PUBLIC POLICY FOR SUSTAINABLE DEVELOPMENT OF GROUPER AQUACULTURE IN INDONESIA

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SUMMARY

The Policy of the Department of Marine Affairs and Fisheries of Indonesia is to control the production of fish from capture fisheries and to increase fish production from aquaculture in terms of both quantity and quality for domestic consumption and export.
At the end of2008, the total value of foreign exchange from aquaculture was expected to be US$ 2.7 billion. One of the important government policies is to establish aquaculture integrated zones. Following the basic concept of zoning, there are five programs for developing aquaculture:

(1) Aquaculture intensification program
(2) Rural aquaculture development program
(3) Integrated aquaculture development program
(4) Culture base fisheries program and
(5) Low input aquaculture.

During the last two decades, Indonesian aquaculture has developed rapidly due to the combined efforts of aquafarmers, investors, and experts from universities and research institutes. Although aquaculture has contributed greatly to the fisheries production and its value, the Indonesian aquaculture sector is still facing many constraints.
Sustainable development of Indonesian aquaculture is affected by constraints in policy, resources, institutions, socio-economic factors, technology and finance. In this paper, these constraints are briefly reviewed and opportunities for further development for Indonesian Aquaculture are discussed. The paper also deals with the need for a specific policy for sustainable development of grouper aquaculture. These policies would encompass, seed, feed, investment, environment, technology and trade.
Commercial production of grouper has gained popularity in Indonesia in the last two decades and Indonesia is now one of major farmed-grouper producing countries in Asia. In addition, Indonesia is the largest producer and exporter of grouper seed, and whole live fish for consumption. As grouper hatchery technology has been developed on a commercial scale, The Agency for Marine and Fisheries Research (AMFR) fast-tracked its transfer to the private sector. To date, about 20 public and private hatcheries and about 240 units of backyard hatcheries have adopted the technology. These private hatcheries hold more than 1.500 grouper broodstock and providing fertilised eggs to the backyard hatcheries. The latest figures show that broodstock spawn production of grouper seed/fry from private and backyard hatcheries located in Gondol- Bali ranged from 0.1-5.0 million throughout the year. Some

of these were exported to Malaysia, Singapore, Taiwan, Hong-Kong and other countries. Adoption of this hatchery technology will guarantee the sustainable growth of grouper aquaculture in Indonesia.

INTRODUCTION

Since commercial fishing is harvesting at or above their maximum sustainable yield, aquaculture is playing an increasing role as a protein food supplier to the world population. Indonesia has proven to be a country of high potential and success in aquaculture for two decades. The increased importance of aquaculture, of fresh, brackish or marine waters, is a substantial part of the country's economic development. Further development of aquaculture is therefore in the national interest. The policy of the Department of Marine Affairs and Fisheries of Indonesia dealing with the fisheries economic development is:

(1) to control production from capture fisheries,
(2) to develop further aquaculture production and
(3) to promote private sector investment in developing aquaculture.

One of the important Government policies is to establish aquaculture integrated zones. Following the basic concept of zoning, there are five programs being implemented for aquaculture development within the country: aquaculture intensification, rural aquaculture, integrated aquaculture, low input aquaculture and culture based fisheries.

1. AQUACULTURE DEVELOPMENT GOALS

The specific development goals of aquaculture are as follows:

1. Increase fish production sufficiently for domestic consumption (food security)
2. Increase fish production in term of both quality and quantity for export and domestic trade
3. Increase efficiency and profitability of aquaculture production systems
4. Improve sustainability and environmental compatibility of aquaculture production
5. Assure quality and safety of aquaculture products
6. Improve marketing of aquaculture products
7. Improve technology transfer, dissemination, and access to global information and technology for aquaculture
8. Ensure that aquaculture development contributes to job creation and growth of the economy
9. Evaluate the potential for development of alternative aquaculture species, production systems and markets
10. Evaluate options for improving the regulatory framework for aquaculture in support of both commercial and public sector aquaculture development.

2. GENERAL POLICIES

2.1 Property and water rights

Most of the freshwater and brackish water fish/shrimp farms in Indonesia are privately owned. This property right is defined and enforced. Shore areas, lakes, rivers and other bodies of water are part of the public domain and cannot be claimed or titled by anybody. The use of portions of a water body for aquaculture requires a permit from the local district government. Access to resources such as water is

relatively limited for small scale fish-farmers (fresh water pond farmers). The Government has encouraged the creation of Water User Farmers Associations in some districts and provinces to allocate the limited water supply among farmers. These Associations have been established gradually.

2.2 Infrastructure development

Consecutive National Economic Development plans have, over the last five years, aimed to develop and rehabilitate infrastructure facilities needed for the expansion of production and trade, and to increase people's well-being. The infrastructure for aquaculture such as zoning areas, roads, electricity supply lines and sea water irrigation are provided by the Government in some areas, while common water treatment ponds, roads and electricity on farms are provided by the private sector or farmers.

2.3 Legal and regulatory frame work

Policies dealing with environmental issues in aquaculture were established after the FAO Code of Conduct for Responsible Fisheries (CCRF). This Code encourages States to establish, maintain and develop an appropriate legal and regulatory framework, which facilitates the development of responsible aquaculture (FAO 1999). An Environmental Impact Assessment (EIA), in Indonesia known as AMDAL, is required for any company which plans to apply for a permit to establish freshwater or brackish water ponds for aquaculture activities with an area of 50 Ha or more [1].
In line with the 1999 FAO Code of Conduct, Indonesia has implemented environmentally friendly practices of aquaculture, and has issued regulations to protect the environment for sustainable future use.
The other regulations that have been put in place, or are being prepared by the Indonesian government can be found at Annex 1. All regulation is expected to help increase the contribution from aquaculture activities to the fisheries sector. Both sectors can be developed further to help the Indonesia economy recover from the Economic crisis.

2.4. Research, technology development and extension

Aquaculture Research and Development is broad and diverse, addressing a wide variety of species and subject areas. The Agency for Marine and Fisheries Research (AMFR) and the Directorate General of Aquaculture (DGAQ), Indonesia, have carried out many aquaculture programs. They include Research, Development and Demonstration; Extension, Education; Information Services; Inspection; Services; Marketing assistance training, Export assistance; Product safety and Quality assurance. Research is carried out through AMFR facilities as well as through partnerships with DGAQ, public and private Universities, other public and private institutions, and the National Aquaculture Development Centre (NADC) under the DG of Aquaculture. Research is directed toward the development of private and commercial aquaculture as well as to support the enhancement of natural resources. The major components of the research base are carried out through AMFR. AMFR supports aquaculture research for a variety of marine and freshwater fin-fish, shellfish and aquatic planning. Areas of research include breeding and seed production, aquatic animal health, nutrition, grow out , production systems,

[1] *EIA/AMDAL is issued according to the Ministry of Environment's Decree No.17/2001. This decree states that every fisheries business should be equipped with AMDAL. This applies to businesses with shrimp ponds with an area of 50 Ha or more; floating net cages on lakes with an area of 2.5 Ha or more or operating 500 cages or more. It also applies to floating net cages in sea water with an area of 5.0 Ha or more or 1000 cages or more and for the pearl culture industry with 50.000 animals.*

sustainability and environmental capability of aquaculture production; product quality and safety; economy ; marketing and information systems.

The importance of a supply of healthy and good quality seed for aquaculture development in Indonesia was recognised as part of the development policy. This also emphasised the need for further research on aquaculture genetics. Genetics plays an important role in increasing productivity and sustainability in aquaculture through higher survival, an increase in turnover rate, better use of resources, reducing production costs and delivering environmental protection. Native genetic resources are under threat and needs to be protected. Aquaculture can play an important role in the conservation of native genetic resources. The research program needs to be directed at domestication and broodstock development. Improved domestication and broodstock management practices and efficient breeding plans are needed to improve production of aquatic animals. Research and development is urgently required the development of standards for: seed quality; health maintenance, including the promotion of healthy seed; disease resistance; and standards for accreditation of hatcheries or farms for the supply of quality seed, as well as for distribution and licensing.
The Indonesian aquaculture industry can benefit greatly from improvements in a technology transfer program, information dissemination, and access to information and technology that is generated and adopted in foreign countries. Development of international information retrieval networks and partnerships could improve access to important technology. The development of appropriate data bases linked to electronic delivery systems would enhance information exchange and facilitate timely communication and implementation of the latest research results and technological advances for the industry.

2.5 Promotion

The Government is also looking at the expansion of markets and improvement of trading promotion. These activities are linked to economic transformation and selling of diversified products. Special priorities are put toward promotion of international markets and strengthening human capacity for people working on trading and export of aquaculture products.
The government realised that it is necessary to stimulate marketing information activities, enable the identification of - and access to - markets for different product groups and to gather information with regard to product quality, branch, hygiene and consumer preferences. In order to gain access to international markets, communication between producers and exporters from Indonesia will provide opportunities to participate in international exhibitions and to communicate with foreign buyers to introduce and improve the position of Indonesian aquaculture products.

3. SPECIFIC POLICY ON GROUPER CULTURE

Grouper belongs to the family of Serranidae, and is a commercially important fish, in particular for the live seafood market in Asia such as Hong-Kong, China, Taiwan, Singapore and Malaysia. The common species that are found in the seafood markets belong to the Sub-family *Epinephelinae* and can be divided into three genera *Epinephelus, Cromileptes* and *Plectrophomus.*
Grouper is widespread throughout the Indo-Pacific region, from Southern Japan to Palau, Guam, New Caledonia, Southern Queensland, Australia, and the Eastern Indian Ocean from the Nicobars to Broome, Western Australia. In Indonesia, grouper is found throughout coastal and marine waters. Tiger grouper can tolerate a wide range of salinity from 10 to 50 ppt. They are carnivores, feeding on small fish and

crustaceans, and are protogynous hermaphrodites, maturing first as females then changing into males as they grow older.
Over the last nine years, research has been directed towards the artificial propagation and rearing of grouper adults, juveniles and larvae. In 1998, the breakthrough of grouper hatchery technology by the Gondol Research Institute for Mariculture (GRIM) Bali – Indonesia, had given the needed boost for the aquaculture industry. (Sugama et al, 1998; Sugama et al, 2001). During these past 9 years, GRIM - in collaboration with the Australian Centre for International Agriculture Research (ACIAR) - has been successfully producing grouper seed on a commercial scale. The seed production techniques developed by GRIM have been widely adopted by farmers in the northern part of Bali, East Java (Situbondo) and South Sumatra (Lampung).
Millions of grouper seed has been marketed, not only in the domestic market but also for export to neighbouring countries such as Singapore, Malaysia, Vietnam, Thailand, Taiwan, Hong Kong and China. The hatchery techniques developed by GRIM have now been transferred to the private sector, reportedly contributing to farmer's incomes, job opportunities and export earnings.

3.1 Policies dealing with seed issue

The success of the technology developed on grouper seed production can be attributed to a large extent to the active research collaboration of the government of Indonesia (e.g., Gondol Research Institute for Mariculture, GRIM) and ACIAR, between 1999 and 2001. Since then, the private sector has taken over this technology for adaptation and commercialisation. There are now six government, fourteen private and 240 backyard hatcheries active in producing grouper seed. These hatcheries produce grouper seed in a range of 0.1-5 million per month. In order to get good quality grouper broodstock and seed to meet the national seed standards, hatchery operators should refer to the specifications mentioned in "Indonesian National Seed Standard"

The Government also carries out seed inspections, which includes assessment of the quality of seed produced, the environment in which they are produced and the monitoring of the cultivation of broodstock as well as the seed market. This inspection is based on the Ministry of Agriculture's Decree No. 1042.1/Kpts/IK 210/10/1999 on seed certification and monitoring.

3.2 Policies dealing with feed issue

Grouper is a carnivorous fish; in the wild they eat smaller fish, squid and various kinds of marine animals. It is highly possible that their feed can be changed to a commercial diet. The main problem in grouper feed production is that most of the raw materials are imported. Since the economic crisis started in 2008, the price of imported feed ingredients increased considerably. The government reacted and decided that the tariffs on aquaculture feed ingredients would be lifted. This policy was granted by the Ministry of Finance's decree No. 155/KM/03/2001.

The government also has a policy to control the feed quality through monitoring and inspection. Feed samples are regularly taken and analysed in Government Laboratories to check whether the feed meets the Indonesian National Feed Standard for Grouper.

3.3 Policies dealing with technology

Grouper aquaculture in Indonesia has recently expanded from marine pond - pen culture to a marine cages culture. It has evolved from an extensive (low stocking density in pond), to an intensive (high stocking density in cage with intensive feeding) culture. Almost 75% of the seed needed for aquaculture

comes from hatcheries. In 2002, research collaboration between GRIM and ACIAR has improved hatchery technology by improving survival rates and seed quality.

Grouper hatchery technology has been developed on a commercial scale. GRIM has fast tracked its transfer to the private sector. GRIM continues to refine and simplify production technology and to give technical assistance to both the private sector and grouper farmers. To date about twenty private hatcheries provide fertilised grouper eggs to 240 backyard hatcheries.

3.4 Policies dealing with marketing

Grouper has been marketed live, mainly to Singapore, Hong Kong, the South China mainland and Taiwan. Due to over-production of grouper seed, the government has allowed the private sector to export the seed after domestic requirements are fulfilled. When private companies want to export seed they have to apply for an export license from the Directorate General of Fisheries. To get approval they need:

1. License letter of the company from Aquaculture Director General
2. Traceability of fry, approved by Head of Provincial Fisheries Services
3. Letter of notification for seed handling facility at the export sites. The letter is issued by the Head of Provincial Fisheries Services. Information needed in the application includes: the name and status of company, address, person in charge, total number of seeds expected to be exported, location of hatchery producing seed and port of export

The government is willing to support and promote expansion of both domestic and international markets. However, since there are several regulation directives, they need to be synchronised between sectors and it still difficult to proceed with this objective. Marketing of grouper seed and products is totally managed by the private sector and the government only plays a supportive role.

3.5 Policies dealing with trade issues

In order to protect domestic and foreign consumers, the Government has developed regulation related to quality control and the control of fisheries products, including milkfish. The recent regulation is that the Minister of Fisheries has issued decree No KEMEN 01/Men/2002 dealing with the Integrated Fish Product Quality Management System. The decree states that each processing unit has to apply the Integrated Quality Management Program which is based on HACCP (Hazard Analysis Critical Control Points). All fisheries export is required to have an Integrated Quality Certificate and/or Health Certificate issued by The Laboratory of Fish Inspection and Quality Control.

Regulation in quality supervision and control which are issued by the Government have been received favourably by several countries such as the European Union (EU) with the commission Decision No. 324/94/EC, dated May 1994 and Canada with the signing of MOU in fisheries quality control between Indonesia and Canada dated 17 January 1996. The main issues in the European Union Commission Decision No. 324/94/EC are: The Laboratory of Fish Inspection and Quality Control is the only Institution authorised to issue “Health Certificates” for fisheries products to be exported to the European Union and the list of processing units which are allowed to export to the EU are marked by “Approval Number”

In order to open potential new overseas markets, the policy of the Department of Marine Affairs and Fisheries is to promote and exhibit Indonesian Fisheries products overseas. While the price of grouper products will be implemented is dependent on market mechanisms.

3.6 Policies dealing with investment

Indonesia, with its open-entry investment policy, is encouraging local and foreign investors to engage in a wide range of aquaculture to sustain and enlarge the sector's contribution to the national economy. Capital is needed to develop and carry out aquaculture activities. Recently, it has become more difficult for the private sector and farmers to get credit from banks. This situation may be caused by the idea that aquaculture is a high-risk business and hat it is capital intensive. The Government has recently launched a policy on capitalisation and banking through regulation No 22, 2005 which states:

1. Indonesian banks do not distribute the credit program anymore
2. The credit program is changed from a channelling system to an executing system and
3. The interest rate given to fish farmers is at a commercial rate.

In order to make it easier for farmers to raise credit, the Minister of Marine Affairs and Fisheries has provided a decree called Food Security Credit (KEP 33/Men/2001). The decree states that Food Security Credit will be organised by an appointed Bank to fish farmers, fish farmer groups (aquaculture association), and farmer cooperatives. The purpose of implementing this Food Security Credit is to increase national food security and farmer income by providing investment credit or working capital with an interest rate that every farmer can pay back. The interest rate is 16.0 % per year and the government is providing rate subsidies.

3.7 Policies dealing with property rights

Most of the coastal areas that are suitable for marine cage culture are open access. Those who want to use the area for culturing marine fish and set up their cages should have licenses from local Governments.

3.8 Policy dealing with the environment

A Code of Practice in Aquaculture has been formulated, but needs to be revised to make it more enforceable. The fisheries code requires that the Government formulates incentives and disincentives such as effluent charges, user fees and negotiable permits to encourage compliance with the environmental standards and promote sustainable management practices. Aquaculture facilities should only be constructed within established zones.

4. PUBLIC AND PRIVATE INTERPLAY

The private sector has contributed significantly to the development of grouper culture, either in hatchery or in grow-out farms. Private corporations have invested particularly in hatchery, feed milling, processing, farming equipment and supplies. Some corporations also invest in R&D and have done research on grouper feed, farming systems and hatchery.

Although there are numerous non-government organisations in Indonesia, their contribution to grouper culture development has been minimal so far. However, the field provides many areas for their involvement, especially to play an active role in poverty alleviation in rural areas.

Annex 1

Other regulation put in place, or anticipated

- Decree No. 17/2001 from the Ministry for Live Environment, concerning AMDAL (EIA);
- Decree No. 1042.1/Kpts/IK 210/10/1999 from the Ministry of Agriculture, concerning inspection for seed certification and monitoring;
- Decree No. 155/KMK03/2001 from the Ministry of Finance, concerning tax exemption policy for imported feeds; and Regulation No. 22 of 1995 concerning to capitalisation and banking policy;
- Decree No. KEP.33/MEN/2001 from the Ministry of Fisheries, regarding Food Security Credit, Free tax or tax holiday policy for national and overseas investors by promoting Indonesian Fisheries at new destination countries;
- Regulation No. 15/2002 concerning Fish Quarantine;
- Regulation of Fisheries No. 9 Year 1985 concerning the protection against dangerous transgenic species or genetically modified fish species;
- KEPMENTAN No. 57/Kpts/OT.210/2/07 concerning Planning for Aquaculture Development Activities or Compulsory Activities to Prepare Environmental Impact Assessment (AMDAL);
- KEPMENTAN No. 562/Kpts/OT.210/6/97 concerning Planning for Aquaculture Development Activities or Compulsory Activities to Prepare Environmental Management Effort (UKL) and Environmental Monitoring Effort (UPL);
- MENLH regulation concerning maximum discharges in the environment;
- KEPMENTAN regulation concerning Green Belt Limits, which is regulation for banning the use of coastal zones of small islands less than 10.000 Km^2 for shrimp production;
- Regulation on surveillance for seed, grow out, pest and diseases, and aquaculture environment; Constructive coordination policy between the Department of Marine Affairs and Fisheries and other qualified agencies such as the Agency for Research and Implementation Technology (BPPT), Agency for Indonesian Knowledge Science (LIPI), and related institutions;
- Policy on improved technology for 12 Technical Implementation Units (UPT), Directorate General of Aquaculture and the Research Agency for Marine Affairs and Fisheries (AMFR or BRKP);
- Government regulation No. 9/1985 from the Ministry of Fisheries concerning government lead information system, collecting, processing, dissemination and extension of technology and production data;
- Collaborative policy the National Development Centre, Local Government, Private Sector and International Institutions to spread the information and technology;
- KEP. 01/MEN/2002 from the Ministry of Fisheries, concerning Integrated Fish Product Quality Management System and HACCP Programmed (Hazard Analysis Critical Control Point;
- Memorandum of Understanding between the Department of Marine Affairs and Fisheries and Indonesian Police concerning maintaining general security;
- Department of Marine Affairs and Fisheries policy concerning the PIR program between nucleus and plasmas, non-tariff barriers concerning to standard of quality and hygiene as well as issues of non trade concern such as environment, labour, animal welfare and genetically modified organisms;
- Decree No. 3025/DPB.5/IX.530.D5/X/01 from the Directorate General for Aquaculture regarding to prohibition using chloramphenicol on shrimp farming;
- Decree No. KEP.26/MEN/2002 from the Ministry of Fisheries, dealing with supply, circulation, using and supervision of fish drugs.