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Policy Dialogue for Promoting Sustainable Shrimp Aquaculture in the Sundarbans

REPORT

1. BACKGROUND

Aquaculture is one of the fastest growing industries around the world. Capture fisheries and aquaculture supplied the world with about 106 million tones of food fish in 2004. Of this total, aquaculture accounted for 43 percent. There is an increasing demand for seafood in international market and will continue to grow in future.

West Bengal the second largest producer of farmed shrimps. It is also the second largest State in terms of areas developed under aquaculture most of which is in the Sundarbans region. Sundarbans eco-region is ideally suited for extensive culture of shrimps, prawns and several other fin and shell fish species, accounting for almost one third of the total brackish water area in the country. It could be a major source of foreign revenue earning as well as livelihoods if utilized properly. The demand for tiger shrimp is leading among all other fin and shell fish species due to immense profitability of cultured shrimps in the international market. Frozen shrimp exports (by value) for West Bengal have increased by 300 percent over 12 years. Most of the farmed shrimps are exported as frozen shrimps to USA, European Union and Japanese markets and today it's over 600 crore export industry for West Bengal alone.

Aquaculture is an essentially been a traditional practice in the Sate of West Bengal for centuries. However, for last two decades the aquaculture sector and especially shrimp farming has become a priority sector. More and more people are investing their land, water as well as financial resources towards shrimp based aquaculture. Rapid expansion of shrimp aquaculture has been driven by several factors in the recent years. They include potentially high profits, international market demand for high quality farmed shrimps and the potential of this sector to generate foreign exchange as well as employment in poor coastal communities.

Demand of farmed shrimps is significant especially when the supply from capture fisheries is limited as well as fluctuating across the globe. Presently, the farmed shrimps accounts for almost 30 percent of total world shrimp production and this share is increasing. Any future growth in the market and shortfall from capture fisheries will be covered by increased aquaculture production. From this perspective, the shrimp aqua farming and its sustainability has a vital role to play towards determining the ecological future of Sundarbans Biosphere Reserve.

2. IMPLICATIONS FOR SUNDARBANS

Rapidly increasing trade in processed shrimps and its undesirable effects have raised many socio-economic as well as environmental issues. Tiger shrimp post larvae (PL) collection from the nature and unsustainable shrimp farming practices especially in the Sundarbans region has resulted in serious environmental degradation. Increasing pressure on land and water resources along with uncontrolled natural resource exploitation may finally jeopardize the viability of the sector as well as the ecoregion.

However, there is a scope of maintaining the socio-economic and environmental sustainability of the entire chain of activities through positive sectoral intervention on the supply side. Supply side of tiger shrimp exports includes both collection as well as farming of shrimps. Primary concern is to reduce the dependence of shrimp farms on the wild caught PL from the Sundarbans region. Unsustainable and indiscriminate collection of wild tiger shrimp PL using wide range of fishing gears are of major concern. This results into elimination of several non target species which has negative implications for overall fishing sector.

Traditional and modified traditional practice has always been environmental resource friendly. However, increasing demand and high profitability along with many other crucial factors as mentioned before are shifting the overall pattern of aqua farming in the region. Trend of shrimp based aqua farming is increasingly shifting towards semi-intensive and intensive practices. Issues like heavy antibiotics and chemical application, imported and non tested feed usage (or no feed at all, improper design of shrimp farms, open water/ marine environment pollution and even deliberate breach of embankment, usage of wild seeds and lack of technical know how for sustaining both highly stocked as well as low stocked aqua farms has impacted the land, water as well as forest resources.

Application of antibiotics and other pharmacologically active substances are not required traditional & improved traditional farming practices. Moreover the pollutant load of the effluent is also low and subsequently the effluent treatment cost is also lower than that of treatment cost of effluents released from semi-intensive and intensive farms. Risks from shrimp diseases are also less and the overall farming practice is sustainable.

Conducive policy regimes could provide mechanism for promotion and facilitation of sustainability through better management practices (BMP) across the entire value chain. Sustainable biodiversity usage is necessary to create a “win-win” trade-environment linkage and the necessary regulatory as well as market based mechanism reform required for the same. This includes good management practices, traceability, ecolabelling, certification and organic shrimp farming.

Finally, integrating environmental considerations in shrimp farming activities with local development planning is likely to complement rather than inhibit trade and mitigate the negative impacts of aquaculture in the Sundarbans ecoregion.

3. ABOUT THE PROJECT

WWF-India is carrying out an outreach and advocacy initiative which is an integral part of the project ‘*Trade, Environment and Rural Poverty: A study in the Sundarbans regions of West Bengal*’ in India. The research component of this project primarily focused on the issue of aquaculture and shrimp export, as this is a major trade-related issue that has impacts on both the environment and the livelihoods of the rural poor in the Sundarbans.

4. OBJECTIVES

Key objectives were:

- a) To share the research findings among key stakeholders.
- b) To discuss major issues of concern for the entire value chain towards maintaining economic as well as ecological sustainability of the sector.
- c) To discuss a broad range of policy options to achieve sustainability in the aquaculture sector which could minimise negative environmental impact on Sundarbans ecoregion as well as support livelihoods.
- d) To facilitate development of mitigation strategies.

5. PARTICIPANTS

Present: Fisheries Dept., Institute of Economic Growth, Sundarban Affairs, The Marine Products Export Development Authority, Land & Land Reforms, West Bengal Industrial Development Corporation, Commerce & Industries Department, SGS-India, National Centre for Sustainable Aquaculture, OSSPARC, District Magistrate (North 24 Parganas) and NABARD.

Absent: Forest Department, Border Security Force, Panchayat & Rural Development, Development & Planning, West Bengal Pollution Control Board, Environment Department and Export Inspection Council.

6. PROCEEDINGS

The dialogue was structured with multifaceted presentations primarily by WWF India and State fisheries department staffs; it was facilitated by Dr. Sejal Worah and Dr. Anurag Danda, WWF-India

3.1 The following presentations were made to initiate the dialogue:

- Workshop objectives, process & Introduction of Participants - by Dr. Sejal Worah, Programme Director, WWF-India
- Overview on aquaculture sector in Sundarbans – by Dr. Madhumita Mukherjee, Joint Director of Fisheries, Dept. of Fisheries, Govt. of West Bengal
- Shrimp Aquaculture issues in Sundarbans – by Prof. Amallesh Chowdhury
- Views & Issues of Aqua Farmers – by Shri Nirapada Sardar, Aquafarmers representative
- Views & Issues of Market Association – Shri Bhuvan Mondol, President, North 24 Parganas Market Association
- Views & Issues of Exporters Association – Mr. Taj Mohammad , President, Sea Food exporters Association, West Bengal
- Issues regarding licensing and registration of aqua farms under Coastal Aquaculture Authority – Shri S.Chakrabarti, Joint Director of Fisheries (ME & MS), Dept. of Fisheries, Govt. of West Bengal
- WWF Project Findings – Dr. Anurag Danda, Sr. Programme Coordinator,
- Presentation of Key issues and recommendations – Dr. Sejal Worah, Programme Director, WWF-India
- Summing up on Sundarbans: Environmental linkages with aquaculture – Dr. Asish Ghosh, Director, CED

The presentations were followed by a Question & Answer session; panel discussion and round table discussion moderated by Dr. Worah and Dr. Danda, WWF India.

Following are the summary of the presentations and the concerns raised by the participants:

3.2 Aquafarmers presentation:

Problems and concerns

1. Lack of knowledge about scientific shrimp aquaculture
2. Chamber to stock quality seeds
3. Access to extension services for improved shrimp aquaculture
4. Crisis of fresh water sources
5. Water quality and disease outbreak
6. Falling production and crop failure
7. Lack of green cover
8. Bycatch and alternate employment for collectors
9. Environmental degradation due to collection
10. Inadequate community and government initiative

Perceived solutions

1. Improved seed quality and provide testing facility
2. Improved water quality
3. Demonstration of scientific farming
4. Demonstration of alternate livelihoods for seed collectors

Rational

1. Availability of good quality tested and certified fish seeds and construction of seed bank
2. Excavation and re-excavation of existing fresh water bodies and raising of embankments
3. Bio-treatment facility
4. Continual social forestry programmes (including mangroves)
5. Involving civil society for regular monitoring, support and evaluation through appropriate authority.

3.3 Exporters/processors presentation:

Key issues

1. Traceability is not possible beyond market level – leading to challenges in addressing buyer queries and moving towards organic farming, eco-labeling and certification.
2. Absence of hatcheries and seed banks leads to inconsistent quality (unhealthy seeds) affecting farming as well as exports.
3. Usage of banned chemicals and antibiotics and subsequent cases of consignment cancellation / export rejections.
4. Wrong practices at farm and market level (e.g. cooling) for higher prices can lead to consignments being rejected.
5. Inadequate PCR testing centers, also not established at proper locations/sites.
6. Poor hygiene and sanitary conditions in auction centres leads to bad handling of raw materials.

Proposed solutions

1. Promote mechanisms and coordination to enhance traceability (no. of agents/individual producers, geographical marking, registration of auction centres and suppliers/agents).
 2. Ensuring that farmers have access to good quality certified seeds.
 3. Strengthen enforcement of existing regulations on inputs and practices.
 4. PCR testing labs should be located keeping in mind geographical location.
 5. Provide government support for improving infrastructure of the auction centres like making funds / grants available.
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3.4 Poverty Alleviation through improved Aquatic Resources Management in Sundarbans Wetlands (Presented by Dr. Madhumita Mukherjee, Joint Director of Fisheries, Govt. of West Bengal)

West Bengal has the largest brackish water area available for shrimp farming in the country. Estimates put the figure around 4.05 lakh ha. Including estuarine area. The brackishwater culture potential area is 2.10 lakh ha. & is about 23.28% of the, total estimated potential culture area of the country.

Sundarban has excellent prospect for brackishwater shrimp & fish culture. Only thing required is to evolve a comprehensive approach taking cognizance of the following variables– seed, water quality management feed, processing & packaging, marketing, infrastructure etc.

The area under shrimp culture in the Sundarbans is around 42,000 ha, distributed as follows:

1. **24Pgs (N):** 35,000 ha in an extensive area of lowlands in Sandaskhali I and II, Minakhan, Hasnabad, Haroa blocks (also Basirhat II and Barasat II block outside of the Sundarbans). There are about 1,000 shrimp farms in the Malancha area (Sandeshkhali I block)
2. **24Pgs (S):** 7,000 ha mainly in Canning block (World Bank project), and a few farms in Basanti and Gosaba blocks.

As per adoption of managerial practices we may visualize following types of culture in West Bengal which includes Sundarbans too:

- a) Traditional
- b) Extensive
- c) Semi-intensive
- d) Intensive
- e) Paddy cum fish culture
- f) Bhasabada fisheries

Monoculture of shrimp in aqua farm is discouraged as this significantly increases the risk of disease outbreak. Traditionally, polyculture practice is encouraged.

However there are some issues which have negative impact on aquaculture and fisheries sector. These are:

Two types of stocking/harvesting regimes exist:

Multiple (continuous) stocking/multiple (continuous) harvesting:

Single stocking/single harvesting

The main fish species currently cultured in the Sundarbans are:

1. Bagda chingri (Tiger shrimp)
2. Golda chingri (Giant freshwater prawn)
3. Parsia (mullet, *Liza parsia*)
4. Bhangon (mullet, *Mugil cephalus*)
5. Magur (walking catfish, *Clarias batrachus*)
6. Tengra catfish
7. Catla
8. Rohu
9. Silver carp
10. Tilapia
11. Guppy (ornamental fish)
12. Molly (ornamental fish)
13. Swordtail (ornamental fish)

Several species opportunistically enter shrimp ponds, and are harvested and sold as 'bycatch':

1. Bhetki (sea bass)
2. *Scatophagus argus*
3. Milkfish
4. Baila (goby)
5. Therapon (*Therapon perch*)
6. Besides Crabs form an important crop here

The ultimate objectives of aquaculture sector development are:

1. To increase the income and employment of the population
2. Raise the nutritional status
3. Maximize economic returns from unit water area
4. Increase the availability of fish in domestic market at reasonable price and
5. To enhance the foreign exchange earnings.

Apart from export market, farmed shrimp has a huge domestic market which worth over Rs. 10 crore. For more than last one decade export of shrimp from West Bengal through Kolkata port is continually increasing both in terms of quantity as well as value.

The low season is July to November due to the reduced salinity from monsoon rainfall (shrimp grow in freshwater during this period). Growth of the first shrimp crop takes 4.5 months, while the second crop is allowed to grow only about 3 months.

Shrimp Seed Supply

In the true sense West Bengal do not have any shrimp hatchery. There are three larval rearing centers (the so called hatcheries) near Digha (South Bengal) region.

Seeds are mainly procured by two ways:

1. From these hatcheries and hatcheries of other states.
2. From wild collections for traditional 'Bhasabada' Fishery

Views about Shrimp Feed

State Government favours to make supplementary feeds for shrimp locally. This will facilitate to monitor quality, formulation and hygiene of the feed as and when needed. In this direction, a booklet has been released by the office of the Deputy Director of fisheries (M&P) on feed formulation & feed making. We are cautious about this subject because artificial feed is the prime suspect of outbreak of white spot disease in our country.

To control disease our prime thrust areas are:

1. Proper pond management & water quality management.
2. Use organic fertilizer
3. Application of probiotics
4. Use of PCR tested seeds
5. Use of methylene blue solution as dip treatment before releasing seeds at ponds.
6. Use of on farm made feed.
7. High stocking avoided.
8. Polyculture encouraged.
9. Consultation with Research centre at the onset of the diseases.
10. Not to use of *ANTIBIOTICS* from pond to plate.

Steps Taken by Dept. of Fisheries, Govt. of West Bengal against Use of Antibiotics:

1. A good number of publication (Books leaflets etc.) on shrimp health management were done and circulated among farmers from Microbiology and Parasitology section of Dept. of Fisheries, Govt. of West Bengal are written in very easy language so as to educate the grass root level farmers regarding modern aspect of farming and adverse effect of chemical, and antibiotic.
2. There are provisions of training of officers of all level within an outside of the state to make them up to date about the present concept of aquaculture.
3. Awareness camps and training are being organized at Block Level for the grass root level farmers to make them aware about the adverse effect of antibiotic.
4. Regular advertisements are being published and widely circulated through BFDA offices depicting the adverse effect of antibiotic.

Major problems in the shrimp farming sector are as follows:

1. Pond leases
2. Water supply
3. Feed quality and supply
4. Diseases
5. Finance system tied to monopoly purchase rights
6. Chain of traders
7. Icing shrimp
8. Shortage of raw material for processing
9. Unplanned development

The Department of Fisheries, Government of West Bengal is already engaged in various projects for poverty alleviation in different areas:

1. **Production of Fish Seed** -62% of the total production in the country
2. **Fish Production** -13.59 lakh tons, of which the marine sector forms 1.78 lakh tons and the inland sector 11.81 lakh tons during the year 2006-07
3. **Fish Farmer's Development Agencies (FFDA)** -Till 2004-2005, 119373.370 ha of water area & The average productivity 3500-4000 Kg ha/ annum
4. **Brackish Water Fish Farmer's Development Agencies (BFDA)**-5300 ha has been developed & in year 2005-06, 61100 t shrimp
5. **Ornamental Fish Culture** -under F.F.D.A and NCDC programmes & Upto 2004-05, 570 nos. of ornamental fishery units have been developed.
6. **Sewage-fed Fisheries** -4082.96 ha area is being cultured producing 25000 t of table fish per annum.
7. **Development of Beels, Bundhs & Reservoirs** -Productivity 800-10000 Kg/ ha/ annum
8. **Implementation of Canal Fishery**
9. **River Ranching Programme** -20 lakh fingerlings every year
10. **Development of Marine Fisheries** -About 4630 no. of mechanised vessels upto 2005-06
11. **Export** -In the year 2005-2006 is 18427 t valued INR 537.0 Crore
12. **Conservation measures for Endangered Fish Species**
13. **Research, Technology & Extension**
14. **Information Communication Technology** -Agriportal
15. **Employment Generation, Poverty Alleviation and Upliftment of Rural Economy** -Rehabilitation of scheduled castes and scheduled tribes families/since 1982 about 20 lakh fisher families and fish farmers have been directly benefited and about twice the number have been indirectly benefited from the various activities undertaken by the DOF

Steps taken for extension / Diversification of aquaculture:

1. Under Extension programme continuance of the Central Sector Scheme viz. Statistical Survey is necessary during the 10th Five Year Plan period.
2. Setting up of regional branches of C.I.F.T/C.I.B.A/National Institute of Cold Water Fishery/National Bureau of Fish Genetic Resources/C.M.F.R.I in WB
3. R & D efforts for genetic management for fish should be immediately started because the resources of sea are not unlimited.
4. Import of parent stock (brood fish) in the ornamental fishery sector.
5. Waving of Import Duty on Artemia for prawn & shrimp hatchery and Ovaprim (inducing agent) in fin fish hatchery.
6. Setting up of modern fish feed industry with high FCR value.
7. As exploitation of sea resources has almost reached optimum level in inshore fishing, it is an immediate necessity to start cultural operations in respect of Mudcrab, Seaweed, Algae (spirulina), Catfish, Oysters etc.
8. Transfer of technology for Seabass breeding.
9. In the Inland Fisheries Sector, development of 5,387 ha. of beels/baors has been done under the NCDC assisted Beel Fisheries Development Scheme through Primary Fishermen's Co-operative Societies. The financial condition of most of these Societies demands lowering of interest rate (7-9%)

of NCDC loans. Hon'ble Union Minister of Agriculture may kindly consider this proposal sympathetically.

10. It is suggested that GOI should consider introduction of subsidy in respect of electricity consumption in the fishery sector.

Steps those are necessary for Sustainable Aquaculture:

1. Farm registration with Aquaculture Authority
2. Optimizing input use (feed, fertilizers etc.)
3. Avoiding usage of antibiotics
4. Monitoring residue in farm products
5. Appropriate disease management
6. Water quality management (both inlet & outlet)
7. Farm hygiene maintenance and post harvest handling
8. Training to farmers on GAP

Major problems faced by shrimp aquaculture sector are as follows:

1. **Pond leases:** Lease period for ponds and bheris are between one and three years duration. This is too short a time for longer term investments, and there is no incentive for shrimp farmers to improve the infrastructure of the pond, let alone drain the pond and prepare the substrate properly. The regulation for shrimp pond leasing need to be standardized, and longer lease term specified. Five year or more is desirable.
2. **Water supply:** The water supply is not properly designed in many areas. In some cases, the outflow from one pond forms the inflow to an adjacent pond. Pollution of the water supply is also a problem. Organic sludge settles on the pond bottom and requires removal. Aeration is needed to break down the BODs. The nutrients initially result in good phytoplankton growth in February which is beneficial to shrimp and mullet growth. However, by April cloudy weather sets in, resulting in dying and decomposition of the phytoplankton and lower water quality. Disease outbreaks sometimes begin as a result.
3. **Feed quality and supply:** Feed is considered the second most important issue for the shrimp farming industry. The supply of shrimp and fish pellet feed is a problem. In lieu of adequate quality feed supply, farmers are forced to use local feed materials, and these do not also result in maximal growth.
4. **Diseases:** The production of shrimp from farms is threatened by white spot and other diseases. Shrimp are said to be most prone to disease outbreak in July-August during the monsoon (possibly due to the abrupt change in salinity in ponds). Mortality is heaviest under monoculture, and less under polyculture. Previously, higher stocking densities were used (3,000 PL per ha) but this resulted in frequently disease outbreaks.
5. **Finance system tied to monopoly purchase rights:** Adequate finance for shrimp farming is not available from finance institutions. This drives shrimp farmers to take loans from shrimp traders, who demand monopoly purchase rights of the shrimp crop in addition to repayment of the loan at high interest rates. Loans should be made available at normal interest rates by finance institutions
6. **Chain of traders:** The system of having several intermediate traders between the shrimp farmer and the processing plant (as well as the fraudulent practice of 'cooling' shrimp in cold water to increase their weight) results in deterioration in quality of the shrimp.⁶¹ Attempts by plants to buy directly

from shrimp farmers have not been successful because the traders have monopoly rights to purchase the shrimp in exchange for giving loans to the farmers.

7. **Icing shrimp** : There is also the problem of preserving shrimp after harvest, as icing of shrimp is not properly done. There is not enough ice available, or in the right locations.
8. **Shortage of raw material for processing**: Processing plants suffer from a shortage of supply of raw material, especially high quality raw material which would realize premium prices on export markets
9. **Unplanned development**: Much of the existing shrimp farming development was unplanned. No survey has been conducted to determine the areas suitable for shrimp farming. Farms are set up where soil conditions are unsuitable for *bagda* (too acis, high pyrits content, high organic matter content). A survey needs to be done and potential shrimp farming areas identified and categorized in terms of their suitability for shrimp farming.
10. **Regulation of shrimp farming activity**: are not regulated. Such criteria as stocking time and stocking density are up to the framers There is no control over farming practices, such as initial stocking density and use of chemicals. The shrimp farming practices.

The Department of Fisheries, Government of West Bengal proposes following recommendations for improvement of aquaculture sector:

1. **Refinement of Production Models**: The project will identify and develop implementable production models for profitable and feasible livelihood activities. The production models are in five sectors : 1) aquaculture, 2) capture fishers, 3) fisheries inputs and post harvest, 4) homestead agriculture and livestock, and 5) handicrafts. The project will develop a production model of each livelihood scheme,14 which was include comprehensive technical specification, fishing budget, cost benefit analysis, risk analysis and environmental impact assessment and sustainability assessment. Each scheme will be required to meet criteria of technical feasibility, profitability, implementability and sustainability. Models will generally be designed for uptake by individuals or small cooperative type groups. Extensive consultation will be held with beneficiary communities throughout the process of model development in order to optimize the design of each model and ensure that it will be acceptable to beneficiaries. In some case trial will be carried out to develop the model. Demonstration units will be established to popularize certain models and for use in training.
2. **Finance packages**: The magnitude of financial liability for a unit of each production model will be moderate. Credit windows will be opened at various financial institutions to accept applications from qualified Sundarbans community borrowers. Borrowers will be approved by the village gram Panchayat committees. The project will make available a fixed yearly quota of units for each production model. Adjustment will be made to the quotes in the even that the pattern of demand for finance does not match the allotted quotes.
3. **Training and extension**: A comprehensive programme for training and extension will be developed and implemented by the proposed project. Existing training programmes will be supported in order to provide recipients of project livelihood support with adequate technical know-how and extension support. Training will be carried out at village level and can include study tours. Extension services will be provided by the existing extension services operated by the fisheries and agriculture agencies of the government. NGO will also participate in project implementation through training and extension activities which will complement that of government agencies. NGO will be identified and allotted discrete 'territories' within the fringe area of the Sundarbans within which to carry out project activities.

4. **Market development:** The project will support the development of markets and construction of market infrastructure in key locations to absorb the increased production of fish and other products arising from the project. Special emphasis will be given to ensuring that producers receive fair market prices through provision of auction halls and transport facilities. The project will assess the existing market for each type of livelihood product and design programmes to improve markets where gaps exist. This can include construction of market infrastructure, provision of market subsidies and incentive product promotion, and development of small-scale processing and export industries.

Thrust Area For Creating Infrastructure:

1. Enhancing farmers' incomes.
2. Improving access to markets for small and medium farmers.
3. Strengthening Fisheries co-operative Society.
4. Reduction in post-harvest losses.
5. Linking with food processing and storage centres.
6. Enable quality and food safety mechanisms.
7. Value addition activities.
8. Contract farming
9. Meeting the changing food habits of modern India.

Way forward:

1. To develop small scale brackishwater aquaculture livelihoods.
2. Comprehensive regulatory framework for shrimp culture has become the need of the hour with the inclusion of other crucial matters such as environmental conservation, public health, legal support, economic incentive, risk insurance, information dissemination, international cooperation and coordination of production, marketing and the management measures.
3. A participatory approach with a harmonious blend of technology, organizational development, institution building and human resource development should, therefore be developed.

3.5 Guidelines For Regulating Management of Coastal Zone in accordance with Coastal Aquaculture Authority Acts & Rules , Fish Producers' Licensing Order and Marine Fisheries Regulation Acts & Rules (Presented by Mr. S.Chakrabarti, Joint Director of Fisheries (ME & MS), Govt. of West Bengal)

Coastal Aquaculture Management entails managed farming or culture of organisms in saline or brackish water areas and also protection, conservation and sustainable development of fisheries in territorial waters along the coast line of the State for the purpose of enhancing production both for the domestic and export markets. The guidelines are intended to assist the farmers in adopting Good Management Practices (GMT) so that it leads to responsible fisheries acceptable in coastal zone which leads to the socio-economic benefits, livelihood security and poverty alleviation in the coastal areas.

Status of Brackish Water Fisheries Development in West Bengal

West Bengal has the largest impounded brackish water area in the country. In the year 2006-07, 63440 MT shrimp have produced.

1.	Potential area	2.10 lakh ha
2.	Area under culture (for 3 district viz. North 24 Parganas, South 24 Parganas and Purba Medinipur)	0.58 lakh ha.
3.	Area covered under BFDA Schemes for 3 districts	5677.66 ha.
4.	Area covered under licensing order for 3 districts (for 3022 nos. of beneficiaries.	5907.60 ha
5.	Area covered under Aquaculture Authority Acts & Rules (for 1992 nos. of beneficiaries)	3738.11 ha.

Guidelines for Aquaculture Practices

The following guidelines are to be observed mandatory in accordance with coastal aquaculture authority Acts & Rules 2005 and Fish Producers' Licensing Order 1994.

1. No producer would be allowed to undertake pisciculture without registration and license;
2. Stocking density should not exceed 4-6 nos. of post larva shrimps per cubic meter of water;
3. Licenses are issued to fish producer who have taken up poly culture / traditional /improved traditional method of culture in brackish water area;
4. Land fit for agriculture can not be used in any case for aquaculture;
5. Destruction of mangrove areas and ecologically sensitive wetlands and other productive lands can not be used for pisciculture.
6. Proper emphasis should be given on environmental protection of the coastal areas.
7. Chemicals, antibiotics, pesticides etc. can not be used in shrimp culture and only organic and bio-fertilizer should be used;
8. Intensive seed collection from wild for stocking the ponds has been banned. Only certified hatcheries produce seed should be used for stocking. Over stocking of ponds should be avoided.
9. Feed input should regularly monitored keeping wastage to a minimum level and daily water exchange should be restored regularly for maintaining good water and soil quality and for reducing organic load;
10. Waste water should be treated for reducing organic load and the water after treatment should be discharged through separate drainage system;
11. For aqua farm a minimum distance of 20 meter and maximum of 100-150 meter should be maintain between two farms. 50-100 meter between nearest agriculture's land, fresh water canal and 100-300 meter away for any humane settlement depending upon the population density and drinking water sources.
12. Mangroves, agricultural lands, saltpan, ecologically sensitive areas like sanctuaries are excluded from shrimp farming.
13. Fish Producers License is valid for one year and every year it should be renewed.

Salient Features of Marine Fisheries Acts & Rules (West Bengal)

Use of shooting or Behundi or any other net made of mosquito netting cloth for the purpose of catching seedling of marine fish species including prawn in the coastal areas, estuarine mouth, canals and creeks including the Sundarban area of the State are strictly prohibited.

7. MAJOR ISSUES OF CONCERNS EXPRESSED COLLECTIVELY

1. Lack of knowledge regarding scientific shrimp farming.
2. Absence of facility to supply good quality tested and certified shrimp seeds.
3. Crop failure and falling production due to disease outbreak.
4. Inadequate community and government initiative.
5. Deteriorating quality of shrimp supplied to the market due to bad harvest and post-harvest handling practice. Storage and transport facility is also an issue.
6. Lack of traceability and proper price realization of farmed products.
7. Deteriorating water quality of the region.
8. Strengthening enforcement of existing regulations on inputs and practices.
9. Improving infrastructure of auction centres/markets.
10. Land use change as well as land rights and lease issues.
11. Aquafarmers cooperative formation for better coordination and communication.

8. FUTURE ACTION

Depending on the concerns shared and issues raised for clarification, following check list was prepared for follow-up and action:

1. **Land use change:** Comprehensive regulatory framework is needed to discourage shrimp farming over agricultural land, paddy land as well as land acquired through clearing of mangroves.
2. **Poor quality hatchery seeds:** Poor quality shrimp seeds supplied from spurious hatcheries is a major hindrance towards promotion of good quality and disease free hatchery reared shrimp seeds usage in the Sundarbans region.
3. **Shrimp seed collection and bycatch:** It is essential to engage non opportunist shrimp seed collectors in some gainful activities which could discourage them from seed collection.
4. **Problem of pollution:** Functional effluent treatment plant is needed in order to check the release of urban effluents further downstream which has an adverse impact on aquafarmers down south in Sundarbans. Defunct effluent treatment plant should be made operational at the earliest.
5. **Policy implementation and enforcement of existing legal provisions:** In the Sundarbans, despite policy initiatives, collection of shrimp seeds from the wild to meet market requirements continues to pose a threat to marine biodiversity as well as the long-term livelihood sustainability of poor communities. Policy guidelines on mesh size of the nets, catching seeds from within the Protected Area and unsustainable shrimp farming practices have been developed to move towards more sustainable aquaculture practices. However, implementation of these policies still remains a major challenge. There are well thought policies as well as legal provisions to check the deteriorating situation. However, there is a need of proper enforcement in a well coordinated manner.
6. **Infrastructure development:** There is an urgent need to provide better market, storage as well as transportation facilities. Traditional markets don't have the required facilities to meet the growing demand of this sector. Furthermore, timely availability of ice and means of transport is also equally crucial.
7. **Traceability, eco-labelling and certification:** Certification scheme must be a home grown, version keeping in mind all the local and regional issues. International market acceptance must be procured before the design of the scheme.
8. **Farmers training, capacity building and better extension services:** Lack of proper extension services and training facilities for aquafarmers is a major hindrance towards sustainable aqua farming. Aquafarmers capacity building is quintessential towards following better farming and management practices.
9. **Coordination and communication between different stakeholders:** Continual communication and coordination among key players is necessary towards attaining sustainability in this sector.

10. **Proper record keeping and documentation:** There is a need for record keeping and documentation which could help farmers towards information and data sharing and help them in providing know how of good management practices in the neighbourhood. This could also help concerned government agencies to prepare sector specific as well as location specific strategies. Absence of proper data and information is a constraint towards sanction of bank loans for aqua farmers as well as availing many government schemes.

9. ISSUES RAISED BY WWF-INDIA

1. Collection of PL Shrimp Seed from wild is resulting in bycatch and biodiversity loss.
2. Conversion of agriculture land to aquaculture farms is leading to social and economic inequity.
3. Non availability of quality hatchery seed in adequate quantity is driving the demand for collection of PL shrimp seeds from wild.
4. Release of untreated effluents from Kolkata contributes to huge pollution load in Sundarbans.
5. Cross border illegal trade in PL shrimp seeds exert negative pressure on Indian Sundarbans
6. There are existing discrepancies in existing incentive regime which need to be clarified (e.g. West Bengal Incentive Scheme 2004)

10. PROPOSED POLICY RECOMMENDATIONS BY WWF-INDIA

1.1 Support development of local seed bank networks that can supply quality seeds.

- a. Lack of locally accessible good quality seed is partly driving collection of wild seeds.
- b. Promotion of good quality tested and certified tiger shrimp PL from hatcheries through seed banks network can demonstrate that quality hatchery seeds provide better economic returns.

1.2 Promote and invest in aqua farms cluster formation.

- a. Multiple, individual farmers leading to problems with traceability, marketability, disease, etc.
- b. The aqua farms clusters could also facilitate the process of traceability, ecolabelling, certification and organic shrimp farming.

1.3 Enforce legal provision to stop the usage of fine mesh nets for collecting wild shrimp PL seed from the Sundarbans region.

- a. According to the *West Bengal Marine Fishing Regulation (Amendment) Rules, 1998* the use of bag-net made of mosquito netting cloth for the purpose of catching shrimp post larvae in the coastal areas, estuarine mouth, canals and creeks including the Sundarban area of the State, is strictly prohibited
- b. However, this practice is still widely followed leading to bycatch problems and associated ecological and socio-economic impacts
- c. Alternate and viable livelihood for the seed collectors need to be developed and demonstrated

1.4 Zonation for aquaculture is necessary to stop indiscriminate conversion of agriculture land.

- a. Inappropriate and unplanned establishment of shrimp farms has resulted in production failures, environmental degradation, land use conflicts and social injustice.
- b. Land zoning should factor in current impacts as well as future implications. Land zoning could not only help identify and demarcate safe zones but also the areas that should be under agriculture or other land uses.

1.5 Control cross-border illegal trade of tiger shrimp post larvae to reduce pressure on the Indian Sundarbans.

- a. There is widespread illegal trade of tiger shrimp PL across the Indo-Bangladesh border. Cross-border illegal trade in wild tiger shrimp PL raises the demand for collection of seed from the wild, and has serious consequences for the natural resource base in the Indian part of Sundarbans.
- b. An in-depth investigation with support from Border forces is necessary to ascertain the extent of cross-border trade in wild tiger shrimp PL.
- c. Awareness generation of BSF personnel on the issue should be conducted

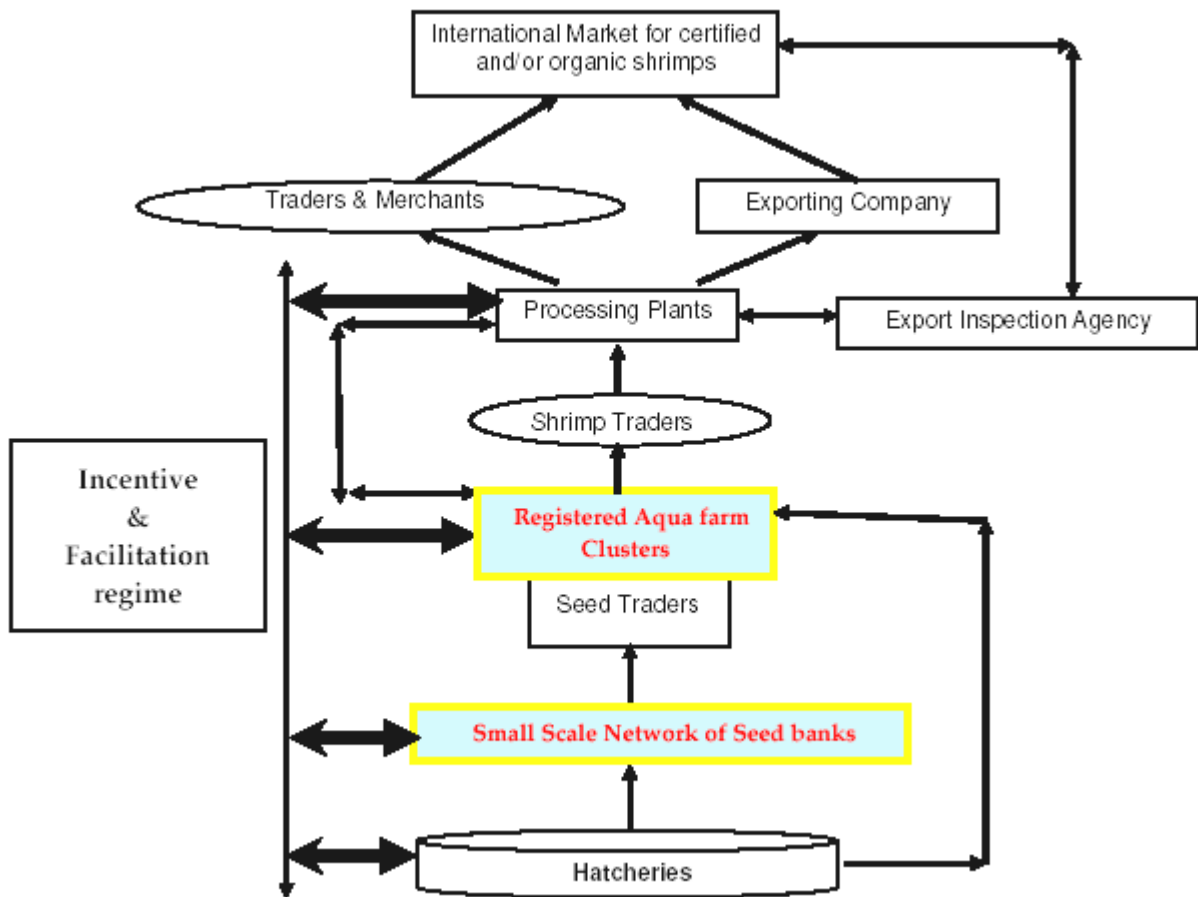
1.6 Enforce effluent treatment and ensure better quality water release into Sundarbans.

- a. Discharge of urban untreated waste water affects the estuarine as well as marine ecosystem of Sundarbans. Deteriorated water quality has affected aqua farms both in terms of quantity as well as quality of produce.
- b. Improved coordination between municipal authority, environment department, state pollution control board, and industry is needed to resolve the issue

1.7 Provide and promote incentives for sustainable shrimp aquaculture.

- a. Agro and food processing sector is identified as a thrust area however at the same time *Aquaculture projects* are listed under negative list of industries (WBIDC Scheme 2004). Different shrimp farming techniques like traditional and improved traditional (more sustainable), and intensive and semi-intensive (less sustainable) receive equal treatment from the State in terms of incentives and facilities.
- b. Differential treatment could help promote traditional and improved traditional techniques, and encourage Better Management Practices (BMPs).

11. PROPOSED MODEL FOR THE VALUE CHAIN



12. CONCLUSION

Further to the above discussion and concerns raised, it was decided that WWF-India, Sundarbans Programme will take an initiative towards organising a demonstration project on sustainable aqua farming. Thereby exporters who are interested can be linked with aqua farmers who are participating in our conservation work which is looking at facilitating the availability of good quality tested and certified tiger shrimp post larvae from hatcheries along with promotion of good aqua farming practices.

13. POST WORKSHOP ACTIVITIES (JANUARY-JUNE,2008)

This dialogue process furnished an occasion for state level senior policy, decision maker, leading experts together with exporters and aquafarmers representatives to discuss a broad range of issues and options to achieve sustainability in the aquaculture sector. It helped us to explore practical ways of supporting sustainable aquaculture in the Sundarbans ecoregion that can enhance incomes as well as maintain the ecological values of the system on which these livelihoods depend. We strongly felt that field demonstration is essential to bridge outreach and advocacy gaps. Subsequently, we initiated a field demonstration during January, 2008.

This field demonstration attempts to promote the following aspect of shrimp aquaculture:

1. Advantages of scientific shrimp farming and better management practices.
2. Benefits of using good quality tested and certified tiger shrimp seeds purchased from hatchery over seeds collected from wild (Sundarbans).
3. Registration, cooperative formation, traceability, marketing and proper price realization.

Later, NaCSA (National Centre for Sustainable Shrimp Farming) has also decided to join forces with us in doing so. Expert hired by WWF-India and NaCSA staff are already providing technical inputs and guidance to participant aquafarmers in the field site. Our local partner is responsible for overall supervision of various field activities, facilitation and resource mobilization.

Period between January-May, 2008 covers the following activities:

1. Identification of local partner and signing of memorandum of understanding.
2. Dialogue with aquafarmers to ensure participation towards small scale demonstration project at field site.
3. Farmer field school approach for outreach and advocacy at grassroots level through series of workshops and meetings.
4. Hiring expert for technical inputs and guidance of participant aquafarmers.

We are already receiving support for field demonstration project from various agencies. Orissa Shrimp Seed Production Supply and Research Centre (OSSPARC) is a leading hatchery in the country and an initiative of Central government. OSSPARC facilitated a visit for participant aquafarmers to demonstrate hatchery operations and quality of hatchery seeds. WWF-India and aquafarmers shared the cost of purchasing 1.25 Lakh hatchery based tiger shrimp seeds purchased from OSSPARC along with quality certificate.

Participant aquafarmers are now in the advanced stage of shrimp farming under this demonstration project. Performances of all farms selected are showing uniqueness in terms of water quality, shrimp growth, water depth etc depending on management practices and it's an ongoing learning process for all of us. Other (non-participant) farmers are quite enthusiastic regarding the results from such field demonstration sites.

Entire exercise resembles modified traditional farming practice (MTFP) and it's a polyculture. Introduction of shrimp and fish feed was a major issue as commercial feed requires massive investment at farmers end (almost 60-70% of total investment). This may push farmers into debt trap especially when the area of interest is already facing significant level of on-farm shrimp mortality. An option of technology transfer towards feed manufacturing at local level is there.

Overall performance of field demonstration is very good. Aquafarmers are already convinced that better farming practices and usage of good quality tested and certified hatchery based tiger shrimp seeds gives good results and the messages is spreading fast in the neighboring areas.

Tangible benefits of this may include:

1. Better natural resource usage and reducing wasteful use in aqua farming sector.
2. Reducing demand for wild tiger shrimp seeds collected from Sundarbans and subsequent reduction in by catch.

Final results from field demonstration are still awaited and we will keep you updated on this.

ANNEXURE 1
Participant list

Sl. No.	Name	Company/Organisation/Department	Phone/Fax/Mobile/Email
1	Mr. V. Subbarao Asst. Director, MPEDA	Marine Products Export Development Authority (MPEDA)	Tel:033-23553668 E mail:marine1149@dataone.in
2	Prof. Amalesh Chowdhury Secretary, SDMBRI	S.D.Marine Biological Research Institute Manufacturer Exporter	Tel: 033-25650305
3	Prof. Kanchan Chopra Director, IEG	Institute of Economic Growth	Tel:011-27667260
4	Dr. Asish Ghosh Director, CED	Centre for Environment and Development	Mobile: 9830567042
5	Mr. Ashok Bhattacharya Additional Director	Fisheries Department, Government of West Bengal	Mobile: 9874278095
6	Mr. S. Chakraborty Joint Director	Fisheries Department, Government of West Bengal	Tel: 033-22156711
7	Mr. Taj Mohammed President	Sea Foods Exporters Association Of West Bengal	Mobile: 9903251789
8	Mr. Ranjan. K. Joseph Asst. Director	Marine Products Export Development Authority (MPEDA)	Mobile: 9433075918
9	Mr. S.C. Acharya Joint Project Director	Sundarban Development Board, Government Of West Bengal	Tel: 033-23348175 Mobile: 9433302109
10	Mr. Manish Pandey Manager	SGS-India	Mobile: 9871794640
11	Mr. N.R. Umesh Chief Executive Officer	NaCSA	Mobile: 9440711600
12	Mr. Vinod Sr. Programme Officer	WWF-India	
13	Mr. M.K. Chattopadhyay Project Director	OSSPARC	Mobile: 9437562360

Sl. No.	Name	Company/Organisation/Department	Phone/Fax/Mobile/Email
14	Mr. B.K. Mondol	Deputy Director of Fisheries, Government of West Bengal	Mobile: 9433193739
15	Mr. Nirapada Sardar Sabhapati	Sandeshkhali-II, Panchayat Samiti	Mobile: 9732670282
16	Mr. Dinabandhu Das Secretary	Joygopalpur Youth Development Centre	Mobile: 9732630178
17	Mr. Krishna Pada Sardar Upa Pradhan	Bermajur-I Gram Panchayat, Block- Sandeshkhali-II	Mobile: 9732687406
18	Mr. D.V. Nakhwa DGM, Technical Fisheries	NABARD, Kolkata	Mobile: 9433064669
19	Dr. Saswati Sen State Director	WWF-India, West Bengal State Office	Mobile: 9433467147
20	Dr. Madhumita Mukherjee Joint Director Of Fisheries	Fisheries Department, Government of West Bengal	Mobile: 9433104500
21	Mr. Bhuvan Mondol President	Haroa Market Association	Mobile: 9434401787
22	Mr. P.K. Mishra District Magistrate, North 24 Parganas	Government Of West Bengal	Mobile: 9433003662
23	Mr. B.K. Dasgupta	Panchayat and Rural Development, Government of West Bengal	Mobile: 9433426579
24	Mr. Jiban Chakraborty OSD & Deputy Secretary	Commerce & Industries Department, Government Of West Bengal	Mobile: 9830164536

ANNEXURE 2

AGENDA

Policy Dialogue for Promoting Sustainable Shrimp Aquaculture in the Sundarbans

09:00-09:30 – Registration		
Workshop objectives, process & Introduction of Participants	09:30-10:00	Dr. Sejal Worah, Programme Director, WWF-India
Overview on aquaculture sector in Sundarbans	10:00-10:15	Dr. Madhumita Mukherjee, Joint Director of Fisheries, Dept. of Fisheries, Govt. of West Bengal
Shrimp Aquaculture issues in Sundarbans	10:15-10:30	Prof. Amalesh Chowdhury
Views & Issues of Aqua Farmers	10:30-10:45	Shri Nirapada Sardar, Sabhapati, Sandeshkhali-II
Views & Issues of Market Association	10:45-11:00	Shri Bhuvan Mondol, President, North 24 Parganas Market Association
Views & Issues of Exporters Association	11:00-11:15	Mr. Taj Mohammad , President, Sea Food exporters Association, West Bengal
Issues regarding licensing and registration of aquafarms under Coastal Aquaculture Authority	11:15-11:30	Shri S.Chakrabarti, Joint Director of Fisheries (ME & MS), Dept. of Fisheries, Govt. of West Bengal
WWF Project Findings	11:30-11:45	Dr. Anurag Danda, Sr. Programme Coordinator, WWF-India
11:45-12:00 - Remarks by additional stakeholders/institutions		
12:00-12:30 – Round Table Discussion		
12:30-13:00 - Tea & Consolidation of Recommendations		
Presentation of Key issues and recommendations	13:00-13:15	Dr. Sejal Worah, WWF-India
13:15-13:45 - Panel Responses		
Summing up on Sundarbans: Environmental linkages with aquaculture	13:45-14:00	Dr. Asish Ghosh, Director, CED
Conclusion and Vote of Thanks		
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