1. Inland fisheries enhancement activities conducted by BFAR

Region	Location of Pilot Sites	Activities
Cordillera Administrative Region	Ambuklao Dam and Binga Dam, Benguet Province	<ul style="list-style-type: none"> Water quality monitoring Fish culture management Open water stocking Repopulation of indigenous fish species
Region II	Magat Dam	 <ul style="list-style-type: none"> Water quality monitoring Fish culture management Open water stocking Repopulation of indigenous fish species Establishment of Magat Inter-agency Task Force
CARAGA Region	Lake Mainit, Surigao	 <ul style="list-style-type: none"> Management of goby fishes Capacity building
	Lake Mahucdam, Surigao	 <ul style="list-style-type: none"> Water quality profiling Establishment of brush park (proposed) Open water stocking
Region IV-A	Bal-on Reservoir, Quezon Province	<ul style="list-style-type: none"> Habitat restoration
	Six river sanctuaries in Rizal Province	<ul style="list-style-type: none"> Maintenance of fish refuge Open water stocking
	Laguna de Bay	<ul style="list-style-type: none"> Maintenance of municipal fish sanctuaries Control of invasive species
	Seven lakes of San Pablo City and Tadalak Lake, Laguna	 <ul style="list-style-type: none"> Capacity building Open water stocking
	Dagatan Lake, Quezon Province	<ul style="list-style-type: none"> Habitat restoration Buffer zone rehabilitation Water quality monitoring Maintenance of fish refuge Fisheries repopulation



Restoration of Dagatan Lake and its Fisheries – A success story

Dagatan Lake is a 7-ha freshwater lake located at 13° 44' N and 121° 18' E in San Antonio, Quezon Province, Luzon Island. In spite of its small size, the Lake plays a significant role in biodiversity being one of the last remaining frontiers for some indigenous freshwater fishes like the native catfish *Clarias macrocephalus*. The Lake had been covered with thick aquatic vegetation posing serious problem on the conservation of the native species that prevented any economic activity. The physical restoration of the Lake and reconstruction of its fisheries had serious challenges and called for the harmonization of legal and juridical mandates between BFAR, national agencies mandated under the Philippine Fisheries Code for the management and conservation of the fishery resources, LGUs with jurisdiction over the Lake under the Philippine Local Government Code, and the fisherfolk beneficiaries. Restoration of the Lake was finally achieved through collaborative efforts that facilitated the pooling of funds and resources; mobilization of the local communities and application of technical tools to revive the Lake to its natural physical state; reconstruction of its fisheries through managed open water stocking of indigenous fishes; improvement of the coastal buffer zone by planting of freshwater mangrove trees; and organization of the Municipal Fisheries and Aquatic Resource Management Council for capacity building. The restoration and management of the Lake not only led to revival of its fisheries but also expansion of its water resource services to provide irrigation and development of eco-tourism activities.



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