



## SEAFDEC/AQD Institutional Repository (SAIR)

Title	Stock assessment of commercially important fishes in Naujan Lake.
Author(s)	Pasumbal, Ramelo A.; Perez, Cirila T.
Citation	Pasumbal, R.A. and Perez C.T. (2001). Stock assessment of commercially important fishes in Naujan lake. In CB Santiago, ML Cuvin-Aralar and ZU Basiao (Eds.). Conservation and Ecological Management of Philippine Lakes in Relation to Fisheries and Aquaculture (pp 99-107). Southeast Asian Fisheries Development Center, Aquaculture Department, Iloilo, Philippines; Philippine Council for Aquatic and Marine Research and Development, Los Baños, Laguna, Philippines; and Bureau of Fisheries and Aquatic Resources, Quezon City, Philippines.
Issue Date	2001
URL	<a href="http://hdl.handle.net/10862/827">http://hdl.handle.net/10862/827</a>

This document is downloaded at: 2013-07-02 06:54:16 CST



# Stock Assessment of Commercially Important Fishes in Naujan Lake

Ramelo A. Pasumbal and Cirila T. Perez

DA-RFU IV-STIARC-ROS for Marine/Brackishwater Development Zone  
San Jose I, Naujan, Oriental Mindoro

Pasumbal RA and Perez CT. 2001. Stock assessment of commercially important fishes in Naujan lake, pp 99-107. *In* CB Santiago, ML Cuvin-Aralar and ZU Basiao (eds.). Conservation and Ecological Management of Philippine Lakes in Relation to Fisheries and Aquaculture. Southeast Asian Fisheries Development Center, Aquaculture Department, Iloilo, Philippines; Philippine Council for Aquatic and Marine Research and Development, Los Baños, Laguna, Philippines; and Bureau of Fisheries and Aquatic Resources, Quezon City, Philippines. 187 pp.

## Abstract

The study aimed to assess the capture fisheries of Naujan Lake with emphasis on commercially important fish species and to determine the extent of their exploitation.

Four major fish landing centers in the municipalities of Socorro, Pola, Victoria and Naujan were surveyed from May 1995 to December 1996. Eight types of fishing gear had been recorded. The most commonly used was gill net or 'pante', followed by fish pot 'bubo', fish corral 'baklad', spear 'salapang', spear gun 'pana', fish trap 'patanga', encircling net 'takilis' and long line 'kitay'.

Tilapia comprised 61% of the total fish production of the lake, followed by therapon (16%), goby (4%) and mudfish (2%). The other species caught were 'pla salid', catfish, mullet, carp, milkfish and shrimp, which contributed 17% to the total production. Migratory fishes like the mullet and milkfish, on the other hand, showed a declining trend in production.

## Introduction

Naujan Lake is one of the most important lakes in the Philippines. It is the fifth biggest lake with a total area of 8.125 ha covering the municipalities of Naujan, Victoria, Pola and Socorro. The lake supports thousands of fisher folk who are mostly dependent on fishing as a means of livelihood. This major freshwater resource in the province of Mindoro Oriental, is presently under the National Integrated Protected Area System (NIPAS ACT R.A. No. 7586) and is being supervised and managed by the Protected Area Management Board (PAMB) of the Department of Natural Resources (DENR-CENRO) in Pasi, Socorro.

Some of the studies conducted on the lake were mostly on assessment and production trends for endemic, exotic and migratory fishes. In 1970 the fish yield for Naujan Lake was 274 mt (Reyes 1978); in 1980, 765 mt (Mercene and Alzona 1984); and in 1990, 123 mt (Enriquez and Pasumbal 1994). Yield for migratory fishes such as caranx, mullet, milkfish, eel and snapper was 61 mt (Reyes 1978) and 17 mt (Mercene and Alzona 1984) in 1970 and 1980, respectively. This means

that fish production in Naujan Lake is declining. It is therefore imperative to determine the present condition of Naujan Lake resources.

The general objective was to assess the capture fisheries of Naujan Lake with emphasis on commercially important fish species and the extent of their exploitation. Specifically, the study aimed to determine the production trends and catch composition of fish species per gear, to assess the relative abundance of fishes caught, and to recommend necessary policies and regulations for the conservation and management of the lake.

## Methods

The project covered four major landing centers (Fig. 1) in the municipalities of Naujan, Victoria, Pola and Socorro. Four data gatherers were hired to help conduct the surveys. Sampling was done ten times a month at two-day intervals. Pertinent data were taken from actual observation and interviews conducted during sampling time and recorded in the prescribed survey forms. Data were consolidated and analyzed.

## Results and Discussion

### Fisherfolk census

Table 1 shows the population of the four municipalities with the coastal population found along the lake and the number of fishermen benefited by the lake. Naujan showed the most number of fishers (208) while Pola had the least (18).

**Table 1. Population of four municipalities bordering Naujan Lake (1995)**

Municipality	Total population	Total coastal Population	Number of fishermen
Naujan	75,726	1,974	208
Victoria	35,828	6,622	119
Socorro	34,182	4,177	91
Pola	29,156	1,309	18
Total	174,892	14,082	436

### Monthly fish catch and species distribution

Table 2 shows the monthly fish catch in Naujan Lake. Peak production in 1996 was observed during the rainy season (May to October). Tilapia *Oreochromis* spp. were the dominant species with 61% of the total fish catch. The other species in the order of their abundance were therapon *Therapon* spp. (16%), goby *Glossogobius* spp. (4%), 'pla salid' *Trichogaster* spp. (2%) and mudfish *Ophicephalus striatus* (2%). Mullet *Mugil cephalus*, catfish *Clarias macrocephalus*, carp *Cyprinus* spp. and shrimp *Macrobrachium* spp. contributed 15%. Production of migratory fishes like mullet, milkfish, caranx, snapper and spade fish has declined from 62 mt in 1970 (Reyes 1978) and 17 mt in 1980 (Mercene and Alzona 1984) to 3 mt (mostly mullet) in 1996.

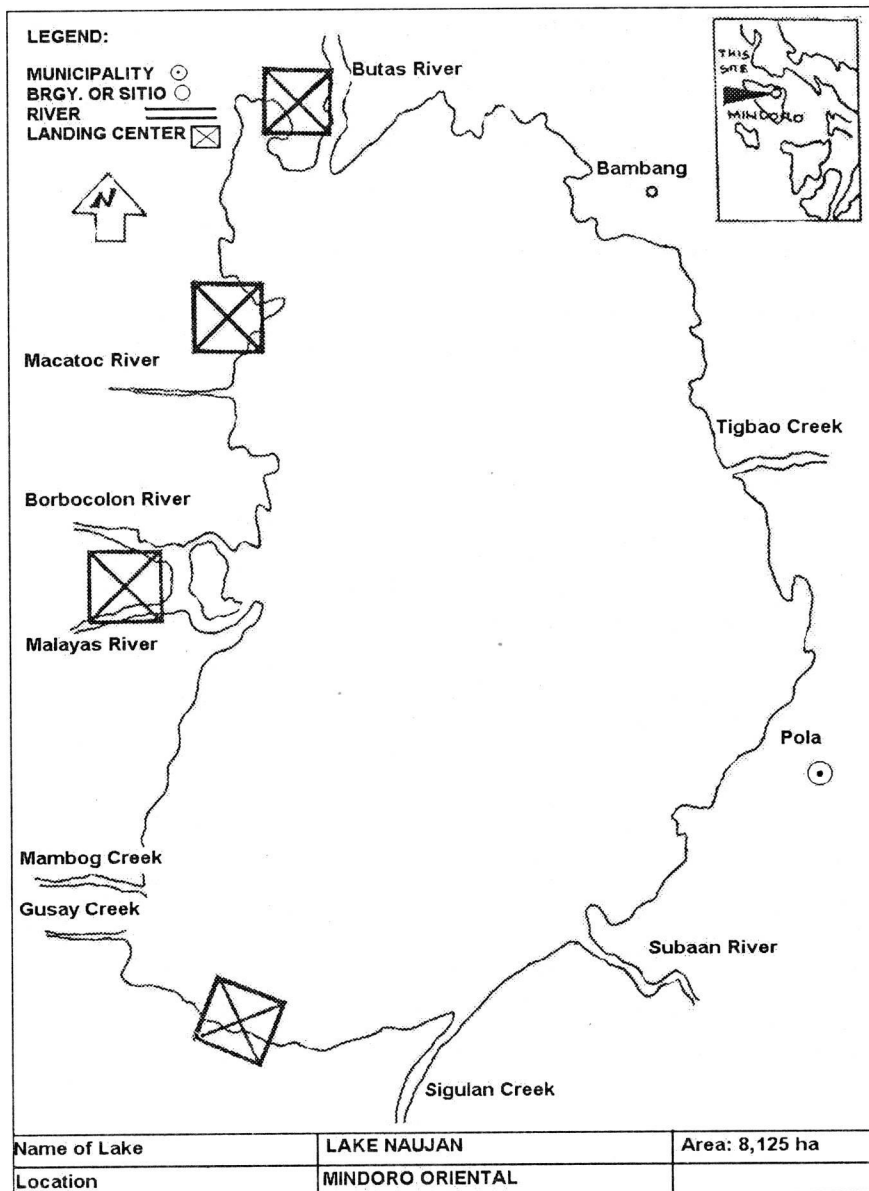


Fig 1. Naujan Lake showing fish landing centers

Based on the 1970 and 1980 fish catch (Reyes 1978; Mercene and Alzona 1984), mudfish and goby were the dominant species in the lake. Present results showed tilapia as the major species which was introduced only in 1989.

### Fish catch by fishing gear and landing center

Based on the study, the largest volume of fish was caught by gill net at 348 mt or 50%, followed by fish pot (111 mt or 16%), encircling net (106 mt or 15%), and fish trap (87 mt or 13%) (Table 3). Figure 2 shows the various types of fishing gears used.

Among the four major landing centers, Bayani had the highest landed catch at 229 mt or 33.2%; followed by Malabo (210 mt or 30.4%), Doungan (147 mt or 21.2%) and Pasi (105 mt or 15.2%) (Table 4).

**Table 2. Fish catch landed (kg) by month for different species at Naujan Lake, 1996**

Month	Tilapia	Mudfish	Shrimp	Goby	Gourami	Pla salid	Catfish	Mullet	Carp	Milkfish	TOTAL
Jan	5,671	794	6,820	1,413	95	3,999	9	167	-	-	18,968
Feb	5,494	306	11,007	2,140	1,724	3,653	38	-	40	-	24,402
Mar	5,058	3,398	8,883	5,827	917	11,175	77	-	176	-	35,511
Apr	18,366	1,503	6,019	335	294	4,686	57	-	-	-	31,260
May	45,371	3,930	12,773	2,014	412	8,952	265	-	-	-	73,717
Jun	53,604	945	4,913	2,039	401	12,321	311	139	133	-	74,806
Jul	53,339	614	7,216	3,036	892	10,268	153	529	162	-	76,209
Aug	42,373	78	4,526	2,860	25	12,451	52	170	46	6	62,587
Sep	72,563	439	2,919	1,979	3,014	11,544	116	633	-	-	93,207
Oct	74,276	1,082	5,047	2,870	1,869	11,841	143	942	-	-	98,070
Nov	24,335	1,056	10,890	2,156	1,279	8,247	-	229	90	-	48,282
Dec	22,366	1,750	14,410	2,287	361	11,871	181	15	553	-	53,794
<b>TOTAL</b>	<b>422,816</b>	<b>15,895</b>	<b>95,423</b>	<b>28,956</b>	<b>11,283</b>	<b>111,008</b>	<b>1,402</b>	<b>2,824</b>	<b>1,200</b>	<b>6</b>	<b>690,813</b>
<b>%Distribution</b>	<b>61</b>	<b>2</b>	<b>14</b>	<b>4</b>	<b>2</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>100</b>

**Table 3. Fish catch landed (kg) by gear and species at Naujan Lake, CY 1996**

Fish	Encircling										Total
	Gillnet	Fish pot	Fish corral	Spear	Fish Trap	Spear gun	net	Long line			
Tilapia	214,098	385	12,527	3,417	87,293	13,177	100,519				431,031
Mudfish			60	1,793		23	5,266	5,829			13,356
Shrimp											95,423
Goby	11,675	95,423						428			28,237
Gourami	11,147	16,134									11,147
Pla salid	106,187										106,187
Catfish	1,274							128			1,402
Mullet	2,824										2,824
Carp	21		150	86		767	176				1,200
Milkfish	6										6
Total	347,617	111,557	12,737	5,296	87,293	13,967	105,961	6,385			690,813
% Distribution	50	16	2	1	13	2	15	1			100

**Table 4. Fish catch landed (kg) in various landing centers at Naujan Lake, CY 1996**

Landing Centers	Month												% Distribution	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Malabo	8,453	9,252	24,402	7,569	15,904	18,113	21,793	12,583	23,465	38,523	14,057	15,745	20,9859	30.38
Pasi	2,483	4,087	4,467	6035	8,775	13,514	11,196	18,723	7,548	10,216	8,661	9,045	10,4750	15.16
Doungan	3,803	6,602	629	9,609	22,466	15,800	11,673	18,150	25,697	8,021	9,577	15,006	14,7033	21.28
Bayani	4,229	4,461	6,013	8,047	26,572	27,379	31,547	13,131	36,497	41,310	15,987	13,998	22,9171	33.17

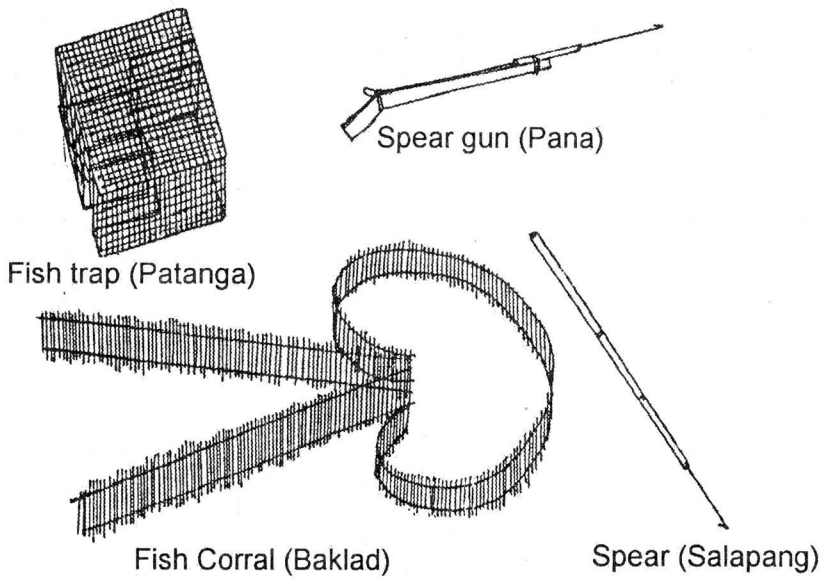
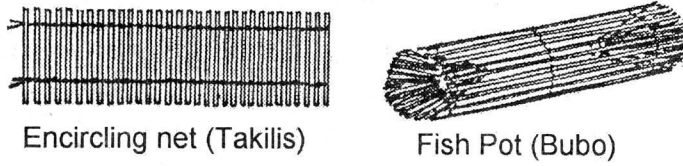
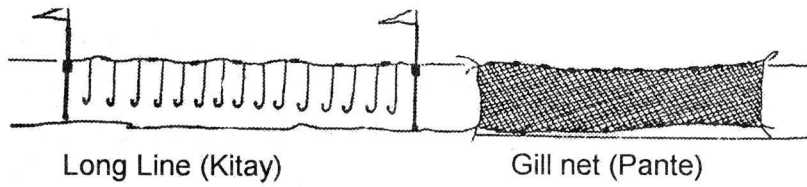


Fig. 2. Common fishing gears used in Naujan Lake

Table 5 shows the catch per unit effort of each fishing gear operated using motorized or non-motorized boat. Fishing on motorized boats using encircling nets had the biggest volume of fish per fishing activity at 13.19 kg followed by gill net (2.59 kg) and fish trap (2.25 kg). Based on the survey, gillnet fishing is the most commonly used method but did not show the highest fish catch. A similar trend was seen for non-motorized boats where encircling net fishing gave the biggest volume of catch per fishing activity at 6.87 kg followed by spear fishing (1.81 kg) and gill net fishing (1.60 kg).

The species composition of landed catch per fishing gear in Naujan lake is presented in Table 6. Tilapia were caught using almost all types of fishing gears except fish pot and longline. Other species were mainly caught by gill net.

**Table 5. Average catch (kg) per actual fishing activity of both motorized and non-motorized boat**

Fishing Gear	Motorized boat				Non-motorized boat			
	1995	1996	Mean	Rank	1995	1996	Mean	Rank
Gill net	1.67	3.51	2.59	2	1.33	1.87	1.60	3
Fish pot	0.81	0.84	0.83	7	0.6	0.73	0.67	8
Fish corral	0.44	2.10	1.27	6	0.67	2.37	1.52	4
Spear	-	-	-		2.66	0.96	1.81	2
Spear gun	1.04	1.89	1.47	5	1.35	1.67	1.51	5
Fish trap	0.91	1.34	2.25	3	0.54	0.93	0.74	3
Encircling net	6.84	19.54	13.19	1	-	6.87	6.87	1
Long line	-	1.63	1.63	4	0.74	1.22	0.98	4
<b>T O T A L</b>	<b>11.71</b>	<b>30.85</b>	<b>23.23</b>		<b>7.89</b>	<b>16.62</b>	<b>15.70</b>	

**Table 6. Species composition (%) of landed catch using different fishing gears, CY 1996**

Fishing Gear	Tilapia	Mudfish	Shrimp	Goby	Gourami	Ayungin	Catfish	Mullet	Carp	Total
Gill net	61.6	0.1		3	3	31	0.3	1		100
Fish pot			86	14						99
Fish corral	98.3	0.5							1.2	100
Spear	64	34							2	100
Spear gun	100									100
Fish trap	94								6	100
Encircling net	95	5								100
Long line		91		7			2			100



### Seasonal abundance

Five fish species - tilapia, therapon, goby, 'pla solid' and mudfish were commonly caught throughout the year and their abundance varied from month to month (Fig. 3). Tilapia (*Oreochromis* spp.) were the most abundant species from April to October. *Therapon* were largely caught from April to December.

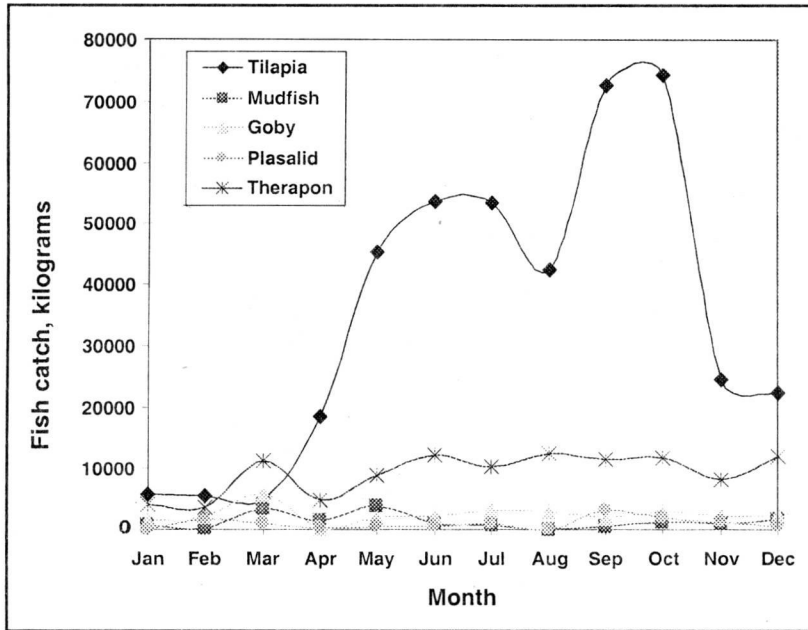


Fig. 3. Seasonal abundance of dominant fish species caught in Naujan Lake, CY 1996

### Conclusion and Recommendations

The study showed that the lake's total fish production has generally been fast declining. Moreover, the population of migratory fishes like mullet and milkfish has slowly diminished in Naujan Lake. It is therefore recommended that resource regeneration projects such as fish seeding should be done to replenish the declining fish stocks. It is likewise suggested that, through the Protected Area Management Board (PAMB), catching bangus and mullet should be banned for at least 5 years.

The survey also showed that use of modified spears or 'salapang' (i.e., combined with electro-fishing gadgets) is very destructive. It is recommended that this gear must be strictly prohibited in the lake.

We further suggest that Fish Warden and Resource Protection Officers be deputized to conduct regular patrolling operations in the area as well as in the four major landing sites to ensure effective implementation of these policies and regulations.

## References

- Enriquez CH and Pasumbal RA. 1994. A Preliminary study of Resource Assessment of Naujan Lake. Paper Presented in R & D In-House Review.
- Mercene EC and Alzona AR. 1984. A survey of Naujan Lake fisheries. Fisheries Research Journal of the Philippines, 9(1 & 2):
- Mercene EC and Nasino MP. 1992. An assessment of the goby fishery in Laguna de Bay, Philippines. The Philippine Journal of Fisheries, 23: 1-12.
- Montemayor JR. 1985. Field Reports. Updated information data and limnological characteristics of Philippine lakes. Fisheries Newsletter, 13, Jan. 1984- June 1985.
- Montemayor JR. 1991. IPAS Survey of Naujan Lake (DENR).
- Reyes TG. 1978. Limnological and fisheries survey of Naujan Lake. The Philippine Journal of Fisheries, 16(2): 61-74.