

Fisheries Stock Enhancement: An Important Measure Towards Sustainable Development of the Fisheries Sector of Viet Nam

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Abstract

The contribution of coastal fisheries and inland fisheries to the livelihoods of the Vietnamese people has long been acknowledged, especially inland fisheries in the rural and mountainous areas. In recent years, inland and coastal fishery resources declined due to overfishing, environmental degradation and population putting increased pressure on the natural resources. The Government of Viet Nam has enacted many policies to support the sustainable development of the fisheries sector such as: the Fisheries Development Strategy 2020, National Master Plan for Fisheries Development 2020 oriented to 2030, Plan on the System of Viet Nam's Marine Protected Areas 2020, Program on Protection and Development of Aquatic Resources 2020. Stock enhancement is considered as an important measure towards sustainable development of Viet Nam's fisheries sector and is an integral component of many inland and coastal fisheries plans in many provinces of Viet Nam. With robust developments in artificial propagation techniques for fast-growing and desirable fish species and consequent increased availability of seed stocks, Viet Nam promotes stock enhancement is a management tool to recover depleted species populations. The main stocks released are *Penaeus monodon*, *Notopterus notopterus*, *Seminabeo notabilis*, *Spinibarichthys denticulatus*, *Hamibagrus elongatus*, *Cyprinus carpio*, *Squaliobarbus curiculus*. A comprehensive evaluation of stock enhancement in large water bodies and rivers has not been done in Viet Nam. However, initial results of these activities are considered important measures for enhancing the resources to be able to continue providing animal protein, employment and household incomes for rural populations.

Keywords: stock enhancement, inland fisheries, coastal fisheries, sustainable development

Introduction/Background Information

Inland, coastal and marine ecosystems are high in productivity and biodiversity and have been providing enormous potentials for the development of the fisheries sector. The fisheries and aquaculture sectors of Viet Nam have expanded rapidly over the past decade, with aquaculture production rising from 1,202,500 metric tons (MT) to 3,620,000 MT from 2004 to 2014, of which 1.0 million MT was contributed by *Pangasius* and 660,000 MT by brackishwater shrimps. Fisheries production in 2014 was about 3,620 thousand MT, of which marine capture fisheries contributed 2,684 thousand MT.

The fisheries sector is significantly contributing to the economy of Viet Nam with the export value of its production in 2014 at about US\$ 7.83 billion. Moreover, the sector employs more than 4 million people and an estimated 10% of the total population derives their main income directly or indirectly from fisheries. The fishery processing sub-sector in particular provides important employment opportunities for female labor.

The contribution fisheries sector to the livelihood of the Vietnamese people has long been acknowledged, especially in the coastal areas. However, the fisheries sector of Viet Nam nowadays also faces many challenges such as:

reducing fishery resources, coastal habitat loss, and water pollution both in inland and marine waters. The fishery resources, particularly inshore and inland fisheries, are considered to be over-exploited with many high value fish resources having declined to low levels. Many natural habitats which play important role for the fishery resources are degraded.

Coastal ecosystems, especially mangrove forests and coral reefs that have important roles in protecting coastal areas and habitats for marine species and providing ecological services to maintain livelihoods of local people, have been degraded significantly. Mangrove areas was 408,000 ha in 1943 but reduced to 209,000 ha in 2007. These issues put more pressure on livelihoods of fishing communities.

Stock enhancement is considered as an important measure towards the sustainable development of Viet Nam's fisheries sector and being an integral component of many inland and coastal fisheries in many provinces of Viet Nam. Thus, fish stock enhancement was determined as a priority project in Decision 188/QĐ-TTg dated 13 February 2012, approving the Program on Protection and Development of Aquatic Resources 2020.

Viet Nam has attained robust developments in artificial propagation techniques for fast-growing and desirable fish species, and consequently increased availability of seed stocks. The main stocks released are species of *Penaeus monodon*,

Activities/Results

Legal framework

The policies, laws and regulations for fishery sector management in Viet Nam have been largely developed and implemented to facilitate multi-sector integration. Various policies and regulations issued have assisted this process by building a policy framework for the fishery sector that includes fishing, aquaculture, processing and conservation, and fisheries resources development. The framework has also been revised and updated through the more recent orientation to sustainable development. To protect its fishery resources, the Government of Viet Nam has recently enacted many policies to support the objective of sustainable development, such as: (i) Vietnam Fisheries Development Strategy 2020 which was approved on September

Fish stock enhancement in Viet Nam

The country's fish stock enhancement program is aimed towards multiple purposes, primarily aiming to improve (directly or indirectly) the stock size/yield above what is obtained in an existing fishery resource; conserve a species or a stock; supplement impoverished stocks; and override bottlenecks in recruitment.

Fish stocks released to water bodies: With robust developments in artificial propagation techniques for fast-growing and desirable fish species and consequent increased availability of seed stocks, stock releasing is conducted in inland water bodies (in reservoirs, rivers, lakes), estuaries and marine waters. The main freshwater species stocked are: *Notopterus notopterus*; *Seminabeo notabilis*; *Spinibarbichthys denticulatus*; *Hamibagrus elongatus*, *Cyprinus carpio*, *Squaliobarbus curiculus*. The main species released in marine waters are *Penaeus monodon*; *Epinephelus* spp. and *Chlamys nobilis*. Fish stock releasing is undertaken in both central and local levels. The releasing program is designed under the Program on Protection and Development of Aquatic Resources 2020 (Decision 188/QD-TTg dated 13 February 2012). All information such as fish species for releasing, fish species composition, releasing time, releasing location are determined. However, the program also faces many challenges such as lack of basic information of water bodies (fish composition,

Notopterus notopterus, *Seminabeo notabilis*, *Spinibarbichthys denticulatus*, *Hamibagrus elongatus*, *Cyprinus carpio*, *Squaliobarbus curiculus*.

16, 2010 by Decision 1690/QD-TTg of Prime Minister; (ii) Decision 1445/QD-TTg of Prime Minister dated August 2013 – the National Master Plan for Fisheries Development 2020 oriented to 2030; (iii) Decision No.742/QD-TTg of the Prime Minister dated May 26th, 2010, approving the Plan on the System of Vietnam's Marine Protected Areas 2020; (iv) Decision No.1479/QD-TTg of the Prime Minister dated October 10th, 2008, approving the Plan on the System of Vietnam's Freshwater Protected Areas 2020; (vi) Decision 188/QD-TTg dated on February 13th 2012, approving the Program on Protection and Development of Aquatic Resources 2020.

fish biological characteristics, ecological parameters, social-economic conditions); lack of effective monitoring and evaluation system for releasing program from central to local level; and limited budget and involvement of stakeholders in governing the releasing program.

Introduction of closed areas: 16 closed areas in Viet Nam have been established in 2011 in order to protect spawning areas, nursing periods of some important species. The establishment of 16 closed areas (**Table 1**) was based on (i) traditional knowledge of fishermen; (ii) consultations with local authorities; and (iii) available scientific information.

Establishment of protected areas: In May 2010, Viet Nam's Prime Minister issued Decision 742, creating 16 marine protected areas (**Table 2**) as part of a broad strategy to move the coastal economy to a more sustainable footing. The development of a marine protected area network has become an important national issue with the objective of establishing a system of marine protected areas to protect ecosystems and marine species, which have high economic and scientific values that contribute to marine economic development and livelihoods of fishing communities in coastal areas.

Table 1: Detailed information on closed areas, closed seasons of 16 closed areas in Viet Nam

Closed areas	Provinces	Closed seasons	Protected species
Hon My - Hon Mieu	Quang Ninh	April 15 – July 31	Metapenaeus
Co To	Quang Ninh	February 15 – June 15	<i>Haliotis diversicolor</i> , Poalloporidae, Acroporidae, Poritidae
Cat Ba - Ba Lạt	Hai Phong - Thai Binh	April 15 – July 31	<i>Lutreria rhynchaena</i> , <i>Perna viridis</i> , breed shrimps of <i>Penaeus merguensis</i> , <i>Penaeus japonicus</i> .
Hon Ne – Lach Ghep	Thanh Hoa	April 15 – July 31	<i>Penaeus merguensis</i> , <i>Penaeus japonicus</i>
Dien Chau Bay	Nghe An	March 01 – April 30	<i>Decapterus maruadsi</i> , <i>Upeneus moluccensis</i> , <i>Upeneus sulphureus</i> .
Gam River	Cao Bang, Tuyen Quang	May 01 – July 31	<i>Bagarius rutilus</i> , <i>Sinilabeo lemassoni</i> , <i>Semilabeo obscures</i>
Lo River	Tuyen Quang, Phu Tho	May 01 – July 31	<i>Semilabeo obscurus</i> , <i>Sinilabeo lemassoni</i>
Red River	Phu Tho, Vinh Phuc, Ha Noi	May 01 – July 31	<i>Knonsirus punctatus</i> , <i>Clupanodon thrissa</i> , <i>Hemibagrus guttatus</i> , <i>Cranoglamis sinensis</i>
Downriver of Lam River	Nghe An, Ha Tinh	July 01 – August 30	<i>Elopichthys bambusa</i> , <i>Sinilabeo tonkinensis</i> , <i>Tor (Folifer) brevifilis</i> .
Ya Ly Lake	Kon Tum, Gia Lai	April 1 – May 31	<i>Chitala sp.</i> , <i>Cosmochilus harmandi</i> <i>Tor tambroides</i>
SerePok River	Dak Lak, Dak Nong	June 01 – August 30	<i>Probarbus jullieni</i> , <i>Chitala blanci</i> , <i>Cirrhinus microleppis</i>
Dong Nai River	Dong Nai, Ho Chi Minh City	June 01 – August 30	<i>Ompok miostoma</i> , <i>Gyrinocheilus aymonieri</i> , <i>Chitala ornat</i>),
Dinh An and Tran De Estuaries	Tra Vinh, Soc Trang	April 1 – June 30	<i>Tenualosa thibaudeaui</i> , <i>Tenualosa toil</i> , <i>Cirrhinus microlepis</i> , <i>Morulius chrysophekadion</i> , <i>Pangasianodon gigas</i>
Coastal area of Bac Lieu	Bac Lieu	April 1 – June 30	Metapenaeus
Coastal area of Ca Mau	Ca Mau	April 1 – June 30	Penaeidae, Metapenaeus
Coastal area of Kien Giang	Kien Giang	April 1 – June 30	Penaeidae, Metapenaeus and Penaeidae Mullidae, <i>Selaroides leptolepis</i> ,

Source: Circular 89/2011/TT-BNNPTNTg

Table 2: List of 16 marine protected areas

No	Name/Provinces	Total area (ha)	Marine area (ha)
1	Dao Tran / Quang Ninh	4,200	3,900
2	Co To / Quang Ninh	7,850	4,000
3	Bach Long Vy / Hai Phong	20,700	10,900
4	Cat Ba / Hai Phong	20,700	10,900
5	Hon Me / Thanh Hoa	6,700	6,200
6	Con Co / Quang Tri	2,490	2,140
7	Hai Van - Son Tra / Thua Thien Hue – Da Nang	17,039	7,626
8	Cu Lao Cham / Quang Nam	8,265	6,716
9	Ly Son / Quang Ngai	7,925	7,113
10	Nam Yet / Khanh Hoa	35,000	20,000
11	Nha Trang / Khanh Hoa	15,000	12,000
12	Nui Chua / Ninh Thuan	29,865	7,352
13	Phu Quy / Binh Thuan	18,980	16,680
14	Hon Cau / Binh Thuan	12,500	12,390
15	Con Dao / Ba Ria – Vung Tau	29,400	23,000
16	Phu Quoc / Kien Giang	33,657	18,700

Source: Prime Minister's Decision No 742/QD-TTg

In 2001, Hon Mun Marine Protected Area (now known as Nha Trang Bay Marine Protected Area) in Khanh Hoa Province was the first marine protected area established in Viet Nam through a cooperation established between the former Ministry of Fisheries and Khanh Hoa Province. In 2005, Cu Lao Cham Marine Protected Area in Quang Nam Province was next established with support from DANIDA. Two latest marine protected areas (Phu Quoc in Kien Giang Province in 2007 and Con Co in Quang Tri Province in 2008) were established under the effort of the provincial governments with only technical support from DANIDA. Until now, 14 16 marine protected areas have been established. It is clear that marine protected areas play an important role in stock enhancement, and

Lessons Learnt

With regards to legal framework, appropriate legislations exist, the problem is enforcement. Limited available resources are barriers to the implementation together with lack of baseline data, time series data, updated information on water bodies, fisheries composition; lack of a monitoring and evaluation system for the releasing program from central to local communities; limited budget and involvement of stakeholders in governing the releasing program. Thus, greater power and resources (human resource, budget) should be given to institutions to enforce the legislations. An underlying

Recommendations and Way Forward

Fish stock assessment should be conducted in important water bodies and baseline data for releasing program should be compiled. Also, it is important to establish an effective monitoring and evaluation scheme for the releasing program. Stock enhancement is closely linked to habitat restoration, thus, the best option would be to integrate stock enhancement practices with habitat improvement. An active management strategy to support released fish populations and related habitats is necessary. Management should be implemented in the form of control over the

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- Circular No.89/2011/TT-BNNPTNT of the Minister dated on December 29th, 2011, approving the list of closure areas in Vietnam

releasing high economic species and threatened species have been conducted yearly. Many pilot projects have been implemented with community participation on the sustainable exploitation and management of the fishery resources. The objectives of the Plan on the System of Vietnam's Freshwater Protected Areas 2020 were to set up 45 freshwater protected areas. In comparison with the marine protected areas, freshwater protected areas establishment has been slow, and so far, relatively few areas have been planned and established. However, the fish stock releasing program in central and local levels focusing on lakes and reservoirs aimed towards multiple purposes of fish stock enhancement. Every year, millions of juvenile fishes are released in freshwater bodies.

problem is lack of basic information about the distribution and abundance of fish species in general, and threatened species, in particular. Assessment of fish population and stocks is very limited. Consequently, knowledge of the status of stocks is weak. The participation of communities living in and near or around the water bodies in managing fisheries resources and related ecosystems is very important for successful fish stock enhancement program. To support this strategy, public awareness and co-management scheme should be implemented.

exploitation and habitat manipulation. Water bodies have multi-purpose uses therefore, it is necessary to push for policies and legislations which safeguard fishing and people depending on it. To support this, an integrated fisheries resources management plan should be developed, based on ecosystem approach. It is also necessary to encourage the participation of all stakeholders in fish stock enhancement, especially the participation of communities living near and around water bodies in managing the fisheries resources.

- Decision No.742/QD-TTg of the Prime Minister dated May 26th, 2010, approving the Plan on the system of Vietnam's marine protected areas to 2020
- Decision No.1479/QD-TTg of the Prime Minister dated October 10th, 2008, approving the Plan on the system of Vietnam's freshwater protected areas to 2020
- Decision 188/QD-TTg dated on February 13th 2012, approving the Program on protection and development aquatic resources to 2020