Israel, Danilo C.; Roque, Ruchel Marie Grace

Working Paper

Toward the Sustainable Development of the Fisheries Sector: An Analysis of the Philippine Fisheries Code and the AFMA

PIDS Discussion Paper Series, No. 1999-01

Provided in Cooperation with:
Philippine Institute for Development Studies (PIDS), Philippines

Suggested Citation: Israel, Danilo C.; Roque, Ruchel Marie Grace (1999) : Toward the Sustainable Development of the Fisheries Sector: An Analysis of the Philippine Fisheries Code and the AFMA, PIDS Discussion Paper Series, No. 1999-01, Philippine Institute for Development Studies (PIDS), Makati City

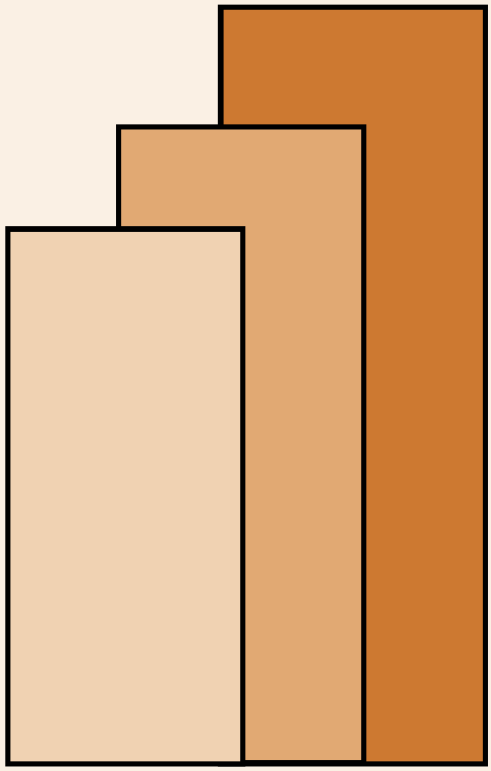
This Version is available at:
https://hdl.handle.net/10419/187387

Philippine Institute for Development Studies

Toward the Sustainable Development of the Fisheries Sector: An Analysis of the Philippine Fisheries Code and Agriculture and Fisheries Modernization Act

Danilo C. Israel and *Ruchel Marie Grace R. Roque*

DISCUSSION PAPER SERIES NO. 99-01



January 1999

For comments, suggestions or further inquiries please contact:
The Research Information Staff, Philippine Institute for Development Studies
3rd Floor, NEDA sa Makati Building, 106 Amorsolo Street, Legaspi Village, Makati City, Philippines
Tel Nos: 8924059 and 8935705; Fax No: 8939589; E-mail: publications@pidsnet.pids.gov.ph
Or visit our website at http://www.pids.gov.ph

Towards the Sustainable Development of the Fisheries Sector: An Analysis of the Philippine Fisheries Code and Agriculture and Fisheries Modernization Act

by

Danilo C. Israel
and
Ruchel Marie Grace R. Roque[*]

I. Introduction

The fisheries sector hosts some of the worst environmental problems of the Philippines. Because of this, it is a critical arena in the effort to attain a more sustainable form of development in the country.

The search for solutions to the environmental problems in the fisheries sector has been going on for years. Amidst the current economic crisis engulfing much of Asia, however, this task may have been relegated to some degree as national attention focuses on more pressing economic issues and resources are allocated to meeting immediate needs.

Notwithstanding the state of the economy, the sustainable development of the fisheries sector should remain a top priority. If the necessary measures to address this end are postponed, the environmental situation in the sector will further deteriorate, endangering not only the interests of its constituents but also the long-run prospects of the economy to recover from the crisis and eventually grow.

Recently, an important law, the Philippine Fisheries Code of 1998 (R.A. 8550), was enacted to develop, manage and conserve the fisheries and aquatic resources of the country (Congress of the Philippines 1998). Another law, the

[*] Ph.D. in Natural Resource Economics/Research fellow and research assistant, respectively, of the Philippine Institute for Development Studies, NEDA sa Makati Bldg., 106 Amorsolo Street, Legaspi Village, Makati City.

Agriculture and Fisheries Modernization Act of 1997 (R.A. 8435) or AFMA, was passed to revive, modernize and develop the agriculture and fisheries sectors (Congress of the Philippines 1997). These two laws are significant to sustainable development because they explicitly recognize the conservation, protection and sustained management of resources as a major objective in the fisheries sector.

Initial hopes were high that the Fisheries Code and AFMA will finally provide many of the answers to the sustainable development problems in the fisheries sector. Of late, however, the budget cuts spun by the economic crisis dampened some of the enthusiasm. It is feared that the reductions in government spending will lead to significant underfunding of the environmentally-related provisions and programs initiated by the two laws, which could eventually result to the underachievement of their intended objectives.

II. Objectives and Organization

The task of this paper is to study the Fisheries Code in relation to the objectives of sustainable development in fisheries. In particular, the paper will analyze the important environmentally-related provisions in the law and propose courses of actions which can already be undertaken to pursue them. In addition, the paper will identify gaps and problems which have been overlooked by the law and propose specific measures to address them. It is hoped that by doing so, the paper will help contribute to the more effective implementation of the Fisheries Code and, subsequently, the attainment of its sustainable development objectives.

Whenever appropriate, this paper will also look into the AFMA in relation to the Fisheries Code and the objective of sustainable development in the fisheries

sector. Relevant provisions in the AFMA will be analyzed in light of their significance in addressing environmental problems in fisheries.

The paper is organized as follows. The third section reviews the performance and administration of the fisheries sector and discusses its various development problems. The fourth section discusses the environmentally-related provisions in the Fisheries Code, as well as AFMA, identifies important gaps and concerns, and proposes possible courses of actions. The last section of the paper provides the conclusions.

III. Review of The Philippine Fisheries Sector

Natural Resources

The Philippines has a total water area of about 220.84 million hectares of which 99.62 percent is marine and only 0.38 percent is inland (Table 1). Of the total territorial marine water area, 26.60 million hectares or 12 percent are coastal and 193.40 million or 88 percent hectares are oceanic. The country has a total shelf area of about 18.46 hectares, a coral reef area of 27,000 square kilometers and a coastline of 17,460 kilometers.

The inland water resources of the country are composed of 338,393 hectares (40 percent) of swamplands, 253,854 hectares (30 percent) of fishponds, and 250,000 hectares (30 percent) of other inland resources. Of the swamplands, 106,328 hectares (31 percent) are freshwater and 232,065 hectares (69 percent) are brackishwater. Of the fishponds, 14,531 hectares (6 percent) are freshwater and 239,323 hectares (94 percent) are brackishwater. Lakes dominate the other inland resources comprising 200,000 hectares (80 percent) of the total while rivers and reservoirs comprised 31,000 hectares (12 percent) and 19,000 hectares (8 percent), respectively.

Human Resources

The fisheries sector has been a major source of employment and livelihood for a large section of the population, especially those residing in the rural coastal areas. As of 1996, it was estimated that the country has about a million fishermen and fish-farmers (Table 2). Of these number, 68.19 percent were in municipal fisheries, 26.09 percent were in aquaculture and 5.72 percent were in commercial fisheries. In addition, approximately 12 percent of the general population derive their livelihood from fisheries-related activities (Trinidad et al. 1993). This large and diverse constituency makes fisheries a politically important sector of the economy.

Production Performance

The overall fisheries sector has performed poorly in recent years (Tables 3 and 4). For the period 1987 to 1997, annual production growth rates were low, particularly volume wise. Moreover, growth rates were generally higher in the earlier years than in the latter years. Growth rates were positive but generally declining from 1991 to 1995, then turned negative thereafter. Value wise, the sector registered better growth rates due to the high prices of fish products.

Of the three subsectors, municipal fisheries performed the worst. Production in terms of volume fell since 1992 and meekly recovered only in 1997. The average annual growth rate for the 1987 to1997 period was likewise negative. The subsector was the most dominant producer in 1987 in both volume and value but was only second to aquaculture by 1997. In value, municipal fisheries has the lowest growth rates among the subsectors . In addition, it registered negative growth rates in 1993 and 1996.

The commercial fisheries performed a little better than municipal fisheries but, volume wise, its annual growth rates have been generally declining since 1990. Its average annual growth rate for the 1987 to 1997 period was only a little higher than that of municipal fisheries. In terms of value, however, the subsector has the highest average annual growth rate which, in some years, reached the two digit mark.

Aquaculture performed the best among the subsectors, registering higher annual growth rates and the highest average rate for the 1987 to 1997 period. From being the lowest producer in 1987, it became the highest producer in 1996. Aquaculture, however, showed negative growth rates in value since 1995, indicating that it is not free of problems. Furthermore, it registered a negative growth rate in volume in 1997.

The weak production performance of the fisheries sector is glaring when compared to GNP and crop agriculture (Tables 5 and 6). In general, both GNP and crop agriculture production grew faster than fisheries production during the 1987 to 1997 period. As a result, the share of fisheries production to GNP was getting smaller. Furthermore, from 1995 to 1997, the ratio of fisheries production to crop agriculture production went down. By 1997, fisheries production comprised only 3.2 percent of GNP, from a high of 5.61 percent in 1987. Likewise, fisheries production was only 29.17 percent of crop agriculture output, from a high of 40.23 percent in 1994.

The poor performance of the fisheries sector extends into the area of international trade. In the 1987 to 1997 period, imports of fishery products exceeded exports, in volume, which resulted to trade deficits (Tables 7 and 8). Due to high international prices for fish products, however, the value of exports exceeded that of imports during the same period resulting in trade surpluses. It is important to note

also that in both volume and value terms, net exports registered negative growth rates in some years.

A comparison of the growth performance of Philippine fisheries to those of other member economies of the Association of Southeast Asian Nations (ASEAN) shows that the country has been among the underperformers (Table 9). The average annual growth rate of production for the period 1988 to 1995 of local fisheries was only about 1.7 percent. In contrast, Indonesia and Malaysia averaged 4.41 percent and 4.12 percent, respectively, which are more than twice the local average rate. Even Thailand had a higher average growth rate of 2.36 percent, which was about twice the local rate.

The poor production performance of the fisheries sector is critical since fish is important to human health and nutrition, being the source of about 75 percent of the national animal protein requirement. This factor, and the growing population, insure that fish will continue to have high demand in the future. In recent years, the national fish requirement has expanded more than supply causing growing deficits over time (Table 10). Importation was intensified to meet the demand but, at best, this was partially effective only as the per capita availability of fish remains way below the requirement.

Fisheries Administration

A summary of the history of the administration of the Philippine fisheries sector is provided in Table 11. Formal administration dated back to the early part of the 20th century. Currently, the commercial fisheries and aquaculture subsectors are governed nationally through the Bureau of Fisheries and Aquatic Resources (BFAR) which falls under the Department of Agriculture (DA). The management of

municipal fisheries has been traditionally assigned to the local government units (LGUs) since the start of formal governance (Table 12). Even before the Fisheries Code, several important fishery laws were already passed. It should be noted that laws were already consolidated once before in 1975, through the Fisheries Decree or P.D. No. 704.

The BFAR, which used to be a staff bureau, was transformed into a line bureau with expanded duties and responsibilities through the Fisheries Code. A noted feature of the organizational setup of the current bureau is the existence of regional and provincial offices, which is in accordance with its role as a line agency (Figures 1 and 2). The regional and provincial agencies are bases for the research, extension, monitoring and other activities of the bureau at the local levels.

Development Problems

The poor production performance of the fisheries sector has been attributed to numerous and interrelated problems, summarized as follow (see Guerrero 1997, PCAMRD 1996b, BAR 1991):

a) Resource depletion in coastal waters

The fish stocks of the country, particular in coastal waters, are already seriously depleted due to effort overfishing and destructive fishing or the use of illegal fishing gears and techniques. The overall impact of effort overfishing on overall marine fishery stocks as well as on certain groups of species are empirically documented in numerous research literature (e.g., Barut et al. 1997, Israel and Banzon 1996, Pauly et al. 1989, Silvestre et al. 1986). It has been shown that marine stocks, particularly demersals and small pelagics, are already biologically and economically

overfished and that drastic reduction in fishing effort is needed to bring the rate of harvesting back to more sustainable levels.

In contrast to effort overfishing, there is little available empirical research on the use of illegal gears and techniques and their actual impact on marine fish stocks. A major reason for this is the scarcity of reliable secondary data on illegal fishing activities. The broadcast and print media, however, have documented from time to time the extent and magnitude of the impact of destructive fishing on fish stocks and ecosystems in particular problem marine areas, and found these to be serious.

b) Environmental damage in marine waters

The environment of a large portion of marine waters is already seriously damaged, as manifested by the destruction of coral reefs and mangroves, and the pollution of marine waters. Based on past surveys, only 30 percent of the total reefs of the country remain in excellent or good condition while the rest are in fair and poor condition (Gomez 1991). The major causes of the destruction of reefs are sedimentation and siltation as a result of land-based development activities as well as effort overfishing and destructive fishing (Gomez et al. 1994).

In the case of mangroves, it was pointed out that back in 1965, the total mangrove areas of the country covered about 4,500 square kilometers (Barut et al.). Ten years later, approximately 2,500 square kilometers were left. By 1981, the number fell even further to 2,500 square kilometers. The main cause of destruction is mangrove conversion to fishponds which accounts for an estimated 60 percent of total destruction (Primavera 1991). Other causes are mangrove harvesting for firewood and other uses, mangrove area conversion for residential, commercial, and general development purposes, such as the construction of coastal roads, dikes and bridges.

The pollution of marine waters is not yet evident at a national scale. However, in some bays located close to population centers, it has become a major problem. The most polluted body of marine water in the country is Manila Bay, which serves as the final drainage of the numerous towns and cities of Metro Manila. In 1990, it was estimated that at least 3,600 tons of refuse and 11 million gallons of industrial wastes annually already flow into the bay (Leonardo 1990). The continuous inflow of large volume of wastes over the years has made the bay unfit for swimming and related recreational purposes. It also rendered fishery catches from the bay questionable for human consumption, destroyed its valuable marine ecosystems, and harmed its overall aesthetic value.

c) Environmental damage in inland waters

The environmental damage in inland waters takes the form of dried-up and highly-polluted rivers and lakes. Although largely undocumented by scientific research, it can be seen by ocular inspection that many rivers in some watersheds are already either fully or partially waterless, especially in the summer months, because of deforestation in the uplands. This environmental problem has resulted in significant economic costs to the affected population, including decreased catch from inland fishing activities and decreased availability of water for irrigation. In addition, many of the rivers in the country which have flowing water all year round are polluted by wastes coming from upstream industrial, agricultural and other human activities. The pollution has not only damaged fish ecosystems and reduced catch but has limited the viability of rivers for washing, swimming and other uses.

Like many rivers, some lakes in the country are also highly polluted. A particular example is Laguna de Bay which has received significant attention in the research literature. The lake has been the receiver of all sorts of wastes from

industries, households and agricultural activities from a major portion of Metro Manila and back flows from the Pasig River (Orbeta and Indab 1994, Zaparalla 1994). As a result, the lake is currently polluted by an overdose of wastes, including those which are toxic and hazardous, which endanger the lives of residents in the surrounding communities. The pollution also jeopardizes the inland municipal fishery and aquaculture activities in the area by affecting output levels and rendering the fitness of lake produced fish questionable for human consumption .

d) Poverty among municipal fishermen

The sad economic plight of municipal fishermen who practice mainly artisanal fishing is well known. In 1994, it was estimated that at least 270,000 fishing households along coastal villages are among the poorest of the poor, with per capita incomes not even reaching one third of the poverty line (Saeger 1994). With the current economic crisis, municipal fishermen are expected to get even poorer as rising prices brought about by currency depreciation depress their effective incomes even further. Worse, the number of poor municipal fishermen could swell as some of the laid-off workers from the other sectors of the economy end up among their ranks and exacerbate further the already intense competition for fishery resources.

e) Low productivity of aquaculture

The aquaculture subsector has been saddled with numerous problems which hindered it from attaining higher productivity. These problems include scarcity of fry in milkfish culture, high cost of production inputs and diseases in prawn culture, and the red tide problem in mussel and oyster culture. In addition, it was reported that of the 261,402 hectares of brackishwater ponds in the country, 160,208 hectares (61 percent) are not utilized at all (BFAR 1996a). It was cited further that despite the achievements of brackishwater aquaculture research, the fishpond productivity per

unit in the country remain low (Saeger 1994). Compared to the average production of 4.0 tons per hectare per year of neighboring countries, the local average production of brackishwater ponds is low at 1.26 tons per hectare per year.

f) Underutilization of offshore and exclusive economic zone (EEZ)

Although the country has vast EEZ water areas (see Table 1), these have not been exploited to the fullest but remain largely underutilized by local fishermen. A major cause of this is the limitation in local capital investment among commercial fishermen, particularly in fishing equipment and technology (Thomas 1998). Many boats in the current commercial fishing fleet fall within the small and medium category and are not suitable for fishing in far flung areas.

Aside from the EEZ, commercial fishing is also weak in other deep sea areas, such as in the Pacific side of the country. This low local presence encouraged poaching by foreign fishermen, a concern which has not been satisfactorily addressed due to the poor vessel facilities and equipment of the Philippine Coast Guard (PCG). The Pacific ocean is also within the typhoon belt which makes commercial fishermen hesitant to fish in its deep waters. There have been reports that to some degree, off shore and deep sea areas are already overfished, but by international poachers (e.g., Barut et al. 1997). The challenge facing the local fisheries sector then is how to control poaching by foreigners and come up with the appropriate fishing equipment and technology to allow it to exploit these areas.

g) High post-harvest losses

High post-harvest losses are an important problem in fisheries because of its sheer magnitude. It was estimated that post-harvest losses amount to about 20 percent to 40 percent of total output (BFAR 1996b). The identified causes are improper handling and processing practices, and poor harvest facilities. For improper handling

alone, the economic costs are already tremendous. It was estimated that in 1993, at least 15 percent of all fish landings was subjected to spoilage resulting to total monetary losses of about P11.7 billion (Saeger 1994).

IV. The Philippine Fisheries Code, AFMA and Sustainable Development

The above listing of problems in the fisheries sector can actually be summarized into three important and intertwined development concerns: poor production, increasing resource depletion and environmental degradation and worsening poverty. In short, the challenge faced by the sector today is not just to raise output but to do it in a more sustainable and equitable way.

In this section, attention is focused on the Fisheries Code and AFMA and their provisions which are relevant to the objective of sustainable development in the fisheries sector. While the issue of equity is related to sustainable development, it is not addressed here so that attention is focused directly on environmental related issues and concerns. The section starts by presenting a background of the fisheries Code and the AFMA. Then it looks into the relevant provisions in both laws, identifying potential gaps and problems and then recommending actions to address said gaps and problems.

Background of The Fisheries Code and AFMA

The Philippine Fisheries Code was passed by the Senate and the House of Representatives on February 9, 1998 to consolidate previous laws in fisheries. The process of legislating the code took about 11 years, from the beginning of the term of President Corazon Aquino in 1987 until the end of the administration of President Fidel Ramos in 1998 (Thomas 1998). As the most recent law in the sector, the

Fisheries Code repeals or modifies all past related laws, decrees, executive orders, and rules and regulations which are inconsistent to it. It is now the binding law in the fisheries sector for all the areas that it covers.

The AFMA, on the other hand, was passed by the Senate on December 15, 1997 and the House of Representatives the following day. The main purpose of the law is to prescribe urgent measures for the modernization of the agriculture and fisheries sectors for profitability and in preparation for the challenges of the current international economic trend of globalization and liberalization. Like the Fisheries Code, the AFMA also repeals or modifies all laws, decrees, executive orders, and rules and regulations which are inconsistent to it.

As earlier mentioned, the Fisheries Code and AFMA are significant milestones because they explicitly recognize sustainable development as an important objective of Philippine society. Specifically, the Fisheries Code declared that the sustainable development, management and conservation of fishery and aquatic resources are both a policy and objective of the state (Congress of the Philippines 1998, pp 2-3). For its part, the AFMA pronounced that the state shall ensure the development of the agriculture and fisheries sectors in accordance with the principle of sustainable development (Congress of the Philippines 1997, p. 2). On the basis of these general pronouncements, the two laws already contributed so much by putting on equal footing sustainable development with the other objectives in fisheries. This is an important departure from previous laws which generally emphasized only on increased production as the overriding sectoral goal and placed secondary importance to sustainable development and other concerns.

Specific Provisions and Sustainable Development

An appropriate way to evaluate in detail the significance of the Fisheries Code and AFMA to sustainable development in the fisheries sector is to analyze their contributions to particular of environmental management. The areas to be considered below are natural resource pricing, delineation of property rights, monitoring and enforcement, use of command-and-control instruments and utilization of market-based instruments. Specific provisions in the laws which tend to strengthen the legal side of environmental management along these areas could significantly contribute to improved management and, thus, are steps in the right direction.

Natural Resource Pricing

The correct pricing of fisheries resources by the national government is a useful tool for attaining a more sustainable form of development in fisheries. This is because correct resource pricing, largely done through the imposition of accurate fees that reflect resource rents, or above normal profits, will force users to be more efficient in their activities. The end result will be a leaner and more competitive industry which produce higher outputs at lower effort levels, thereby reducing overfishing without sacrificing production. In addition to the economic and environmental gains of correct pricing, there are generated revenues from the extraction of rents from users, funds which the national government badly need in this time of crisis.

The commercial fisheries and aquaculture are the two subsectors where resource rents are potentially high and where correct resource pricing should be exercised. At present, however, the efforts of the national government to impose this management tool is lame. The current license fee rates in the commercial fisheries

are very low and were set many years ago (Tables 13 and 13a). For a 250 gross ton motorized boat, for instance, the annual boat license is only P1,000 which was set way back in 1983. In addition, the annual application fee is minimal at P400 or P2,000 which was determined back in 1993. The cash bond and the annual license fees for fishermen are likewise a pittance. All in all, the total cost to commercial operators for getting government approval to fish in commercial waters, for all types of boats, is negligible especially given the current prices.

In the aquaculture subsector, the situation is similar. The rental rates for using government-owned fishponds are minimal and were set several years ago (Table 14). The annual rental fee per hectare of fishponds is only P50 since 1979 while the annual application fee is P1,000 since 1993. The cash bond is also low at P50 per hectare. Again, the total cost to the user of leasing a government-owned fishpond per year is minimal, given current prices.

In the municipal fisheries subsector, where many fishing activities are artisanal, resource rents are expectedly low, if any. Therefore, extracting these from the fishermen may not be desirable and fair action. Currently, although no actual data can be presented here, the license fees imposed by LGUs on municipal fisheries are, on the average, reasonably low. In the future, if municipal resources are better managed and returns from municipal fishing increase, there may be a need to raise license fees in the subsector, both as a means of controlling fishing effort and generating much needed funds for the government.

It is encouraging to note that the Fisheries Code recognized the current underpricing of the rights to exploit commercial and aquaculture resources. The law alloted two important sections on the issue (Table 15). Section 6 stipulated that the rentals for government-owned fishponds and licenses for commercial fishing boats

should reflect resource rents. In addition, Section 7 required that the number of licenses and permits for the conduct of fishery activities be based on Maximum Sustainable Yield (MSY) and that preference be given to users residing in the local communities. In the case of the municipal fisheries, Section 6, however, simply required that LGUs impose the appropriate license fees.

The abovementioned provisions of the Fisheries Code are novel in that they explicitly embraced correct resource pricing as an important tool of fisheries management. The job at hand now is for the BFAR to immediately implement correct resource pricing in commercial fisheries and aquaculture. As an initial activity, the agency should determine the estimated resource rents and MSY levels in the two subsectors. The first phase of the Fisheries Sector Program (FSP) conducted studies to evaluate these parameters and the results should be put to good use by the agency. In addition, a substantial number of other studies are already done and these should be used as references for the purpose (Israel and Banzon 1996, PIDS 1995, Schatz 1991, Pauly et al. 1989, Silvestre et al. 1986).

Once the correct license fees in the commercial fisheries and rental rates in aquaculture are estimated, the next step is for the BFAR to firmly implement these rates with strong political will. A new Fisheries Administrative Order (FAO) may be needed to achieve this task after consultations are done with the various actors in the two subsectors and the general public.

Three things may have to be seriously considered in the application of new rates. Following the advice of Schatz (1991), the new rates can be increased on a staggered basis to soften opposition and allow adjustment by those who are affected. Periodic reestimation and adjustment of the rates, probably every two years, should be done to respond to the time factor and dynamism in the fisheries sector and economy.

The new rates will have to be imposed as soon as possible not only to help effect sustainable development goals but also to help the revenue generation efforts of the government caught in crisis. Additional funds generated through correct resource pricing will allow the government to operate more normally even in these tight times.

For fairness sake, it may be desirable to have funds generated through higher fee rates in the fisheries sector reinjected back to its sources through the conduct of sustainable development-related projects and programs in commercial fisheries and aquaculture. The present system of budget management that requires revenues from fees be forwarded to the national government, however, may make this type of earmarking difficult. In the future, a way to allow earmarking must be seriously studied by pertinent authorities as this may help soften the opposition to increased fees among fisheries resource users.

Delineation of Property Rights

The proper delineation of property rights, specially in the municipal fisheries, is important to sustainable development because when the long-term rights of fishermen and other users to marine resources are well defined and secure, they will tend to exploit them in a more sustainable manner. This will happen since fishermen are assured that the ultimate benefits of their practices and activities will accrue to them.

Traditionally, the municipal fisheries has been an open access subsector. Practically anyone can be a fisherman and fish as much as he wants with little government interference. The result of this free-for-all regime is the overexploitation of coastal fisheries which is not just ongoing in particular areas but even at the national scale.

The Local Government Code (LGC) of 1991 recognized the problem of overexploitation due to open access and started the process of legislating the proper management of municipal fisheries resources. It mandated LGUs to safeguard and conserve resources within their jurisdictions and devolved to them considerable management powers to do so (Congress of the Philippines 1991, Tabunda and Galang 1992). The Fisheries Code went further by also providing nongovernment organizations (NGOs) and other local organizations with powers to manage coastal resources. In particular, Sections 20 and 22 of the Fisheries Code provided for the granting to municipal folks, organizations and cooperatives of demarcated fishery areas for fish capture, mariculture and fish farming (Table 15). Furthermore, Sections 17 and 21 mandated that resident fisherfolks, organizations and cooperatives have the priority in the granting of fishery rights by the LGUs and in the exploitation of demarcated fishery areas of their respective communities.

As a whole, the provisions in the Fisheries Code granting fishery rights to local organizations have provided a general basis for a clearer delineation of property rights in the municipal level and are then welcome. The ball is now in the hands of the LGUs to appropriate these rights to fishermen and users in a socially equitable and environmentally sustainable manner. In the distribution of rights, LGUs must put utmost importance to the ability of organizations to sustainably manage municipal fisheries resources. To do this, LGUs must require proposals from organizations wanting to manage resources to include an environmental impact analysis which will serve as an important basis in the granting of fishery rights. This requirement must be implemented across all proposed projects with expected significant environmental impact.

While the Fisheries Code has clear positive contributions to property rights delineation, however, it also legislated a provision which is politically and socially controversial. In Section 18, the law allowed for some small and medium scale commercial fisheries operations in municipal waters within 10.1 to 15 kilometers from the shoreline, provided some conditions are met. This provision run counter to the LGC which provided that marine waters from the shoreline up to 15 kilometers away are the sole domain of the municipal fishermen.

The granting of rights to commercial fishing in areas within 10.1 to 15 kilometers from the coastline has strong advocates from both sides. Those in favor insist that it will allow the capture by commercial fishermen of fish in deeper waters which otherwise cannot be caught by the limited gears and techniques of municipal fishermen. Those who are against argue that it will merely exacerbate the overexploitation of resources and the social injustice already prevailing in the fisheries sector. They further insist that the area in contention serves as an important component of the whole coastal fisheries ecosystem and its overexploitation will surely damage and reduce municipal fisheries stocks.

Given the controversy created, the provision in the Fisheries Code granting rights to commercial fisheries to fish in the farther portions of municipal waters clearly deserves a second look. A study should be undertaken by BFAR to investigate the scientific merits of the issue, particularly its impact on fish stocks and the environment, among others. This study should provide a categorical answer and serve as basis for amending the contested provision, if the need arises. It should be noted that at present, the provision already sets a bad precedent in terms of legislative inconsistency in that it reverses the position of the LGC which is itself also a recent law.

At the level of the LGUs, care must be exercised by local executives in the granting of rights to commercial fishermen to fish in their waters. Where the granting of rights disregards environmental considerations and is based mainly on political factors, local organizations and residents must exercise their moral duty to strongly oppose this by all legally acceptable means.

Monitoring and Enforcement

Effective monitoring and enforcement are necessary for laws to have bite. This is more so in the fisheries sector where the covered area and constituency are large and widely distributed. It has been said many times that the Fisheries Sector has adequate laws but that failure lies mainly in monitoring and enforcement. The main reason posited for this is that fisheries agencies and law enforcement authorities such as the PCG do not have the financial and manpower resources to effectively monitor and enforce the laws given such enormous coverage.

Monitoring and enforcement is an area also covered by the Fisheries Code. The law mandated that monitoring and enforcement be a common responsibility of the national government, LGUs and the citizenry (Table15). For monitoring, in particular, Section 14 stipulated that the DA create a monitoring, control and surveillance system in coordination with the LGUs, other government agencies and the private sector to ensure fisheries management on a sustainable basis. Section 38 requires commercial vessels to gather catch data and other relevant information and submit them to the DA. Furthermore, Section 67 mandated the strengthening of the Fisheries Inspection and Quarantine Service for purposes of monitoring and regulating the importation and exportation of fishery resources.

For enforcement, on the other hand, Section 65 mandated the BFAR to enforce all laws, formulate and enforce all rules and regulations governing the conservation and management of fishery resources, except municipal waters. Furthermore, Sections 16, 73 and 77 required the LGUs and the municipal, city, and integrated fisheries and aquatic resources management councils (MFARMCs, CFARMCs, ICFARMCs) to conduct and assist law enforcement in municipal waters.

In general, the Fisheries Code has provided many of the legal requirements for an effective implementation of monitoring and enforcement. It can be noted, though, that the problem of limited wherewithal to undertake monitoring and enforcement has not been explicitly addressed by the law. Chapter VII, which stipulates the allotment of public funds to specific concerns, did not include any provision for monitoring and enforcement. It appears that The Code intends to address the problem of funds by sharing the burden of monitoring and enforcement with the LGUs many of which have financial problems of their own. Furthermore, involving the private sector in the effort is a rather new approach that has yet to be tested. While its participation could cut direct public costs, wholehearted private involvement requires incentives, something that may impose indirect, but also real, costs to the government

Without additional financial commitment, the task of monitoring and enforcement of the EEZ and other offshore areas, which fall outside of the reach of the LGUs and private organizations, will remain a particularly difficult task for the national law enforcement agencies. The government, therefore, should start to aggressively look for other less financially demanding options to effectively guard its offshore fisheries resources. A potentially attractive approach is to raise the issue of fisheries monitoring and enforcement at the international level, such as in the ASEAN, and see if a cooperative monitoring and enforcement system among

neighboring countries can be established. Given that other countries may have monitoring and enforcement problems of their own, a common effort that will distribute costs and raise effectiveness could be an attractive option for many of them.

Command and Control Instruments

The use of command and control instruments has been the prevalent approach in the environmental management of not only the fisheries sector but the entire country as well. Over the years, several FAOs have been executed to implement such instruments. The Fisheries Code consolidated these by allotting entire chapters and numerous sections on environmentally sensitive command and control instruments (Table 15). Chapter IV, which included Sections 80 and 81, stipulated that fishery reserves and sanctuary areas may be established by the government where commercial fishing will not be allowed. Chapter VI, which covered Sections 86 to 107, imposed violations on different sorts of infractions, including the use of illegal gears, exploitation of sensitive resources like corrals, illegal fishing in reserves, sanctuaries and other prohibited areas, and even aquatic pollution. Individual sections in other chapters also set rules on catch ceilings, closed seasons, foreign species, endangered species. Two important sections set certain requirements related to the operation of fisheries projects. Section 12 required the submission by the proponents of all environmentally sensitive fisheries projects to the DENR of an environmental impact statements (EIS). Section 13 required an environmental compliance certificates (ECC) from the same agency before a fisheries project which may have environmental impact can be undertaken.

For its part, the AFMA also contained a particular command and control provision which is advantageous to the fisheries environment. Section 12 of the law stipulated the preservation, at all times, of important watersheds, a move which should help lower the inflow of wastes from upland sources into coastal marine areas and improve the viability of rivers, lakes and other inland water bodies.

As an integration of past laws, the large number of command and control instruments in the Fisheries Code is expected. Sections 12 and 13 are another novelty and should contribute a lot to improved fisheries management by way of allowing the general application of the requirements of an EIS and ECC that were sparingly and selectively applied only in the past. These important provisions should go a long way towards helping attain the goal of a more sustainable form of development in the sector. Along this line, the DENR must work closely with the BFAR in immediately implementing Sections 12 and 13 among projects in the commercial fisheries and aquaculture subsectors. While not explicitly stated, it is clear that the provisions also cover the municipal fisheries and, hence, the DENR should likewise extend assistance to the LGUs in the implementation of the EIS and ECC requirements.

It is observed that the monetary rates for penalties mentioned in Chapter VI of the Fisheries Code for various infractions appear sufficient at present but these should be periodically reviewed by the BFAR so rates can be adjusted to reflect changes over time and other factors. Rates should be continuously adjusted to make them real deterrents to potential violators.

Market-Based Instruments

Other than command and control instruments, the goal of sustainable development in the fisheries sector can be pursued through the use of market-based instruments. The theoretical arguments supporting the use of market-based instruments are abundant in the literature (e.g., Pearce and Turner 1991) . Empirically, they have been found to work in particular countries, especially when combined with command and control instruments.

It is another important novelty that the Fisheries Code recognized the importance of market-based instruments as a tool in environmental management. Section 48 of the law stipulated that the DA should formulate incentives and disincentives, such as effluent fees, user fees, negotiable permits and other market-based instruments to encourage compliance to environmental standards and promote sustainable management practices in aquaculture. It is a wonder, however, why the commercial fisheries subsector is not covered by this provision. This is one area which may need reconsideration and amending.

The task at hand is for the BFAR to start working on the development of the appropriate market based instruments for the aquaculture subsector. For the environment, in general, several studies have already been done and these sources should be utilized by the agency in forming some instruments specific for fisheries (e.g., ADB 1997a, 1997b). Although the Fisheries Code did not mandate LGUs to implement market-based instruments in their areas, it goes without saying that the potential of such as a tool for management at the local level must be seriously explored.

Other Sustainable Development Related Issues

Aside from the areas which have direct bearings on environmental management considered above, there are other important issues which are also critical to the sustainable development efforts in fisheries and need looking into. These are as follows:

Institutional issues

Over the years, the administration of the fisheries sector at the national level has been moved from one department to another (Table 11). Since 1987, administration has been assigned to the DA through the BFAR, an arrangement reconfirmed by Section 64 of the Fisheries Code (Table 16). This classification of fisheries as under agriculture creates a potentially critical problem in terms of the environmental management of marine resources. It has been argued by some sectors that since the DA has a predominantly food production mandate, placing national fisheries administration fully under its wings may relegate the status of the sector as a critical natural resource and environment base.

The pronouncement of the current national administration to give priority to government streamlining in the near future in order to make governance more efficient provides a chance for this institutional question in fisheries management to be addressed once and for all. Little else can be said at this point except that a serious study must be undertaken that will look into the different possibilities for administering the fisheries sector. As a result, this study should provide the most feasible streamlining approach for the administration of the fisheries sector, given the different criteria agreed by all concerned parties.

Another environmentally important institutional issue brought about by the Fisheries Code is its creation of the national fisheries and aquatic resources management councils (NFARMCs), IFARMCs, CFARMCs, MFARMCs and barangay fisheries and aquatic resources management councils (BFARMCs) by virtue of Sections 70 to 79. Some sectors noted that the composition of these councils is highly skewed in favor of development over conservation. It can be seen, for instance, that only one representative from an NGO is allowed to sit in each of these councils. Moreover, the law did not specifically state that only environmentally-oriented NGOs should serve, allowing the possibility that the environmental lobby will not be represented at all.

On one hand, the above institutional issue may be considered contentious as it requires the assumption that the other non-NGO representatives to the councils are purely development-oriented, a premise that is open to debate. On the other hand, the dreaded situation can certainly happen. Thus, an amendment of the Fisheries Code may be necessary to ensure that the environmental lobby will be reasonably represented in the councils. A numerically clear voice that pursues environmental goals is needed in such councils with so much important management functions. Similarly, at the level of the LGUs which have the right to form the BFARMCs, local executives should make it a point that environmentally-oriented NGOs are well represented.

Research and development issues

Research and development (R&D) in fisheries has been beset with numerous problems which contribute to its poor performance as an engine of sectoral development (Israel 1998). Among the most important problems of fisheries R&D is

the low funding from the national government (Table 17). The share of fisheries R&D to the total national government expenditure of 0.03 percent is way below acceptable levels. Moreover, it is relatively too small in comparison to what has been afforded agriculture and natural resources (ANR) R&D budget as a whole.

Aside from budget, in terms of sustainable development, fisheries R&D has been biased against environmental research in favor of production-oriented activities as well (Table 18). For instance, resource economics and management studies comprised no more than 7 percent of the total socioeconomic and policy studies conducted so far in the fisheries sector.

To address the funding problems in fisheries R&D, Section 112 of the Fisheries Code legislated the creation of a P100 million fund for environmentally-sound, local resource-based and labor-intensive technology development (Table 16). For its part, Section 83 of the AFMA stipulated that R&D allocations for fisheries and agriculture be raised to at least one percent of the gross value added (GVA) by year 2001 although it is silent on the sharing of funds between the two sections. While some funding commitments were done by the two laws, the current economic crisis and government funding cutbacks puts into question the actual materialization of these commitments to fisheries R&D. Again, little can be said except to hope that the government should try its best to find funds not only to finance fisheries R & D but also the most important programs of the Fisheries Code and AFMA.

The problem of low attention to environmental and sustainable development issues by fisheries R & D could have been partly addressed by the Fisheries Code through Section 82 which created the National Fisheries Research and Development Institute (NFRDI) under the BFAR (Table 16). The objectives of the institute stated in Section 84, however, appear to be mostly development and socially oriented and,

queerly, do not specifically include the conduct of research related to the environment and sustainable development. Therefore, a lot still needs to be done to promote environmental research in fisheries. A potential way of achieving this is for the BFAR to specifically mandate, through an FAO, all research agencies under it to provide equal attention to sustainable development as a research concern. The Philippine Council for Aquatic and Marine Research and Development (PCAMRD) which plans, monitors and evaluates fisheries R&D and other research agencies, should, through their own channels, do the same thing.

Education issues

Formal fisheries education in the Philippines dates back at least four decades ago (Fernandez 1996). Yet, like R&D, it has been an ineffective tool of sectoral development. At present, there appears to be no dearth of fisheries schools in the country, as manifested, for instance, by the larger ratio of fisheries technical schools to their total number (Table 19). The problem, however, is that the schools have an inadequate number of teachers which are also generally poorly trained. Coupled with this are the inadequacy in facilities and other problems which have their roots in poor funding. Fisheries technical and vocational schools, for instance, only has not more than 15 percent of the total funding for all technical and vocational schools (Table 20). The ultimate end result is the production of many poorly trained and half-baked graduates, a sad consequence which may be true also for Philippine education in general.

In terms of sustainable development, the problem in fisheries education worsens since not only are the graduates poorly trained, their training has a mostly production biased-orientation. The curricula of fisheries courses of institutions

supervised by the Commission for Higher Education (CHED), for example, are generally short on environmentally-related courses (Tables 21 and 21a). Of the numerous courses offered, only about three touch on the environment and not one deals on fisheries environmental economics, an important course in the determination of optimal resource exploitation. This shortcoming is partly caused by the lack of qualified people to teach environment related courses and the traditionally production orientation of fisheries school administrators.

Both the Fisheries Code and AFMA alloted substantial sections to deal with the numerous problems in fisheries education. Section 115 of the former and Section 75 of the latter provided for the professionalization of fisheries graduates by requiring them to pass a board examination before they can practice their trade. Section 116 of the Fisheries Code also stipulated the upgrading of fisheries schools and colleges. Furthermore, Section 117 of the Fisheries Code and Section 67 of the AFMA stipulated the inclusion of fisheries conservation subjects in the curricula at the elementary and secondary levels. The problem of lack of sustainable development related courses at the technical and vocation as well as tertiary levels, however, has not been considered in both laws.

It is difficult to comment on a problem in fisheries that may simply be a microcosm of a bigger problem facing society. The professionalization of fisheries graduates is a step in the right direction although this will make fisheries education a lot more expensive to parents of fisheries students, many of whom belong to the lower economic brackets. To alleviate this additional economic pressure on the poor, the government must come up with a financial assistance system that will make the process of fisheries board examinations less economically taxing on parents.

Requiring elementary and secondary students to take fisheries conservation subjects may be too much since not all these people will join the fisheries industry someday. It would have been better if elementary and secondary students are just required to take general environmental conservation courses, not specific but including fisheries. At any rate, this part of the Fisheries Code may be amended to require the taking of more fisheries conservation subjects, specifically fisheries environmental economics and other relevant courses not currently offered, among technical, vocational and tertiary students taking fisheries related degrees.

Statistics and information issues

The availability of useful and comprehensive secondary data and information for use in R & D is a necessity for sustainable development. In Philippine fisheries, however, the data gathered by pertinent agencies like the Bureau of Agricultural Statistics (BAS) are mostly, if not all, production-oriented (Table 22). Statistics measuring environmentally relevant variables, even on a periodic basis, are generally not collected.

It is unfortunate that the Fisheries Code did not touch on the need to upgrade the quality of data and information gathered by government agencies. Sections 121 and 122 of the law merely addressed the issues of protection of sensitive technical information and assistance in collecting information. In comparison, the AFMA is more sensitive on the issue. Its Section 41 required the creation of a National Information Network (NIN) which, among others, shall provide fisheries information including resource accounting data.

The Department of Agriculture should make the gathering of secondary fisheries statistics and information more inclusive of environmental concerns, even if

only on a periodic, say five year, basis. This may be done through a Department Administrative Order (DAO) requiring the BAS, in coordination with other agencies, to do so. The BAS should be able to gather such statistics and information by including environmental parameters among those they regularly monitor in the field and by also looking into the data and statistics gathered by several NGOs conducting environmentally-related projects in the country.

Extension issues

As part of its program to transfer service delivery functions, the LGC devolved the responsibility of fisheries extension at the local level to the LGUs (Congress of the Philippines 1991, Tabunda and Galang 1992). This, however, created some problems as many LGUs do not have the resources to effectively perform the job of extension. In order to address this constraint, Sections 120 of the Fisheries Code and Title 3, Chapter 2 of the AFMA made the job of fisheries extension a shared responsibility of the national government and the LGUs.

Section 65 of the Fisheries Code also mandated the BFAR to assist LGUs in developing their technical capability to develop, manage, regulate, conserve and protect fisheries resources. This section take cognizance of the fact that fisheries extension over the years may have concentrated only in the propagation of production-oriented technologies and has disregarded sustainable resource use as an extension goal. This is another positive development which should be welcome to the environmental community.

The mere return of the involvement of the national government in fisheries extension does not mean that extension will now proceed smoothly and effective. The extension program in fisheries and agriculture in the country has been plagued by

numerous problems over the years, foremost of which are the lack of funding support and inadequacy in trained staff and facilities (e.g. Legaspi 1996). The budget of the BFAR should be increased so that its personnel and facilities, especially those in the regional and provincial offices, can be improved for the purpose of conducting effective extension together with the LGUs. If enough additional budget from the national government for extension will not be forthcoming, then the BFAR should devise means to generate budget for the purpose and this is where earnings coming from increased fees imposed on commercial and aquaculture resource users may be useful, if earmarking can be made possible in the future. Another option is for the BFAR to promote cooperation and streamlining of the extension activities of all government agencies and even the NGOs involved in the fisheries sector so that costs can be shared between all those involved.

Credit issues

Credit is critical in fisheries where many of the entrepreneurs may not have enough personal capital to venture into production operations on their own. Over the years, loans have been granted in fisheries but at a lower scale compared to agriculture. In general, the loan to output ratios of specific agricultural crops and of agriculture as a whole are greater than that of fisheries (Table 23). Livestock and poultry has a lower loan to output ratio than fisheries but forestry has a much higher one. A note of comfort is that the average growth rate of fisheries loans for the period 1987 to 1997 is greater than that for total agricultural loans (Table 24).

The Fisheries Code recognized the need for additional credit in the fisheries sector through Sections 109, 110, 111, 112 and 114 (Table 16). These sections mandated that funds be made available for credit to the municipal, commercial and

aquaculture subsectors. For its part, the AFMA, dedicated Chapter 3 on the issue of credit in agriculture and fisheries and established funds for the purpose. These promised monies, if indeed made available to their intended beneficiaries, should help address the problem of low credit for the fisheries sector.

There are numerous other reasons why fisheries credit is laggard and recommendations on how to address them are equally abundant (e.g., Caneda 1996). Suffice it to say that the national government and those involved in running the credit program in the country should take seriously the recommendations and act immediately on those which can be feasibly implemented now. Regarding credit and sustainable development, the implementors of the credit program should see to it that Sections 12 and 13 of the Fisheries Code are followed in the granting of credit, that is, implement the EIS and ECC requirements among borrowers. While these requirements may discourage some borrowers and hinder credit access in the short-run, the long-term gains to society in terms of sustainable development of the fisheries sector are clearly superior and must be desired.

Infrastructure issues

For the fisheries sector to fully develop, additional port and post-harvest facilities will be necessary. As earlier mentioned, the post-harvest losses in fisheries are substantial and lowering these to a minimum will do a lot to improve productivity.

The available data on fisheries facilities indicate that the country has a large number of ports and most of these are operating (Table 25). However, it has been pointed out that several coastal regions do not have regional ports and that many coastal municipalities do not have ports (Davila 1996). In addition, ice plants, freezers and cold storages are lacking in many areas. In some places where facilities

are available, these are underutilized because of the reduced landed harvest by the fishermen due to stock depletion.

The Fisheries Code acknowledged the problem of lack of infrastructure support in fisheries through Section 119 which stipulated the provision of additional infrastructure facilities which include not only ports and post-harvest facilities but also markets and farm to market roads. The law, though, is silent on how the provision of these additional infrastructure will be financed. Similarly, Chapter 6 of the AFMA mandated the provision of additional infrastructure facilities for agriculture and fisheries. It also mentioned in Section 111 that 10 percent of the initial annual allocation of the AFMA be allocated for the provision of such facilities. Hopefully, if the AFMA funds for infrastructure development are forthcoming, fisheries facilities may indeed be improved. Those regions and municipalities which are wanting in facilities should be afforded first priority, but subject to their capability to sufficiently produce and other selection criteria.

In terms of sustainable development, Section 119 of the Fisheries Code specified that the feasibility of providing additional facilities will also be analyzed based on their environmental impacts, which means that the EIS and ECC requirements will be imposed. To add to this, it is suggested that the DENR or the LGUs should require those managing all fisheries facilities which may have significant environmental impacts to hire pollution officers to take care of proper environmental management in these facilities.

Public awareness issues

Finally, there is no question that an enlightened populace can help a lot in the promotion of sustainable development in fisheries. This is because the environmental problems in the sector are not only caused by fisheries resource users but also by participants from other sectors and the general public as well. As mentioned, a lot of the marine pollution are caused by land-based industrial, commercial and household activities which are far related to the fisheries sector. To attain a more sustainable type of development in fisheries, there, it is necessary to make other sectors and the general public aware of the consequences of their actions on the environment and ways to mitigate said actions.

The Fisheries Code addressed the issue of public awareness through Section 118 which required the DA, CHED and the Department of Education, Culture and Sports (DECS), and the Philippine Information Agency (PIA) to undertake a nationwide educational campaign to promote, among others, the conservation and proper use of the environment. This is well said although the funds needed for the purpose is not specified in the law. Without additional funds, the agencies tasked to do this campaign have no recourse but to involve the private sector and to streamline their activities related to public education and awareness so that maximum effect at the least cost can be achieved.

V. Conclusions

In retrospect, the above review of the Fisheries Code and AFMA shows that the laws has made substantial contributions to the goal of sustainable development in the fisheries sector. It also demonstrates that even in the middle of the current economic crisis and the subsequent public deficits it has spawned, there are a lot of

things which can already be done based on the laws to promote a better and much improved environmental management in the sector.

Among others, the provisions of the Fisheries Code which require the imposition of correct resource pricing in the commercial fisheries and aquaculture, the submission and approval EIS and ECC for all projects, and the implementation of market-based instruments should be immediately implemented by the authorities. In addition, other provisions in the law relating to specific concerns related to fisheries sustainable development should be vigorously pursued. The benefits from the pursuance of these provisions will certainly go a long way towards improving environmental management in the sector.

While already helpful in its present form, The Fisheries Code has some contentious provisions which need to be reconsidered in light of the goal of sustainable development in the fisheries sector. In particular, the provision granting some access to commercial fishermen in municipal water needs to be seriously restudied and changed if found socially and environmentally disadvantageous. In some instances, the law also mandated the provision of certain public services which are environmentally desirable and yet provided little indication on how said activities will be funded. This limitation of the law cultivates the fear that it may eventually end up among the list of numerous outputs of the legislative system which cannot be effectively implemented due to gross underfunding.

To end, a categorical judgement of the contribution of the Fisheries Code to the goal of sustainable development cannot be done here. The final word on the law depends a lot on how it will be pursued by the agencies who will implement it and whether or not it will be wholeheartedly accepted by the constituency it aims to govern.

References

Asian Development Bank (1997a). Potential uses of market-based instruments for environmental management in the Philippines. Environment Division, Office of Environment and Social Development. 114 p.

_____ (1997b). Potential uses of market-based instruments for environmental management in the Philippines, the essentials. Environment Division, Office of Environment and Social Development. 26 p.

Barut, N. C., M. D. Santos and L. R. Garces. (1997). Overview of Philippine marine fisheries, p. 62-71. *In* G. Silvestre and D. Pauly (eds.). Status and management of tropical coastal fisheries in Asia. ICLARM Conf. Proc. 53, 208 p. ICLARM, Makati City.

Bureau of Agricultural Research (1991). National fisheries research program 1990-1994. Department of Agriculture, Elliptical Road, Diliman, Quezon City. 113 p.

Bureau of Agricultural Statistics (1997a). Fisheries statistics of the Philippines 1992-1996. Department of Agriculture, Quezon City. 77 p.

_____ (1997b). 1996 Philippine fisheries profile. Department of Agriculture, Quezon City. 48 p.

Bureau of Fisheries and Aquatic Resources (1996a). Main report on the Second National Workshop on Policy Planning and Industry Development. Quezon City. 278 p.

_____ (1996b). Fisheries sector development project report. Paper submitted to the Asian Development Bank and Department of Agriculture.

_____ (1989). A compilation of fisheries administrative orders. Department of Agriculture, Quezon City.

_____ (1995). Fisheries administrative orders (a compilation). Department of Agriculture, Quezon City. 190 p.

Caneda, L. (1996). Strategic/implementation plan and project ideas for fisheries credit, pp. 135-56. *In* Main report of the second national fisheries workshop on policy planning and industry development. Bureau of Fisheries and Aquatic Resources.

Congress of the Philippines (1998). The Philippine Fisheries Code of 1998. Republic Act No. 8550. 59 p.

_____ (1997). The Agriculture and Fisheries Modernization Act of 1997. Republic Act No. 8435. 39 p.

_____ (1991). The Local Government Code of 1991. Republic Act No. 7160. 270 p.

Davila, N. M. (1996). Strategic plan physical infrastructure for fisheries and aquaculture, pp. 90-4. *In* Main report of the second national fisheries workshop on policy planning and industry development. Bureau of Fisheries and Aquatic Resources.

de Jesus, C. C., L. G. Bondoc and A.G. Maghirang (1997). Policy research in the fisheries sector: Status, Direction and Priorities. Philippine Council for Aquatic and Marine Research and Development, Los Banos, Laguna.

Fernandez, P. M. (1996). Strategic/implementation plan and project ideas for fisheries education in the Philippines, pp. 166-76. *In* Main report of the second national fisheries workshop on policy planning and industry development. Bureau of Fisheries and Aquatic Resources.

Gomez, E. D. (1991). Coral reef ecosystems and resources in the Philippines. Canopy Int., 16 (5), pp. 1-12.

Gomez, E. D., P. M. Alino, H. T. Yap and W. Y. Licuanan (1994). A review of the status of Philippine reefs. *In* Mar. Polut. Bull., 29 (1-3), pp. 62-68.

Guerrero, R. D., III (1997). The sustainable development of Philippine fisheries resources. Philippine Council for Aquatic and Marine Research and Development, Los Banos, Laguna. 10 p.

Israel, D. C. (1998). Research and development in the Philippine Fisheries Sector. Philippine Institute for Development Studies. Draft Report.

Israel, D. C. and C. P. Banzon (1998). Overfishing in the Philippine marine fisheries sector. Economy and Environment Program for Southeast Asia (EEPSEA) Research Report Series. 32 p.

Legaspi, A. S. (1996). Strategic/implementation plan and project ideas on fisheries training and extension, pp. 157-65. *In* Main report of the second national fisheries workshop on policy planning and industry development. Bureau of Fisheries and Aquatic Resources.

Leonardo, L. (1990). Pollution in Metro Manila. *In* Philippine Development, Vol. XVII, No. 4, pp. 18-21.

National Statistical Coordination Board (1997). Philippine statistical yearbook.

_____ (1998). Inventory of ports.

Orbeta, E.V. and A.L. Indab (1994). Estimation of pollution loads and cost of preventing future water quality deterioration in Laguna Lake. Technical Report No. 2 of the MEIP Laguna de Bay Economic Valuation Study. 21 p.

Pauly, D., G. Silvestre and I. R. Smith. (1989). On development, fisheries and dynamite: brief review of tropical fisheries management. *In* Natural Resource Modelling, 3 (3), pp. 307-329.

Pearce, D. W. and R. K. Turner (1991). Economics of natural resources and the environment. The John Hopkins University Press, Baltimore, U.S.A.

Philippine Council for Aquatic and Marine Research and Development (1996a). An analysis of the R & D investment in the fisheries sector. Los Baños, Laguna.. 43 p.

_____ (1996b). National marine science research and development program. 27 p.

Philippine Institute for Development Studies (1995). Philippine mangrove resource valuation project. Fisheries Sector Program, Bureau of Fisheries and Aquatic Resources, Bureau of Agriculture. 82 p.

Primavera, J.H. (1991). Intensive prawn farming in the Philippines: ecological, sound and economic implications. *In* Ambio, 20, pp. 28-31.

Republic of the Philippines (Various Years). General Appropriations Act. 1990, 1991, 1992, 1993, 1994, 1995, 1996.

Silvestre, G., R. Regalado and D. Pauly (1986). Status of Philippine demersal stocks-inferences From underutilized catch rate data, pp.47-96. *In* D. Pauly et al. (eds). Resources, management and socio-economics of Philippine marine fisheries. Tech. Rep. Dep. Mar. Fish. Tech. Rep. 10: 217 p.

Saeger, J. (1994). Overview of Philippine fisheries: problems and potentials. 69 p.

Schatz, R. (1991). Economic rent study for the Philippine fisheries sector. Final Report.

Tabunda, M. s. and M. M. Galang. A guide to the Local Government Code of 1991. Mary Jo Educational Supply, Manila, Philippines.

Thomas, F. (1998). Advocacy paper on increasing competitiveness in the Philippine commercial fisheries industry. Paper presented at the Shangri-La's EDSA Plaza Hotel, Mandaluyong City. 26 p.

Trinidad, A. C., R. S. Pomeroy, P. V. Cruz and M. Aquero (1993). Bioeconomics of the Philippine small pelagics fishery. ICLARM Technical Report No. 38. Makati, Metro Manila.

Yap, Wilfredo (1997). Can the Philippines produce enough fish for the multitude?. *In* Aquaculture Asia, Vol. II No. 3, pp. 32-38.

Zafaralla, M.T. (1994). The dwindling fish productivity of Laguna de Bay: its relationship with water quality and primary productivity. Technical Report No.3 of the MEIP Laguna de Bay Economic Valuation Study. 17 p.

Table 1. Total aquatic resources of the Philippines, 1996

Resources	Length/ Area		% to Total
A. Marine Resources			
Total Territorial Marine Water Area (including the EEZ)	**220,000,000**	**ha**	**99.62**
a. Coastal	26,600,000	ha	
b. Oceanic	193,400,000	ha	
Shelf Area (Depth 200 m)	18,460,000	ha	
Coral Reef Area	27,000	sq. km.	
Coastline	17,460	km.	
B. Inland Resources			
Total Inland Water Area	**842,247**	**ha**	**0.38**
1. Swamplands	338,393	ha	
a. Freshwater	106,328	ha	
b. Brackishwater	232,065	ha	
2. Existing Fishpond	253,854	ha	
a. Freshwater	14,531	ha	
b. Brackishwater	239,323	ha	
3. Other Inland Resources	250,000	ha	
a. Lakes	200,000	ha	
b. Rivers	31,000	ha	
c. Reservoirs	19,000	ha	
Total Water Area	**220,842,247**	**ha**	**100.00**

Source: BAS (1997a)

Table 2. Estimated employment in fisheries, 1996

Sector	Number of Persons	%
Aquaculture	258,480	26.09
Municipal	675,677	68.19
Commercial	56,715	5.72
Total	**990,872**	**100.00**

Source: BAS (1997b)

Table 3. Philippine fish production, by subsector, 1987-1997

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Quantity (Thousand Metric Tons)											
All sectors	2,213.0	2,299.7	2,371.1	2,503.4	2,599.0	2,625.7	2,632.0	2,721.0	2,784.2	2,769.2	2,766.5
Commercial	591.2	600.0	637.0	700.6	759.8	804.9	824.4	859.3	893.2	879.1	884.6
Municipal	1,060.9	1,068.5	1,104.6	1,131.9	1,146.8	1,084.4	1,014.0	992.6	972.0	909.2	924.5
Aquaculture	560.9	599.5	629.3	671.1	692.4	736.4	793.6	869.1	919.0	980.9	957.4
Value (Million Pesos)											
All sectors	37,349.4	42,118.2	45,093.7	52,177.2	60,033.3	65,443.5	70,215.8	80,192.1	83,056.5	83,139.1	80,745.2
Commercial	9,820.7	10,270.0	11,033.4	12,410.6	15,244.6	16,800.6	18,021.2	20,714.5	23,065.4	24,555.3	25,935.3
Municipal	16,107.5	16,633.1	18,387.7	19,300.1	22,132.6	22,656.4	22,031.4	24,474.9	26,463.8	25,373.2	27,392.9
Aquaculture	11,421.2	15,213.0	15,672.6	20,466.5	22,656.1	25,986.5	30,163.2	35,002.7	33,527.3	33,210.6	27,417.0

Source: BAS (various years)

Table 4. Annual growth rates of Philippine fish production, by sector, 1988 -1997

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Average
Quantity (%)											
All sectors	3.92	3.10	5.58	3.82	1.03	0.24	3.38	2.33	-0.54	-0.10	2.28
Commercial	1.49	6.17	9.98	8.45	5.94	2.42	4.24	3.95	-1.59	0.63	4.17
Municipal	0.72	3.38	2.47	1.32	-5.44	-6.49	-2.11	-2.07	-6.46	1.68	-1.30
Aquaculture	6.88	4.97	6.64	3.17	6.35	7.77	9.51	5.75	6.73	-2.40	5.54
Value (%)											
All sectors	12.77	7.06	15.71	15.06	9.01	7.29	14.21	3.57	0.10	-2.88	8.19
Commercial	4.58	7.43	12.48	22.84	10.21	7.26	14.94	21.00	-2.03	5.62	10.43
Municipal	3.26	10.55	4.96	14.68	2.37	-2.76	11.09	8.13	-4.12	7.96	5.61
Aquaculture	33.20	3.02	30.59	10.70	14.70	16.06	16.12	-4.27	-0.94	-17.45	10.17

Source: Table 3

Table 5. Gross national product, crop agriculture production and fisheries production in the Philippines, 1987-1997

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Value (Million Pesos)											
GNP	665,443	782,069	905,459	1,071,433	1,254,562	1,374,838	1,500,287	1,736,382	1,958,932	2,261,339	2,526,891
Crop Agriculture	107,473	125,313	144,407	153,925	164,312	172,710	177,472	199,327	230,396	270,015	276,826
Fisheries	37,349	42,118	45,094	52,177	60,033	65,444	70,216	80,192	83,057	83,139	80,745
Ratios (%)											
Fisheries / GNP	5.61	5.39	4.98	4.87	4.79	4.76	4.68	4.62	4.24	3.68	3.20
Fisheries / Crop Agriculture	34.75	33.61	31.23	33.90	36.54	37.89	39.56	40.23	36.05	30.79	29.17

Sources: NSCB (1997), BAS (various years)

Table 6. Annual growth rate of gross national product, crop agriculture and fisheries production in the Philippines, 1988-1997

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Average
Value (%)											
GNP	17.53	15.78	18.33	17.09	9.59	9.12	15.74	12.82	15.44	11.74	14.32
Crop Agriculture	16.60	15.24	6.59	6.75	5.11	2.76	12.31	15.59	17.20	2.52	10.07
Fisheries	12.77	7.06	15.71	15.06	9.01	7.29	14.21	3.57	0.10	-2.88	8.19
Ratio (%)											
Fisheries / GNP Ratio	-4.05	-7.53	-2.22	-1.74	-0.52	-1.68	-1.32	-8.19	-13.29	-13.09	-5.36
Fisheries / Crop Agriculture Ratio	-3.29	-7.09	8.55	7.78	3.71	4.41	1.69	-10.39	-14.59	-5.27	-1.45

Source: Table 5

Table 7. Philippine exports, imports and net exports of fishery products, 1987-1997

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Quantity (Metric Tons MP)											
Exports	111,830	120,903	145,099	143,038	144,939	131,915	163,745	172,080	169,746	164,673	173,888
Imports	104,936	164,375	197,963	196,115	193,635	221,545	208,895	241,194	270,213	262,587	295,016
Net Exports	6,894	-43,472	-52,864	-53,077	-48,696	-89,630	-45,150	-69,114	-100,467	-97,914	-121,128
Value (Million Pesos)											
Exports	6,442	9,599	10,248	11,529	14,049	11,090	14,074	15,027	15,657	15,110	16,337
Imports	637	1,312	1,424	1,834	2,323	2,496	2,249	2,505	2,923	3,178	4,020
Net Exports	5,805	8,287	8,824	9,695	11,726	8,594	11,825	12,522	12,734	11,932	12,317

Source: BAS (various years)

Table 8. Annual growth rates of Philippine exports, imports and net exports of fishery products, 1988-1997

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Average
Quantity (%)											
Exports	8.11	0.20	-1.42	1.33	-8.99	24.13	5.09	-1.36	-2.99	5.60	2.97
Imports	56.64	0.20	-0.93	-1.26	14.41	-5.71	15.46	12.03	-2.82	12.35	10.04
Net Exports	-730.58	0.22	0.40	-8.25	84.06	49.63	-53.08	-45.36	2.54	23.71	-67.67
Value (%)											
Exports	49.01	0.07	12.50	21.86	-21.06	26.90	6.77	4.19	-3.49	8.12	10.49
Imports	105.97	0.09	28.79	26.66	7.45	-9.90	11.39	16.69	8.71	26.49	22.23
Net Exports	42.76	0.06	9.87	20.95	-26.71	-37.60	-5.89	-1.69	6.29	3.23	1.13

Source: Table 7

Table 9. Annual growth rates of ASEAN fish production, 1988-1995

Countries	1988	1989	1990	1991	1992	1993	1994	1995	Average
Brunei Darusalam	-47.85	13.52	1.38	-29.70	3.03	3.23	0.00	0.00	-7.05
Indonesia	8.18	5.48	3.25	6.82	5.84	5.70	0.00	0.00	4.41
Malaysia	-3.57	7.22	7.28	-2.65	12.96	4.49	2.36	4.91	4.12
Philippines	1.09	4.40	5.28	4.84	-1.92	-0.36	0.55	-0.31	1.70
Singapore	-9.81	-17.16	5.66	-1.87	-11.82	0.89	17.22	0.48	-2.05
Thailand	-4.77	2.01	3.19	6.51	9.17	2.80	0.00	0.00	2.36

Notes: Rates for the Philippines are different from those in Table 4 due to difference in data sources.
Source of basic data: FAO database

Table 10. Philippine fish requirement based on 36 kg per capita assumption, net supply, and shortfall, 1985-1994

Year	Requirement ('000 mt)	Supply ('000 mt)	Deficit ('000 mt)	Imports ('000 mt)	Per capita supply (kg)	
					W/O imports	With imports
1985	1,979	1,676	303	6	30.5	30.6
1986	2,019	1,755	263	33	31.3	31.9
1987	2,059	1,775	284	68	31.0	32.2
1988	2,100	1,790	310	117	30.7	32.7
1989	2,142	1,873	269	141	31.5	33.8
1990	2,185	1,937	248	131	31.9	34.1
1991	2,263	2,037	226	145	32.4	34.7
1992	2,313	2,013	300	145	31.3	33.6
1993	2,363	1,983	380	119	30.2	32.0
1994	2,413	1,966	447	124	29.3	31.2

Source: Yap (1997)

Table 11. National fisheries administration in the Philippines, 1907-1998

Agency	Year	Relevant Legislation
Fishery Section, Bureau of Government Laboratories	1907	
Division of Fisheries, Bureau of Science		
Fish and Game Administration, Department of Agriculture and Commerce	1933	GM Order No.4
Fish and Game Administration, Bureau of Science	1934	
Division of Fisheries, Department of Agriculture and Commerce	1939	GA Order No. 15
Bureau of Forestry and Fishery	early years of WW II	
Bureau of Fisheries (independent office)	latter years of WW II	
Bureau of Fisheries	1947	RA No. 177
Bureau of Fisheries Department of Agriculture and Natural Resources	1957	EO No. 216
Philippine Fisheries Commission Department of Agriculture and Natural Resources	1963	RA No. 3512
Bureau of Fisheries	1972	Integrated Reorganization Plan
Bureau of Fisheries and Aquatic Resources (BFAR) Ministry of Natural Resources	1974	PD No. 461
BFAR (staff bureau) Ministry of Agriculture and Food	1984	EO No. 967
BFAR (staff function fully implemented) Department of Agriculture	1987	EO No. 116
BFAR (line bureau) Department of Agriculture	1998	RA No. 8550 Fisheries Code

Note: GM means General Memorandum, GA, General Administrative, RA, Republic Act, EO, Executive Order and PD, Presidential Decree

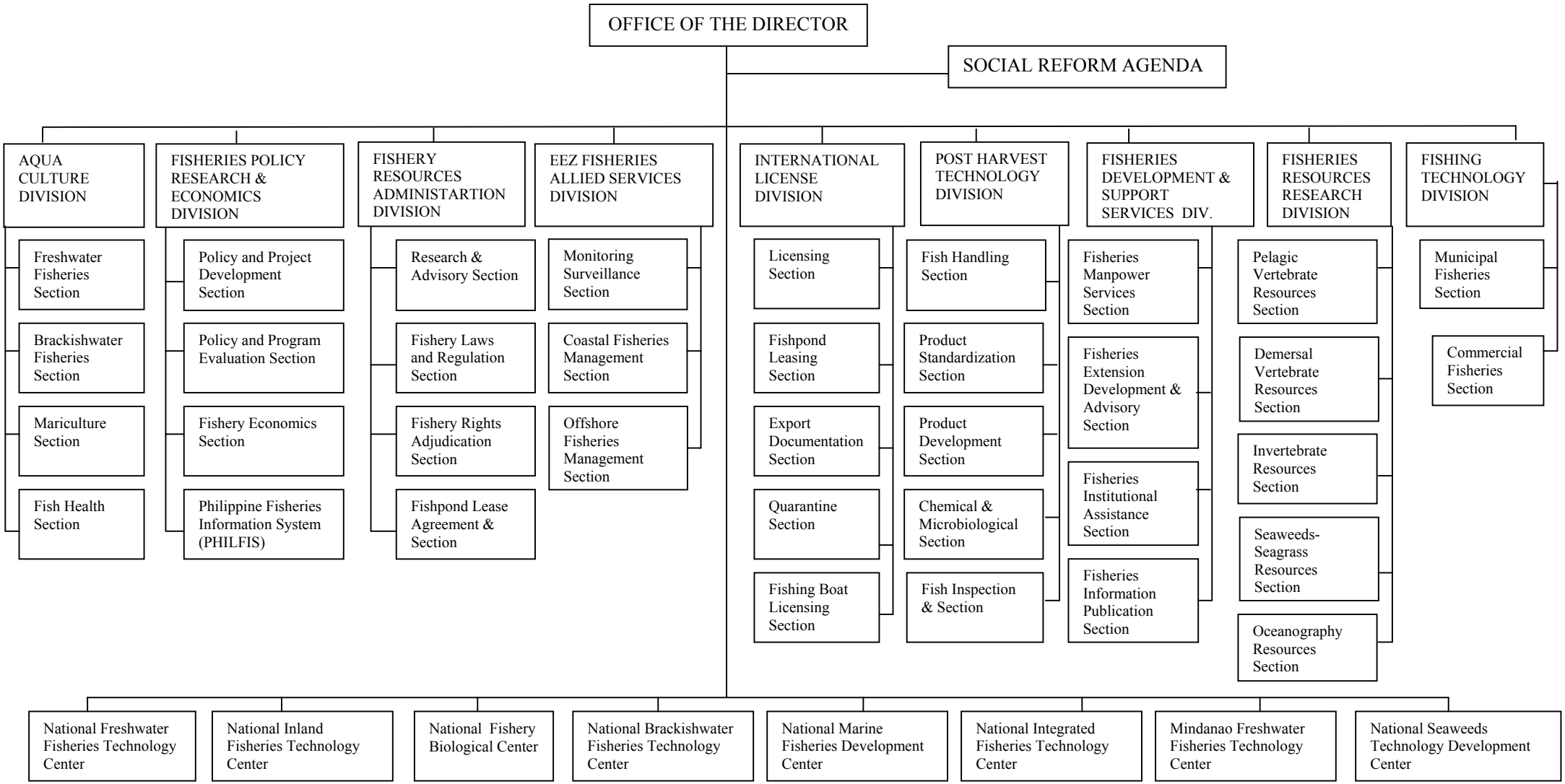
Source: BFAR Files

Table 12. Important legislation related to fisheries prior to the Philippine Fisheries Code

Legislation	Year	Important Provisions
CA Nos. 2657 and 2711	1917 and 1934	Gave the municipal councils the authority over the municipal fishing activities
		Renders precise the dual authority of the national and municipal governments to govern the fisheries
		Defined municipal waters as that water area 3 nautical miles from the shoreline
CA No. 4003 or Fisheries Act	1932	Specified that no powered vessels of more than 3 gross ton (GT) are allowed to fish in territorial waters without a permit or license issued by the Secretary of Agriculture and Commerce
Philippine Constitution Article XII	1935	Gave the Filipino citizens exclusive right to exploit the marine resources of the country
PD No. 704 or Fisheries Decree	1975	Revised and consolidated all previous laws and decrees affecting the fisheries sector
PD No. 1599	1978	Declared the Exclusive Economic Zone (EEZ) extending Philippine territorial waters 200 nautical miles from the baseline from which territorial sea is measured
RA No. 7160 or the Local Government Code	1991	Devolved government powers to Local Government Units (LGUs)
		Defined municipal waters as the distance of 15 km from the shoreline
		Authorized LGUs to allow regulated commercial activities after a 10-km distance from the shoreline
		Specified that the municipalities have the exclusive authority to grant fishery privileges and impose fees
		Indicated that marginal fishermen are given preferential right in the granting of fishery privileges

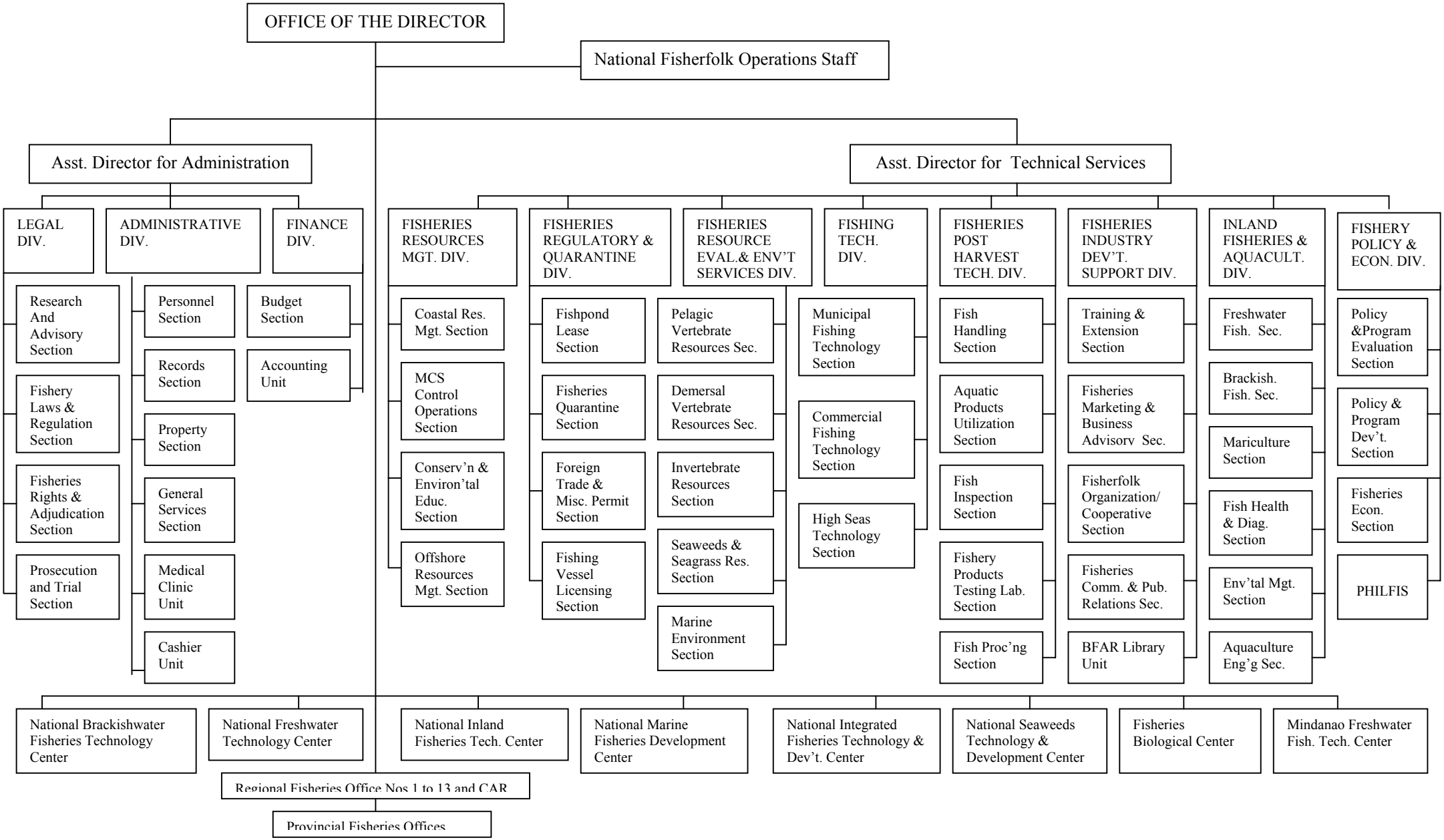
Note: CA means Commonwealth Act; PD, Presidential Decree; RA ,Republic Act
Sources: BFAR Files

Figure 1. Organizational structure of BFAR as a staff bureau



Source: BFAR Files

Figure 2. Organizational structure of BFAR as a line bureau



Source: BFAR Files

Table 13. Existing fees in the commercial fisheries

Year/Legislation	Commercial Fishing Boat License(CFBL)	Fisherman's License	Cash Bond	Clearance Fee
1983 FAO No. 144	Annual license fee is set based on the tonnage of the boat (see Table 13a)		i) motorized boat more than 3 GT- P50.00 ii)motorized boat more than 3 GT to 50 GT - P 150.00 iii)motorized boat more than 50 GT to 200 GT - P300.00 iv)motorized boat over 200 GT - P500.00	
1993 FAO NO. 187	The annual application fee for CFBL is P400.00 and for a special CFBL, the rate is P2,000.00	Annual fees: i) application - P20.00 ii) new license - P20.00 iii)renewal - P20.00		Clearance fee: P50.00 per trip

Note: In the past, a fee for fish catch was collected. According to BFAR, no fish catch fee is collected at the present.
Sources : BFAR (1989), BFAR (1995)

Table 13a. Annual license fee rates based on boat classification

Boat Classification	License Fee
Nonpowered fishing boat of more than 3GT	P50.00 + P2.00 per gross ton or fraction thereof
Powered Basnig/Bagnet of more than 3 to 25 GT	P100.00 + P2.00 per gross ton or fraction thereof
Sapiao, kubkub,talakop and/ or other fishing gear more than 3 to 25 GT	P100.00 + P2.00 per gross ton and fraction thereof regardless of fishing gear used
For powered vessel used for trawl/towing boats of more than 3 to 25 GT	P125.00 + P2.00 per gross ton and fraction thereof
For powered vessel more than 25 to 50 GT	P150.00 + P2.00 per gross ton and fraction thereof
For motorized boat of more than 50 but not more than 75 GT	P200.00 + P2.00 per gross ton and fraction thereof
For motorized boat of more than 100 to 150 GT	P350.00 + P2.00 per gross ton and fraction thereof
For motorized boat of more than 150 to 250 GT	P500.00 + P2.00 per gross ton and fraction thereof
For motorized boat of more than 250 GT	P500.00 + P2.00 per gross ton and fraction thereof

Source: BFAR (1995)

Table 14. Existing fees for government-owned fishponds in aquaculture

Year/Legislation	Fees	Bond
1979 FAO No. 125	Annual rental: P50.00 per hectare and fraction thereof	Cash bond deposit for converted FLAs and 25-yr Fishpond Lease Agreements (FLAs) issued prior to the conversion is P50.00 per hectare and fraction thereof and may be waived entirely if after 5 yrs improvements have been introduced and lessee has satisfactorily complied with the terms and conditions of the lease
1993 FAO No. 187	Annual application fee: Fishpond - P1,000	

Sources : BFAR (1989), BFAR (1995)

Table 15. Important environmentally-related provisions of the Philippine Fisheries Code

Section	Title	Content
A. Correct Resource Pricing		
6	Fees and other fishery charges	The rentals for fishpond areas covered by the fishpond lease agreement (FLA) and license fees for commercial fishing boat license (CFBL) shall be set at levels that reflect resource rent from the utilization of resources and shall be determined by the Department: *Provided…*
7	Access to fishery resources	The Department shall issue such number of licenses and permits for the conduct of fishery activities subject to the limits of the MSY of the resource as determined by scientific studies or best available evidence. Preference shall be given to resource users in the local communities adjacent or nearest to the municipal waters.
B. Proper Delineation of Property Rights		
17	Grant of fishing privileges in municipal waters	The duly registered fisherfolk organizations/ cooperatives shall have preference in the granting of fishery rights by the municipal/city council pursuant to Section 149 of the Local Government Code: *Provided…*
18	Users of municipal waters	All fishery related activities in municipal waters, as defined in this Code, shall be utilized by organizations who are listed in the registry of municipal fisherfolk. The municipal or city government, however, may, through its local chief executive and acting pursuant to an appropriate ordinance, authorize or permit small and medium commercial fishing vessels to operate within the ten point one (10.1) to fifteen (15) kilometers from the shoreline in municipal waters, as defined herein, provided…
19	Registry of municipal fisherfolk	The LGU shall maintain a registry of municipal fisherfolk who are fishing or may desire to fish in the municipal waters for the purpose of determining priorities among them, of limiting entry into the municipal waters, and of monitoring fishing activities and/or other related purposes: *Provided…*

Table 15. Continued…

Section	Title	Content
20	Fisherfolk organizations and/ or cooperatives	Fisherfolk organizations/cooperatives whose members are listed in the registry of municipal fisherfolk, may be granted use of demarcated fishery areas to engage in fish capture, mariculture and/or farming: *Provided…*
21	Priority of resident municipal fisherfolk	Resident municipal fisherfolk of the municipality concerned and their organizations/ cooperatives shall have priority to exploit municipal and demarcated fishery areas of the said municipality.
22	Demarcated fishery right	The LGU concerned shall grant demarcated fishery rights to fishery organizations/ cooperatives for mariculture operation in specific areas identified by the Department.
C. Monitoring and Enforcement		
14	Monitoring, control and surveillance of Philippine waters	A monitoring, control and surveillance system shall be established by the Department in coordination with the LGUs, FARMCs, the private sector and other agencies concerned to ensure that the fisheries and aquatic resources in Philippine waters are judiciously and wisely utilized and managed on a sustainable basis and conserved for the benefit and enjoyment exclusively of Filipino citizens.
16	Jurisdiction of municipal/city governments	The municipal/city government shall have jurisdiction over municipal waters as defined in this Code. The municipal/city government… The LGUs shall also enforce all fishery laws, rules and regulations as well as valid fishery ordinances enacted by the municipal/city council. ⋮

Table 15. Continued…

Section	Title	Content
38	Reportorial requirements	Each commercial fishing vessel shall keep a daily record of fish catch and spoilage, landing points, and quantity and value of fish caught, and off-loaded for transshipment, sale and/or other disposal. Detailed…
65	Functions of the Bureau of Fisheries and Aquatic Resources	As a line bureau, the BFAR shall have the following functions: ⋮ n. Enforce all laws, formulate and enforce all rules and regulations governing the conservation and management of fishery resources, except in municipal waters, and to settle conflicts of resource use and allocation in consultation with the NFARMC, LGUs and local FARMCs; ⋮
67	Fisheries Inspection and Quarantine Service	For purposes of monitoring and regulating the importation and exportation of fish and fishery/aquatic resources, the Fisheries Inspection and Quarantine Service in th BFAR is hereby strengthened and shall have the following functions: ⋮
74	Functions of the M/CFARMCs	The M/CFARMCs shall exercise the following functions: ⋮ c. Assist in the enforcement of fishery laws, rules and regulations in municipal waters; ⋮
77	Functions of the IFARMCs	The IFARMC shall have the following functions: ⋮ c. Assist in the enforcement of fishery laws, rules and regulations in concerned municipal waters; ⋮

Table 15. Continued…

Section	Title	Content
D. Command and Control Instruments		
12	Environmental impact statement (EIS)	All government agencies as well as private corporations, firms and entities who intend to undertake activities or projects which will affect the quality of environment shall be required to prepare a detailed environmental impact assessment (EIS) prior to undertake such development activity. The preparation…
13	Environmental compliance certificate (ECC)	All environmental impact statements (EIS) shall be submitted to the Department of Environment and Natural Resources (DENR) for review and evaluation. No person, natural or juridical, shall undertake any development project without first securing an environmental compliance certificate (ECC) from the Secretary of the DENR.
46	Lease of fishponds	Fishpond leased to qualified persons and fisherfolk organizations/cooperatives shall be subject to the following conditons: ⋮ h. The lessee shall provide facilities that will minimize environmental pollution, i.e., settling ponds, resorvoirs, etc. : *Provided…* ⋮
54	Insurance for fishponds, fish cages and fish pens	Inland fishponds, fish cages and fish pens shall be covered under the insurance program of the Philippine Crop Insurance Corporation for losses caused by *force majeure* and fortuitous events.
80	Fishing areas reserved for exclusive use of government	The Department may designate area or areas in Philippine waters beyond fifteen (15) kilometers from the shoreline as fishery reservation for the exclusive use of the government or any of its political subdivisions, agencies or instrumentalities, for propagation, educational, research and scientific purposes: *Provided…*
81	Fish refuge and sanctuaries	The Department may establish fish refuge and sanctuaries to be administered in the manner to be prescribed by the BFAR at least twenty-five percent (25%) but not more than forty percent (40%) of bays, foreshorelands, continental shelf or any fishing ground shall be set aside for the cultivation of mangroves to strengthen the habitat and the spawning grounds of fish. Within…

Table 15. Continued…

Section	Title	Content
86	Unauthorized fishing or engaging in other unauthorized fisheries activities	No person shall exploit, occupy, produce, breed, culture, capture or gather fish or fingerlings of any fishery species or fishery products, or engage in any fishery activity in Philippine waters without license, lease or permit. ⋮
87	Poaching in Philippine waters	It shall be unlawful or any foreign person, corporation or entity to fish or operate any fishing vessel in Philippine waters. ⋮
88	Fishing through explosives, noxious or poisonous substances and/or electricity	1) It shall be unlawful for any person to catch, take or gather or cause to caught, taken or gathered fish or any fishery species in Philippine waters with the use of electricity, noxious or poisonous substances such as sodium cyanide in the Philippine fishery areas which will kill, stupefy, disable or render unconscious fish or fishery species: *Provided…*
89	Use of fine mesh net	It shall be unlawful to engage in fishing using nets with mesh smaller than that with which may be fixed by the Department: *Provided…*
90	Use of active gear in the municipal waters and bays and other fishery management areas	It shall be unlawful to engage in fishing in municipal waters and in all bays as well as other fishery management areas using fishing gears as defined in this Code.
91	Ban on coral exploitation and exportation	It shall be unlawful for any person or corporation to gather, possess, sell, or export ordinary, precious and semi-precious corals whether raw or in processed form, except for scientific or research purposes.
92	Ban on "muro-ami" and other methods and gears destructive to coral reefs and other marine habitat	It shall be unlawful for any person, natural or juridical, to fish with gear method that destroy coral reefs, seagrass beds and other fishery marine life habitat as may be determined by the Department. "Muro-ami" and any of its variations and such familiar gear and methods that require diving, other physical or mechanical acts to pound on the coral reefs and other habitat to entrap, gather or catch fish and other fishery species are also prohibited. ⋮

Table 15. Continued…

Section	Title	Content
93	Illegal use of superlights	It shall be unlawful to engage in fishing with the use of superlights in municipal waters or in violation of the rules and regulations which may be promulgated by the Department on the use of superlights outside municipal waters. ⋮
94	Conversion of mangroves	It shall be unlawful for any person to convert mangroves into fishponds or for any other purpose. ⋮
95	Fishing in overfished area and during closed season	It shall be unlawful to fish in overfished area and during closed season. ⋮
96	Fishing in fishery reserves, refuge and sanctuaries	It shall be unlawful to fish in fishery areas declared by the Department as fishery reserves, refuge and sanctuaries. ⋮
97	Fishing or taking of rare, threatened or endangered species	It shall be unlawful to fish or take rare, threatened or endangered species as listed in the CITES and as determined by the Department. ⋮
98	Capture of sabalo and other breeders/ spawners	It shall be unlawful for any person to catch, gather, capture or possess mature milkfish or "sabalo" and such other breeders or spawners of fishery species as may be determined by the Department: *Provided…* ⋮
99	Exportation of breeders, spawners, eggs or fry	Exportation of breeders, spawners, eggs or fry as prohibited in this Code shall be punished…
100	Importation or exportation of fish or fishery species	Any importation or exportation of fish species in violation of this Code shall be punished…

Table 15. Continued…

Section	Title	Content
101	Violation of ceiling catch	It shall be unlawful for any person to fish in violation of catch ceilings as determined by the Department. Violation…
102	Aquatic pollution	Aquatic pollution as defined in this Code shall be unlawful. Violation…
103	Other violations	Other fishing activities considered as violation to the Code include: a) *failure to comly with minimum safety standards …* ⋮
104	Commercial fishing vessel operators employing unlicensed fisherfolk or fishworker or crew	The owner/operator of a commercial fishing vessel employing unlicensed fisherfolk or fishworker shall be fined…
105	Obstruction of defined migration paths	Obstruction of any defined migration path of anadromous, catadromous and other migratory species in areas including, but not limited to, river mouths and estuaries within a distance determined by the concerned FARMCs shall be punished…
106	Obstruction of fishery law enforcement officer	The boat owner, master or operator or any person acting on behalf of any fishing vessel who evades, obstructs or hinder any fishery law enforcement officer of the Department to perform his duty shall be fined…
107	Promulgation of administrative orders	For purpose of fishery regulation or other fishery adjustments, the Department in consultation with the LGUs and local FARMCs, shall issue fishery administrative orders or regulations for the conservation, preservation, management and sustainable development of fishery and aquatic resources.
E. Market-based Instruments		
48	Incentives and disincentives for sustainable aquaculture practices	The Department shall formulate incentives and disincentives such as, but not limited to, effluent charges, user fees and negotiable permits, to encourage compliance with the environmental standards and to promote sustainable management practices.

Source: Congress of the Philippines (1998)

Table 16. Other important provisions of the Philippine Fisheries Code

Subject	Section	Title	Content
Institutional Issues	64	Reconstitution of BFAR	The Bureau of Fisheries and Aquatic Resources is hereby reconstituted as a line bureau under the Department of Agriculture.
	70	Creation and composition of the National Fisheries and Aquatic Resources Management Council	There is hereby created a National Fisheries and Aquatic Resources Management Council, referred to as NFARMC, as an advisory/ recommendatory body to the Department. The NFARMC shall be composed of fifteen (15 members) consisting of: …
	71	Terms of office	The members of the NFARMC, except the Undersecretary of Agriculture and the Undersecretary of the Interior and Local Government, shall serve for a term of three (3) years without reappointment.
	72	Functions of the NFARMC	The NFARMC shall have the following functions: a. Assist in the formulation of national policies for the protection, sustainabe development ans management of fishery and aquatic resources for the approval of the Secretary; :
	73	The Municipal/City Fisheries and Aquatic Resources Management Councils (M/CFARMCs)	The M/CFARMCs shall be created in each of the municipalities and cities abutting municipal waters. However, the LGU may create the Barangay Fisheries and Aquatic Resources Management Councils (BFARMCs) and the Lakewide Fisheries and Aquatic Resources Management Councils (LFARMCs) whenever necessary. Such BFARMCs and LFARMCs shall serve in an advisory capacity to the LGUs.

Table 16. Continued…

Subject	Section	Title	Content
	74	Functions of the M/CFARMCs	The M/CFARMCs shall exercise the following functions: a. Assist in the preparation of the municipal fishery development plan and submit to the Municipal Development Council; ⋮
	75	Composition of the M/CFARMC	The regular members of the M/CFARMCs shall be composed of: ⋮ d. Representative from the accredited non-government organization; ⋮
	76	The Integrated Fisheries and Aquatic Resources Management Councils (IFARMCs)	The IFARMCs shall be created in bays, gulfs, lakes and rivers and dams bounded by two (2) or more municipalities/cities.
	77	Functions of the IFARMCs	The IFARMCs shall have the following functions: a. Assist in the preparation of the integrated fishery development plan and submit to the concerned municipal development councils; ⋮
	78	Composition of the IFARMCs	The regular members of the IFARMCs shall be composed of the following: ⋮ d. One (1) representative from NGO; ⋮

Table 16. Continued…

Subject	Section	Title	Content
	79	Source of funds of the FARMCs	A separate fund for the NFARMC, IFARMCs and M/CFARMCs shall M/CFARMCs shall be established and administered by the Department from the regular annual budgetary appropriations.
Research and Development	82	Creation of the National Fisheries Research and Development Institute (NFRDI)	In recognition of the important role of fisheries research in the development, management, conservation and protection of the country's fisheries and aquatic resources, there is hereby created a National Fisheries Research and Development Institute (NFRDI). ⋮
	84	Research and development objectives	Researches to be done by the NFRDI are expected to result in the following: a. To raise the income of the fisherfolk and to elevate the Philippines among the top five (5) in the world ranking in fish production; b. To make the country's fishing industry in the high seas competitive; c. To conduct social research on fisherfolk families better understanding of their conditions and needs; and d. To coordinate with the fisheries schools, LGUs private sectors regarding the maximum utilization of available technology, including the transfer of such technology to the industry particularly the fisherfolk.
	112	Special Fisheries Science and Approfishtech Fund	The Department shall provide subsidy for full technical and financial support to the development of appropriate technology, both in fishery and ancillary industries that are ecologically sound locally source-based and labor intensive, based on the requirement and needs of the FARMCs…

Table 16. Continued…

Subject	Section	Title	Content
Education	115	Professionalization of fisheries graduates	There is hereby created a Fisheries Board of Examiners in the Professional Regulation Commission to upgrade the fisheries profession: *Provided…*
	117	Inclusion of fisheries conservation subjects in school curriculum	Fisheries conservation subjects shall be incorporated in the curricula of elementary and secondary schools both private and public.
	118	Educational campaign at all levels	The Department, the CHED, the DECS and the Philippine Information Agency shall launch and pursue a nationwide educational campaign to - : b. Promote the development, management, conservation and proper use of the environment; :
Statistics and Information	121	Protection of sensitive technical information	The Department shall take such measures as may be necessary in order to protect trade, industrial and policy information of Filipino fisherfolk, fisheries owners/operators, entrepreneurs, manufacturers and researchers, when disclosure of such information will injure the competitiveness or viability of domestic fisheries.
	122	Assistance in collecting information	The Department, in coordination with other government entities concerned, may require Filipino representatives abroad and foreign-based personnel to assist in the collection of fisheries data and information.
Extension	65	Functions of the Bureau of Fisheries and Aquatic Resources	As a line bureau, the BFAR shall have the following functions: : q. Assist the LGUs in developing their technical capability in the development, management, regulation, conservation, and protection of the fishery resources; :

Table 16. Continued…

Subject	Section	Title	Content
	120	Extension services	The Department shall develop cost-effective, practical and efficient extension services on a sustained basis in addition to those provided by state educational institutions, especially to municipal fisherfolk in undeveloped areas, utilizing practicable and indigenous resources and government agencies available, and based upon a system of self-reliance and self-help.
Credit	109	Municipal fisheries grant fund	For the development, management and conservation of the municipal resources, there is hereby created a Fishery Grant Fund to finance fishery projects of the municipal fisherfolk. The amount… For this purpose, the Department, may seek financial assistance from any source and may receive any donations therefor.
	110	Fishery loan and guarantee fund	Pursuant to Section 7, Article XIII of the Constitution, there is hereby created a Fishery Loan and Guarantee Fund with an initial of one hundred million pesos (P100,000,000) which shall be administered by the Land Bank of the Philippines. The fund…
	111	Fishing vessels development fund	There is hereby created a Fishing Vessels Development Fund to enhance the building and/or acquisition of fishing vessels. This shall be a…
	112	Special Fisheries Science and Approfishtech Fund	The Department shall provide subsidy for full technical and financial support to the development of appropriate technology, both in fishery and ancillary industries that are ecologically sound locally source-based and labor intensive, based on the requirement and needs of the FARMCs…
	114	Other fisheries financing facilities	In addition to fisheries credit guarantee, grant and other similar facilities granted under this Code, qualified Filipino fisherfolk and fisheries enterprises shall enjoy each such other facilities granted them under existing and/or new laws/ specially as to rural credit, with preference being given to fisheries cooperatives.

Table 16. Continued…

Subject	Section	Title	Content
Infrastructure	119	Infrastructure support	The Department in cooperation with the concerned agencies shall- a. Prepare and implement a nationwide plan for the development of municipal fishing ports and markets; ⋮
Public Awareness	118	Educational campaign at all levels	The Department, the CHED, the DECS and the Philippine Information Agency shall launch and pursue a nationwide educational campaign…

Source: Congress of the Philippines (1998)

Table 17. Total national government expenditures, government expenditure in ANR R&D, and R&D expenditures in the fisheries sector of the Philippines for 1982-1995 (In million pesos)

Year	Total National Government Expenditure	Government Expenditure		% of Total National Government Expenditure	
		R&D for ANR	R&D for Fisheries	R&D for ANR	R&D for Fisheries
1982	57,029	905.11	14.52	1.59	0.030
1983	61,838	852.36	14.67	1.38	0.024
1984	53,450	780.73	10.14	1.46	0.019
1985	58,329	888.91	15.82	1.52	0.027
1986	67,409	1,035.49	22.02	1.54	0.033
1987	79,321	318.47	18.07	0.40	0.023
1988	85,539	1,099.54	33.40	1.29	0.039
1989	117,012	1,033.93	37.03	0.88	0.032
1990	156,668	1,070.27	76.33	0.68	0.049
1991	166,158	1,180.18	67.74	0.71	0.041
1992	194,778	1,276.83	109.98	0.66	0.056
1993	309,437	2,404.52	119.49	0.78	0.039
1994	322,695	2,463.25	38.34	0.76	0.012
1995	387,398	2,649.59	63.89	0.68	0.016
Average	151,223	1,283.00	45.82	1.02	0.03
Ave. Growth Rate	17.09	23.57	23.67	0.07	0.05

Note: ANR means Agriculture and Natural Resources
Source of Table: PCAMRD (1996a).

Table 18. Socioeconomic and policy studies in the fisheries sector by type/discipline and year, Philippines

Type of study	Period of Study					Total	%
	1974 and below	1975 to 1980	1981 to 1986	1987 to 1992	1993 to date		
Socioeconomics (General)	2	52	40	53	25	172	13.64
Production Economics/ Management	8	39	90	46	19	202	16.02
Resource Economics/ Management	0	7	13	41	25	86	6.82
Sociological/ Sociocultural	3	4	7	25	19	58	4.60
Marketing/ Trade and Prices	11	63	78	46	20	218	17.29
Policy Studies	4	27	62	89	50	232	18.40
Industry Studies	0	9	17	7	5	38	3.01
Institutional							
a. Credit	0	2	9	3	2	16	1.27
b. Cooperatives	0	1	1	10	6	18	1.43
c. Legal	0	2	0	1	1	4	0.32
d. Agencies/NGO/Community	0	0	0	5	3	8	0.63
e. Education/Manpower S & D	0	0	4	1	2	7	0.56
f. Extension/Training/Technology Adoption	0	3	5	2	2	12	0.95
g. Tenurial/Territorial use rights	0	2	4	9	1	16	1.27
Bio-economics	0	0	0	2	1	3	0.24
Consumption/Demand	2	1	2	0	0	5	0.40
Others							
a. Feasibility/Investment Studies	8	27	37	26	17	115	9.12
b. Impact/Effect Studies	1	2	1	3	0	7	0.56
c. Processing	4	8	9	5	0	26	2.06
d. Gender (Role of Women)	0	0	2	3	4	9	0.71
e. Others (e.g. livelihood opportunities)	0	1	0	1	7	9	0.71
Total	43	250	381	378	209	1261	100.00
Average	3.41	19.83	30.21	29.98	16.57	100	

Source: de Jesus et al. (1997)

Table 19. Number of technical and vocational education schools in the Philippines, 1998

Type	Number	%
Fisheries Schools	50	23
All Schools	221	100

Source: General Appropriations Act (1996)

Table 20. Appropriations for the programs and activities of fisheries technical-vocational/higher education institutions, 1991-1996

Insitution		1991	1992	1993	1994	1995	1996
Fisheries Technical-Vocational/ Higher Education Insitutions							
Region I	Bangui School of Fisheries	2,279,000	2,522,000	2,574,000	2,421,000	2,457,000	4,231,000
Region I	Bolinao School of Fisheries	2,040,000	2,421,000	2,440,000	2,395,000	2,429,000	4,083,000
Region I	Pangasinan College of Fisheries	2,933,000	3,714,000	3,741,000	3,763,000	3,818,000	6,369,000
Region I	Ilocos Norte Regional School of Fisheries	2,112,000	2,218,000	2,213,000	2,109,000	2,139,000	3,596,000
Region II	Sabtang National School of Fisheries	1,771,000	2,430,000	2,398,000	2,054,000	2,109,000	3,531,000
Region II	Abulug School of Fisheries	1,613,000	2,165,000	2,203,000	1,884,000	1,926,000	3,960,000
Region II	Pamplona National School of Fisheries	1,757,000	2,469,000	2,404,000	2,208,000	2,259,000	3,672,000
Region II	Solana Freshwater and Fisheries School	2,408,000	3,271,000	3,257,000	3,048,000	3,109,000	5,035,000
Region II	Isabela School of Fisheries	2,075,000	2,811,000	2,696,000	2,494,000	2,560,000	4,213,000
Region III	Bataan School of Fisheries	5,128,000	4,351,000	4,367,000	4,359,000	4,521,000	7,327,000
Region III	Malolos Marine Fishery School and Laboratory	3,179,000	3,616,000	3,593,000	3,544,000	3,700,000	6,391,000
Region III	Obando School of Fisheries	3,300,000	926,000	1,387,000	1,368,000	1,529,000	2,746,000
Region III	Candelaria School of Fisheries	4,033,000	4,207,000	4,360,000	4,297,000	4,465,000	7,286,000
Region IV	Aurora National Fishery School	2,283,000	1,864,000	1,872,000	1,985,000	2,028,000	3,763,000
Region IV	Apolinario R. Apacible School of Fisheries	5,610,000	7,373,000	7,228,000	8,064,000	8,095,000	13,249,000
Region IV	Cavite College of Fisheries	3,856,000	4,804,000	4,270,000	4,542,000	5,109,000	8,325,000
Region IV	Los Baños College of Fisheries	8,124,000	7,022,000	6,941,000	7,070,000	7,635,000	12,448,000
Region IV	Tanauan School of Fisheries	3,875,000	4,234,000	4,225,000	5,004,000	4,996,000	8,751,000
Region IV	Looc National School of Fisheries	2,738,000	1,572,000	1,555,000	1,336,000	1,346,000	2,643,000
Region IV	Bongabong School of Fisheries	2,767,000	3,453,000	3,453,000	4,385,000	4,406,000	7,434,000
Region IV	Coron School of Fisheries	3,322,000	3,383,000	3,349,000	3,738,000	3,759,000	6,593,000
Region IV	Lamon Bay School of Fisheries	2,559,000	1,951,000	1,942,000	1,993,000	2,378,000	4,165,000
Region IV	Judge Guillermo Eleazar Memorial School of Fisheries	3,584,000	3,881,000	3,728,000	4,248,000	4,914,000	8,114,000
Region V	Masbate School of Fisheries	5,493,000	3,812,000	3,652,000	3,633,000	3,743,000	6,280,000
Region V	Magallanes School of Fisheries	2,833,000	3,861,000	2,794,000	2,808,000	713,000	1,212,000
Region V	Gov. Mariano Fuentebella Memorial School of Fisheries	2,097,000	2,294,000	2,250,000	2,483,000	2,561,000	4,242,000
Region V	Barcelonita Fishery Schol	3,755,000	4,755,000	2,208,000	2,349,000	4,817,000	4,426,000
Region V	Bikal Fisheries School	1,031,000	1,254,000	1,232,000	1,262,000	1,324,000	2,477,000
Region V	San Jose Fisheries School	1,290,000	1,540,000	1,439,000	1,651,000	1,719,000	2,976,000
Region VI	Numancia National School of Fisheries	3,093,000	2,557,000	2,535,000	2,368,000	2,464,000	4,578,000
Region VI	San Joaquin School of Fisheries	3,373,000	2,773,000	2,747,000	2,607,000	2,772,000	4,846,000
Region VI	Aklan National College of Fisheries	7,885,000	6,313,000	6,340,000	6,251,000	7,579,000	10,991,000
Region VI	Negros Occidental School of Fisheries	6,862,000	5,656,000	5,246,000	7,685,000	5,842,000	8,712,000

Table 20. Continued…

Insitution		1991	1992	1993	1994	1995	1996
Region VI	Tario Lim Memorial School of Fisheries	3,502,000	4,528,000	4,412,000	4,351,000	4,985,000	7,515,000
Region VII	Bohol School of Fisheries	3,927,000	4,556,000	4,671,000	6,102,000	5,156,000	7,668,000
Region VII	Calape National School of Fisheries	1,871,000	2,260,000	1,992,000	2,101,000	2,105,000	3,553,000
Region VII	Clarin School of Fisheries	2,753,000	3,323,000	3,354,000	3,430,000	3,409,000	5,366,000
Region VIII	Naval School of Fisheries	4,279,000	2,152,000	2,232,000	2,078,000	2,078,000	3,385,000
Region VIII	Matarinao School of Fisheries	1,743,000	2,013,000	1,997,000	1,836,000	1,836,000	3,200,000
Region VIII	Bato School of Fisheries	3,573,000	3,771,000	3,744,000	3,940,000	3,945,000	6,297,000
Region VIII	Carigara School of Fisheries	3,186,000	3,647,000	3,597,000	3,884,000	3,888,000	5,958,000
Region VIII	Eladio T. Balite Memorial School of Fisheries (Bobon)	2,381,000	2,713,000	2,651,000	2,617,000	2,622,000	4,524,000
Region VIII	San Vicente School of Fisheries	2,447,000	965,000	911,000	858,000	858,000	1,404,000
Region VIII	Clarencio Calagos Memorial School of Fisheries	2,083,000	1,844,000	1,929,000	1,975,000	1,974,000	3,124,000
Region VIII	Samar Regional School of Fisheries	6,835,000	7,314,000	7,527,000	7,902,000	7,985,000	10,544,000
Region VIII	Rafael Lentejas Memorial School of Fisheries	3,996,000	2,437,000	2,793,000	2,600,000	2,600,000	3,735,000
Region IX	Dipolog School of Fisheries	3,287,000	4,332,000	4,440,000	4,478,000	4,488,000	8,444,000
Region X	Baliangao School of Fisheries	2,171,000	3,056,000	3,969,000	2,699,000	2,699,000	4,758,000
Region X	Northern Mindanao School of Fisheries	3,353,000	4,153,000	4,389,000	3,626,000	5,635,000	6,019,000
Region X	Dinagat School of Fisheries	2,910,000	2,989,000	3,143,000	2,674,000	2,676,000	4,480,000
Region X	Malimono School of Fisheries	2,657,000	3,035,000	3,186,000	2,608,000	2,612,000	4,225,000
Region XI	Lupon School of Fisheries	5,200,000	4,311,000	4,135,000	3,631,000	3,696,000	5,982,000
Region XI	Davao del Sur School of Fisheries	3,388,000	3,315,000	4,159,000	3,868,000	3,958,000	6,604,000
Region XI	Bula National School of Fisheries	2,853,000	2,552,000	2,829,000	2,891,000	2,897,000	4,683,000
Region XII	Iligan City National School of Fisheries	2,788,000	3,587,000	3,652,000	3,595,000	3,657,000	5,735,000
Total for Fisheries Technical-Vocational and Higher Education Institutions		182,241,000	184,326,000	182,351,000	185,150,000	190,980,000	305,868,000
Total for All Technical/Vocational and Higher Education Institutions		1,336,582,000	1,423,029,000	1,277,114,000	7,238,381,000	1,971,636,000	2,183,501,000
% to Total for All Technical/Vocational and Higher Education Institutions		14.27	12.95	13.64	2.56	9.69	14.01

Institutions included in the table are those which appears in the GAA from 1989 to 1996.
Source: General Appropriations Act (1990-1995)

Table 21. Standard courses offered by CHED-supervised institutions for Bachelor of Science in Fisheries

Course	Major (No. of units)		
	Aquaculture	Marine Fisheries	Fish Processing
I. General Education	87	87	87
Language and Literature			
English	12	12	12
Filipino	6	6	6
Mathematics	12	12	12
Natural Science	25	25	25
Humanities	9	9	9
Social Science	12	12	12
Other Courses			
The Life and Works of Jose Rizal (PI 100)	3	3	3
Physical Education (PE)	8	8	8
II. Common Fisheries Courses	26	26	26
General Fisheries and Laws	3	3	3
Fisheries Ext. Ed. I	3	3	3
Fisheries Ext. Ed. II	3	3	3
Fisheries Business	3	3	3
Fisheries Management	3	3	3
Research Methods	3	3	3
Aquatic Bilogy I	5	5	5
Cooperative Principles and Practices	3	3	3
III. Core Courses	53 - 55	49	50
A. Major in Aquaculture			
Aquaculture Engeineering	3		
Aquaculture I	3		
Aquaculture II	5		
Aquatic Biology II	3		
Biochemistry	4		
Biology of Fishes	3		
Fish Breeding	3		
Fish Genetics	3		
Fish Health	3		
Fish Nutrition and Feeding Mgt.	5		
Fish Physiology	4		
Hatchery Management	3		
Seminar	1		
Special Problem	3		
Water Quality and Biological Productivity	4		
Electives	3 - 5		

Table 21. Continued….

Course	Major (No. of units) Aquaculture	Marine Fisheries	Fish Processing
B. Major in Marine Fisheries			
Fishing Boat Design and Construction		5	
Fishing Gear Design and Construction		5	
Marine Ecology		3	
Marine Instrumentation		3	
Marine Machineries		3	
Navigation and Seamanship I		3	
Navigation and Seamanship II		5	
Oceanology I		3	
Oceanology II		2	
Offshore and Coastal Fishing		5	
Postharvest Handling		3	
Seminar		1	
Special Problem		3	
Electives		5	
C. Major in Fish Processing			
Fish Biochemistry			4
Fish Chemistry			4
Fish Handling and Refrigeration			5
Fish Microbiology			5
Fish Processing I			5
Fish Processing II			5
Fish Processing III			3
Fish Analytical Chemistry			3
Plant Sanitation and Hygiene			3
Quality Assurance			5
Special Problem			3
Electives			6
Seminar			1
Practicum (non-credit)	(240 hrs)	(240 hrs)	(160 hrs)
Total (units)	163-165	162	163

Source: CHED-Technical Panel for Agriculture Files

Table 21a. Description of standard courses offered by CHED-supervised institutions for Bachelor of Science in Fisheries

Course	Description
General Eduaction Courses	
English (Communication Skills)	
English I	Skills of listening, speaking, reading and writing
English II	Intermediate skills of listening, reading and writing
English III	Introduction to literature; The study of literary types, fiction, poetry, drama, essay and biography
English 10	Writing of scientific paper
Filipino	
Filipino I Sining ng Pakikipagtalastasan	Mga paraan sa pakikipagtalastasan o pagpapahayag, paglalarawan, pagsasalaysay, paglalahad at pangangatwiran
Filipino II Mga Piling Katha ng mga Manunulat na Pilipino	Pagpapalawak ng kaalaman sa pagsasalita at pagbabasa sa pamamagitan ng pag-aaral ng mga piling katha ng manunulat na Pilipino
Mathematics	
Math I College Algebra	Linear equations, quadratics, complex numbers, binomial theorem, progressions; theory of equations
Math II Plane Trigonometry	Trigonometric functions, solutions of right and oblique triangle; logarithms and application, radian and inverse trigonometric functions and complex numbers
Math III Calculus	Indefinite integral and its applications; area under the curve; definite integral

Table 21a. Continued…

Course	Description
Statistics I Elementary statistics	Basic statistical concepts, frequency tables and distributions; sampling; average test of significance; regression and correlation; introduction to analysis of variance and experimental designs
Natural Sciences	
Zoology	Biological principles as related to zoology; general life history; morphological characteristics and relationships of representative of the more important animal phyla
Botany	Structure, functions, adaptation and phylogenetic relationships of plants
Chemistry I General and Inorganic Chemistry	General principles theory and experimentation in Chemistry
Chemistry II Organic Chemistry	Organic structural theory and introduction to reaction mechanisms and structure of organic compound
Physics I Mechanics and Heat	Inertia, motion, forces and energy properties and laws of solid and liquids; temperature measurements and effects on properties and material and heat flow
Physics II Electricity and Magnetism	Sources, effects, measurement and uses of electricity, magnetism; fundamentals of wave motion applied in the study of sound and light
Common Fisheries Courses (for all majors)	
General Fisheries and Laws	Survey of fisheries resources, their production, utilization and conservation; current local, national and international ordinances, laws and agreements
Aquatic Biology I	General morphology, anatomy and systematics of aquatic organisms important to fisheries

Table 21a. Continued…

Course	Description
Fisheries Management	The principles and methods of management and conservation of aquatic resources in relation to fisheries
Fisheries Extension Education I	Principles and methods of technology transfer and diffusion concept of organization; program development, implementation and evaluation
Fisheries Extension Education II	Roots, methods and approaches to extension work and practice
Research Methods	Design of research projects and data analysis with emphasis on statistical techniques
Fisheries Business	Principles and practices of managing small and medium scale commercial fisheries enterprises including fisheries cooperatives
Cooperative Principles and Practices	Principles, practices and history of cooperatives in the Philippines; the relationship of cooperative to rural and national economic development
Core Courses	
Major in Aquaculture	
Ecology of Fishes	Environmental factors that affect the distribution and adaptation of fishes
Aquatic Biology II	Biology, taxonomy and distribution of commercially important invertebrates, macro and micro flora
Fish Physiology	Functions of organs and organ systems of fishes and selected aquatic organisms
Aquaculture I	Principles, methods and developments in the cultivation of commercially important aquatic organisms
Aquaculture II	Application of farming systems of selected species, project and case studies, and aquaculture planning and development

Table 21a. Continued…

Course	Description
Aquaculture Engineering	Site selection and survey design and layout, construction and installation and maintenance of aquaculture facilities
Fish Health	Study of occurrence and spread of fish diseases/ parasitic and their isolation and identification, and prevention and control
Fish Nutrition and Feeding Management	Principles of nutrition, nutrient requirements, feeding formulation and preparation and practical feeding
Water Quality Management and Biological Productivity	The physics, chemistry and biology of inland and coastal waters and their interrelationship; sampling and analytical techniques
Biochemistry	Intermediary metabolism of proteins, fats and carbohydrates on relation to fisheries
Fish Genetics	Theories and principles of genetics and its application to fisheries
Hatchery Management	Fundamentals and techniques of food production, hatchery and nursery operations and fish propagation
Fish Breeding	Brood stock development and management; application of qualitative genetics to fisheries
Major in Marine Fisheries	
Fishing Boat Design and Construction	The principles and methods of fishing boat design and construction
Marine Ecology	The influence or the physico-chemical and biological properties of sea water on the distribution of marine organisms
Marine Machineries	Operation and maintenance of marine machineries and equipment in fishing vessels
Marine Instrumentation	Operation and maintenance of marine navigation and fishing instruments on board fishing vessels

Table 21a. Continued…

Course	Description
Offshore and Coastal Fishing	Operation and maintenance of small scale and large scale fishing gear and devices
Fishing Gear Design and Construction	The principles and methods of fishing gear construction
Oceanology I	Physical chemical and biological properties of marine waters
Oceanology II	Sampling and analytical techniques
Navigation and Seamanship I	Principles, instruments and methods used in coastal and celestial navigation
Navigation and Seamanship II	Practice of coastal and high seas navigation, application of marine rules and regulations of the road and fishing boat management
Post Harvest Handling II	Handling of fish catch on board fishing vessels; icing and freezing
Major in Fish Processing	
Fish Microbiology	Bacteria, yeasts, molds and parasites associated with fish; their characteristics and importance
Fish Handling and Refrigeration	Principles and techniques of handling and refrigeration of fish and other fisheries products
Fish Processing I	Principles and methods of processing fisheries products with emphasis on curing
Fish Processing II	Canning of fish and fisheries products
Fish Processing III	Utilization of seaweeds and minor fisheries products
Fish Biochemistry	An integrated application of the theories of organic chemistry to the properties and chemical activities of protein, fats and carbohydrates

Table 21a. Continued…

Course	Description
Fish Chemistry	Chemical components of fish and fisheries products and their reactions postmorterm; instrumental methods of analysis
Quality Assurance	Methods for quality assessment of fish and fisheries products, physico-chemical, microbiological and sensory
Plant Sanitation and Hygiene	Principles of plant sanitation and personnel hygiene; good manufacturing practice
Fish Analytical Chemistry	Quantitative analytical techniques for fish and fisheries products

Source: CHED-Technical Panel for Agriculture Files

Table 22. Contents of the Fisheries Statistics of the Philippines

	Title
Part I	Fishery Resources and Consumption
Part II	Fish Production by Sector
Part III	Production by Type of Aquafarm
Part IV	Production by Species
Part V	Fish Prices
Part VI	Costs and Returns of Selected Species
Part VII	Foreign Trade

Source: BAS (1997a)

Table 23. Loan to output ratio, by commodity, 1987-1997

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Average
% Agricultural Production Loans to Gross Value Added in Agriculture	16.1	18.6	13.8	15.8	17.6	18.8	15.2	16.4	15.2	14.8	15.4	16.15
Agricultural Crops												
Palay	8.9	10.6	10.3	13.6	19.9	22.1	10.4	14.1	13.2	11.5	13.2	13.44
Corn	4.7	4.0	4.1	3.3	6.6	5.5	2.5	3.9	4.2	4.9	5.4	4.46
Coconut	36.4	39.2	13.4	25.4	12.8	16.2	5.5	10.7	12.2	13.8	14.5	18.19
Sugar	136.8	106.4	105.6	91.4	70.5	130.0	70.6	85.4	93.9	83.6	117.3	99.23
Livestock and Poultry	8.6	10.9	11.6	35.5	17.3	11.9	8.9	11.6	11.7	12.1	12.7	13.89
Fisheries	7.4	12.3	9.5	11.1	13.3	13.9	10.1	13.3	13.3	12.3	13.5	11.82
Forestry	11.0	12.8	12.2	14.5	28.0	21.4	47.9	38.7	87.3	151.1	235.0	59.99

Source: ACPC Year-End Reports (various years)

Table 24. Agricultural production loans granted, by commodity, 1987-1997(In million pesos)

Year	Total Agricultural Loans Granted	Loans Granted to Fisheries Sector	% Share to Total Agricultural Loans
1987	27,460.0	2,698.4	9.8
1988	35,290.0	4,576.5	13.0
1989	31,205.9	4,222.7	13.5
1990	41,292.0	5,685.4	13.8
1991	46,164.5	6,088.9	13.2
1992	56,057.9	7,063.3	12.6
1993	54,488.0	8,173.2	15.0
1994	56,382.8	8,852.1	15.7
1995	62,765.7	9,352.1	14.9
1996	69,666.6	9,405.0	13.5
1997	75,043.2	10,581.1	14.1
Average	50,528.8	6,972.6	13.6
Average Growth rate	11.3	16.2	

Source: ACPC Files

Table 25. Inventory of ports, by region, 1997

Region	Total	Classification				Status	
		Fishing Ports	Feeder Ports	Commercial		Operational	Non-Operational
				Private	Public		
1	43	18	6	8	11	38	5
2	33	19	6	4	4	29	4
3	52	12	3	27	10	45	7
4	258	82	55	52	69	240	18
5	115	66	7	18	24	105	10
6	149	47	11	67	24	149	0
7	160	42	16	60	42	146	14
8	141	37	26	42	36	131	10
9	76	23	4	21	28	73	3
10	202	53	56	52	41	190	12
11	109	19	9	60	21	108	1
12	38	10	-	21	7	36	2
ARMM	47	16	15	6	10	47	0
NCR	71	3	-	64	4	66	5
Total	1494	447	214	502	331	1403	91

Source: NSCB, 1998