

Recovery and sustainable development of aquaculture industry in tsunami affected Aceh and Nias provinces in Indonesia

P.A. Padiyar¹, W. Subachri², Pamudi³, S. Raharjo⁴,
M.J. Phillips⁵, and R.P. Subasinghe⁶

INTRODUCTION

The Indian Ocean tsunami of 26 December 2004 caused death of more than 250 000 people, severely affected livelihoods of more than a million people and destroyed coastal infrastructure in eleven countries in Asian and African continents. The aquaculture industry is one of the hardly hit coastal rural livelihood sectors especially in Indonesia, India, Thailand and Sri Lanka. This article covers the rehabilitation and recovery efforts made by various organizations in Nanggroe Aceh Darussalam and North Sumatra (Nias Island) provinces of Indonesia during last two years of post-tsunami situation.

AQUACULTURE IN ACEH, INDONESIA

Aquaculture is one of the important livelihood activities along the coastline of Nanggroe Aceh Darussalam in Indonesia. During pre-tsunami year (2003), aquaculture in Aceh contributed to 16 percent (24 000 tonnes) of the total fish production which accounted for 32 percent (US\$ 56 million) of the total of US\$ 164 million fishery value. This formed about 4 percent of the provincial economy. As per the FAO/MMAF estimate, about 94 000 people are directly employed in 47 000 ha of brackish water fish farms (locally known as "tambaks") and in the aquaculture supply chain.

The uniqueness of aquaculture system in Aceh is the traditional farming practice with high quality farm-gate fish produce. Aquaculture is not new to the people of Aceh compared to the rest of the world. It started about 3-4 generations before (during early- and mid-twentieth century). After the mid-eighties, farmers started focusing on shrimp (*Penaeus monodon*) farming due to availability of hatchery produced seed, artificial feed and lucrative profit margin. Milkfish (*Chanos chanos*) polyculture is also practiced along with shrimp. In some districts, grouper nursing, cage culture of crabs and tilapia are very much prevalent. About 213 hatcheries used to produce shrimp seeds in Aceh following crude system of seed production. Traditional



aquaculture is still widely prevalent in this province. The development of the province was almost halted during last 3 decades due to the political conflict. Poor infrastructure, illiteracy, economical backwardness, geo-political isolation of people and the lack of business investments in this province may be the main reasons for lagging behind in aquaculture compared to other provinces of Indonesia. The *tambaks* are situated in sensitive coastal area which is highly dynamic in terms of geophysical aspects and diverse in terms of natural resources. All these facts make aquaculture and associated livelihoods economically, socially, and environmentally important for Aceh.

DAMAGE BY TSUNAMI

Tambaks were perhaps the first man-made structure along the coastline that got touched



Farmer training in Batee, demonstrating the bags of lime and other agro-inputs for proper usage

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and razed by giant devastating ocean wave 'tsunami' on 26 December 2004. It caused extensive damage to the aquaculture infrastructure facilities like fish ponds, fish cages, seed production centers, water supply canals, roads and other related government and private infrastructures along the coast line which lead to the loss of livelihood of fish farmers. In an estimate of FAO/MMAF, about 20 000 ha of *tambaks* and 193 shrimp hatcheries were heavily damaged and more than 40 000 people lost their aquaculture-based livelihood in Aceh.

POST-TSUNAMI RESPONSE

Responding to the immediate need to rehabilitate the aquaculture infrastructure and restore the livelihoods of thousands of tsunami-affected fish farmers, various donors and implementation agencies including government line agencies, international and national non-governmental organizations (NGO) came forward to support and assist the Government of Indonesia and the people of Aceh and Nias and started their aquaculture rehabilitation activities since mid-2005. As per the information gathered from different agencies, until November 2006 about 28.5 percent (5 695 ha of 20 000 ha) of the damaged *tambaks* (fish ponds) are rehabilitated or in the process of rehabilitation, about 45 of 193 damaged shrimp hatcheries (23%) are rehabilitated (Table 1).



A scene of mechanical excavation to repair *tambak* embankment in Rungkom village, Pidie

As a first step to the rehabilitation activities, the FAO in cooperation with the Ministry of Marine Affairs and Fisheries (MMAF) and the Australian Centre for International Agriculture Research (ACIAR) published a set of guidelines for *tambak* rehabilitation called "15 steps for aquaculture farm rehabilitation in Aceh" which was widely distributed to all the stakeholders in Aceh.

The FAO focused its *tambak* rehabilitation activities in 18 villages of 5 sub-districts in Aceh Besar, Pidie and Bireuen along the northeast coast of NAD. In total, 720 *tambak* (fish pond) farmers/households started their aquaculture based livelihoods and more than 1 387 internally displaced people (IDP) got

Table 1: Overall status of aquaculture sub-sector rehabilitation in NAD and Nias

	Pre-tsunami	Tsunami damage	Rehabilitation completed/ ongoing	Progress (%)
Tambak (fish ponds)	47 000 ha	20 000 ha	5 695 ha	28.5%
Shrimp hatcheries	223	193	45	23%

EFFORTS BY FAO

FAO is one of the lead agencies which successfully implemented rehabilitation activities in the aquaculture sub-sector in Nanggroe Aceh Darussalam (NAD), Province of Indonesia, during 2005-2006. Fourteen percent of the rehabilitated *tambaks* in Aceh were supported by FAO. The donors for aquaculture rehabilitation activities in FAO include the European Commission Humanitarian Aid (ECHO) (Project No. OSRO/INS/509/EC) and the Government of Spain (Project No. OSRO/INS/512/SPA).

temporary employment for more than 23 726 person-days of work through cash for work (CfW) scheme during rehabilitation of *tambaks* and water supply canals. Embankments of 448.75 ha of *tambaks* and 19 115.30 meters of secondary and tertiary water supply canals were physically repaired by mechanical excavation contracts and or by CfW scheme. *Tambak* inputs which included shrimp and milkfish seed, pellet feed, feed check trays, lime, fertilizer, water filter nets, hapa, water pumps and gasoline, etc., were distributed to 795.77 ha of *tambaks* where farmers started farming shrimp and milkfish.



Houses of tambak farmers

Table 2: Build back better: What do we mean by it?

Item	Pre-tsunami status	Rehabilitation specification
Height of Tambak embankment	0.5 - 0.75 m (Shallow ponds)	1 - 1.5 m (Deeper ponds)
Width of embankment	Bottom = <3 m Top = <0.5 m (Weak embankments)	Bottom = 4 - 7 m Top = >0.5 m (Robust embankments)
Water gate	Wooden planks (Expensive, US\$ 600, depend on timber availability, 3 4 year life span, difficult to operate)	PVC pipe (Cheaper, US\$ 250 and environment friendly saving timber, >10 year life span, very easy to operate)
Water supply Canal	Shallower than tambak depth (water from tambak cannot be completely drained)	Deeper than tambak depth (water from tambak can easily get drained by gravity)
Shrimp seed quality	No testing (High risk of disease pathogen introduction)	Tested Seeds (Low risk of disease pathogen introduction)
Water filtration	No (Easy entry of disease causing pathogen in to tambak)	Double mesh filters (Stop most of the disease causing pathogen entering the tambak)
Shrimp hatchery	Single room non-biosecure design and crude practices: Poor health seeds	Multi -room biosecure design and Better Management Practice health seeds

Village farmer training was conducted in 17 villages during the rehabilitation process and more than 525 farmers actively participated in the training which focused on better management practices (BMP). Province level best practice workshop for *tambak* rehabilitation was organized three times to share the information and better coordinate aquaculture rehabilitation activities. Similarly, district level coordination meetings were conducted in two districts.

To initiate production of high health shrimp seeds in Aceh, the FAO constructed a model shrimp hatchery at the Fisheries Senior High School (SUPM) in Ladong. Hands-on training was given to private hatchery operators on the design and construction of biosecure shrimp hatchery. The rehabilitation of nine tsunami-damaged private hatcheries is also under progress.

CONCERNS AND CHALLENGES

Within the process of rehabilitation of the aquaculture sub-sector in Aceh, sustainability is given priority using the slogan of "build back better". Table 2 gives some examples of 'build back better' in *tambak* rehabilitation. The main concern during the early rehabilitation stage was the political conflict situation. On 16 August 2005, the Helsinki Peace Accord was signed between Aceh Rebels (GAM) and the Government of Indonesia thus ending three decades of bloody unrest. As a result, the rehabilitation activities got accelerated. Due to the conflict situation during the last 30 years, Acehnese people were socially and politically isolated from the rest of the country. People still have a feeling of insecurity from various angles including their livelihoods. The lack of local technical expertise adds to the complexity of the situation and calls for capacity building of local institutions and people. So while rehabilitation of the damaged aquaculture industry with a focus on sustainability is in progress, the local social issues, environmental aspects (protection of green belt) and local man power capacity need to be clearly understood and fully taken in to account.

WHAT'S NEXT?

For the immediate future development of aquaculture industry in Aceh, the following should be the priorities: (a) wide-spread promotion of BMPs for environment friendly *tambak* farming; (b) on-farm demonstration of disease prevention and control; (c) promotion of diversification with other local, economically important fish species and seaweed; (d)



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A scene of cash for work to repair tambak embankment in Rungkom village, Pidie

promotion of food safety issues and better post-harvest handling practices; (e) strengthening of farmer organizations (BMPT) at village, sub-district and district level; (f) establishment of farmer service centres (water quality and disease diagnostic laboratories) at district and sub-district level; (g) establishment of quality control laboratories for screening pesticide and antibiotic residues; (h) production of high health shrimp seeds through BMP for hatcheries; and (i) efficient utilization of Aceh shrimp brood-stock.

¹Arun Padiyar
Food and Agriculture Organisation of the UN
Rehabilitation Support Coordination Unit
Jalan Angsa No.12, Ateuk Deah Tanoh
Banda Aceh, NAD, Indonesia
E-mail: arunpadiyar@gmail.com

²Wahju Subachri
Food and Agriculture Organisation of the UN
Rehabilitation Support Coordination Unit, Indonesia
E-mail: wahjusubachri@gmail.com

³Pamudi
Food and Agriculture Organisation of the UN
Rehabilitation Support Coordination Unit, Indonesia
E-mail: pamudi73@yahoo.com

⁴Sugeng Raharjoh
Regional Brackishwater Aquaculture Development
Centre (BBAP) Jalan Ujung Bate - Krueng Raya Km
14 Aceh Besar, NAD Indonesia
E-mail: sugeng_r19@yahoo.com.sg

⁵Michael J. Phillips
Network of Aquaculture Centres in Asia-Pacific (NACA)
PO Box 1040 Kasetsart Post Office
Bangkok 10903, Thailand
E-mail: Michael.Phillips@enaca.org

⁶Rohana P. Subasinghe
Aquaculture Management and Conservation Service
FAO Fisheries and Aquaculture Department
E-mail: Rohana.Subasinghe@fao.org