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The World Bank**

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PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR20.6 MILLION (US\$ 28.0 MILLION EQUIVALENT)

AND A GEF GRANT

IN THE AMOUNT OF SDR3.7 MILLION (US\$ 5.0 MILLION EQUIVALENT)

TO THE

PEOPLE'S REPUBLIC OF BANGLADESH

FOR A

FOURTH FISHERIES PROJECT

June 14, 1999

Rural Development Sector Unit
South Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective April 28, 1999)

Currency Unit = Taka (Tk)
US\$1.00 = Tk48.65

FISCAL YEAR: July 1 – June 30

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank	GEF	Global Environmental Facility
ARDMCS	Aquatic Resources Development, Management, and Conservation Studies	GOB	Government of Bangladesh
BAO	Budget and Accounts Officer	ha	Hectares
BFRI	Bangladesh Fisheries Research Institute	ICLARM	International Centre for Living Aquatic Resources Management
BKSB	Boronol-Kola-Salimpur-Bashukhali	ICR	Implementation Completion Report
BMC	Beel Management Committee	IDA	International Development Association
BWDB	Bangladesh Water Development Board	IRR	Internal Rate of Return
CAS	Country Assistance Strategy	kg	Kilogram
CBFMP	Community Based Floodplain Management Project	LGED	Local Government Engineering Department
C&AG	Comptroller and Auditor General	M&E	Monitoring and Evaluation
CNRS	Centre for Natural Resources Studies	MOFL	Ministry of Fisheries and Livestock
CPP	Compartmentalization Pilot Project	MOL	Ministry of Land
DANIDA	Danish International Development Agency	MLGRD	Ministry of Local Government and Rural Development
DFID (UK)	Department for International Development	MOWR	Ministry of Water Resources
DFOs	District Fisheries Offices	NGO	Non-governmental Organization
DOF	Department of Fisheries	NPV	Net Present Value
EGIS	Environment and Geographic Information System	NWFEP	Northwest Fisheries Extension Project
ERR	Economic Rate of Return	O&M	Operation and Maintenance
EU	European Union	OED	Operations and Evaluation Department
EUS	Epizootic Ulcerative Syndrome	PCD	Project Coordinating Director
FAO	Food and Agriculture Organization	PIP	Project Implementation Plan
FAP	Flood Action Plan	PMU	Project Management Unit
FCDI	Flood Control, Drainage and Irrigation	PMRs	Project Management Reports
FME	Financial Management Expert	SA	Special Account
FRR	Financial Rate of Return	SMC	Sanctuary Management Committee
FSMF	Fish Seed Multiplication Farms	SWMC	Surface Water Modeling Centre
FTC	Fisheries Training Centres	TFP	Third Fisheries Project
FTEP	Fisheries Training and Extension Project	TFO	Thana Fisheries Officer
GDP	Gross Domestic Product	UNDP	United Nations Development Program

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**Bangladesh
Fourth Fisheries Project**

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Bangladesh
Fourth Fisheries Project

Project Appraisal Document

South Asia Region
Bangladesh Country Unit

Date: 06/14/99	Task Team Leader/Task Manager: J. Weijenberg and R. Epworth/ B. Ateng and I. Ahmad
Country Director: Frederick T. Temple	Sector Manager: R. Ali
Project ID: BD-PE- 9468	Program Objective Category: EN
Sector: Rural Development	
Lending Instrument: SIL	Program of Targeted Intervention: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Project Financing Data	<input type="checkbox"/> Loan	<input checked="" type="checkbox"/> Credit	<input type="checkbox"/> Guarantee	<input type="checkbox"/> Other [Specify]	
For Loans/Credits/Others:					
Amount (US\$m/SDRm): 28.0m/20.6m					
Proposed terms:	<input type="checkbox"/> Multicurrency	<input type="checkbox"/> Single currency, specify			
Grace period (years): 10	<input type="checkbox"/> Standard Variable	<input type="checkbox"/> Fixed	<input type="checkbox"/> LIBOR-based		
Years to maturity: 40					
Commitment fee: Not exceeding 0.5%					
Service charge: 0.75%					
Financing plan (US\$m):					
Source	Local	Foreign	Total		
Government	9.3	-	9.3		
Beneficiaries	3.0	-	3.0		
IDA	24.6	3.4	28.0		
GEF	3.0	2.0	5.0		
DFID	7.7	7.8	15.5		
Total	47.6	13.2	60.8		
Borrower: Government of Bangladesh					
Guarantor: Not Applicable					
Responsible agency(ies): Department of Fisheries, Ministry of Fisheries and Livestock					
Estimated disbursements (Bank FY/US\$m):					
	2000	2001	2002	2003	2004
Annual	7.9	8.4	7.5	2.8	1.4
Cumulative	7.9	16.3	23.8	26.6	28.0
Project implementation period: 5 yrs Expected effectiveness date: Aug. 2, 1999 Expected closing date: Dec 31, 2004					

A: Project Development Objective

1. Project development objective and key performance indicators (see Annex 1):

The objective of the project would be to support sustainable growth in and equitable distribution of the benefits generated from increased fish and shrimp production for domestic consumption and exports. The project would contribute to poverty alleviation in Bangladesh by improving the livelihoods of poor people dependent on fisheries resources. In addition, while not directly monitored under the project, the increased production would have important nutritional and health benefits, particularly for the poor since fish contributes about 60% of animal protein in their diet.

The objective would be achieved through the following interventions: (i) improvement of inland open-water fisheries management through the development of sustainable, community-based institutions and supporting them in undertaking a program of adaptive management of their fisheries resources using technical measures such as stock enhancement of floodplain fisheries, restoration of fisheries habitats, establishment of fish sanctuaries, and construction of fish passes; (ii) establishment of sustainable and equitable institutional arrangements for managing shrimp polders and works (including improvements in salt-water inlets, flushing structures and channels) to facilitate the development of environmentally friendly smallholder shrimp production; (iii) improvement of sustainability of shrimp fry collection through the development and extension of less destructive methods and by helping poor shrimp fry collectors gain access to services and support; (iv) development and application of an appropriate extension strategy for freshwater aquaculture and establishment of an institutional network including the Department of Fisheries (DOF) and other organizations to apply and improve that strategy; (v) studies of key issues in aquatic resource development and management in Bangladesh and development of a socially feasible and ecologically sound management plan for the conservation of *hilsa* fisheries; and (vi) strengthening the capacity of DOF to manage and support the fisheries sector, plan for its development and long-term sustainability and implement national fisheries policy.

Progress toward the objectives would be measured and monitored based on (i) increase in fish and shrimp production; (ii) increase in the incomes of fisher-families; (iii) increase in employment opportunities; (iv) increase in number of smallholder shrimp farmers; and (v) preservation of aquatic habitats and biodiversity.

B: Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project (see Annex 1):

CAS document number: 17453-BD Date of latest CAS discussion: March 6, 1998 (the CAS update is scheduled to be discussed in July 1999)

The Bank's overarching mission is to help Bangladesh reduce poverty by promoting rapid, employment-creating economic growth and interventions that directly assist the poor. At the rural sector level, this goal is to be achieved through faster rural and agricultural development -- shared economic growth, increased food security, and improved natural resources management. The goal is clearly articulated in Bangladesh Rural Development Strategy that provides the framework for the Bank's country assistance strategy (CAS) with respect to rural development. The CAS update aims at accelerating agricultural growth and rural development and strengthening linkages between agriculture and non-agricultural development to address the needs of the poor. It also gives special attention to gender issues and aims at expanding partnerships with NGOs and donors. The proposed project would support faster rural and agricultural development by increasing fish and shrimp production for domestic consumption and export with special emphasis on sustainable resource management principles, rural poverty alleviation, employment generation, and conservation of aquatic biodiversity. The total production of the country is about 1.3 million metric tons out of which inland fisheries contribute almost

80%. A large and rapidly increasing number of very poor people depends on fishing for nutrition and income. The sector accounts for about 10% of agricultural GDP, 3% of total GDP, 8% of total export earnings, 60% of animal protein intake, and 7% of total protein intake in the country. It employs almost 2 million and 12 million full-time and part-time fishermen, respectively. The project would have a potential for wide-ranging involvement of women and women groups in fisheries development.

The project would also contribute to CAS's goal of expanding partnerships with donors and NGOs. The project would provide a vehicle for interacting more effectively with donors that are active in the fisheries sector. DFID, one of the main donors involved in the sector and for whom elimination of global poverty is an overarching objective, would be the main partner providing parallel financing to this project. The Project is fully consistent with DFID's Country Strategy and would make a significant contribution to its fisheries and aquatic resources sector strategy for Bangladesh.

NGOs are expected to play a significant role in the implementation of inland open-water fisheries management and coastal shrimp aquaculture components of the project. The proposed project would, therefore, contribute significantly to achieving CAS goals. It would also support Bangladesh's national objectives outlined in the Fifth Five Year Plan of 1997 and the goals of the National Fisheries Policy of 1998.

2. Main sector issues and Government strategy: ¹

There are conflicting demands on the fisheries sector in Bangladesh. The contribution of the sector to national food supply and GDP (including vital export earnings) needs to be optimized in order to support economic growth and employment. To ensure the sustainability of that contribution, fisheries need to be managed effectively and the aquatic environment conserved and protected. As fisheries provides a vital source of food for a large proportion of poor rural households, access to the benefits of fisheries for as broad a segment of the population as possible is also a critical concern. Where these conflicting demands are not effectively resolved, it is generally the poor who lose out. Their access to fish for food and income is progressively eroded by a combination of habitat degradation, appropriation of access rights by the more powerful segments of society and unmanaged and indiscriminate resource use. The multiplicity of agencies involved in the control and management of fisheries, institutional weaknesses such, poor co-ordination among relevant agencies, non-enforcement of fisheries laws and regulations due to lack of human, physical and financial resources, and limited access to credit further complicate sectoral problems.

The fisheries sector in Bangladesh is made up of four distinct sub-sectors: open-water fisheries, closed water aquaculture, coastal aquaculture, and marine fisheries. The current project is focussed on the first three of these sub-sectors. The problems facing each of these sub-sectors, the sub-sectors' potential and strategies for realizing that potential are described below.

¹ The assessments below are based on economic and sector work of the Bank and other development agencies. These include findings of the Bank's ESW -- Fisheries Sector Review, Report No. 8830-BD, March 20, 1991; a series of reports prepared by consultants and NGOs between 1991 and 1996 in the context of the Third Fisheries Project; Flood Action Plan (FAP) 17; Draft Sector Strategy Paper prepared by ODA-funded consultant in 1996; Papers presented at a 1995 Fisheries Workshop organized jointly by the Ministry of Fisheries and Livestock (MOFL), UNDP, and ODA; IDA's Sector Strategy Note, September 30, 1996; Recommendations of a Fisheries Workshop organized jointly by MOFL, IDA and ODA, August 25, 1996; A 1988 Coastal Environmental Management Plan for Bangladesh prepared by ESCAP; Background papers prepared by consultants assisting the Government in preparing the proposed project.)

Open-water fisheries. Bangladesh has vast inland open-water fisheries resources. The total area of inundable floodplain is 5.48 million ha. About 50% of total fish production in Bangladesh comes from inland open water fisheries. However, changes in patterns of land use and the widespread development of flood-control schemes nation-wide have had an important impact on the extent of natural floodplain available for fish feeding and reproduction. Fishing pressure from a growing population has increased dramatically and has seriously affected the abundance of some species (particularly valuable migratory carps) and may even be putting the availability of more resilient floodplain fish at risk. Siltation, often a result of up-stream changes in catchments, has reduced water flows and cut off vital access routes for fish from one habitat to another. Because of these issues, potential yields are not being achieved. Current yields of 130kg/ha could be doubled. Increased use of pesticides and fertilizers in agriculture and growing industrial pollution are also contributing to the deterioration of the environment for fish.

Increasing fishing pressure has translated into greater competition for access to fisheries resources. The value of formal access arrangements to these resources, such as leasing, has increased rapidly, providing important revenue for the government but encouraging more complete depletion of the resource by leaseholders. Access to fisheries resources is frequently marked by confrontation and violence, illustrating both the importance of the resource and the pressure to which it is subjected. Declining availability of fish to subsistence part-time fishermen traditionally using floodplain fisheries to provide protein to their families is another issue facing the sector.

The Government of Bangladesh (GOB) is addressing these issues through a strategy which includes: (i) conserving aquatic resources; (ii) shifting priorities in management from revenue-generation to biological conservation and sustainability; (iii) increasing production by involving beneficiaries in management and stock enhancement; and (iv) rehabilitation of degraded habitats. The negative impact of flood control and road infrastructure on floodplain fisheries are being mitigated through a program of floodplain stocking and fish pass construction. The introduction of gear-based licensing schemes for selected fisheries has also been experimented with some success and has been seen to contribute to a more equitable and sustained distribution of fisheries benefits among resource-users.

Coastal aquaculture. Rapid development of shrimp farming in the extensive coastal and brackishwater areas of Bangladesh has made a very significant contribution to the growth of national export earnings and shrimp farming is now an important element in both the local and national economies. Area under shrimp increased from 64,000 ha in 1984/85 to 140,000 ha in 1996/97 and annual production increased from about 7,500 tons to 34,000 tons over the same period. Growth in quantity and value of shrimp exports has been impressive, averaging 15% per annum over the last 10 years. However, the expansion of shrimp farming has raised important issues regarding land and water use in coastal areas. The contrasting demands of rice farmers and those involved in shrimp farming have generated frequent conflicts in which poorer social groups in shrimp farming areas have often been the losers.

Unplanned shrimp farming development has led to degradation of agricultural land and negatively affected the livelihoods of local people. GOB with assistance from the European Union (EU) are undertaking a number of regional visits to assist with the development of a policy paper on integrated coastal zone management which incorporates vital interests prevailing in coastal areas. Resolution of conflicts is of key importance if the industry is to grow sustainably.

A recent ban on shrimp exports to EU due to health reasons disrupted exports from Bangladesh and other regional exporters. The ban has since been lifted and the EU and FAO are providing assistance in improving overall hygiene and quality standards.

Yields are low; currently about 340 kg/ha. It is envisaged that this can be increased to around 500 kg/ha. Outbreak of diseases, particularly "White Spot" may continue to threaten the shrimp culture.

The sustainability of shrimp farming is also threatened by its reliance on the collection of wild shrimp fry. This activity now sustains a large number of households using cheap methods that supply key seed inputs to shrimp farmers but may, in the process, be gravely damaging wild stocks of both shrimp and other aquatic species. The development of brackish water shrimp hatcheries could supplement the supply of seed as is practiced in many countries. However, hatchery operation in Bangladesh has not been demonstrated to be competitive due to low salinity that prevails through much of the year and low temperatures from November to February. In the absence of adequate hatchery development to supply the sub-sector, the long-term sustainability of shrimp production and shrimp farming development is in jeopardy. Shrimp fry collection involves many poor and vulnerable people, including women and children, and the needs of these groups also have to be considered in the search for appropriate solutions to the problem.

GOB's strategy concerning shrimp farming includes promotion of improved traditional rather than intensive shrimp farming; group formation; extension services on how to deal with shrimp disease outbreaks; conservation of wild seed and larvae; promotion of hatcheries for fry production, extension of technical skills to shrimp farmers and the creation of infrastructure facilities for the private sector.

Aquaculture Extension and Training. Aquaculture offers significant potential for increasing the fish supply in Bangladesh. It is currently estimated that there are about 147,000 hectares of ponds in the country, out of which only 60% are cultured and 40% are under-utilized. Considerable potential exists to increase production through better utilization and management of these resources. But the sub-sector still faces problems. Many people, particularly the poor, do not have access to appropriate technology or skills, because of weak extension.

Key elements in the government's strategy for the sub-sector are increasing the scale and scope of training for farmers to increase technical knowledge and skills, the provision of loans, the encouraging group utilization of ponds and rehabilitating publicly-owned derelict ponds.

Institutional strategies. GOB recognizes institutional bottlenecks and the public sector's over-involvement in fisheries activities and has expressed its intention to reorganize and restructure fisheries institutions, encouraging the private sector and NGOs to play a greater role. It also recognizes the need for greater co-ordination within and among government agencies concerned with fisheries development and management to reduce duplication and overcome hurdles posed by multi-tier jurisdiction situations. A comprehensive National Fisheries Policy Paper has recently been approved which provides a framework for addressing these issues but implementing this policy will require institutional changes. This project will support change and assist with translating the policy into an appropriate strategy for implementation. The capacity of both government agencies and NGOs to deal with the sector, in terms of skills, resources and coordination between institutions, has to be improved. The importance of involving resource-users themselves in management has also been emphasized and forms the principle focus of the project.

3. Sector issues to be addressed by the project and strategic choices:

The project would address several critical issues in the fisheries sector. Interventions to address the threats to the sustainability of inland open-water fisheries would include floodplain fisheries stock enhancement; aquatic habitat restoration, (re-excavation of canals and *beel*); construction of fish passes/fish-friendly regulators; and establishment of aquatic sanctuaries in a variety of ecosystems. Improved fisheries management and fish sanctuaries would also arrest the degradation of the environment and the decline in aquatic biodiversity. The unifying feature of these interventions is the central role of beneficiary communities in determining the appropriateness of different management measures and the

subsequent assumption of responsibility for their management and, eventually, their costs. Community-based management of the fisheries resources, coupled with long-term leases of water bodies, would secure long-term access to aquatic resources by resource-users, making better management a viable proposition for them and leading to a more sustainable exploitation of those resources. The promotion of gear-based management systems together with measures to enhance and conserve fisheries resources would ensure equitable distribution of benefits among different resource-user groups and ensure that poorer users are not denied access. NGOs would be involved in each of these activities well in advance of on-the-ground investments and throughout the implementation period.

The project would address some of the environmental and social issues facing the shrimp sub-sector by investigating mechanisms for achieving local consensus over shrimp development and assisting in designing and demonstrating environmentally-friendly and sustainable shrimp production and supporting the creation of appropriate infrastructure. This would target smallholder farmers inside shrimp polders. More sustainable methods of collecting shrimp fry would also be encouraged by providing training in improved methods and other support to poor people, particularly women, involved in shrimp fry collection.

The project would address the issues of under-utilization of pond resources and poor access to appropriate technology and skills by developing an appropriate extension strategy for aquaculture, based on the considerable experience of other projects to date. An experiential learning approach to extension would be adopted under the project to encourage improved aquaculture development among small-scale farmers. Access to capital would be facilitated by creating linkages to existing credit in both the formal and NGO sectors.

Problems of degradation of the aquatic environment and biodiversity loss would be addressed by mainstreaming aquatic biodiversity conservation into the fisheries sector. Comprehensive studies would be undertaken on ecological issues of national and global significance, and policy recommendations would be developed. Particular attention would be given to developing a socially and ecologically viable management plan for *hilsa* fisheries. Other studies would include assessments of baseline conditions and data on aquatic biological and genetic diversity of selected inland and coastal ecosystems. They would be designed to generate vital information and data which would be used for developing and formulating future fisheries projects, ecosystem protection and conservation programs, and policy recommendations and for mainstreaming aquatic conservation into the fisheries sector. Biodiversity conservation would also be addressed through the training of and support to shrimp fry collectors. Weak fisheries institutions would be strengthened through supporting activities directly necessary for project implementation and those intended for the long-term institutional strengthening of DOF.

A number of key strategic choices were made in the process of designing the project. Emphasis has been given in all components to the issue of sustainability after the credit and grants close. To achieve this, key stakeholders have provided guidance at all stages in project preparation to ensure full ownership by them of all the measures and institutions developed under the project. At the site level, beneficiaries would play a leading role in deciding on appropriate measures, implementing and managing them, and, progressively assuming responsibility for total operational costs. The role of both the project and the donors would be to provide services, advice, and support to activities led by the community. To create the required flexibility within the project to accommodate this community-level planning, a participatory process approach was adopted to project planning. The Project Document and Project Implementation Plan need to be regarded as framework documents that outline activities and inputs but need to be constantly adjusted to account for developments in the field. A constant process of reflection on experience and incorporation of learning into the project would be required.

Up-front cost sharing of investments would replace the failed cost recovery strategy attempted under the Third Fisheries Project. For example, the proposed credit would finance up to 90% of the stocking costs in the first year of the operation of a specific floodplain, 60% the second year, and 30% the third year, with the balance financed by the communities. Communities would finance 100% of the stocking costs from the fourth year of operation onwards. In the case of habitat restoration, the beneficiaries would need to agree to take responsibility through community management of the O & M of the habitats restored, including payment of the O & M costs via inclusion in the fishing license fees. Some adjustments may need to be made, on a case-by-case basis, in cases where beneficiaries are dispersed or difficult to identify. Beneficiaries would be expected to pay any O&M costs involved in fish passes and water regulators such as for operation, removing weeds from the channels and restoring fish habitats in channels. This could be done through licensing arrangements for fisheries or other appropriate mechanisms identified in conjunction with resource-users and other stakeholders. BWDB Guidelines for Peoples' Participation would be followed in setting up these water management mechanisms but some adjustments may need to be made, on a case-by-case basis. Beneficiaries would also be responsible for routine O&M of shrimp infrastructure

While credit is a constraint to fisheries development, it is not seen as a binding constraint to the success of the project. DFID will provide limited credit support, through NGO sub-contracts to the inland open-water fisheries and coastal aquaculture components. This will be used to support alternative income earning opportunities for poor people deprived of income streams from fisheries exploitation during periods of restricted access. NGOs would provide credit to landless fisher families, who would be the target for the inland open-water fisheries component, and the small-holders who would be the target of the shrimp component. Lack of credit is not considered to be a significant constraint to aquaculture development within the project which will promote low external input, low intensity and low risk production strategies. Evidence from projects around Bangladesh suggest that sustainable and significant increases in fisheries production are attainable without direct provision of credit. In Northwest, a DFID financed project, has increased average pond production from 1,250kg/ha to over 2,000kg/ha, an increase of over 65% without directly providing credit to producers.

Other strategic choices made included: (i) working through NGOs to establish appropriate community-level management and decision-making mechanisms instead of exclusively through DOF technical staff; (ii) stocking only indigenous species until an evaluation of the impact of exotic species on aquatic biodiversity could be carried out; and, (iii) encouraging lower instead of higher stocking densities in floodplain stocking so as to increase the chances that local communities would be able, progressively, to take on the financial responsibility for stocking.

C: Project Description Summary

1. Project components (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

<u>Component</u>	<u>Category</u>	<u>Cost Incl. Contingencies (US\$M)</u>	<u>% of Total</u>	<u>Bank- financing (US\$M)</u>	<u>% of Bank- financing</u>
1. Community-based Inland Open-water Fisheries Management	Fingerlings, consultancies, civil works, support to NGOs, equipment, studies, monitoring	17.1	28	8.2	47.9
1.1 Community-based stock enhancement		7.9	12.9	3.0	38.0
1.2 Pilot fish passes/water regulatory structures		4.6	7.5	3.4	73.9
1.3 Fish habitat restoration		2.3	3.8	1.8	78.3
1.4 Pilot aquatic sanctuaries		2.3	3.8	0.0	0.0
2. Coastal Shrimp Aquaculture	Civil works, consultancies, support to NGOs, equipment, monitoring	8.5	13.9	6.3	74.1
2.1 Completion of Third Fisheries polders		4.8	7.9	3.4	70.8
2.2 Development of new polder		3.4	5.5	2.7	79.4
2.3 Training of shrimp fry collectors		0.3	0.5	0.2	66.7
3. Freshwater Aquaculture Extension and Training	Equipment, transport, consultancies	5.7	9.4	4.3	75.4
4. Aquatic Resources Development, Management and Conservation Studies	Studies, consultancies, equipment, transport	3.9	6.4	0.8	20.5
4.1 Management of <i>hilsa</i> areas		1.1	1.8	0.5	45.5
4.2 Assessment of ecosystem integrity and sustainability		1.1	1.8	0.0	0.0
4.3 Ecological relations of exotic species		0.3	0.5	0.0	0.0
4.4 Action plans and aquatic database		1.1	1.8	0.0	0.0
4.2 Studies to prepare future projects		0.3	0.5	0.3	100.0
5. Institutional Support to DOF and Training of NGOs	Training, civil works, transport, equipment, consultancies	25.8	42.3	8.5	33.0
5.1 Project Management Unit		1.0	1.6	0.2	20.0
5.2 National and expatriate consultants		10.6	17.4	0.0	0.0
5.3 Transport, machinery and equipment		7.1	11.6	3.4	47.9
5.4 Training		1.4	2.3	0.0	0.0
5.5 Construction of DOF District Offices		1.1	1.8	1.0	90.9
5.6 Flood Damage Rehabilitation		4.7	7.7	3.9	83.0
Total		60.8	100.0	28.0	46.1

2. Key policy and institutional reforms supported by the project:

The project would support relevant policy reforms identified by GOB inter-ministerial consultations (Ministries of Fisheries and Livestock, Land, Water Resources, Finance, Agriculture, Forest and Environment, and Local Government and Rural Development) for the successful implementation of the various components of the proposed project. These policy reforms pertain to assuring greater community involvement in, and responsibility for, sustainable management of fisheries resources. Accordingly, the project would ensure community involvement in all steps of the inland fisheries management and coastal aquaculture development. A number of agreements would be needed between the Ministry of Fisheries and Livestock (MOFL) and other ministries/agencies. These include agreements with:

- (a) the Ministry of Land (MOL) or the Ministry of Youth and Sports (as the case may be) to transfer the fisheries management of *jalmohals* (water bodies) in selected floodplains under the proposed project to DOF for a period of seven years as requested on a case-by-case basis. DOF would in turn, on a pilot basis, transfer the management of fisheries to local communities under a gear-based licensing system, also for a period of seven years. A tentative list of *jalmohals* identified as available for stocking and establishment of sanctuaries has been submitted to the Secretary, MOL. MOFL provided to IDA and DFID a short list of 20 floodplains from those developed under TFP that could be stocked during the first year of stocking (year two of project) under the project;
- (b) MOL to transfer fisheries management of selected canals, channels, and *beels*² for fish habitat restoration to MOFL/DOF for seven years. DOF in turn would put the habitats under community-based management, also for a period of seven years. The communities would be responsible for the operations and maintenance of the restored habitats. DOF has assembled a short list of habitats for which restoration could be initiated in the second year of the project;
- (c) the Ministry of Water Resources (MOWR) to allow borrow pits to be leased through DOF to groups of poor fishing families and groups of women on a long-term basis (seven years) with the assistance of NGOs. The MOFL has confirmed with MOWR that any borrow pits developed under the project would be made available as noted above for a period of seven years;
- (d) MOWR/BWDB to permit construction of fish passes and modifications to existing sluice gates to make them more suitable for fish migration. Beneficiaries would be responsible for the routine operations and maintenance costs of the structures. A list of FCDI projects where fish passes and/or fish-friendly structures could be constructed has been identified by BWDB based on the work done under the Second Small Scale Flood Control Drainage and the Irrigation Project and Flood Action Plan (FAP) 6 study. BWDB, with DOF, has prepared a short list of 12 fish passes and eight regulators from which those to be developed under the project would be selected;
- (e) MOL to permanently not renew leases of channels in polders taken up for shrimp development under the project. The project would only work in polders where leases have expired and are not renewed. The beneficiaries would be responsible for routine operations and maintenance of the water management works. The Government provided to IDA during negotiations the status of lease of channels inside the proposed shrimp polders -- most of the channels are free of leases; and
- (f) BWDB to transfer the operation and maintenance (O&M) responsibility of project financed water management works in shrimp polders to community-based organizations once the works are

² Small lake, low-lying depression, a permanent body of water in a floodplain or a body of water created by rains or floods that may or may not dry up in the dry season.

completed. No works would be taken up for polder improvement under the project until agreement is reached with the respective community of its commitment to taking on routine O&M responsibilities of the water management works. Any required major repairs would be done by BWDB. A draft National Water Policy, which provides guidelines for stakeholders' participation, has been prepared which would allow BWDB to transfer O&M responsibilities to community-based organizations/local government.

The project would also support NGO involvement in the implementation of various components of the project.

3. Benefits and target population:

The project would be inclusive, supporting broad-based actions, which would improve opportunities and services generally while addressing issues of equity and barriers to participation of poor men and women. The long-term benefits of the project would be sustained access to fish for food and income for people in Bangladesh. Those for whom fishing is a significant source of livelihood would be assured of that livelihood into the future by interventions to arrest the decline of the resource and ensuring sustained access. Enhancement of the resource, and the support of aquaculture development, would also lead to the increase in financial and nutritional benefits from fisheries and the creation of employment opportunities. The resource management approaches used would empower communities to take responsibility for the resources they depend on and increase their self-reliance. Fish is the major source of animal protein for many poor rural families and improved access to fish would ensure better nutritional status. Environmental degradation, in the form of overexploitation of floodplain fisheries and poor water management in shrimp producing areas would be arrested and reversed. Biodiversity would also be conserved in these areas. The capacity of DOF, NGOs and other institutions to effectively and sustainably support the fisheries sector would be strengthened and a service orientation encouraged.

At full operation, the project would be expected to account for incremental fish and shrimp production of about 22,000 metric tons and 2,500 metric tons per annum, respectively. The project would also create about 440,000 additional jobs per year.

Involvement in fisheries, and consumption of fish, is so diffused in Bangladesh that benefits from the improvement of the sustainability of fisheries and enhancement of production would reach many people. But the primary stakeholders in fisheries are mainly poor rural households. Those most dependent on capture fisheries resources are almost entirely very poor households who suffer from low social status and poor access to resources and alternatives. The project's interventions to set up appropriate, beneficiary-led management mechanisms would benefit these people most, as they would be assured of more secure access to sustainable fisheries and participation in decision-making over resource use. Likewise, the implementation of management measures through these mechanisms, such as the enhancement of fisheries production through stocking, habitat restoration, construction of fish passes and the establishment of fish sanctuaries, would be of particular benefit to these primary resource-users. But many equally poor landless rural laborers and small or marginal farmers who rely on fisheries on a seasonal or occasional basis would also benefit. The resolution of conflicts over resource-use and the definition of rights and management responsibilities would also benefit these users and ensure more equitable access to fisheries benefits. The components that promote in-migration of fish (fish passes, habitat restoration) would increase the proportion of smaller fish sizes which would benefit subsistence fishermen.

Aquaculture and shrimp production components would involve mainly small-scale farmers – men and women --who have access to land and ponds, and would create opportunities for employment for laborers, resolve conflicts and arrest environmental degradation which have seriously affected the poor.

Shrimp seed collectors mostly come from the poorest strata of rural society and include many women and children. These would benefit by receiving training in more sustainable methods of collection and by linking up with institutions and organizations which can provide them with services and support which they currently lack. Increased fish production from all of these components would benefit rural and urban consumers. NGOs would be involved extensively in the project, playing a key role as the interface between the project, national level institutions, and the project's beneficiaries. They would benefit from gaining vital experience in dealing with natural resource-management issues and providing better services to their client populations and members.

4. Institutional and implementation arrangements:

Implementation Period. The project would be implemented over a five-year period. However, the need to plan for longer term support in order to establish sustainable community-based mechanisms for aquatic resource management is recognized and would be addressed by a study to plan for future work beyond the end of the project.

Executing Agency. Department of Fisheries (DOF) of the Ministry of Fisheries and Livestock (MOFL) would be the main executing agency.

Project Implementation Plan. DOF has prepared a Project Implementation Plan (PIP). PIP and its accompanying annexes record agreed-upon and time-bound action plans, procedures and criteria to be used by DOF and other agencies for project implementation and the indicators to be used in project monitoring and evaluation. It also shows how the various components would be managed and coordinated and how the funds would be handled. In addition to the PIP, an annual implementation plan including: (i) detailed implementation program for various components; (ii) procurement plan; (iii) project management reporting requirements; and (iv) training plan covering contracts for training, agreed and satisfactory to IDA, would be prepared. While this implementation plan would be as complete as possible, community-based resource management such as that being undertaken by the project requires a considerable amount of flexibility and adaptability during the course of implementation. Different resource-user groups have different capacities for taking on resource management responsibilities and time-frames may vary considerably from site to site. It would therefore be difficult to develop precise, time-bound plans for many key components in the project. The process of implementation of the project and the adjustments required by key institutions, such as DOF and NGOs, would constitute important learning and special attention needs to be paid to this aspect of implementation. Mechanisms for ensuring constant review of progress, issues which arise and adjustment of planning to accommodate new learning have been incorporated. The project team has appraised the draft PIP and determined that it is satisfactory. Assurances were obtained during negotiations that the annual plans would be prepared.

Project Oversight. A Project Steering Committee comprising two NGOs, two private sector, and public sector representatives has been set up under the chairmanship of the Secretary, MOFL, to guide project preparation. GOB delegation confirmed during negotiations that the present Steering Committee would be reconstituted by June 30, 1999 to guide the project during implementation.

Project Coordination. Project Coordination Committees comprising representatives of the implementing agencies would be established at the national, district and *thana* levels.

Project Management Unit. Under ideal circumstances, project implementation should be carried out through normal units of DOF, with a small Project Management Unit (PMU), under the direction of a Project Coordinating Director (PCD), established to handle project financial management and reporting, procurement and administration. However, the current organizational structure and staffing patterns of DOF are far from ideal. Almost all staff are fisheries officers, and few staff with accounting skills or

expertise in social issues are available. The administrative arrangements do not provide adequate independent internal controls. The present financial management capability in DOF is very weak. DOF has an Accounts Officer and a Budget Officer. They are responsible for the budgeting and accounting of the entire department and are not necessarily available to handle any project work. The department has about 20 projects. The budget and accounts of the projects are separate from those of DOF. The accounts of the projects are handled by each project's own personnel. There are no procurement personnel in DOF, excepting an Engineering Cell which is mostly responsible for civil works. The expertise of this cell is not suitable to handle multi-dimensional procurement. Given these deficiencies and the large number of components included in the proposed project, a PMU would be established in DOF. It would be headed by a Project Coordinating Director (a senior official of DOF with previous experience in implementing donor-assisted projects) who would be assisted by four Deputy Project Coordinating Directors for: (i) Open-water Fisheries Management; (ii) Freshwater Aquaculture; (iii) Shrimp and Coastal Aquaculture; and (iv) Procurement, Administration, and Accounts. The PCD would directly supervise: (i) Monitoring and Evaluation Cell through an Assistant Director; and (ii) Engineering Cell through an Executive Engineer. The PMU would be responsible for planning and carrying out tasks including financial management, accounting, procurement, administration, and training. It would also be responsible for coordination of all project activities in accordance with a time-bound action plan and for the annual review of project implementation plans. It would also coordinate the activities of different government agencies and NGOs involved in the project, recruitment of consultants and commissioning of special studies. It would be the main contact with the donors for all project-related matters. Some of the deficiencies in DOF would be remedied by reallocation of authorized positions, without violating GOB decisions against increasing staff numbers. The staffing of the PMU would therefore be larger than usual. However, steps will be taken to ensure that the PMU does not become an isolated entity within DOF and close links between project components and executive branches of the DOF must be established and operational. The broader objectives of institutional capacity building within the DOF more widely will necessitate close working relationships between the project and other stakeholders. GOB delegation confirmed during negotiations that *PCD and Deputy Project Directors had been appointed*. The Deputy Project Directors are those officers currently holding executive positions for inland open-water, shrimp and coastal aquaculture and freshwater aquaculture extension and training.

Implementation Responsibilities by Component. BWDB and the Local Government Engineering Department (LGED) would be responsible for all proposed civil works except for DOF facilities. For such civil works, DOF would work closely with BWDB or LGED and with the NGOs involved. The NGOs would link the project and concerned institutions with the communities. They would play a leading role in initial surveys, organization and capacity-building among resource-users and monitoring and evaluation of project impacts. The following GOB departments, local communities, and selected NGOs would work together in implementing the proposed project components as follows:

- (1) community-based inland open-water fisheries management:
 - 1.1 stock enhancement -- DOF, local fishing communities, and NGOs;
 - 1.2 pilot fish pass construction -- BWDB, DOF, local fishing communities, and NGOs;
 - 1.3 fish habitat restoration (channel and *beel* re-excavation) -- LGED, DOF, local fishing communities, and NGOs; and
 - 1.4 aquatic sanctuaries -- DOF, local fishing communities, and NGOs;
- (2) coastal shrimp aquaculture -- BWDB, DOF, local fishing communities, and NGOs;

- (3) freshwater aquaculture extension and training -- DOF, NGOs, and private sector;
- (4) aquatic resources development, management, and conservation studies -- DOF, Bangladesh Fisheries Research Institute (BFRI), and BWDB; and
- (5) institutional support to DOF and training of NGOs -- DOF.

Accounting and Financial Reporting Arrangements: PMU of DOF and BWDB agreed to design, develop and maintain project financial management systems to meet IDA's requirements under OP/BP 10.02 and the guidelines under Loan Administration Change Initiative (LACI). Accounts and records to be maintained by PMU and BWDB will be capable of disclosing a true and fair view of the financial position and of facilitating progress in monitoring the project. PMU and BWDB will prepare Project Financial Statements and Project Management Reports separately, details are provided in Annex 6 and included in the PIP.

The Comptroller and Auditor General (C&AG) through its Directorate of Audits, Foreign Aided Projects, (DOAFAP) would carry out the audits for the Project Accounts, Special Accounts and Statement of Expenditures and two separate audit reports (DOF and BWDB) would be submitted to IDA within six months from the end of each fiscal year. In addition, GOB agreed to carry out performance audits by June 30, 2001 (three months before the mid-term review) and December 31, 2003 (six months before the closing date). A private firm of Chartered Accountants, acceptable to IDA, would be appointed to conduct such audits. Assurances were obtained during negotiations that audit reports would be submitted to IDA no later than six months after the close of the fiscal year. Assurances were also given during negotiations that performance audits would be conducted.

Disbursements: Disbursements are projected over a period of five years, FY00-FY04. Details on credit proceeds are provided in Annex 6. Until June 30, 2001 current disbursement procedure will continue, thereafter PMR based disbursement will be introduced. Three Special Accounts will be opened -- two for DOF (one for IDA funds and one for GEF), one for BWDB in a commercial bank acceptable to IDA. Assurances were obtained during negotiations that GOB would implement a system satisfactory to IDA for channeling funds required to implement the project.

Procurement. Procurement would be in accordance with procedures acceptable to IDA as summarized in Annex 6. Procurement would be in accordance with the procurement schedule presented in PIP, Annex 9. *Standard procurements, agreed with GOB, would be used.* Procurement progress would be included in the quarterly progress reports. In order to permit DOF to pay small bills, while awaiting reimbursement from the IDA Special Account, GOB would have to finance a small revolving fund in addition to normal matching funds through the Annual Development Program. Reimbursements from the Special Account for such expenditures would be deposited back into the revolving fund.

Procurement of fingerlings would be done by the communities, based on procurement arrangements acceptable to GOB and IDA (expected in most cases to be procured from small producers in the vicinity). DOF staff, Floodplain Management Coordination Committee, and the NGOs working with these groups would jointly certify actual delivery and acceptable quality. GOB would make payments directly to the suppliers upon receipt of such certification. In the case of BWDB and LGED, procurement activities under the project would be carried out by respective BWDB and LGED hierarchy. For BWDB works, the engineering consultants, in association with representatives of the community, would certify the quantity and quality of works. For works implemented through LGED, the design and supervision would be done by their own departmental engineers while the community representatives

would participate in design concepts, selection of canals and water bodies, general supervision and operation and maintenance.

Monitoring and Evaluation. PMU would have overall responsibility for monitoring and evaluation. The project objectives would be regularly monitored against agreed performance indicators. Key development indicators are presented in **Annex 1**. In order to monitor a project of this kind, and provide information to project planners and stakeholders regarding impacts, project participants at various levels would need to be involved. To monitor project impacts at the Project Development Objective level, some monitoring down to the household and fishing unit level would be necessary. The involvement of NGOs at the interface between the project and beneficiary communities would provide the opportunity for their involvement in the monitoring and evaluation process. Monitoring and evaluation at this level can take advantage of NGOs involvement with beneficiaries to use alternative, participatory approaches to monitoring. These can also play a role in increasing beneficiary ownership of and involvement in the entire process. For monitoring project implementation at a higher level, more detailed indicators required would be presented in the PIP but there would be a need to revise and update these indicators as the project develops. A consulting firm, to be funded under TA, would assist PMU in the area of monitoring and evaluation.

Reporting, Mid-term and Completion Reviews. PMU would be responsible for preparing six-monthly reports to be submitted to IDA and DFID not later than (date) and (date) of each year for the preceding period. A Mid-term review would be held no later than half-way after credit signing (date). DOF, in consultation with other implementing agencies, IDA, GEF, and DFID, would prepare in advance a working paper to facilitate the review. The review would establish progress toward the main project objectives and not merely an inventory of disbursements. The review would focus on the key indicators presented in Annex 1. Recommendations of the review would include, if necessary, project restructuring and would incorporate outputs from monitoring activities at all levels.

Project Supervision and Completion Report. IDA and DFID would conduct two joint supervision missions per year. The first mission would correspond with a project launching workshop. DOF staff, especially PMU staff responsible for monitoring and evaluation, would play a key role in these supervision activities. Project supervision would be closely linked to the implementation schedule (outlined in the PIP) and would involve monitoring a number of key development objective indicators. An implementation completion report (ICR) would be prepared within six months after the project closes and would focus on the achievements of the project and its impact in relation to its objectives as reflected by the indicators presented in Annex 1.

D: Project Rationale

1. Project alternatives considered and reasons for rejection:

The management of fisheries resources by those dependent on those resources is central to the project. The principal rationale behind this approach is that it is the people dependent on the use of a resource who have the greatest vested interest in ensuring the sustainability of that resource. Provided they can be assured of long-term control over the flow of benefits generated by the resource, it will be in their interests to ensure that the resource is not depleted. But where external agencies control access and apportion use-rights to local users for limited periods, resource-mining is encouraged. In the case of floodplain fisheries, local fishers have no incentive to undertake, or observe, any measures to protect the resource if they have no guarantee of continued access to that resource in the future, when the benefits of protection would be reaped. This is particularly the case in inland fisheries in Bangladesh where the majority of resource-users come from poor or vulnerable rural households whose priorities are dominated by immediate survival, who have few alternatives available to them and whose access to all resources tends to be precarious.

Experience from past projects in the sector, both in Bangladesh and elsewhere, has shown that resource users can change their behavior from resource depletion to sustainable use provided they are able to exert sufficient control over the resource. Experience from the IDA-funded Third Fisheries Project (TFP) in Bangladesh showed how, with proper preparation and organization, communities can take responsibility for the management of their local fisheries and take action to enhance the resources available. Several other projects in Bangladesh involving local NGOs and international institutions such as the International Centre for Living Aquatic Resources Management (ICLARM) have created a significant body of experience and precedents where management by resource-users has proven to be a viable alternative to centralized management by government. International experience recently reviewed and synthesized in FAO publications has reinforced this learning³.

The alternatives, such as the establishment of an effective centralized system of fisheries management in Bangladesh, with all the enforcement mechanisms required, would require unsustainable levels of resources. Past experience also indicates that such systems are not appropriate for dealing with the complexity of tropical floodplain fisheries dominated by artisanal fishers.

The adoption of a community-based approach to the management of fisheries in open-water floodplains is further justified by the need to resolve the conflicting demands on water resources in general. These demands change rapidly and require immediate responses and this means that locally-based, locally-accountable and transparent organizations are generally better adapted than agencies based outside the resource-user community. Experience in projects in the water sector, such as the CPP in Tangail, has shown how locally developed user organizations can be effective in ensuring distribution of benefits from a resource such as water which is equitable and widely accepted within the user community. Past problems in shrimp production areas have shown how the needs of different user groups can conflict. Where local level organizations are not in place to take such conflicts in hand, it is usually the poor who lose out. By contrast, locally-based institutions are in a better position to reflect the diverse needs and priorities of different interest groups. Both in floodplains and in shrimp polders the needs of fishers and shrimp producers will have to be resolved with those of farmers, water transport and other rural sectors. This is best done at the local level responding quickly to changing demands and circumstances.

A strategy of working through NGOs in setting up these resource-user organizations has been adopted, rather than working directly with communities through DOF and project staff. This choice is based on the experience of past projects, notably TFP, where NGOs played a key role in addressing the social issues raised by resource enhancement. DOF also has limited resources to work at the field-level and has limited skills in facilitation and mobilization at the community level. The twin role of fisheries officers as extension agents and enforcers of regulations also leads to problems in community-level work. NGOs, provided they have the capacity and experience, are more likely to have the sort of long-term commitment to, and skills needed for working with, the community that are critical for supporting community fisheries management.

All institutional arrangements and technical interventions developed under the project would need to be appropriate for local resource-users and within their management capacity. The need for an approach where interventions can be adjusted to adapt to local conditions and capacity has led to the adoption of a process orientation to project planning. This is instead of a more traditional, and rigid, approach where all project activities and inputs would be determined, in detail, prior to implementation. Instead, several key aspects of the project, such as the exact location where different types of intervention would be

³ Petr, T. (ed), 1998. *Inland Fisheries Enhancements*. FAO Fisheries Technical Paper No.374. Papers presented at the FAO/DFID Expert Consultation on Inland Fishery Enhancements. Dhaka, Bangladesh, 7-11 April, 1997. FAO, Rome; Hoggarth, D.D. *et al.*, (in publication). *Management Guidelines for Asian Floodplain River Fisheries : Parts 1 and 2*. FAO Fisheries Technical Paper xxx(number to be determined). FAO, Rome.

carried out, have been left open as their selection would ultimately be dependent on the people who would be taking responsibility for them on the ground.

Technical recommendations adopted by the project would be affected by similar considerations. Where communities select floodplain stocking as an option, lower densities would be recommended to avoid problems of fingerling supply and make it easier for local fishers and other users to take over the costs by the end of the project. Where sanctuaries are selected, it would be recommended that they protect only key habitats or parts of local fishing grounds as opposed to larger areas covering complete water bodies or floodplains. This would mitigate the potentially negative short-term impacts of reducing fishing effort and leave areas open for fishing so as to ensure fisheries access at the same time as enhancing sustainability. For similar reasons, the establishment of traditional, centrally-controlled protected areas was rejected in favor of areas identified and managed by beneficiaries themselves. This was because the intensity of resource-use, the level of dependence on the resource, and the constraints facing agencies responsible for environmental protection and fisheries enforcement makes a traditional protected areas approach impractical in Bangladesh. The potentially negative social and economic consequences of establishing protected areas would also be avoided in this way.

In the planned completion of shrimp polders initiated by the TFP, great attention would be paid, not only to creating appropriate beneficiary-group management institutions, but to ensuring that general consensus among beneficiary-groups is obtained before proceeding with civil works. This approach has been selected in preference to placing emphasis on technical interventions by outside agencies in order to avoid some of the conflicts which shrimp development has caused in the past. All interventions would be conditional on the establishment of technical feasibility, with special attention to possible environmental impacts, and general agreement among all potential stakeholders on the type of interventions required. Local stakeholders, supported and guided by local NGOs, would be advised by experts from the relevant technical agencies and the project on possible options but would be able to establish their own priorities in the design of structures. This approach was selected to allow local people to establish ownership of the project and ensure an equitable distribution of its benefits. It is also expected to lead to communities taking on the bulk of responsibility for operation and maintenance of structures with BWDB only intervening when required for major works.

Inclusion of shrimp processing in the project was considered in light of the recent EU embargo on shrimp exports. Although this embargo has been lifted future disruption is a risk. The shrimp processing sector is however receiving financial and technical assistance from other donors, notably EU and FAO. The project did not include marine fisheries. Other donors, principally UNDP and DFID are preparing initiatives in coastal resource management and on the basis of those experiences a follow-on to this project may be able to offer effective assistance, possibly as part of a sector investment program.

A sector investment project approach that would provide more leeway to deal with institutional and policy issues was considered. While the approach would have significant advantages to the project approach it was assessed to be too early to consider sector-wide financing at this stage. A National Fisheries Policy has only just been approved and has not yet been translated into a rational strategy. The institutions are weak and reorganization is necessary. This project will support such change and pave the way for possible sector-financing as a follow-on initiative.

2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned):

Sector issue	Project	Latest Supervision (Form 590) Ratings	
		(Bank-financed projects only)	
		Implementati on Progress (IP)	Development Objective (DO)
Bank-financed			
Group formation; operation & maintenance	Shrimp Culture (Completed -- PCR rating Satisfactory);	NA	NA
Technical viability of improved breeding and lake management	Oxbow Lakes Fishery (Completed -- OED rating Unsatisfactory)	NA	NA
Technical, economic and social viability of stocking open inland waters with fingerlings	Third Fisheries (Completed -- ICR and OED rating Satisfactory)	NA	NA
Fisheries research	Agricultural Research Management	S	S
Mitigation of damage to fisheries	Water Sector Improvement (planned);	NA	NA
Design to avoid environmental damage, including fisheries	Gorai River Restoration (planned); Coastal Embankments Rehabilitation II (planned)	NA NA	NA NA
Other development agencies			
Asian Development Bank	Second Aquaculture Development Project		
DANIDA	Aquaculture Extension in Mymensingh, Phase I and II; Patuakhali Project		
DFID	Fisheries Training and Extension, Phase II; Northwest Fisheries Extension Project, INTERFISH, CAGES, GOLDA, GMF, RDRS, SUFER		
CIDA	FAP 6		
GEF/DOE	Biodiversity and Conservation		
ICLARM	Community-based Fisheries Management		
IFAD/DANIDA	Northwest Fishculture Extension Oxbow Lakes Small Scale Fisheries Development		

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

3. Lessons learned and reflected in the project design:

There are several aspects of the current project which reflect learning from past experience. First of all, the process by which the project has been formulated has brought together the borrower, the donors and, most importantly, the principal stakeholders in identifying the key issues that the project should address. Past projects were often formulated with relatively limited involvement of borrowers and eventual beneficiaries, leading to a limited sense of ownership for both the borrower and beneficiaries and poor sustainability as a result. This involvement of all key players from an early stage has been particularly important given the complexity and scope of the project. The design process has involved inter and intra departmental meetings; briefings with the local consultative sub-group on fisheries; extensive field visits were undertaken at thana and district levels to collect field information, stakeholder meetings at thana and district levels; Divisional workshops; inter-ministerial meetings, national seminar followed by a process of continuous dialogue and consultation. The leadership provided by DOF in project preparation is indicative of how experience from previous projects has been internalized by DOF and mainstreamed into the project design process.

TFP identified beneficiary involvement from an early stage as being critical. Long-term sustainability of community-based floodplain fisheries management relies on the beneficiaries ultimately being willing to bear the cost of management themselves. Experience has shown that they are willing to do this if: (i) the benefits are clear; (ii) long-term control over the resource is assured; (iii) appropriate mechanisms are identified to distribute costs among potential beneficiaries; and (iv) those costs somehow reflect the benefits obtained by different beneficiary groups. This final point was of considerable importance and has led to the recommendation which the project would make to participating communities that management interventions be accompanied by the introduction of gear-based licensing system which would allow cost sharing and a transparent and equitable distribution of access and benefits.

An appreciation of the critical role of NGOs has also been derived from experience from TFP, International Centre for Living Aquatic Resources Management (ICLARM) Community-based Fisheries Management Project, and IDA/DANIDA supported Oxbow Lakes Project. Where NGOs were not originally involved in such projects it has generally been necessary to bring them in at a later date to help resolve the problems and conflicts which can arise where fisheries enhancement and management has been imposed from outside. Independent of donor funding, there are also other NGO-supported activities in several locations in Bangladesh which have provided valuable experience in the NGO-sector in fisheries and water-resource management.

TFP was also involved in the promotion of smallholder shrimp culture and many important lessons have been learned from this experience. Failure to anticipate possible social conflicts can have serious implications for projects in this sector. Thorough consultation with different stakeholders and the identification and recognition of their conflicting interests is critical if a commonly acceptable solution is to be found. Technical solutions need to be simple and manageable and over-intensification should be avoided. NGOs have been shown to be able to play an important role as they can also assist poorer, more vulnerable stakeholders to protect their interests in the face of pressure from more powerful elite. The need for this careful preparatory work has been recognized in project design.

In the aquaculture extension component, one of the principal objectives would be to take the extensive learning about aquaculture extension accumulated in Bangladesh over the last two decades and integrate it into a coherent extension strategy for the country. It has been seen that "blueprint" approaches are not adequate and a more flexible strategy needs to be developed. Experience from a DFID-funded projects has suggested that a experiential learning approaches can be particularly effective in helping to promote a more equitable distribution of benefits among community members. Experience from an ADB-funded Second Aquaculture Development Project and various DANIDA-supported projects in aquaculture, as well as on-going aquaculture extension and training programs have all provided valuable learning which

would assist the project in developing a viable strategy. Close co-ordination with on-going projects would be important to ensure consistency and effective implementation.

4. Indications of borrower commitment and ownership:

A Steering Committee comprising representatives of public, private, and NGO sectors has been set up under the chairmanship of the Secretary, MOFL, to guide project preparation. It has been agreed that the committee would be retained to guide project implementation. DOF, with support of consultants, is responsible for project preparation. An extensive participatory approach is being followed to ensure ownership by key stakeholders. Staff of implementing agencies have been involved in intensive discussions with IDA missions. GOB's commitment is also reflected in the cabinet's recent approval of a National Fisheries Policy and agreement to transfer management of water bodies selected to be supported under the project to DOF for a period of seven years. DOF would transfer fisheries management to communities for the same length of time. GOB has also agreed not to renew leases to canals in polders selected for shrimp development. It has also approved the Project Concept Paper.

5. Value added of Bank support in this project:

A strong leadership role is required given the magnitude of issues and the number of donors working in the sector and the impact of investments of other sectors on fisheries. Collectively, the Bank and DFID are in a unique position to play that role given their role in coordinating policies and donor activities in the sector and their accumulated understanding of what is needed to develop the sector (acquired through project and sector work). They are also in a position to build partnerships with experts in the sector and NGOs (including local, regional, national, and foreign NGOs), other institutions, and donors.

E: Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

1. Economic (supported by Annex 4 and Annex 4A):

[X] Cost-Benefit Analysis : NPV=US\$ 106.6 million; ERR= 48%⁴

Economic analysis was carried out for all project components that have direct and quantifiable benefits. The main project benefits would be increased fish and shrimp production through various investment interventions and better resource management; increased employment opportunities; and aquatic biodiversity conservation. All this would be expected to contribute to rural poverty alleviation. Sensitivity, risk, distributive, and fiscal impact analyses were also done. Details on methodology and assumptions are given in Annexes 4 and 4A. Results of the economic analysis are presented Annex 4A, Table 7. The project's overall net present value (NPV) discounted at 12% is Taka 5,263.4 million (about US\$106.6 million) and the overall economic rate of return (ERR) is 48%. The ERRs for each component are much higher than 12%, the estimated opportunity cost of capital in Bangladesh. The project significantly enhances the net economic wealth of Bangladesh. The increase in availability of fish for domestic consumption, and the foreign exchange earned through export of shrimp generate substantial benefits to society. In fact, the economic NPV is larger than the financial return on investment.

Inland open-water fisheries component, including the training program, enhances the net wealth of the economy through the increase in fish production. The people in Bangladesh are better off, since the project is able to increase the supply of a staple food. ERRs for the inland open-water fisheries sub-components range from 30% (fish passes and regulators) to 183% (aquatic sanctuaries). The shrimp component shows a marked improvement since the economic value of the shrimp exports is higher than the export price, due to the foreign exchange premium gained through exports. The investment costs are lower as well, since the economic costs of most of the investments are lower than their financial values.

⁴ Two sub-components (hilsa conservation and shrimp fry collection) for which incremental benefits are difficult to estimate were excluded from the economic analysis reported in the Borrower's Project Implementation Plan. The overall ERR falls to 39% when these two sub-components are excluded.

Therefore, the economic NPV of the shrimp component is 50% greater than the financial NPV. ERRs for the shrimp sub-components are 70%, 22%, and 59% for completion of TFP polders, development of a new polder, and improvement in shrimp fry collection methods, respectively. Freshwater aquaculture extension component has an NPV of Taka 1,149 million and ERR of 77%. *Hilsa* conservation shows a high ERR of 282% due to high returns associated with low investments.

The economic outcome is sensitive to a reduction in production factor (yield) and cost overruns (Annex 4A, Table 9). A reduction in the production factor substantially affects the economic outcome as well as the financial results. A catastrophe in the form of fish or shrimp disease or serious drought, which would significantly alter the expected yields would affect the economic NPV in two ways: the lower economic return due to less fish that may be available for consumption and the loss of positive economic externalities through shrimp exports which gain a foreign exchange premium. A 50% reduction in yield can compromise the economic viability of the project. A combination of negative changes in production and investment cost can impact the project adversely (Annex 4A, Table 10). For example, a combined 40% decrease in fish yield and 30% increase in investment cost or 35% decrease in yield and 60% increase in cost would make the NPV become negative and ERR fall below 12%. The likelihood of such high negative changes in yield and cost occurring at the same time is low.

The riskiness of the NPV can be inferred from the standard deviation that result from the risk analysis (Annex 4A, Table 16). Based on the selected risk variables, the economic and the financial returns are equally affected by the possible fluctuations. It is significant to note that neither analysis yields a probability of obtaining a negative NPV (Table 17). However, this does not mean that it would be impossible for this project to fail. This analysis is based on the assumption that the project has the institutional capacity and management to operate the facilities in a manner so that costs would be contained and the production yields would be realized within the assumed range and distribution for these key variables and that fish and shrimp disease outbreak is unlikely. The project seeks to manage risks associated with this assumption by concentrating efforts on increasing institutional capacity. While incremental production is difficult to accurately forecast, sensitivity analysis confirms the robustness of the results. Also, the project remains strong even when those components for which incremental production is difficult to estimate (*hilsa* management and shrimp fry collection) are excluded from the analysis. Shrimp disease has been common in Bangladesh but the project will promote only semi-intensive forms of production, minimizing the risks of disease.

There is an opportunity cost to using credit and grant money in any project. Although grants do not require repayment, the project is utilizing financial resources that would otherwise be used elsewhere in the economy. The financing of the project with IDA credit and DFID and GEF grants can be justified in this case, however, since the project is able to increase the net economic wealth of Bangladesh.

2. Financial (see Annex 4 and 4A): NPV=US\$ 83.7 million; FRR= 37%

Financial analysis was also done for all components with direct and quantifiable benefits. The results are presented in Annex 4A, Table 1. The project is extremely robust in its potential to increase fish and shrimp yields and provide a sound financial return on these investments. Since there are various stakeholders, the project was evaluated from an unleveraged total investment point-of-view. Each component that increases the catch generates a positive NPV. In the inland open-water fisheries component, stocking and aquatic sanctuaries show very high returns. In fact, aquatic sanctuaries provide an NPV that is three times greater than the present value (PV) of its investment. The fish passes sub-component also has a NPV similar to the aquatic sanctuaries, but requires substantially higher investments in order to obtain such a return.

The coastal shrimp aquaculture component provides substantial revenues due to the increases in yield and the high export price. The completion of the polders begun in the previous project captures all the

revenue but only incurs the cost of completion, since the benefits would be absent in the event it is not completed. The costs are small relative to the benefits since a large part of the investment was already undertaken during the previous project. This is indicated by the higher NPV/PV-of-Costs ratio. The new polder that is expected to be developed by the project provides an adequate albeit relatively lower rate of return, because the entire cost of building infrastructure in the polder is attributed to the project. The NPV/PV-of-Cost ratio indicates that the return relative to investment is significantly lower than the previous sub-component.

Past experience shows that extension and training programs generally lead to more efficient fish cultivation techniques and practices that benefit fishermen. The project includes such a component designed to harness all the potential of the other components by further increasing the yields. This component generates an NPV of Taka 1,108.4 million and an FRR of 69%.

The fisheries studies and the project management investments do not generate a positive NPV since we are unable to allocate the costs of these general expenditures to any specific project components. They are expected, however, to have a significant impact on the project's returns, since support to DOF is deemed necessary to harness all other project benefits. Therefore, these investments are best evaluated as a part of the complete project rather than as individual components. When analyzed together, the project remains robust as it generates an NPV of Taka 4,134.4 million and an FRR of 37%.

Fiscal impact:

Externalities received by GOB are some of the fiscal impacts of the project. GOB gains incremental tax revenue on all taxable project costs. It also gains incremental tariff revenue on any importable input utilized by the project, while it bears the foreign exchange premium costs. The contribution that would be made by the beneficiaries is another source of revenue for GOB.

The project provides GOB with Taka 11,290 lakh in net revenues through the externalities generated by project components as detailed in Annex 4 (see also Annex 4A, Table 12). The Completion of TFP Polders provides the greatest fiscal revenue since it generates tax and tariff revenues from the large investment as well as the foreign exchange premium that result from shrimp exports. GOB's fiscal budget is also affected by outflows due to project costs since GOB bears most of the investment costs. DOF only receives the fishermen's contribution to the investment. The revenues from increased production are captured solely by the fishermen. The resulting budgetary shortfall is expected to be funded through the IDA-led financing package as well as the externality revenues generated by the project. The remaining deficit, estimated to be Taka 8,810 lakh in present value terms must be supplied in the form of subsidies by GOB (Annex 4). The operational budgetary shortfall has a present value of Taka 6,794 lakh. GOB's yearly budget cash flows prior to and with financing are illustrated in Annex 4A, Tables 13 and 14, respectively. This is in addition to the investment financing being arranged with the various funding agencies. The average net real annual GOB budget outlay during the operation phase of the project would be about Taka 700 lakh. Even though this is not a substantial outlay, GOB must have a plan to finance the operational costs it would incur on behalf of the project.

Some components/sub-components of the project would require net subsidies from GOB after collecting tax revenues and including external financing (Annex 4). *Hilsa* conservation has the highest subsidy element (Taka 216.3 million), followed by inland open-water fisheries stock enhancement (Taka 194.9 million), fish passes (Taka 174 million), aquatic sanctuaries (Taka 142.4 million), habitat restoration (Taka 51.4 million), and development of new shrimp polder (Taka 29.2 million). These subsidies are justified because the benefits to society from the project are substantial. In spite of high financial returns, the private sector would not be expected to invest in *hilsa* conservation due to non-excludability of those not sharing in the investment. The same argument applies to fish passes, aquatic sanctuaries, and habitat restoration. While the Government may be able to exclude some people from fishing in the floodplains

through licensing, an individual investor cannot do it. The shrimp component would be attractive to large private investors. However, government subsidy is justified on social grounds. Social problems have arisen where larger investors in shrimp farming, often from outside the local community, attempt to enforce their own priorities for management on local farmers. Land for shrimp culture has, on occasions, been expropriated by larger investors at the expense of small landowners. This has led to small-holders either being excluded from shrimp farming or being unable to practice mixed shrimp and rice farming. Public provision of the infrastructure would remove the barrier to entry for the small-holders.

3. *Technical:*

All of the activities proposed under the proposed Inland Open-water Fisheries, Coastal Shrimp Aquaculture, and Freshwater Aquaculture Extension and Training components have all been demonstrated to be technically feasible in Bangladesh under IDA and other operations and initiatives in the country. Details of the design of each of these components can be found in Annex 2. Of these, the stocking of open-water bodies has been tested by TFP and Second Aquaculture Development Project. The proposed aquaculture extension strategy has been tested in Northwest Fisheries Project. The establishment of aquatic sanctuaries, the establishment of fish passes and fish friendly regulators and the habitat restoration components have data from a limited number of test operations carried out by ICLARM, FAP 6 and CNRS, respectively. These sub-components would be developed as pilot operations under the project with intensive monitoring to verify the estimated production and environmental benefits of their implementation. The *Hilsa* Conservation and Management sub-component's design -- a study under the Aquatic Resources Development, Management and Conservation Studies (ARDMCS) component -- has little prior experience in Bangladesh. That sub-component would be carefully monitored to determine the extent to which the anticipated incremental benefits are realized. The proposed ARDMCS are a critical element in project design. The information gained from these studies would help in making adjustments to operation and management of the Open-water Fisheries and Coastal Shrimp Aquaculture components to improve production efficiency and to mainstream aquatic biodiversity conservation into inland fisheries management and coastal shrimp seed collection.

A key element in the formulation of the production components under the project has been the comprehensive consultation and participation of all stakeholders in their design. In addition, the operation of most of the components envisaged in the Inland Open-water Fisheries and Coastal Shrimp Aquaculture components would be handled directly by the primary beneficiaries, with assistance from NGOs in organizing the communities to assume their respective responsibilities. The importance of this participation, and the mobilization and organization required to articulate it, to the success of the technical interventions planned by the project means that close co-operation between the technical components of the project and the social and institutional components would be essential. The project would also include a strong institutional strengthening component with the PMU specifically and DOF more generally receiving technical and management support from an expert team of expatriate and national consultants.

4. *Institutional:*

a. **Executing agencies.** DOF would be the main executing agency for the project under the overall leadership of the Director General, DOF, who reports to the Secretary, MOFL. DOF has a presence in all parts of the country up to the *thana* level. It has implemented a large number of donor-assisted projects -- currently there are about 20 projects under implementation. DOF is a long established department with a strong focus on fish biology and production. However, the staff lack skills in social, economic, and institutional development and community participation for effective fisheries management. DOF is also weak in procurement, accounting, and financial management. These skills are important and need to be

strengthened. The traditional role of DOF has been protection and control of the fisheries resource. The new role implied by the recently issued National Fisheries Policy requires a fundamental change in approach, from regulation and control to participation and cooperation with local communities, the private sector, and NGOs, and provision of advice. The project would foster this emerging change in approach. National and international consultants would be recruited in professional areas in which DOF lacks expertise and which are particularly important for project success. To ensure that DOF's dependence on TA is gradually reduced, partnerships would be established between individual consultants and DOF officers who would both have offices within DOF headquarters building and through the training program that would be supported by the project.

While it would be desirable to implement this project through the existing executive branches of the Department of Fisheries, after careful appraisal the decision was made to establish a Project Management Unit (PMU). The outcome of appraisal also determined the type of expertise from national and international consultants required to assist in project implementation as well as the training program to be supported by the project. Consideration was also given on how to wean DOF from its dependence on TA. Project activities would continue through the PMU while overall institutional capacity building would be going on in parallel. A training specialist would be recruited to develop training programs with other technical specialists for DOF and NGO staff who in turn would train the project beneficiaries. Thus, the strategy is not only to build capacity in DOF, but also in NGOs and in CBOs. In the long-term, the latter would undertake some of the tasks currently dealt with by DOF. Unlike in previous cases, the consultants and DOF staff will have offices within the DOF headquarters building to establish partnerships and ensure team work. In addition to supporting the PMU and paying for consultants, the project would also assist in translating the recently issued National Fisheries Policy into action.

BWDB and LGED are the other implementing agencies. BWDB is familiar with implementation of donor-assisted projects. It was also involved in the implementation of the IDA-assisted Shrimp Culture Project and the shrimp component of TFP. While BWDB has some weaknesses, it is capable of implementing the components assigned to it with the assistance of a consulting firm. LGED is a well respected department which has a demonstrated record of ability to carry out civil works.

NGOs are going to be involved in the implementation of almost all components. NGOs made vital contributions to TFP. Their involvement would significantly improve the chances of a successful implementation of the project and ensure the longer-term sustainability of project interventions as they are in a position to commit themselves to supporting resource-user communities for longer periods. While the technical knowledge of some NGOs is limited, their community skills are high and they would constitute a key element in the project structure. At the local level, NGOs would also help the project achieve closer co-operation with supporting services, particularly micro-credit institutions, and local-level coordinating agencies. These may be extremely important in ensuring project sustainability. The capacity of NGOs to provide these linkages would be included in the criteria used for NGOs selection for co-operation with the project.

b. Project management. A PMU would be established in DOF and would be responsible for coordinating all project activities and for planning and carrying out tasks including financial management, accounting, procurement, administration, and training. It would be headed by a Project Coordinating Director who would be assisted by four Deputy Project Directors. Assurances were obtained during negotiations that full professional staffing of the PMU would be made.

5. *Social:*

The main social development goals of the project are: increased domestic fish consumption, increased rural employment, and decrease in rural poverty. The preparation of the project has taken these social development goals into consideration, for example, through the use of local and international consultants. Likewise, TFP provided a wealth of data and experiences that were brought to bear on the present project. All project components have been assessed with regard to these social development goals. A detailed social assessment is presented in Annex 12.

The social framework for the project has been designed to provide the project authorities with an overall framework to guide the identification, preparation, appraisal, and implementation of the project taking social issues into account. The framework provides the basis for an ongoing social assessment process which will guide decision-making related to designs, community involvement, and maximizing the positive social impact of the project. It also contains the principles upon which support mechanisms are to be based if the project causes negative and involuntary impacts of a socio-economic nature. The framework can be found in the project files.

One of the special emphases of the proposed project is rural poverty alleviation. However, it is recognized that increased production alone does not necessarily guarantee a reduction in poverty. Thus, the project design puts a great deal of emphasis on access to fisheries resources by the poor. The project's social development goals would be achieved through targeted activities in the individual components. Project design, implementation, and operation would follow a collaborative management (also referred to as co-management) system that integrates all key stakeholders in the project activities.

The project's overall strategy for inland open-water fisheries management provides the local fishing communities with a variety of options to address the problems facing the sub-sector through different management measures consisting of stocking, habitat restoration, establishment of fish sanctuaries, construction of fish passes, or a combination of these options; and shrimp farming. The unifying feature of these interventions would be the central role of the communities in determining the appropriateness of different management measures, and the subsequent assumption of responsibility for their management and the accompanying costs. The communities, with technical guidance from DOF, BWDB, and LGED on the one hand, and NGO assistance on social issues on the other hand, would be allowed to choose which of these options or combination of options is most appropriate for their circumstances. The communities would be fully involved not only in the selection of options, but also in their design and implementation.

Stocking. TFP experience shows that stocking of floodplains with fingerlings can have a combination of positive and negative impacts, especially on the poorer resource users. The nature of the impact depends on a complex interplay of factors in which social and management aspects clearly are of paramount importance. Given this experience, the proposed project places emphasis on the development of appropriate management mechanisms at the community level. The stocking density as well as the species composition would largely be decided by the community that would pay for it in the long run. The emphasis in the fisheries stock enhancement sub-component would be on the smaller water bodies where fishing communities can be more easily organized into groups to manage project activities, hence ensuring that the benefits are available directly to fishermen and equitably distributed. TFP experience also shows that NGOs can play a critical role in helping organize the fishing communities to ensure access to the water bodies. Hence an NGO would be recruited to assist each community in determining what option, or a combination of options, offered by the project would be appropriate for their situation, in advance of commencement of project-assisted activity in the community.

Habit restoration. There is potential for conflict between rice farmers and fishermen in the areas selected for habit restoration. Project design provides for creating mechanisms beforehand in

communities to resolve possible conflicts that may arise, for example, from attempts to restore fish habitat.

Fish passes. The site selection for fish passes and regulators would have to take into account the feasibility of establishing workable management mechanisms. These would have to mediate between the varied, and often conflicting, interests of different water user groups within the command area.

Sanctuaries. In view of economic and social consequences of permanently banning fishing over an extended period of time in large water bodies to be declared aquatic sanctuaries, the serious problems of enforcing such a ban, and the likely sustainability after the credit closes, a decision was taken to delineate the sanctuary in only a portion of the fished area as a place for the natural spawning and nurturing of fish. This would ease the difficulties of restricting fishing by regulation and of finding alternative livelihoods for the people affected in the reserved area. Protection would be organized and provided on a voluntary basis by local fishermen.

Shrimp farming. Social problems have arisen where larger investors in shrimp farming, often from outside the local community, attempt to enforce their own priorities for management on local farmers. Land for shrimp culture has, on occasions, been expropriated by larger investors at the expense of small landowners. This has led to smallholders either being excluded from shrimp farming or being unable to practice mixed shrimp and rice farming. The shrimp development component would aim at addressing some of the social problems facing this rapidly developing sub-sector and which undermine its sustainability. The thrust would be on helping smaller landowners to participate more directly in shrimp farming. Community consultation and organization with the assistance of an experienced NGO is the foundation upon which this component would be implemented, based on prior experience in the sub-sector. Any civil works would be preceded by agreement with the community involving them in the design concepts, site selection, general supervision of implementation work, and operation and maintenance.

Project design takes gender into account. While women would be encouraged to participate as much as possible in all project activities, the component most directly benefiting women would be the training in shrimp fry collection, an activity which provides employment to tens of thousands of poor women and children in the coastal areas. Because of the limited requirements in terms of skills and equipment required for fry collection, it has attracted the involvement of many poor people for whom it has come to represent either an important supplement to their incomes or their sole source of livelihood. Many women and children are known to be actively involved in fry collection. Unfortunately, the catch methods used, inappropriate handling, and poor transportation result in considerable wastage. Promoting more environmentally friendly collection techniques would help make their livelihoods sustainable. Re-excavation of canals and *beels* would also provide an important source of income for groups of targeted poor, including poor women, who are usually employed in earthworks. Aquaculture extension will also consider the role of women in managing homestead ponds, and experience from other projects will inform this targeting.

Land acquisition needs under the project would be minimal (about 20 ha). Provision has been made in project costing for compensating those whose land may be acquired. On the issue of possible resettlement of families because of the 20 ha that would be acquired, GOB and IDA would agree (*during negotiations*) that procedures and guidelines outlined in the social framework would be followed in dealing with resettlement issues.

6. *Environmental assessment:* Environmental Category A B C

The main environmental concerns are reviewed in Annex 11 to this PAD. They are described in detail in the: Environmental Assessment Report for the proposed project that can be found in the project file. IDA concluded from the latter report that the project is an Environmental Category B project since the project components were found to have relatively limited environmental impact potential; and for those adverse impacts which could potentially occur, there exists reasonably straightforward and understood mitigation measures to mitigate impacts.

Generally, the improvement in sustainable management of the aquatic environment and fisheries in Bangladesh is one of the major objectives of the project, and the project design has been formulated to achieve this objective to the degree possible. Nevertheless, some of the proposed project components could have potential adverse impacts on the environment if not implemented properly and monitored carefully to make any needed adjustments in component implementation and management. The issues by component are as follows:

(a) Inland Open-water Fisheries Management:

- i. possible adverse impacts on indigenous biodiversity due to the potential introduction of exotic species;
- ii. potential adverse impacts upon non-stocked species due to introduction of large numbers of the few stocked species released in open waters;
- iii. potential adverse impacts on genetic diversity of stocked indigenous species due to introduction of large numbers of hatchery-produced fingerlings derived from a limited gene pool;
- iv. possibilities of pathogen transmission to wild stocks due to stocking of diseased fingerlings; and
- v. potential change in hydrology within polders in which fish passes, fish friendly regulators, and habitat restoration would be established.

(b) Coastal Shrimp Aquaculture:

- i. the shrimp culture period extends into the rice growing period reducing the time needed for paddy to mature; and
- ii. the collection of wild shrimp seed increases fishing pressure on shrimp larvae and other larvae further threatening coastal biodiversity and marine and inland fisheries productivity.

(c) Freshwater Aquaculture Extension and Training:

- i. escape of fish stocked in ponds;
- ii. degradation of pond water quality and effluent management; and
- iii. potential bio-accumulation in culture fish of naturally occurring arsenic in groundwater, if is used to fill aquaculture ponds.

Overall, these potential adverse environmental impacts that could result from implementation of the project components have been identified and minimized in the project design. In addition, the project would include the Global Environmental Facility (GEF)-assisted Aquatic Resources Development, Management, and Conservation Studies (ARDMCS) component. This component includes all required environmental monitoring activities that would be necessary to assess the above potential impacts and provide the knowledge necessary to make adjustments, where possible, in project design should estimated impacts of the project be exceeded. The ARDMCS would also strengthen the institutional capacity of DOF, BWDB, and Ministry of Local Government and Rural Development (MLGRD) to mainstream

aquatic biodiversity in their development activities, as result of their participation in and support gained toward this objective under the project.

7. Participatory approach [key stakeholders, how involved, and what they have influenced; if participatory approach not used, describe why not applicable]:

a. Primary beneficiaries and other affected groups:

A recently approved National Fisheries Policy has features that show a fundamental change in DOF's approach from regulation and control to participation and cooperation with local fishing communities and NGOs. The way in which the project is being prepared shows a marked strategy shift in DOF. DOF has made a serious attempt to initiate partnership as a basic fisheries development strategy. This is reflected in project design. There has been extensive consultation, collaboration, and information sharing between DOF and other government ministries and agencies, beneficiaries/community groups, private sector, NGOs, academic institutions, and donor agencies during the identification and preparation of the project. A series of participatory workshops that included all categories of stakeholders have been conducted at the local, *thana*, district, divisional, and national levels to share information with key stakeholders and to seek their views on project design. This consultation, collaboration, and information sharing would be expected to continue during the implementation and operation phases of the project. The project would, in turn, contribute to fostering this emerging major change. Implementation responsibilities by component shows that all major stakeholders (communities, DOF, BWDB, NGOs) would be involved in implementation.

The resource-users themselves are the key stakeholders in sustainable fisheries development. Their participation and adoption of management roles would be a key feature of inland fisheries management and coastal aquaculture components. Their participation would be institutionalized through a range of appropriate mechanisms. Past examples of such mechanisms developed in the TFP and other projects have been Beel Management Committees (BMCs), but, depending on the particular case, they might be called Floodplain Management Committees, Sluice Gate or Fish Pass Management Committees, Sanctuary Management Committees or Canal or Water Management Committees where the issue is not just one of fisheries access but of water control and resolution of multiple water-use issues. These committees would be the main decision making body in the floodplain stocking program. Particular attention would be paid to the inclusion and representation of vulnerable groups, such as the very poor women, to ensure that their concerns are accommodated and that they share in the benefits generated by the project.

Bangladesh has a network of rural-based NGOs with strong involvement in fisheries development. The experience with TFP showed that NGOs have a comparative advantage in organizing local communities, conducting participatory activities, and facilitating the participatory process. Since the communities would be expected to play a greater role under the proposed project than they did under TFP, the role of NGOs would be expected to be even more critical. For this reason, two NGOs are represented on the Steering Committee guiding preparation of the project. The NGOs would be involved in the implementation of all components. Some of their key functions would include: community organization and mobilization; capacity building and skill development; participatory action oriented education and extension; providing linkages among themselves and between them and DOF/GOB; creating linkages, where required, between existing credit mechanisms and resource-user groups; creating environmental awareness in the communities; and giving feedback to DOF.

b. Other key stakeholders:

While DOF is the lead institution within GOB responsible for the project, important roles would also be played by several other GOB ministries and agencies. The cooperation of other ministries and agencies (MOL, MOWR, MLGRD, Finance, BWDB, LGED, FRI) is sought in the project through consultations and interactions. BWDB would be involved where water bodies under their control are targeted for improvement or management and where the improvement of flood-control structures would be required. MOL, which controls the leases for fisheries in key water bodies, would also play a fundamental role in ensuring that access rights on selected water bodies are transferred to DOF that, in turn, would transfer such rights to the fishing communities immediately. LGED would also be engaged in the planning and implementation of engineering works which would be required for habitat restoration. The private sector is represented on the Steering Committee. DOF would continue to share project information with the Local Consultative Group on Fisheries.

F: Sustainability and Risks

1. Sustainability:

Project sustainability would be addressed at three levels: technical, institutional, and financial.

Technical sustainability. Inland open-water fisheries management (stock enhancement, habitat restoration, fish passes/regulators, and aquatic sanctuaries), coastal shrimp aquaculture, and freshwater aquaculture extension and training components of the project appear technically sustainable. There would be special focus on appropriate management of the fisheries resource and promotion of approaches and technologies that would increase fish and shrimp production in a sustainable manner. Giving beneficiaries longer term, instead of one-year, leases of water bodies would provide the incentive for resource conservation. Mainstreaming of aquatic biodiversity concerns into the development of the fisheries sector would also contribute to long-term sustainability.

Institutional sustainability. The sustainability of community-based fisheries management as an institution is less certain. Concerted efforts by those opposed to the principles of user control over resources can undermine even the best planned attempts to set up community-based management institutions. In some areas or even specific communities, the social and political context may prove un conducive to developing this type of management approach. Thorough identification of potential sites, involving local NGOs and looking carefully at both the technical aspects and the social feasibility of community-based management, would help to minimize these risks. Careful assessment of NGO capacity to deal with opposition would also play a role. GOB's commitment to long-term leases of water bodies to the communities would constitute a basic precondition for initiating the community-based management process. Institutional sustainability would be strengthened by the significant involvement of NGOs in assisting the communities in organizing themselves to implement and operate the project, and by GOB's commitment to beneficiary participation and agreement to lease water bodies to the communities for a period of seven years. The project would nurture broad-based support among major stakeholders (GOB, communities, private sector, and NGOs).

Financial sustainability. The likelihood that the project would be financially sustainable after the close of the credit is substantial. All components have high financial rates of return and positive net present values. Most O&M responsibilities would be borne by the beneficiaries. The net benefits accruing to the beneficiaries (after allowing for O&M costs) are on the order of Taka 79,310 lakh (Annex 4A, Table 11). The fishing families in the project area stand to gain significantly as the project is designed to increase fish production and train fishermen regarding better fishing methods, which together will significantly improve the yields. Although most of the O&M responsibilities would fall on the beneficiaries, GOB would still be expected to carry out periodic maintenance and major repairs in the case of shrimp infrastructure, fish passes and water regulators and pay for incremental staff and logistics.

2. Critical Risks (reflecting assumptions in the fourth column of Annex 1):

<u>Risk</u>	<u>Risk Rating</u>	<u>Risk Minimization Measure</u>
Annex 1, cell "from Outputs to Objective"		
<ul style="list-style-type: none"> • GOB maintains a policy and institutional framework that is conducive to community-based management of inland open-water fisheries and community-based coastal shrimp culture 	S	The project would nurture broad-based support among the major stakeholders (GOB, communities, private sector, and NGOs).
<ul style="list-style-type: none"> • Changes in beneficiaries' attitudes take place to move from resource depleting to resource conserving behaviors 	S	Giving beneficiaries longer term instead of one year leases of water bodies would provide the incentive for resource conservation.
<ul style="list-style-type: none"> • Consensus on appropriate institutional arrangements and technical interventions achievable. 	M	The social context within which technical interventions are applied is less certain but the project will work with an experienced NGO in this area to ascertain social feasibility.
<ul style="list-style-type: none"> • Socially acceptable and technically viable methods for improving the sustainability of small-scale shrimp fry collection can be identified. 	S	While technical options exist, their suitability and accessibility for poor fry collectors is less certain. Care will be taken to identify improved methods that are accessible to poor fry collectors
<ul style="list-style-type: none"> • Excessively prolonged or repetitive floods, or major disease outbreak do not seriously constrain aquaculture development. 	M	Management strategies mitigate the effects of floods as far as possible. Other work is in hand to improve regional cooperation on animal health and quarantine to minimize disease risks. Improved extensive production is promoted which carries less risk with regard to disease.
<ul style="list-style-type: none"> • Management and staff of DOF internalize change process 	H	Organizational change within DOF in past has been elusive. Technical inputs of this project are much more focused but institutional inertia will remain a significant risk. Project design, emphasizing community empowerment and use of NGOs, would minimize effects of slower than desirable DOF reform.
Annex 1, cell "from Components to Outputs"		
<ul style="list-style-type: none"> • Community-based management of inland fisheries development is sustainable 	S	NGOs would assist the beneficiaries to form groups to manage the resource and to stand up to the more powerful segments of the community.
<ul style="list-style-type: none"> • Smallholder shrimp development is socially and environmentally sustainable; no major shrimp disease outbreak 	S	Group formation supported by NGOs; Promotion of improved traditional rather than intensive shrimp farming, use of existing canals to return the ecological condition closer to that which existed prior to embankment construction, extension services on how to deal with shrimp disease outbreaks, conservation of wild seed and larvae, and promotion of hatcheries for fry production.

Risk	Risk Rating	Risk Minimization Measure
• More productive/higher yielding aquaculture technologies adopted	M	Promoting aquaculture technologies that the intended beneficiaries can afford.
• Management and staff of DOF internalize change process	S	Involvement of community groups in all stages of the project would make it difficult for DOF to renege on its commitment to developing partnerships with beneficiaries, private sector and NGOs.
Overall Risk Rating	S	

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)

3. Possible Controversial Aspects:

It is a fact that the predominant current methods of shrimp culture in Bangladesh contribute to social and environmental problems in the shrimp farming areas. The purpose of the shrimp component is to demonstrate on a small-scale alternative methods of shrimp culture, carried out by smallholders with a vested interest in preserving their land, and using more environmentally friendly techniques. The impact would be expected to be positive. Also, the concerned NGOs have been involved in the discussions during project preparation, and NGOs would be used in organizing and training the community participants. In spite of all this, opposition to shrimp farming is likely to continue to be strong in some quarters. It is therefore important that the design, and implementation of subprojects in this component be done in a fully participatory and transparent manner. DOF would also need to be proactive in sharing information with all key stakeholders. Another possible controversial aspect relates to a conceivable negative impact of floodplain stock enhancement on biodiversity and genetic diversity. Experience from TFP shows that fingerling stocking is technically viable. Studies of floodplains stocked in TFP showed improved performance of non-stocked species, presumably resulting from improved floodplain management following stocking. Only indigenous species would be stocked during the initial years to minimize the potential adverse impacts that exotic species might cause to the country's aquatic ecology. A review of existing information on the impact of exotic aquatic species on open-water ecosystems/habitats would be supported by the project. Should the findings of this review show that the impact of stocked exotic species is negligible, the use of these exotic species in later years of the floodplain stocking program would be considered.

G: Main Credit Conditions

1. Effectiveness Conditions:

- All actions precedent to the effectiveness of DFID Grant Agreement would have to be fulfilled for IDA to declare the Development Credit Agreement and the GEF Grant Agreement effective.

2. Other [classify according to covenant types used in the Legal Agreements.]:

Board Presentation

- GOB has approved two Project Proformas, one for DOF and LGED and the other for BWDB, which was a condition for Board presentation.

Implementation

- Ministry of Land (MOL) would transfer management of *jalmohals* in selected floodplains under the project to DOF for a period of seven years. DOF would, in turn, transfer the management of fisheries to fishing communities for the same length of time;

- MOL to transfer fisheries management of selected rivers, channels, and *beels* for fish habitat restoration to DOF for seven years. DOF would in turn put the habitats under community-based management, also for a period of seven years;
- MOL to permanently not renew leases in polders taken up for shrimp development under the project. The project would only work in polders where leases have expired and are not renewed;
- Ministry of Water Resources (MOWR) to permit construction of fish passes and modification to selected existing sluice gates on existing embankments to make them more suitable for fish migration;
- MOWR would allow borrow pits developed under the project to be leased through DOF to groups of poor fishing families for a period of seven years;
- GOB would ensure that any civil works, other than DOF facilities, would be preceded by agreement with the community involving them in the design concepts, site selection, general supervision of implementation work, and operation and maintenance;
- GOB would implement a system satisfactory to IDA and DFID for channeling funds required for carrying out the project;
- GOB would ensure that beneficiaries under the stocking program pay gear-based fishing licensing fees sufficient to cover DOF lease payment to MOL for *jalmohals* in the floodplains transferred to DOF and that the beneficiaries contribute their share of fingerling stocking according to agreed percentages;
- GOB would ensure that beneficiaries of the fish passes/fish-friendly regulators and fish habitat restoration programs pay gear-based fishing licensing fees sufficient to cover estimated average annual operations and maintenance of the facilities;
- Stocking of the floodplains would be with indigenous species only unless the results of planned studies under the project demonstrate that the use of exotic species is not harmful to biodiversity;
- GOB would ensure that a full feasibility study, including economic, financial, technical, social, environmental, and community organizational aspects is carried out before commencing civil works in the shrimp component of the project;
- Fish Seed Multiplication Farms to be rehabilitated under the Project would only be used for the purposes of developing improved brood stock of the major fishes artificially propagated in the country and not for seed multiplication for commercial purposes;
- A joint project mid-term review would be carried out by GOB, IDA, and DFID no later than two years from the date project effectiveness. DOF, in consultation with other implementing agencies, IDA, GEF, and DFID, would prepare in advance a working paper to facilitate the review;
- Project Management Unit would monitor and evaluate implementation of the project in accordance with agreed performance monitoring indicators.

Management

- GOB would ensure that the Project Management Unit is adequately staffed during project implementation, and would consult IDA and DFID prior to replacing any of its key staff;
- GOB would maintain until completion of the project a Project Steering Committee comprising NGO, private sector, and public sector representatives under the chairmanship of the Secretary, Ministry of Fisheries and Livestock, to guide the project during implementation;
- For the purpose of assisting in carrying out inland open-water fisheries management and coastal shrimp aquaculture components of the project, NGOs would be selected in accordance with procedures and criteria agreed with IDA and DFID;
- Project Management Unit would maintain a computerized financial management, accounting, disbursement, and reporting system for the project within one year from date of project effectiveness;

Reporting

- Project Management Unit would maintain policies and procedures to enable it to monitor and evaluate on an ongoing basis, in accordance with indicators outlined in Annex 1, the carrying out of the Project and the achievement of the objectives of the Project;
- Project Management Unit would prepare quarterly progress reports to be submitted to IDA and DFID no later than 45 days after the end of each calendar quarter for the preceding period.

Audits

- Project Financial Systems would be audited annually in accordance with auditing standards acceptable to IDA. Annual audit reports would be submitted to IDA and DFID no later than six months after the end of each fiscal year;
- A private firm acceptable to IDA and DFID would be used to conduct performance audit of the project including verification of procurement documentation and review of the financial management system. Such audit would be carried out before the mid-term review of the project and after the fourth year of project implementation. The first auditor would be appointed by March 31, 2001 while the second auditor would be appointed by June 30, 2003 to carry out performance audit by September 30, 2001 and December 31, 2003, respectively; and

Involuntary Resettlement

- There would be no involuntary resettlement under the project, but there would be acquisition of about 20 ha of non-homestead land. Such land acquisition would follow procedures and guidelines set out in the agreed social framework which has been included in the PIP. All land acquisition proposals would be consistent with GOB provisions and would be agreed with IDA in light of the Bank's OD 4.20 and OD 4.30.

H. Readiness for Implementation

The engineering design documents for the first year's activities are complete and ready for the start of project implementation. Not applicable.

The procurement documents for the first year's activities are complete and ready for the start of project implementation.

The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.

The following items are lacking and are discussed under loan conditions (Section G):

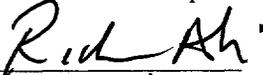
I. Compliance with Bank Policies

This project complies with all applicable Bank policies.

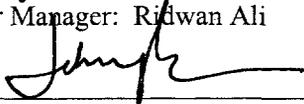
[The following exceptions to Bank policies are recommended for approval: The project complies with all other applicable Bank policies.]



Team Leader: Robert Epworth



Sector Manager: Ridwan Ali



for Country Director: Frederick Thomas Temple

Annex 1
Bangladesh
Fourth Fisheries Project
Project Design Summary

Narrative Summary	Key Performance Indicators	Monitoring and Evaluation	Critical Assumptions
<p>Sector-related CAS Goal: Poverty alleviation through accelerated agricultural growth and rural development</p>	<p>Increase in crop, fisheries, and livestock production</p> <p>Increase in employment opportunities in the rural areas</p>	<p>Periodic agricultural census data from Bangladesh Bureau of Statistics; Annual production data collected by the Departments of Agriculture, Fisheries, and Livestock; and Project Monitoring and Evaluation (M&E) Reports</p>	<p>(Goal to Bank Mission) Benefits from agricultural growth and rural development contribute to poverty alleviation.</p>
<p>Project Development Objective:</p> <p>To support sustainable and equitable growth in the benefits generated from increased fish and shrimp production.</p>	<ol style="list-style-type: none"> 1. Production of fish from floodplains targeted by project increased by 100% by project end 2. Production of shrimp from shrimp polders targeted by project increased by 20% by project end 3. Production from aquaculture increased by 50% in target communities of 200 <i>thanas</i> by project end. 4. By end of project at least 80% of project benefits resulting from increased production will accrue to beneficiaries from moderately and extremely poor categories⁵. 5. Forum for representing user-group management institutions in project oversight and decision-making established by year 1 and sustained. 	<p>Baseline reports, Independent livelihood monitoring.</p> <p>Baseline production surveys; Production monitoring by project and resource-users; Independent monitoring by national NGO; Quarterly Progress and supervision reports Evaluation (mid-term and final) reports.</p>	<p>(Objective to Goal)</p> <p>Benefits of increased production reach the target groups</p>
<p>Outputs:</p> <p>1. Sustainable and equitable community-based systems of managing and enhancing inland open-water fisheries established and operational.</p>	<ol style="list-style-type: none"> 1.1 40 beel/floodplain, 5 water regulator, 8 fish pass, and 50 fish sanctuary management committees established through a participatory process by project end and sustained beyond project completion. 1.2. A total of (i) 60,000 ha of floodplains stocked with fingerlings each year, (ii) 8 fish passes constructed and 5 fish-friendly regulators installed, (iii) 10 fish habitats rehabilitated and (iv) 50 fish sanctuaries established by the end of project. 	<ol style="list-style-type: none"> 1.1 Quarterly Progress Reports; M&E Reports; Supervision Mission Reports; Evaluation Mission Reports (Mid-term and Final), Ex-post evaluation. 1.2 Quarterly Progress Reports; M&E Reports; Supervision Mission Reports; Evaluation Mission Reports (Mid-term and Final); Baseline production surveys; Production monitoring by project and resource-users; Independent monitoring by national NGO; Ex-post evaluation and impact assessment 	<p>(Outputs to Objective)</p> <p>GOB maintains a policy and institutional framework that is conducive to community-based management of inland open-water fisheries</p> <p>NGOs with capacity to support community management can be identified</p>
<p>2. Institutional arrangements for sustainable and equitable management and development of shrimp polders established and operational</p>	<p>2.1 Feasibility studies completed for 4 TFP polders by year 1 and 1 additional polder by year 3.</p>	<p>2.1 Feasibility study report; Quarterly Progress Reports</p>	<ul style="list-style-type: none"> • Feasibility studies able to identify appropriate interventions for 3 TFP polders and 1 additional polder

⁵ Indicators based on a combination of daily calorific intake; land ownership; per capita annual income; and food deficit status.

Narrative Summary	Key Performance Indicators	Monitoring and Evaluation	Critical Assumptions
	<p>2.2 Plan for institutional arrangements and technical interventions prepared and agreed by all stakeholders by year 2 in 3 TFP polders and by year 4 in 1 additional polder</p> <p>2.3 Total of 50 Block/polder management committees established in 3 TFP polders by year 2 of project and in 1 additional polder by year 3</p> <p>2.4 219 Regulators / sluices constructed/ rehabilitated, 363 km canal excavated, 35 jetties / stair constructed / rehabilitated, 9 landing platform constructed / rehabilitated and 860 km afforestation by project end.</p> <p>2.5 Number of smallholders directly involved and receiving benefits from shrimp production in polders increased by 30% by project end</p>	<p>2.2 Plan document; Documentation of agreements between stakeholders and project</p> <p>2.3 As above</p> <p>2.4 Quarterly Progress Reports; M&E Reports; Supervision Mission Reports; Evaluation Mission Reports (Mid-term and Final); Baseline production surveys</p> <p>2.5 Quarterly Progress Reports; M & E reports; Mid-term review and final evaluation; Independent monitoring by national NGO</p>	<ul style="list-style-type: none"> • Consensus on appropriate institutional arrangements and technical interventions achievable • GOB maintains a policy and institutional framework that is conducive to community-based management of coastal shrimp culture
3. Environmental sustainability of shrimp fry collection increased	<p>3.1 Sustainable methods of shrimp fry collection developed and adopted by at least 35% of targeted fry collectors by year 3</p> <p>3.2 Appropriate institutional arrangements for participation by shrimp fry collectors in decision-making established by year 1.</p> <p>3.3 Training program for shrimp fry collectors developed and implemented by project reaching: 10,000 fry collectors by Year 2; 20,000 by Year 3; 30,000 by Year 4. At least 75% of all fry traders trained will be women.</p> <p>3.4 Linkages between fry collectors institutions and support services established and utilized by year 2</p>	<p>3.1 Quarterly Progress Reports; M & E reports; Mid-term review and final evaluation; Adoption surveys</p> <p>3.2 Quarterly Progress Reports; M & E reports; Mid-term review and final evaluation; Independent monitoring by national NGO.</p> <p>3.3 As above</p> <p>3.4 As above</p>	Socially acceptable and technically viable methods for improving the sustainability of small-scale shrimp fry collection can be identified
4. A national aquaculture extension strategy developed, approved, coordinated and implemented	<p>4.1 Extension strategy developed, documented and approved by end of year 3</p> <p>4.2 Framework for aquaculture support network prepared for 200 <i>thanas</i> by year 2</p> <p>4.3 Co-ordinated aquaculture extension programmes involving network members developed, resourced and implemented in 50 <i>thanas</i> by end of year 3 and a further 150 <i>thanas</i> by end of year 5 and sustained beyond project life.</p>	<p>4.1 Strategy document; Quarterly Progress Reports;</p> <p>4.2 Quarterly Progress Reports; M&E Reports; Supervision Mission Reports; Evaluation Mission Reports (Mid-term and Final);</p> <p>4.3 As above plus ex-post evaluation and impact assessment</p>	<p>Approval of national aquaculture extension strategy forthcoming by MOFL/DOF</p> <p>Relevant agencies involved in aquaculture willing to co-operate.</p> <p>Excessively prolonged or repetitive floods or major disease outbreak do not seriously constrain aquaculture development.</p>

Narrative Summary	Key Performance Indicators	Monitoring and Evaluation	Critical Assumptions
	4.4 35% adoption of improved aquaculture technology in 670 ha of ponds in 200 thanas increasing productivity to 3 tonnes per ha by end of project.	4.4 Baseline production surveys; Production monitoring by project and resource-users; Ex-post evaluation and impact assessment	
	4.5 At least 25% of project participants in pond aquaculture development will be women.	4.5 Project monitoring reports.	
5. Understanding of aquatic resource and biodiversity conservation improved.	5.1 Studies completed and documented by year 3 of project 5.2 Action plans to mainstream biodiversity conservation into fisheries sector completed	5.1 6 th 5-year plan; relevant fisheries policy and planning documents; Quarterly Progress Reports; M&E Reports; Supervision Mission Reports; Evaluation Mission Reports (Mid-term and Final) 5.2 Same as in 1.1	Policy and planning recommendations based on studies receive political support
6. Socially and ecologically sound <i>hilsa</i> management plan developed and implemented	6.1 Relevant studies completed and documented by year 1 6.2 <i>Hilsa</i> management plan completed, discussed with stakeholders, approved and resourced by year 2 6.3 <i>Hilsa</i> management plan implemented by year 2	6.1 Plan documentation; Quarterly Progress Reports; M&E Reports; Supervision Mission Reports; Evaluation Mission Reports (Mid-term and Final); 6.2 Documentation of agreements with stakeholders; Quarterly Progress Reports; M&E Reports; Supervision Mission Reports; Evaluation Mission Reports (Mid-term and Final) 6.3 As above	Stakeholders agree to management plan. Sufficient resources available for plan implementation
7. Capacity of DOF to manage and support the sector and implement National Fisheries Policy strengthened	7.1 Action Plan for the implementation of the National Fisheries Policy completed and documented by year 1 7.2 Assessment of organisational and human resource capacity and needs of DOF completed by year 1 7.3 Plan for organisational and human resource development prepared and approved by year 2 and implemented by year 3. 7.4 Strategy and program for post-project development of the fisheries sector prepared and approved by end of project	7.1 Quarterly Progress Reports; M&E Reports; Supervision Mission Reports; Evaluation Mission Reports (Mid-term and Final) 7.2 As above. 7.3 Plan documentation; As above. 7.4 Strategy and program documentation; as above.	Management and staff of DOF internalize change process

Narrative Summary	Key Performance Indicator	Monitoring and Evaluation	Critical Assumptions
<p>Components (see Annex 2 for project description)</p> <p>1. Inland Open-water Fisheries Management</p> <p>1.1 Community-based Stock Enhancement</p> <p>1.2 Pilot Fish Passes/Water Regulatory Structures</p> <p>1.3 Fish Habitat Restoration</p> <p>1.4 Pilot Aquatic Sanctuaries</p>	<p>Inputs: (budget for each component)</p> <p>1. US\$17.1 million</p> <p>1.1 US\$ 7.9 million</p> <p>1.2 US\$ 4.6 million</p> <p>1.3 US\$2.3 million</p> <p>1.4 US\$ 2.3 million</p>	<p>Quarterly Progress and Disbursement Reports</p>	<p>(Components to Outputs)</p> <ul style="list-style-type: none"> • Access to and control of water bodies is assured • No unusual drought/flood or outbreaks of disease
<p>2. Coastal Shrimp Aquaculture</p> <p>2.1 Completion of Polders under Third Fisheries Project</p> <p>2.2 Development of New Polder</p>	<p>2. US\$8.5 million</p> <p>2.1 US\$4.8 million</p> <p>2.2 US\$3.4 million</p>	<p>Quarterly Progress and Disbursement Reports</p>	<ul style="list-style-type: none"> • Canals in polders are free of leases
<p>3 Shrimp Fry Collectors</p>	<p>3 US\$0.3 million</p>		<ul style="list-style-type: none"> • Consensus can be achieved among stakeholder on appropriate interventions
<p>4. Freshwater Aquaculture Extension</p>	<p>4. US\$5.7 million</p>	<p>Quarterly Progress and Disbursement Reports</p>	<ul style="list-style-type: none"> • Access to financial support are readily available
<p>5. Aquatic Resources Policy Development</p> <p>5.1 Management of <i>Hilsa</i> Fisheries Areas</p> <p>5.2 Aquatic Biological and Genetic Diversity Assessments and Database</p> <p>5.3 Studies to Develop Future Projects</p>	<p>5. US\$3.9 million</p> <p>5.1 US\$1.1 million</p> <p>5.2 US\$2.5 million</p> <p>5.3 US\$0.3 million</p>	<p>Quarterly Progress and Disbursement Reports</p>	<ul style="list-style-type: none"> • DOF maintains staffing strength for aquatic biological and genetic diversity assessments after credit closes • Ecologically sound and socially feasible management interventions can be identified • Support from agencies concerned with enforcement is forthcoming
<p>6. Institutional Support</p> <p>6.1 Project Management Unit</p> <p>6.2 National and Expatriate Consultants (Monitoring and Evaluation)</p> <p>6.3 Transport, Machinery and Equipment</p> <p>6.4 Training</p> <p>6.5 DOF District Offices</p> <p>6.6 Flood Rehabilitation/Genetic Management</p>	<p>6. US\$25.8 million</p> <p>6.1 US\$1.0 million</p> <p>6.2 US\$10.6 million</p> <p>6.3 US\$7.1 million</p> <p>6.4 US\$1.4 million</p> <p>6.5 US\$1.1 million</p> <p>6.6 US\$ 4.7 million</p>	<p>Quarterly Progress and Disbursement Reports</p>	<ul style="list-style-type: none"> • Appropriate and efficient manpower made available for PMU • Timely recruitment of appropriate consultants

Annex 2
Bangladesh
Fourth Fisheries Project
Detailed Project Description

Project Component 1 - Inland Open-Water Fisheries Management US\$17.1 million (to be funded as follows: IDA US\$8.2million; GEF US\$1.3 million; DFID US\$3.6 million; GOB US\$ 1.0 million; and Beneficiaries US\$ 3.0 million)

The open-water fisheries management component would attempt to address the problems facing open-water inland fisheries through different management measures consisting of stocking, habitat restoration, establishment of fish sanctuaries, construction of fish passes or a combination of these options. The unifying feature of these interventions would be the central role of resource-user communities in determining the appropriateness of different management measures and the subsequent assumption of responsibility for their management and, eventually, their costs by the resource-users who would benefit from their implementation.

While choices regarding what management interventions are appropriate and how and where they should be implemented must ultimately rest with the communities concerned, the project would aim to encourage the implementation of a range of possible management interventions which past experience has suggested may be applicable. The key interventions to be proposed are: floodplain fisheries stock enhancement; aquatic habitat restoration- re-excavation of canals and *beels*; construction of fish passes/fish-friendly regulators; and establishment of aquatic sanctuaries in a variety of ecosystems.

The objectives of this component would be to reduce poverty and improve local people's nutrition through the sustainable development of open-water fisheries resources in an environmentally sound manner. The communities would be directly involved in the design, site selection, management, and monitoring of the investments and actions taken. The beneficiary communities would bear full costs of operation and maintenance, the funds for which would be derived from a gear-based, fishing license system that would be formulated with assistance from the Department of Fisheries (DOF) and non-governmental organizations (NGOs) with full participation of the receiving community in the design and operation of one or more of the above actions. The charges under the gear-based licensing system would be set based on two components, reimbursement of DOF lease payment to Ministry of Land (MOL) and estimated average annual operations and maintenance costs (O&M), respectively. The first one would be paid to the Government of Bangladesh (GOB) and the second would be deposited into an account that would be owned and managed by the community to cover annual O&M costs. These payments would be made via direct bank deposits to a GOB account and a community-managed account, respectively. Copies of the deposit slips into these two accounts would be provided to the Thana Fishery Officer for issuance of individual fishing licenses, which would be floodplain-specific. In addition to the fish production monitoring of stocked and non-stocked species that would be conducted in each floodplain developed by the project, at least one representative floodplain in each Division where the project would be implemented and not receiving assistance for open-water fisheries development would similarly be monitored as control areas. The participation of the community would aid DOF in ensuring that the provisions of the Fish Conservation Act are implemented in floodplains covered under the project.

Fisheries Stock Enhancement (US\$7.9 million of which IDA US\$3.0 million; DFID US\$2.0 million; GOB US\$0.1 million; and Beneficiaries US\$2.8 million). This sub-component would involve the stocking of fingerlings of indigenous species in the floodplains, primarily comprised of hatchery-produced rui (*Labeo rohita*), catla (*Catla catla*), and mrigal (*Cirrhinus mrigala*). The rationale for using these indigenous species is that hatchery production of these species is feasible and well known in

Bangladesh, and it minimizes the potential adverse impacts that exotic species can cause to Bangladesh's aquatic ecology. Though exotics have been deliberately and inadvertently released in Bangladesh in previous years, the potential impacts of these introductions on indigenous species have not been quantified; and, therefore, the strategy of stocking indigenous species would be followed to minimize risks and preserve the country's aquatic ecology. A review of existing regional information on the impact of exotic aquatic species on open-water ecosystems/habitats would be supported by the project. Should the findings of this review show that the impact of stocked exotic species is negligible, reconsideration would be given concerning the use of exotic fishes in the floodplain stocking program.

The objective would be to use stocking programs as catalysts for improved fisheries management in floodplains with a water area of up to 3,000 ha and water depth of one meter or more at maximum flood. Based upon experience with the Third Fisheries Project (TFP), this size floodplain can be managed by one community. One larger floodplain, such as Boronal-Kola-Salimpur-Bashukhali (BKSB) or another, which was assisted under TFP, would also be included as a pilot to test methods for sustainable multi-community participation in management of a larger floodplain. The project would finance a maximum stocking density of 10 kg/ha/year, approximately comprised in the first year of rui (40%), catla (40%), and mrigal (20%). The stocking density would be determined through consultation with the receiving community through the Floodplain Management Committee. It is assumed that the ratios may vary to some degree from one floodplain to another and this would be adjusted based on catch/recovery statistics on returns from stocking. (The data from some floodplains previously stocked under TFP was used in setting the proposed initial-year stocking proportions.) The following criteria would be used in determining the stocking density to assure sustainability of floodplain stocking: (a) the capacity of the communities to share in the costs of stocking; and (b) the required quantity of stocked fingerlings can be procured relatively close to the stocked floodplain, which would further reduce stress and mortality during and after transport. The procurement of fingerlings would be done by the communities through the Bank's national shopping method. The objective of these criteria is to permit quick (within four years) transfer of control and responsibility of the stocking program to the communities managing the fisheries.

In addition to the maximum of 3,000 ha floodplain area with a water depth of one meter or more, the following criteria would also be required for selected floodplains: (a) the effective water area would have a depth of 1 m or more for a duration of about 120 days, following an area, depth, and duration analysis of each floodplain by a capable agency (e.g. EGIS, SWMC, etc.) in Bangladesh; (b) the water quality and nutrient richness should be suitable for optimal fish growth; (c) easy accessibility by road or boat for stocking and marketing; (d) the local fishing community is interested to participate in the program, willingness to establish a representative Floodplain Management Committee, and contribute to the stocking costs per the project guidelines; (e) absence of internal or external social conflicts that cannot be resolved and would adversely affect the stocking program; and (f) presence of an interested NGO that meets the project's selection criteria.

The proposed IDA credit would finance up to 90% of the stocking costs in the first year of the operation of a specific floodplain, 60% the second year, and 30% the third year, with the balance financed by the communities. Communities would finance 100% of the stocking costs from the fourth year of operation onwards. It is expected that a majority of the fingerlings would be procured in the vicinity of the floodplain stocked. The members of the fishing communities responsible for fisheries management in the *beels* would be encouraged to participate in fingerling production. The fingerling stocking densities may also be increased if the communities decide to do so during or after the project, but the proportion of financing noted above would be based on a maximum of 10 kg/ha/year, if the amount actually stocked is above the 10 kg/ha/year target. All floodplains to be taken up under the project should be initiated in the first three years of the project to allow for the financing plan noted above to be completed during the five-year project period. It is estimated that 24,000 ha would be stocked in the second year and 36,000 ha

would be stocked in the third year for a total of 60,000 ha under the project. The first year's floodplains would largely be derived from those areas stocked under TFP, where at least one year's monitored data of fish catch would be available from prior years' fisheries assessments of these areas. An NGO would be recruited to work with each community involved in the first year's stocking for at least 6 months in advance of the stocking date. For new floodplains, a full year's monitoring and NGO assistance would need to be conducted and provided, respectively, in advance of stocking.

Habitat Restoration (US\$2.3 million of which IDA US\$1.8 million; DFID US\$0.2 million; GOB US\$0.3 million). As a floodplain delta of the Ganges, the Brahmaputra and the Meghna rivers, Bangladesh has one of the world's richest and most diverse inland aquaculture environments, supporting a variety of living aquatic resources. Fish migration and recruitment in natural water depend on good ecological condition, but in recent years, for both natural and man-made reasons, the environment has been seriously degraded, one of the major consequences being the siltation of rivers and canals. Canals are a crucial element in interconnecting the open-water network and maintaining the migration of fish for breeding in the floodplains. Due to siltation, many formerly perennial canals and tributaries now flow only seasonally, and without these connections, stocks and production and species diversity will eventually decline.

The objective of this component is to increase productivity and biodiversity by reopening important routes by which riverine fish reach floodplains to breed and graze. The component would include up to 10 pilot habitat restoration sub-projects for more effective fish migration through them. In addition to technical considerations, for instance, giving priority to the routes with productive fisheries yields over the largest area, criteria for the selection of the sites would include the willingness of communities to participate in construction, management and maintenance. Attempts would also be made to minimize potential conflicts between farmers and fishermen.

As in the case of floodplain stocking, an NGO would be required to be present in the area to establish if there is community support for and willingness to participate in the activity. Similar arrangements would be made to these sub-projects, as noted above for fisheries stock enhancement, in that the beneficiaries would agree to take responsibility through community management of the O & M of the habitats restored, including payment of the O & M costs via inclusion in the fishing license fees. Some adjustments may need to be made, on a case-by-case basis, in cases where beneficiaries are dispersed or difficult to identify.

Where communities, in consultation with the project, opt for habitat restoration, the Local Government Engineering Department (LGED) would be responsible for implementing the civil engineering works of this component. DOF, together with consultants and LGED, has narrowed the number of potential sites from the original list of 125 to 15. The 10 sites would be selected from this short list. However, there is a need to be flexible. In the course of detailed design exercise, there may be a need to drop some of the sites in the short list.

Construction of Fish Passes/Friendly Regulators US\$4.6 million of which IDA US\$3.4 million; DFID US\$0.6 million; GOB US\$0.6 million). In order to increase foodgrain production, many flood control, drainage and irrigation (FCDI) projects have been implemented in the country. These projects were implemented without assessing their impact on fisheries. Some of the projects have blocked fish migration routes. The inclusion of properly designed fish passes to allow passage of fish through FCDI embankments and water regulators is one way of resolving this problem. A pilot program to establish a fish pass in FCDI project was taken in the Flood Action Plan. This limited experience has demonstrated that fish pass construction is economically viable and socially acceptable if potential conflicts among resource users are adequately addressed.

This component would aim to extend the experience of this pilot and restore some of the former migration routes between selected rivers and protected floodplains by constructing up to eight pilot fish-passes. Twelve possible FCD/I schemes where fish passes would be technically and socially feasible have already been identified and sites would be provisionally selected from this list. Where feasible, improving the management and structure of existing water regulators to allow fish to migrate freely would also be considered. Up to five selected water regulator structures would be modified with fish-friendly sluices. Eight possible schemes for this work have also been identified. If successful, solutions of this kind could be replicated in over 500 sites around the country in the future.

The site selection for fish passes and regulators would have to take into account the feasibility of establishing workable management mechanisms. These would have to mediate between the varied, and often conflicting, interests of different water user groups within the command area. Special consideration would be given to mitigation measures prepared under the Second Small-Scale Drainage and Irrigation Project and Northeast Regional Study (FAP 6). As in the open-water fisheries component of the project, NGOs would be called upon to work with communities in analyzing options for the water management mechanisms and establishing appropriate committees. Beneficiaries would be expected to pay any operation and maintenance costs involved such as for operation, removing weeds from the channels and restoring fish habitats in channels. This could be done through licensing arrangements for fisheries or other appropriate mechanisms identified in conjunction with resource-users and other stakeholders. BWDB Guidelines for Peoples' Participation would be followed in setting up these water management mechanisms but some adjustments may need to be made, on a case-by-case basis.

The project will also employ one biologist per pass to be responsible for monitoring impact. The office accommodation of the biologist would be in local BWDB office. After the project period, this responsibility would be handed over to the local TFO.

Implementation of the civil works involved would be by the BWDB.

Aquatic Sanctuaries (US\$2.3 million of which GEF US\$1.3⁶ million; DFID US\$0.8 million; Beneficiaries 0.2 million). The entire Ganges/Brahmaputra floodplain, which accounts for half of the land area of Bangladesh, is a wetland of international importance. Within this area, 50 semi-permanent freshwater systems have been identified as being particularly significant but, due to their hydrological dependence on surrounding areas they cannot be viewed as independent habitats for conservation purposes. In any event, population pressures and the associated need for food and fiber are so intense throughout the delta, that it is neither practical nor feasible to manage these areas as totally protected areas. In this context, the only feasible option for protecting biodiversity values is to try and mainstream aquatic biodiversity conservation within the day to day activities of the fisheries and related sectors. The Bangladesh Conservation Strategy (1992) endorses this approach, contemplating a series of activities to protect ecosystem integrity and biodiversity conservation at a variety of levels; policy, zoning, water resources management, fisheries management and targeted research. One element of the strategy is to promote establishment of aquatic sanctuaries to conserve fish stocks, preserve biodiversity and increase fish production. The benefits of such sanctuaries accrue locally, through the preservation of breeding stock for commercial species, and globally, through the preservation of breeding stock subsidiary species. They have the added attraction that, as a form of fisheries management, they are relatively easy for communities to implement and enforce

Under this component, up to 50 pilot-scale community-managed aquatic sanctuaries would be established by the project in small rivers and channels with flowing waters and in areas where fishing rights are not

⁶ Of which US\$0.7 million is for monitoring floodplain fisheries productivity, genetic diversity, and biodiversity in project areas. In addition to project-specific monitoring, this activity would include independent basic biological characterization and monitoring of aquatic biodiversity in all project areas.

leased. IDA funds will be used to cover baseline costs and GEF funds will be used to finance incremental activities required to broaden the scope of protection provided including: exclusion of all extractive activities in the sanctuaries; enforcing restrictions on hunting; increasing community awareness; and, independent biodiversity monitoring.

Following the process identified for the entire open-water fisheries component, local resource-users would be involved from the start in identifying appropriate sites and mechanisms for managing them. Actual sites would be selected once the Project Management Unit (PMU) and consultant teams are in place. Selection criteria would include community interest, ecological considerations (global biodiversity importance), geographical and ecological representation, etc. The strategy would follow experience gained under a pilot project assisted by the International Centre for Living Aquatic Resources Management (ICLARM) which reduces the prospect of potential social conflicts by delineating the sanctuary in only a portion (around 50 ha) of the fished area as a place for the natural spawning and nurturing of fishes. This should ease the difficulties of restricting fishing by regulation and of finding alternative livelihoods for the people affected in the reserved area. Protection would be organized and provided on a voluntary basis by local fishermen.

The declared sites for aquatic sanctuary would be demarcated. Baseline surveys of the sanctuary areas would be undertaken in the first year of the project while NGOs work with communities to prepare appropriate mechanisms for managing the sanctuaries. Sanctuary Management Committees (SMC) at each site have been shown by the CBFMP to be successful mechanisms where they are comprised of elected community members. The SMC would be supported by the NGO involved, the DOF and consultants. Final selection of appropriate sites would be based upon the communities' agreement to establish and manage the sanctuaries and observe the restrictions on fishing required to make them effective.

Re-stocking of the sanctuaries along the lines of the floodplain restocking component would represent a further option for communities electing to develop aquatic sanctuaries. Species composition and stocking densities would be determined after reviewing the relevant previous studies and the results of the baseline studies, but for costing purposes, a stocking rate of 2 kg/ha/year of the same species as in the floodplain stocking component is assumed. In cases where communities do take up this option, costs would be recovered progressively using the same system described above for floodplain stocking. Any associated licencing arrangements would aim to cover the costs of DOF leasing from MOL.

Project Component 2 - Coastal Shrimp Aquaculture US\$8.5 million (to be funded as follows: IDA US\$6.3 million; GEF US\$0.1 million; DFID US\$0.7 million; GOB US\$1.5 million)

The contribution of coastal aquaculture, and particularly shrimp culture, to both the local and national economies is very significant. The sub-sector not only generates important export earnings but has also created a new source of employment and income in coastal areas, which have traditionally been among the most marginal and impoverished in the country. The Shrimp and Coastal Aquaculture component would aim to address some of the environmental and social issues facing this rapidly developing sub-sector and which undermine its sustainability.

Unplanned development of shrimp culture has had negative environmental impacts in terms of water quality, disease, mangrove deforestation and the degradation of agricultural land. In particular, the practice of alternating shrimp culture and rice farming has often been upset by more intensive use of land areas for shrimp. The combination of seasonal shrimp culture and rice farming would be possible and sustainable but requires better water management. Potentially destructive methods of shrimp fry collection, on which the sub-sector depends, also have significant environmental implications.

Social problems have arisen where larger investors in shrimp farming, often from outside the local community, attempt to enforce their own priorities for management on local farmers. Land for shrimp culture has, on occasions, been expropriated by larger investors at the expense of small landowners. This has led to smallholders either being excluded from shrimp farming or being unable to practice mixed shrimp and rice farming.

Appropriate infrastructure combined with adequate management mechanisms can resolve some of these conflicts and reduce negative environmental impacts. Past efforts to do this have often been marred by poor design and construction and a failure to take social and institutional aspects into consideration. The involvement of local resource-users at all stages, both in designing appropriate structures and managing them is critical if the concerns and priorities of all stakeholders are to be accommodated.

The Shrimp and Coastal Aquaculture component would therefore consist of two sub-components: Polder Development and Management and Training of Shrimp Fry Collectors.

Polder Development and Management (US\$8.3 million of which IDA US\$6.1 million; DFID US\$0.7 million; GOB US\$1.5 million). The Third Fisheries Project initiated work on developing 4 polders in the coastal region of Khulna where smallholders could control the entrance of brackishwater allowing them to carry out both extensive shrimp culture and rice farming at different times of the year. Block Committees were set up as mechanisms for the management of structures and the representation of local users in decision-making. TFP experience showed that there is a need to involve stakeholders in the design, general supervision and management of water control structures. Further, for the water management structures to be fully operational, canals within polders should not be leased out.

The involvement of NGOs, brought in to mediate in conflicts between user groups and address the issues raised, has increased success in resolving problems and helping smallholders manage their shrimp farming activities effectively.

There is potential to improve the productivity of these smallholder farmers, and increase both their earnings from shrimp and agriculture, and their contribution to overall shrimp production, if these polder structures are completed and their management further improved.

The shrimp and coastal aquaculture component would therefore aim, in the first place, to learn and build on the experience of TFP in addressing the issue of smallholder shrimp production. NGOs with appropriate experience would be called upon to help the project carry out a detailed appraisal of current conditions in the four polders and one new polder. Thorough consultations with local stakeholders in order to understand the issues and perceptions of different stakeholder groups would be used as a basis for identifying future interventions in the area. Agreement must be reached with local people on appropriate interventions to complete work on the polders and establish sustainable mechanisms for their management so that the needs of all concerned groups can be accommodated. In addition, arrangements for the permanent non-renewal of leases on canals within polders taken up for development under the project must be made. The project would only work in polders where leases have expired and are not renewed and confirmation on the existing lease situation in polders selected for the project must be provided prior to project appraisal.

Following these agreements, a full feasibility study, covering engineering, aquaculture, socio-economic and community organizational aspects would be carried out incorporating the results of consultations with the community and looking in detail at the environmental and economic feasibility of proposed interventions and the formal mechanisms required to ensure that smallholder farmers would be able to benefit from them. This study would be carried out during the first year of the project and development

would start from the second year. BWDB has prepared preliminary cost estimates for additional investment in engineering works, which would be validated during that study.

BWDB would employ an engineering firm to handle the design of civil works, assist in evaluation of bids, and supervise construction. The contractual arrangements, managed through an NGO, would ensure community participation in design concepts and in general supervision to help assure appropriate design and adequate quality of the works as described above.

BWDB has made preliminary cost estimates of US\$3.9 million for completing work on the four TFP polders, and US\$2.8 million for developing one new polder (in both cases, including a provision for NGO and DOF costs).

Improvement in Shrimp Fry Collection Methods (US\$0.3 million of which IDA US\$0.2 million; GEF US\$ 0.1 million). The shrimp culture industry in Bangladesh depends almost entirely on fry collected from the wild. Because of the limited requirements in terms of skills and equipment needed for fry collection, it has attracted the involvement of many poor people for whom it has come to represent either an important supplement to their incomes or their sole source of livelihood. Many women and children are known to be actively involved in fry collection. Unfortunately, despite the scarcity and high price of the product, the catch methods used, inappropriate handling and poor transportation all result in colossal wastage. The collection process also causes mortality of a large number of non-target aquatic organisms leading to the destruction of other aquatic species and adverse effects on biodiversity in the marine and estuarine environment. The potential long-term impacts of this activity, which is in constant expansion to keep pace with growing demand from shrimp farmers, are therefore extremely serious.

Past extension efforts to deal with this problem have started to address the problem but the complexity of the situation is clear. Means of reducing the mortality of shrimp fry and other non-target species do exist but approaches to encouraging people to adopt them need to be developed. The poverty of many of the people engaged in the activity means that tangible benefits from alternative methods are required if they are to change their practice. Obvious alternatives for the large numbers of poor people if they were to stop fry collection engaged are not available.

This component would encourage adoption of alternative fry-harvesting systems to reduce present wastage and inadvertent impacts on non-target species. Clearly, some benefits accrue locally to the fry collectors themselves and to the fishers they supply and the costs associated with achieving those limited objectives will be financed by IDA (the techniques are already known). The GEF will fund the additional work necessary to adapt the approach so as to maximize benefits to non-target species.

Any work with the fry collector community would have to be initiated by participatory appraisals of the communities involved to identify possible avenues for action to improve shrimp fry collection methods and reduce the damaging effects of the trade. The intention would be to develop a training program for shrimp fry collectors aiming to reduce wastage of both the fry resource and non-target organisms by promoting improved collection, handling and transportation methods for the fry. This training program would be developed in close consultation with concerned agencies working in the area and with experience of the fry collector communities. Care would be taken to identify improved methods that are accessible to poor fry collectors. Where additional expense or effort is required in the use of improved methods, means of encouraging fry collectors to adopt them would need to be developed. These would be discussed and identified in consultation with concerned agencies and the fry collectors themselves.

The incremental activities necessary to extend the benefits to cover non-target species include: identification of the impacts of harvesting activities on the different life-stages of non-target species; development of a conceptual model to quantify these impacts; development and pilot-testing of modified

procedures to reduce impacts on non-target species; and, incorporation of the results into the overall training program.

The development of the training strategy (including the analytical work on non-target species), in consultation with all stakeholders, would take up the first year of the project with a view to commencing training activity in the second year. The expected target population for this training would up to 29,500 post-larvae collectors and 500 post-larvae and prawn fry traders. These would be trained and low cost equipment developed for temporary storage of shrimp post-larvae at the collection centers and scientific transportation of the post-larvae to the farming areas.

There is a potential saving of 617 million Bagda and Galda fry from reduced handling and transportation mortality and 61,650 million non-target shrimp and fish fry saved from immediate mortality. If saved and released into the river or sea, and only 1% mature and are caught, the potential incremental annual output is over 2000 tons of fish per annum.

Project Component 3 - Freshwater Aquaculture Extension and Training US\$5.7 million (to be funded as follows: IDA US\$4.3 million; GOB US\$1.4 million)

This component would provide a significant opportunity for sustainably increasing fish production in Bangladesh. Production can be increased in two ways: first by increasing the area of water currently under culture and secondly by increasing productivity through improved pond management. The component would assist with the development of a national aquaculture extension and training strategy to develop consistent and co-ordinated approaches across the sector, which promote collaborative efforts between DOF and other extension agencies in the fisheries sector. Direct efforts would adopt group experiential learning approaches accessible to all pond farmers within targeted communities. Its objective would be to increase fish supplies from aquaculture through intensified yields and increased areas under production, to strengthen extension links by which newly researched technologies reach farmers, and to improve management of fisheries at the *thana* level through greater co-operation between DOF and the private sector.

The approach would be based on the village model, as used in the DFID-assisted Northwest Fisheries Extension Project (NWFEP). The project would work in 30 districts, covering 200 *thanas* of 8,000 villages, over the life of the project. Districts would be selected where there are no similar ongoing programs of other donors, and the extension models, and the extension package offered, would be consistent with those used in other programs. Two hundred incremental extension staff are costed into the project. Credit needs to support aquaculture development would be provided by NGOs. DOF, through the project, would implement collaborative extension approaches that would enable training to reach selected NGOs, schoolteachers, fry traders and Department of Agricultural Extension staff. Training would be provided at the renovated Fisheries Training Centers (FTC) and Fish Seed Multiplication Farms (FSMF) and at the new district offices.

A linkage would be established between the Fisheries Training & Extension Project (FTEP- *DFID*) & FFP so that the trained manpower could be used properly. DOF manpower trained under FTEP would be utilized in this project and newly recruited manpower would also be trained through FTEP.

The model would work as follows: The principal effort would be in the first year in each village, starting with an initial rally, followed by four group-training sessions and seven follow-up advisory visits. These would be provided mainly by the full-time Extension Officer on contract in each *thana*, supported by regular *thana*-level staff. In the second (and final) year, part-time support would be provided by the regular staff only - say, two training and four advisory visits per village/group. Each Extension officer would cover 10 new villages each year, making forty villages per *thana* over the project life (assuming 6

months set-up time, and allowing time for the follow-up year to take place in the last 10 villages). The village/group is assumed to comprise an average of 25 farmers, of whom 35% would have adopted improved practices by the second year. Further drop-outs in successive years are assumed to be balanced out by new adopters. On this basis, a total of 70,000 farmers would benefit directly from the project.

The project would fund the cost of salaries and allowances for the Extension Officers, daily allowances for participating regular staff, 2 motor-cycles per *thana* (one for regular staff) and the cost of running rallies, training and advisory sessions. For the purposes of the economic appraisal, it is assumed that the production model to be promoted would be “improved extensive,” with fertilization but no feed.

Project Component 4 – Aquatic Resources Development, Management, and Conservation Studies US\$3.9 million (to be funded as follows: IDA US\$0.8 million; GEF US\$3.0 million; GOB US\$0.1 million)

This component would assist in strengthening the basis for aquatic resources policy development. Presently, DOF is a traditional fisheries department with a skills-mix reflecting this heritage; quite a strong focus on the biology and ecology of commercially and artisanally exploited species but lacking the knowledge base and technical capacity required to transform itself into an integrated manager of aquatic ecosystems as a whole, which is what it must become if the global values of Bangladesh’s wetland resources are to be protected. This component is designed to provide DOF with the basic tools it needs to make this transformation. The component would consist of five sub-components: Management of *Hilsa* Fisheries Areas; Assessment of Ecosystem Integrity and Sustainability; Ecological Relations of Exotic Species; Action Plans and Aquatic Database; and Studies to Develop Future Projects. Through this and the following component, the project would support the establishment of a long-term foundation for successful mainstreaming through institutional support, capacity building, ecological assessments, and policy development.

Management of *Hilsa* Fishing Areas (US\$1.1 million of which IDA US\$0.5 million; GEF US\$0.5 million, and GOB US\$0.1 million). *Hilsa* is an important species of fish in Bangladesh, annual production being 80,000 metric tons from the inland waters and 126,000 metric tons from the marine waters, accounting for 16.5% of total national fish production. The *hilsa* fish life-cycle involves migrating upstream from the sea for breeding in freshwater. *Hilsa* is exploited by intensive fishing of the migrating adults during May to October, and during January to April each year in the estuaries and the lower and upper reaches of the Meghna and Padma rivers. In the last forty years, changes in ecological conditions have changed the migratory route, and during the peak breeding season, thousands of nets are used to harvest this species. Annually around 3,707 metric tons of juvenile *hilsa* (known as *jatka*) are being captured illegally by fishermen violating the Fish Act. A rough estimate is that if 10% of illegal fishing were stopped, there would be an estimated extra production of 23,000 tons per year.

Since *hilsa* is the single most important source of fish in Bangladesh, measures for its sustainable management and conservation are essential. There is already a case for the reduction in the *jatka* fishery but other measures are almost certainly needed to safeguard the resource and obtain optimum yields. In order to protect and conserve the *hilsa* stock, this sub-component would operate in two stages.

During the first year of the project, consultants would prepare a management plan which would outline technical, legal and institutional activities that DOF and other parties involved would need to take to sustain the fishery. The management plan would use accumulated data from DOF and FRI, particularly from the Chandpur Station, together with a survey conducted within the project to ascertain the results of recent changes as well as the current patterns of catch and effort. This survey would involve working with fishing groups to assess catches and also monitoring selected landing centers, amongst which one of the largest is Dhaka. From these sources of information a diagnosis of the status of the *hilsa* stocks

would be made along with the most likely future of the stocks. The study would characterize the life-cycle of the *hilsa* and its associated biodiversity, as well as the economic and social dimensions of *hilsa* exploitation. This information would be used to develop and implement a management plan for *hilsa* that is biodiversity-friendly, including time-bound actions required to optimize yields and safeguard stocks. The result of the study could lead to a regional initiative to conserve the *hilsa* in the Bay of Bengal. The second stage of the sub-component would be to commence implementation of the management plan, for which a provisional lump sum is included in the project budget.

Ecosystem Integrity and Sustainability (US\$1.1 million of which GEF US\$1.1 million); Ecological Relations of Exotic Species (US\$0.3 million of which GEF US\$0.3 million); Action Plans and Aquatic Database (US\$1.1 million of which GEF US\$1.1 million); and Studies to Develop Future Projects (US\$0.3 million of which IDA US\$0.3 million). Despite the strong attention that the fisheries sector has received in Bangladesh, the current information base is not adequate to make sound long-term decisions regarding sustainable aquatic ecosystem management and biodiversity conservation. Therefore comprehensive studies would be undertaken on ecological issues of national and global significance, and policy recommendations would be developed. These studies would include assessments of baseline conditions and data on aquatic biological and genetic diversity of selected inland and coastal ecosystems. They would be designed to generate vital information and data which would be used for developing and formulating future fisheries projects, ecosystem protection and conservation programs, and policy recommendations and for mainstreaming aquatic conservation into the fisheries sector.

Key research and monitoring activities would be conducted to help scope the dimension and complexity of these mainstreaming needs. These studies would also identify key linkages between the fisheries sector and freshwater biodiversity conservation that would serve as a strong basis to develop future fisheries projects. The studies would include:

- Assessment of ecosystem integrity and sustainability within the context of large-scale water projects. Emphasis would be on the relations between aquatic biodiversity conservation and inter-connections between deepwater areas, *baors*, *beels*, and sanctuaries, (including understanding the food webs) as well as additional biological and ecological information in relation to the annual hydrological cycle. This sub-component would allow a full understanding of the root causes of biodiversity loss and would serve as the foundation for developing policy recommendations designed to mitigate these losses;
- Formulation and testing of ecological management practices for *Hilsa* fishing areas. Current fishing practices are indiscriminate and thought to be destructive to associated biodiversity. Therefore, this activity would characterize the life-cycles of biodiversity associated with *Hilsa* fisheries which are of important culture value in Bangladesh. This information would be used to develop and implement a management plan for *Hilsa* that is biodiversity-friendly and which is expected to be considered as an innovative and pilot initiative;
- Monitoring of floodplain fisheries productivity and biodiversity in project-assisted areas. In addition to project-specific monitoring, this component would include independent basic biological characterization and monitoring of aquatic biodiversity in all project areas⁷; and
- Dynamics of introduced exotic species and evaluation of impacts upon native biodiversity. Previous fisheries projects introduced a variety of exotic species which are believed to have had a negative impact upon native biodiversity. This study would scope and describe these impacts, develop policy recommendations and plans as well as pilot actions for eradication if possible.

⁷ This activity would be funded under Component 1, Inland Open-water Fisheries Management.

Studies would also be undertaken to consider future opportunities for aquaculture and fisheries development and to prepare project proposals for future consideration. This will look specifically at the appropriateness of a sector investment approach to future development.

The results of these studies/assessments would be used to develop policy recommendations and prepare strategic and technical action plans. An important tool to be used would be a freshwater biodiversity database to integrate, monitor and manage existing information, plan future activities and prioritize areas for action, assess dynamics and changes in freshwater ecosystems, evaluate and measure impacts of human activities, etc. The information generated would be used to fine-tune project activities during the life of the project, develop new policies, and serve as the basis for future fisheries projects preparation and implementation.

Project Component 5 - Institutional Support: Manpower, Training and Equipment US\$25.8 million (to be funded as follows: IDA US\$8.5 million; GEF US\$0.6 million; DFID US\$11.2 million; GOB US\$5.4 million)

This component would cover two forms of assistance to DOF -- activities that are directly necessary to implement the project, and activities intended for the long term institutional strengthening of DOF. Activities, which would support project implementation, include additional staff for the PMU, national and international consultants to implement and monitor the impact of the project and essential transport, machinery and equipment. Staffing for the PMU would be drawn, as far as possible from within the executive branches of the DOF. Special attention would be paid to preventing the establishment of a parallel unit within DOF but rather to integrate project implementation within the everyday functions of the Department.

The project would also have a broader impact on the sector and on DOF organization. A National Fisheries Policy, which provides direction for the sector, has recently been approved by Cabinet. DOF now needs the capacity to translate the newly approved policy into action and to develop the necessary execution plan. Toward this objective, the project would provide a consultant to assist with formulating any specific organizational changes needed to implement the National Fisheries Policy. Additional activities to support DOF would include training for DOF staff to strengthen its capacity to manage fisheries development and provide adequate aquaculture extension; improved DOF office facilities in districts covered by the project; and the rehabilitation of flood-damaged buildings, including Fish Seed Multiplication Farms and Training Centers.

Project Management Unit (US\$1.0 million of which IDA US\$0.2 million; GOB US\$0.8 million). The project would have a number of components involving different agencies. The PMU at the national level would co-ordinate the activities of different government agencies and NGOs. It would be headed by a senior official of DOF with previous experience of implementing aided projects.

The staff required for the PMU at HQ and Divisional level would involve 86 posts, of which five would be existing posts and a further 29 would be filled by serving officers on deputation. Costs for staff will be shared between the GOB and IDA. GOB would pay the full costs of the existing posts, the salary costs of the deputed officers, and a contribution (rising from 25% to 80%) of the balance of salaries and allowances.

Consultants (US\$10.6 million of which DFID US\$10.5 million;). National and international consultants would be recruited in professional areas in which DOF lacks expertise and which are particularly important for project success. These would include community management, fisheries socio-economics, fisheries resource management, training and extension for freshwater and shrimp aquaculture, monitoring and evaluation, financial management, institutional development, and training management.

The level of technical assistance (TA) requested by DOF was much higher. This level was reduced in the course of project appraisal in consultation with DOF. DOF considers the reduced level of TA as the minimum needed to carry out the Project. To ensure that DOF's dependence on TA is gradually reduced, partnerships would be established between individual consultants and DOF officers who would both have offices within the DOF headquarters building and through the training program that would be supported by the project. Project activities would continue through the PMU while overall institutional capacity building would be going on in parallel. A training specialist would be recruited who would work in developing training programs with the other technical specialists for DOF staff and NGO staff who in turn would train the project beneficiaries. Thus, the strategy is not only to build capacity in DOF, but also in NGOs and in community-based organizations. In the long-term, the latter would be doing some of the tasks that are currently being done by DOF. The NGOs will still be there long after our project. The consultants would project would also assist in translating the recently issued National Fisheries Policy into actions.

Transport, Machinery and Equipment US\$7.1 million of which IDA US\$3.4 million; GOB US\$3.7 million;). This sub-component would fund the cost of vehicles and office and other equipment, including all items required to implement those components under the direct control of DOF - equipment for components implemented by LGED and BWDB are included in the component budgets.

Training (US\$1.4 million of which GEF US\$0.6 million; DFID US\$0.8 million). Staff within DOF currently have a strong biological focus. In order to strengthen DOF's capacity to manage fisheries development, provide effective aquaculture extension and implement the project, staff training would be provided to strengthen, in particular, economics, social development, community development, and participation skills. Training would include some overseas courses (masters and short courses), support to attend international meetings and seminars, and in-country courses, some of which would be provided by overseas institutions. Wherever possible, split center courses would be encouraged, with field work being undertaken in Bangladesh. Details of the proposed training program are included in the PIP. For example, GEF would finance incremental costs defined as those that would increase staff capacity beyond those required to support management activities with an exclusive fish production vision in order to incorporate full consideration and understanding of biodiversity issues. These skills include freshwater and aquatic ecology, population biology and modeling, taxonomy, cultural aspects, traditional knowledge, and genetics.

DOF District Offices (US\$1.1 million of which IDA US\$1.0 million; GOB US\$0.1 million). In order to support project activities and to further strengthen the DOF, it is proposed to construct up to 10 new District Fisheries Offices (DFOs) in districts that lack these buildings. Priority would be given to the three districts comprising the Chittagong Hill Tracts and those districts in which major project-assisted investments would be implemented. DOF has prepared a list of selected DFOs to be constructed under the project. Estimated cost of the 10 DFOs is US\$0.8 million.

Flood Damage Rehabilitation (US\$4.7 million of which IDA US\$3.9 million; GOB US\$0.7 million). The project would also assist in the renovation of DOF facilities (including Fish Seed Multiplication Farms and Fisheries Training Centers) damaged by the 1998 floods. Eight Fish Seed Multiplication Farms (FSMFs) were divested under the Third Fisheries Project. FSMFs to be rehabilitated under the proposed project would be used for the purpose of maintaining a diverse genetic population of fish brood stock. This objective is different from that of being public sector commercial seed producers. Genetic diversity has been raised as a serious concern for the cultured fishes in the country. The quality of fish seed has declined due to inbreeding within species and use of unsuitable brood stock. Accordingly, a new initiative was included in the project to develop improved brood stock management of the major fishes artificially propagated in the country. Thus, FSMFs to be rehabilitated would be used as part of this initiative. The activity requires a high degree of technical expertise concerning genetics and would

be supported in part by Fisheries Research Institute (FRI) scientists and complement a similar DFID-assisted program currently under implementation in Parbatipur. Assurance was given during negotiations that the facilities rehabilitated under the project would be used only for the specified functions and not for general fish seed multiplication. However, any excess production from fish genetic improvement activities, including hatchlings, fry, fingerlings, and brood stock may be sold. DOF engineers would make estimates of the costs of renovation for project costing purposes, and these estimates would be reviewed by an engineering design consultant financed by the project after it becomes effective. For budgeting purposes, a preliminary amount of US\$4.7 million has been allocated.

Annex 3
Bangladesh
Fourth Fisheries Project
Estimated Project Costs

Project Component	Local	Foreign	Total
	-----US \$ million-----		
1. Community-based Inland Open-water Fisheries Management	12.9	0.6	13.5
1.1 Community-based Stock Enhancement			
1.2 Pilot Fish Passes/Water Regulatory Structures	6.1	0.0	6.1
1.3 Fish Habitat Restoration	3.6	0.1	3.7
1.4 Pilot Aquatic Sanctuaries	1.8	0.0	1.8
	1.4	0.5	1.9
2. Coastal Shrimp Aquaculture	6.9	0.0	6.9
2.1 Completion of Third Fisheries Project Polders	3.9	0.0	3.9
2.2 Development of New Polder	2.8	0.0	2.8
2.3 Training of shrimp Fry Collectors	0.2	0.0	0.2
3. Freshwater Aquaculture	4.7	0.0	4.7
3.1 Extension and Training	4.7	0.0	4.7
4. Aquatic Resources Development, Management, and Conservation Studies	2.0	1.1	3.1
4.1 Management of <i>Hilsa</i> Areas			
4.2 Assessment of Ecosystem Integrity and Sustainability	0.8	0.1	0.9
4.3 Ecological Relations of Exotic Species	0.5	0.4	0.9
4.4 Action Plans and Aquatic Database	0.1	0.1	0.2
4.5 Studies to Prepare Future Projects	0.5	0.4	0.9
	0.1	0.1	0.2
5. Institutional Support to DOF and Training of NGOs	11.9	9.2	21.1
5.1 Project Management Unit	0.9	0.0	0.9
5.2 National and Expatriate Consultants	1.7	6.8	8.5
5.3 Transport, Machinery, and Equipment	4.2	1.7	5.9
5.4 Training	0.4	0.7	1.1
5.5 Construction of DOF District Offices	0.9	0.0	0.9
5.6 Flood Damage Rehabilitation	3.8	0.0	3.8
Total Baseline Cost	38.4	10.9	49.3
Total Baseline Cost			
Physical Contingencies	3.7	0.7	4.4
Price Contingencies	5.5	1.5	7.0
Total Project Cost	47.6	13.2	60.8

Annex 3A
Bangladesh
Fourth Fisheries Project
Estimated Project Costs by Component and Financing Plan
(Including Contingencies)
(US\$ Million)

COMPONENT	of which:					Total
	IDA	GEF	DFID	GOB	Ben ⁸	Total
1 Community-based Inland Open-water Fisheries Management	8.2	1.3	3.6	1.0	3.0	17.1
1.1 Community-based stocking	3.0		2.0	0.1	2.8	7.9
1.2 Restoration of fish habitats	1.8		0.2	0.3		2.3
1.3 Aquatic sanctuaries		1.3 ⁹	0.8		0.2	2.3
1.4 Fish passes and regulators	3.4		0.6	0.6		4.6
2 Coastal Shrimp Aquaculture	6.3	0.1	0.7	1.5		8.5
2.1 Completion of TFP polders	3.4		0.5	1.0		4.8
2.2 Development of new polder	2.7		0.2	0.5		3.4
2.3 Improvements in shrimp fry collection methods	0.2	0.1		0.0		0.3
3 Freshwater Aquaculture	4.3			1.4		5.7
3.1 Aquaculture extension and training	4.3			1.4		5.7
4 Aquatic Resources Development, Management, and Conservation Studies	0.8	3.0		0.1		3.9
4.1 Management of hilsa fisheries areas	0.5	0.5		0.1		1.1
4.2 Assessment of ecosystem integrity and sustainability		1.1				1.1
4.3 Ecological relations of exotic species		0.3				0.3
4.4 Action plans and aquatic database		1.1				1.1
4.5 Studies to prepare future projects	0.3					0.3
5 Institutional Support to DOF and Training of NGOs	8.5	0.6	11.2	5.4		25.8
5.1 Project Management Unit	0.2			0.8		1.0
5.2 National and expatriate consultants			10.5			10.6
5.3 Transport, machinery, equipment	3.4			3.7		7.1
5.4 Training		0.6	0.8			1.4
5.5 DOF district offices	1.0			0.2		1.1
5.6 Flood rehabilitation/genetic problem	3.9			0.7		4.7
6 Total cost	28.0	5.0	15.5	9.3	3.0	60.8

⁸ Ben stands for Beneficiaries.

⁹ Out of US\$1.3 million, US\$0.7 million is for monitoring floodplain fisheries productivity, genetic diversity, and biodiversity in project assisted areas.

Annex 3B
Bangladesh
Fourth Fisheries Project
Incremental Cost Analysis for GEF Funding

Baseline

Under the baseline scenario, it is expected that Bangladesh will continue to invest its own resources and borrow from development agencies to increase fish production with emphasis on employment generation, poverty alleviation, and protein production. Even the long-term sustainability of the important inland fisheries sector depends upon the maintenance of natural hydrological and ecological processes. Important institutional, capacity, and information barriers remain that impede the internalization of these issues in the decision-making process. Therefore, under the baseline scenario it can be expected that further investments in the inland fisheries sector will occur with the objective of increasing production and productivity, while ignoring broader ecological goals. Under this scenario, it is possible that the ecological sustainability of the system will suffer, although because of the high productivity of the delta it may be possible to maintain some degree of production within a much simplified and biologically impoverished system.

Global Environmental Objectives

The global environmental objectives of the GEF components of this project are to conserve globally important wetlands and aquatic biodiversity in Bangladesh by mainstreaming biodiversity and aquatic ecosystem conservation within the inland and coastal fisheries sector. Importantly, this project will also help develop a model with broader applicability for mainstreaming biodiversity considerations in a sector with crucial social, economic, and environmental dimensions throughout tropical regions.

GEF Alternative

Under the GEF scenario, substantial information, capacity, and experience will be developed to promote the mainstreaming of aquatic biodiversity conservation and its sustainable use within the fisheries sector. The GEF approach relies on removing barriers for successful mainstreaming through demonstration, capacity building, enhancement of the information base for sound decision making, and policy development. The GEF components (in phases) will support the piloting of community-based aquatic sanctuaries to benefit both fishing resources and freshwater biodiversity; enhance local capacity for addressing aquatic ecosystem management issues; enhance the knowledge base for sound ecosystem management and decision-making, including monitoring and evaluation for sustainable long-term aquatic ecosystem management; and develop feasible policy recommendations for mainstreaming. It is expected that these steps will have substantial multiplicative effects and provide the foundation for mainstreaming biodiversity considerations within Bangladesh's important fisheries sector.

Incremental Costs

The incremental costs are calculated as the difference between the GEF scenario and the baseline scenario. The results are presented in the matrix below.

Incremental Cost Matrix for GEF Funding

Component	Cost Category	Cost US\$ Million	Domestic Benefit	Global Benefit
1. Inland Open Water Fisheries Management	Baseline	15.8	Increased inland fish production	Habitat enhancement and improvement of overall aquatic habitats condition
	GEF Alternative	17.1		Pilot experiences on aquatic sanctuaries with applicability throughout Bangladesh
	Incremental	1.3		
2. Coastal Shrimp Aquaculture	Baseline	8.4	Environmentally-friendly shrimp aquaculture	Loss of habitats due to shrimp cultivation eliminated
	GEF Alternative	8.5		Conservation of aquatic biodiversity dependent associated with shrimp industry
	Incremental	0.1		
3. Freshwater Aquaculture, Extension and Training	Baseline	4.5	Enhanced and innovative experiences with sustainable aquaculture	Opportunities to mainstream aquatic biodiversity considerations
	GEF Alternative	4.5		Same as above
	Incremental	0.0		
4. Aquatic Resources Policy Development	Baseline	0.9	Enhanced capacity at all levels for sustainable fisheries management; ability to deal with productive aspects of inland fisheries sector	Enhanced capacity for aquatic ecosystem management
	GEF Alternative	3.9		Ability to mainstream aquatic biodiversity of global importance; information generation for policy development to achieve mainstreaming
	Incremental	3.5		
5. Institutional Support and Capacity Building	Baseline	25.2	Enhanced capacity to translate policy into action and to develop the necessary execution plan.	Enhanced appreciation of national biodiversity conservation among policy makers.
	GEF Alternative	25.8		Enhanced appreciation of global biodiversity conservation among policy makers.
	Incremental	0.6		
TOTALS	Baseline	55.8		
	GEF Alternative	60.8		
	Incremental	5.0		

Annex 4
Bangladesh
Fourth Fisheries Project
Cost Benefit Analysis Summary
(Taka million, 1998)

Components	Net Present Value of Flows		Fiscal Impact	
	Economic Analysis	Financial Analysis ¹⁰	Taxes	Subsidies ¹¹
1. Inland Open-water				
i) <u>Stock Enhancement</u>				
Benefits	1354.1	1354.1	58.6	194.9
Costs	1003.8	1062.5		
Net Benefits:	350.3	291.7		
IRR:	42%	36%		
ii) <u>Fish Passes</u>				
Benefits	707.1	707.1	34.8	174.0
Costs	467.5	502.3		
Net Benefits:	239.6	204.8		
IRR:	30%	26%		
iii) <u>Habitat Restoration</u>				
Benefits	319.4	319.4	14.8	51.4
Costs	220.1	235.1		
Net Benefits:	99.1	84.2		
IRR:	35%	30%		
iv) <u>Aquatic Sanctuaries</u>				
Benefits	664.3	664.3	22.4	142.4
Costs	390.4	412.8		
Net Benefits:	273.8	251.5		
IRR:	183%	143%		
2. Coastal Shrimp				
i) <u>Compl. of TFP Polders</u>				
Benefits	3943.9	3556.2	527.2	(36.6)
Costs	1801.5	1941.0		
Net Benefits:	2142.4	1615.1		
IRR:	70%	57%		

¹⁰ If the difference between the present value of financial and economic flows is large and cannot be explained by taxes and subsidies, a brief explanation of the difference is warranted, e.g., "The value of financial benefits is less than that of economic benefits because of controls on electricity tariffs."

¹¹ Additional subsidy that is needed from the Government of Bangladesh after collecting tax revenues, and including external financing.

Components	Net Present Value of Flows		Fiscal Impact	
	Economic Analysis	Financial Analysis ¹²	Taxes	Subsidies ¹³
ii) Dev. Of New Polder				
Benefits	786.9	710.0	126.6	29.2
Costs	618.3	667.9		
Net Benefits:	168.6	42.1		
IRR:	22%	15%		
iii) Improvement in Shrimp Fry Collection				
Benefits	116.3	116.3	2.0	(1.3)
Costs	9.8	18.1		
Net Benefits:	102.5	98.2		
IRR:	71%	54%		
3. Freshwater Aquacul. Extension & Training				
Benefits	2141.9	2141.9	40.6	(4.4)
Costs	9928	10335		
Net Benefits:	1149.0	1108.4		
IRR:	77%	69%		
4. Aquatic Resource Hilsa Conservation				
Benefits	2099.6	2099.6	30.3	216.3
Costs	724.8	755.2		
Net Benefits:	1374.7	1344.4		
IRR:	282%	261%		
TOTAL PROJECT¹⁴				
Benefits	12133.4	11668.7	1129.0	881.0*
Costs	6866.0	7532.1		
Net Benefits:	5263.4	4134.4		
IRR:	48%	37%		

* Includes net subsidies on other cost components as well. The subsidy already includes the impact of the tax revenues.

Summary of benefits and costs:

The main project benefits would be increased fish and shrimp production through various investment interventions and better resource management; increased employment opportunities; and aquatic biodiversity conservation. All this would be expected to contribute to rural poverty alleviation. Project

¹² If the difference between the present value of financial and economic flows is large and cannot be explained by taxes and subsidies, a brief explanation of the difference is warranted, e.g., "The value of financial benefits is less than that of economic benefits because of controls on electricity tariffs."

¹³ Additional subsidy that is needed from the Government of Bangladesh after collecting tax revenues, and including external financing.

¹⁴ The total benefits and costs include the fisheries studies and the institutional support costs as well.

costs include: fingerlings, civil works, transport, machinery and equipment, consultants, training, and studies.

Main Assumptions: The underlying assumptions employed in the analysis are:

Prices. All values have been expressed in constant 1998 prices. The real prices of fish and shrimp are expected to remain constant, but all data are adjusted to reflect the effects of inflation. Most of the shrimp from the project was assumed to be exported, while most of the fish was assumed to be consumed domestically. All traded commodities were valued at import parity prices and non-traded goods were based on domestic financial prices. Non-traded outputs and inputs were expressed in border prices through application of conversion factors. Detailed explanation of how conversion factors for various items were arrived at is in the project file. Assumed output prices are also in the project files. Adjustments were also made for foreign exchange premium.

Investment Costs. After removing price contingencies, taxes, and duties, all investment costs have been included in the analysis. Since these distortions are transfers within the economy, they do not constitute a true resource cost. Details on cost items and their respective values assumed in the analysis are in the spreadsheets kept in the project files. Labor was separated into skill categories. The wage rates were at the prevailing rates for equivalent labor. Expatriate labor was assumed to repatriate a portion of their income. The economic cost of labor is also distorted by income taxes. These were excluded in order to arrive at conversion factors for different skill categories of labor.

Project Life. A 20-year project life was assumed for all components except for restoration of fish habitats for which a 10-year life was assumed. A five-year implementation period was assumed.

Fish and Shrimp Yields. The increases in yield due to project impacts were derived from past experience in Bangladesh with similar projects. For example, an eightfold increase was assumed for the fingerling stocking program. Details are in the spreadsheets kept in project files.

Overhead Costs. Whenever possible project costs have been allocated to specific components in the financial and economic analysis. However, it was not possible, for example, to allocate the cost of investment in Project Management Unit, national and foreign consultants, transport, machinery, and equipment to any of the components for which it was possible to estimate a rate of return and net present value. These overheads amount to about 40% of the cost of the other components, and DOF has allocated them on a pro-rata basis. Thus, the costs of the components for which NPV, FRRs and ERRs could not be estimated are somehow built into the estimation of these parameters in other components of the project where the parameters could be estimated. Details are in the spreadsheets in the project files.

Sensitivity analysis / Switching values of critical items

The most critical variables are cost over-runs and decreases in fish and shrimp yields. The table below shows the percentages by which these variables would need to change in order to reduce the overall project FRR and ERR to 12% and financial and economic NPV to zero. The table also shows the percentages by which the same variables need to change in order for the FRR and ERR for each sub-component to fall to 12% and for the respective NPV to fall to zero.

Switching Values of Critical Items

	Investment Cost Over-run	Decrease in Yield
Overall project FNPV	185%	-35%
Overall project ENPV	280%	-43%

	Investment Cost Over-run	Decrease in Yield
Stock Enhancement FNPV	94%	-22%
Stock Enhancement ENPV	119%	-26%
Fish Passes FNPV	93%	-29%
Fish Passes ENPV	121%	-34%
Habitat Restoration FNPV	81%	-26%
Habitat Restoration ENPV	104%	-31%
Aquatic Sanctuaries FNPV	249%	-38%
Aquatic Sanctuaries ENPV	292%	-41%
Compl. of TFP Polders FNPV	599%	-45%
Compl. of TFP Polders ENPV	859%	-54%
Dev. Of New Polder FNPV	26%	-6%
Dev. Of New Polder ENPV	112%	-21%
Improvement in Shrimp Fry Collection Methods FNPV	625%	-86%
Improvement in Shrimp Fry Collection Methods ENPV	1088%	-92%
Extension & Training FNPV	414%	-52%
Extension & Training ENPV	478%	-54%
<i>Hilsa</i> Conservation FNPV	2605%	-64%
<i>Hilsa</i> Conservation ENPV	2858%	-65%

Annex 4A
Bangladesh
Fourth Fisheries Project
Financial and Economic Analysis

1. Methodology

The approach adopted in this study is to carry out the appraisal of this project through the evaluation of its five major components. The analysis addresses the financial, economic and distributive aspects of each of these components.¹⁵ The analysis is also conducted from the viewpoint of the fisheries sector, the economy, and the fishermen themselves, who are expected to be the main beneficiaries of the project. It is important to distinguish between each aspect and consider them separately, since each viewpoint focuses on a different aspect of the costs and benefits of the project. We further analyze the budgetary impacts of the project on DOF, the project's implementing agency.

Financial analysis is based on discounted cash flows. The net present value (NPV) of the project is estimated from the total investment point-of-view, which evaluates the project from an unleveraged perspective. Such an analysis helps assess the financial robustness of the project and its ability to generate sufficient funds to repay any debt obligations. This analysis is conducted for each component of the project.

Following the financial analysis, economic prices are estimated for inputs and outputs to derive the statement of net economic benefits. While the financial analysis focuses on the net financial benefits of the project, the economic analysis aggregates all benefits and costs to the entire economy. Furthermore, we calculate the premium on foreign exchange placed upon the economy as a result of distortions in the market for foreign exchange in Bangladesh. The commodity specific conversion factors are estimated for the major inputs and outputs of the project. Applying these variables, the financial cash flow statement is converted to reflect the economic resource flows generated by the project.

The analysis is further expanded to assess the allocation of externalities (costs or benefits) of the project. It is important to ascertain whether certain groups in the economy benefit from the project at the expense of others.

Risk analysis is an important enhancement applied to the financial, economic and distributive analysis. It is useful for decision-makers to assess the potential variability of key variables and their effects on the project outcomes. Project parameters such as real exchange rates, input prices, and inflation can be important in determining future returns of this project. To measure the extent of various risks and their effect on the project, a Monte Carlo analysis¹⁶ is used to model a probable distribution of the risk variables and the resulting outcome.

¹⁵ Jenkins, Glenn P., "The Valuation of Stakeholder Impacts in Cost-Benefit Analysis", Development Discussion Paper #631, HIID, Cambridge, MA, April 1998.

¹⁶ Using Crystal Ball risk analysis software developed by Decisioneering Inc., Denver, Colorado.

2. Financial Analysis

The project is extremely robust in its potential to increase fish and shrimp yields and provide a sound financial return on these investments. Since there are various stakeholders, the project was evaluated from an unleveraged total investment point-of-view. Results of the financial analysis are presented in Table 1. Nominal and real cash flows are presented in Tables 2 and 3, respectively.

Each component that increases the catch generates a positive NPV. In the inland open-water fisheries component, stocking and aquatic sanctuaries show very high returns. In fact, aquatic sanctuaries provide an NPV that is three times greater than the present value (PV) of its investment. The fish passes sub-component also has a NPV similar to the aquatic sanctuaries, but requires substantially higher investments in order to obtain such a return.

The coastal shrimp aquaculture component provides substantial revenues due to the increases in yield and the high export price associated with the sale of shrimp. The completion of the polders begun in the previous project capture all the revenue but only incur the cost of completion, since the benefits would be absent in the event it is not completed. The costs are small relative to the benefits, since a large part of the investment was already undertaken during the previous project. This is indicated by the higher NPV/PV-of-Costs ratio. The new polder that is expected to be developed by the project provides an adequate albeit relatively lower rate of return, because the entire cost of building a polder is attributed to the project. The NPV/PV-of-Cost ratio indicates that the return relative to investment is significantly lower than the previous sub-component.

Past experience shows that training programs generally lead to more efficient fish cultivation techniques and practices that benefit fishermen. The project includes such a component designed to harness all the potential of the other components by further increasing the yields. This component generates a substantial NPV at a relatively small cost.

The fisheries studies and the project management investment do not generate a positive NPV since we are unable to allocate the costs of these general expenditures to any specific project components. They are expected, however, to have a significant impact on the project's returns, since support to DOF is deemed necessary to harness all other project benefits. Therefore, these investments are best evaluated as a part of the complete project, rather than as individual components. When analyzed together, the project remains robust as it generates an overall NPV of Taka 4,134.4 million, with an FRR of 37%.

Table 1: Results of Financial Analysis
(in Taka Lakhs)

	NPV in 1998 Taka Lakhs	FIRR %	NPV/PV Costs
COMPONENT 1 – OPENWATER FISHERIES			
Community-based Stockings	2,917	36	0.93
Restoration of Fish Habitats	842	30	0.81
Aquatic Sanctuaries	2,515	143	3.56
Fish Passes and Regulators	2,048	26	0.97
COMPONENT 2 – COASTAL SHRIMP AQUACULTURE			
Completion of TFP Polders	16,151	57	5.99
Development of new Polder	421	15	0.26
Improvement in Shrimp Fry Collection Methods	1006	54	3.97
COMPONENT 3 – FRESHWATER AQUACULTURE			
Aquaculture Extension and Training	11,084	69	4.14
COMPONENT 4 – AQUATIC RESOURCES POLICY DEVELOPMENT			
<i>Hilsa</i> Management	13,444	261	26.05
Conservation and other Studies	-1722		
COMPONENT 5 – INSTITUTIONAL SUPPORT			
Project Management Unit	-7361		
TOTAL NPV @ 12% (real)	41,344	37	

Table 2. Financial Net Cash Flows [Nominal]
(in Taka Lakhs)

YEAR	1	2	3	4	5	..10	...15	...20
COMPONENT 1 - OPENWATER FISHERIES								
<i>COMMUNITY BASED STOCKINGS</i>	(137)	(660)	(540)	(21)	1,105	1,150	1,467	1,873
<i>RESTORATION OF FISH HABITATS</i>	(67)	(389)	(309)	(140)	509	686	-	-
<i>AQUATIC SANCTUARIES</i>	(81)	(14)	284	378	460	691	882	1,125
<i>FISH PASSES AND REGULATORS</i>	(225)	(1,047)	(933)	579	838	1,090	1,392	1,776
<i>HILSA MANAGEMENT</i>	(196)	(111)	2,331	2,487	2,611	3,279	4,185	5,341
COMPONENT 2 - COASTAL SHRIMP AQUACULTURE								
<i>COMPLETION OF TFP POLDERS</i>	(1,428)	(1,272)	423	2,166	4,106	5,330	6,803	8,683
<i>DEVELOPMENT OF NEW POLDER</i>	(123)	(924)	(978)	(94)	(271)	882	1,121	1,430
<i>IMPROVEMENT IN SHRIMP FRY COLLECTION</i>	(117)	(14)	35	89	149	351	448	571
COMPONENT 3 - FRESHWATER AQUACULTURE								
<i>AQUACULTURE EXTENSION AND TRAINING</i>	(959)	(114)	498	1,172	2,596	3,479	4,440	5,667
COMPONENT 4 - FISHERIES STUDIES								
<i>CONSERVATION AND OTHER STUDIES</i>	(422)	(385)	(424)	(465)	(728)	-	-	-
COMPONENT 5 - INSTITUTIONAL SUPPORT								
<i>PROJECT MANAGEMENT UNIT</i>	(3,707)	(1,530)	(1,542)	(1,069)	(1,109)	-	-	-
TOTAL	(7,463)	(6,459)	(1,154)	5,081	10,266	16,938	20,737	26,467

Table 3: Financial net Cash Flows (Real)
(in Taka Lakhs)

YEAR	1	2	3	4	5	...10	...15	...20
COMPONENT 1 - OPENWATER FISHERIES								
<i>COMMUNITY BASED STOCKINGS</i>	(137)	(629)	(489)	(19)	909	741	741	741
<i>RESTORATION OF FISH HABITATS</i>	(67)	(371)	(280)	(121)	419	442	-	-
<i>AQUATIC SANCTUARIES</i>	(81)	(13)	258	326	379	445	445	445
<i>FISH PASSES AND REGULATORS</i>	(225)	(997)	(846)	500	690	703	703	703
<i>HILSA MANAGEMENT</i>	(196)	(105)	2,114	2,148	2,148	2,114	2,114	2,114
COMPONENT 2 - COASTAL SHRIMP AQUACULTURE								
<i>COMPLETION OF TFP POLDERS</i>	(1,428)	(1,211)	383	1,871	3,378	3,436	3,436	3,436
<i>DEVELOPMENT OF NEW POLDER</i>	(123)	(880)	(887)	(81)	(223)	569	566	566
<i>IMPROVE. IN SHRIMP FRY COLLECTION</i>	(117)	(13)	32	77	122	226	226	226
COMPONENT 3 - FRESHWATER AQUACULTURE								
<i>AQUACULTURE EXTENSION AND TRAINING</i>	(959)	(109)	452	1,012	2,136	2,243	2,243	2,243
COMPONENT 4 - FISHERIES STUDIES								
<i>CONSERVATION AND OTHER STUDIES</i>	(422)	(367)	(384)	(402)	(599)	-	-	-
COMPONENT 5 - INSTITUTIONAL SUPPORT								
<i>PROJECT MANAGEMENT UNIT</i>	(3,707)	(1,457)	(1,399)	(923)	(913)	-	-	-
TOTAL	(7,463)	(6,152)	(1,046)	4,390	8,446	10,919	10,474	10,474
NPV @ 12.0%	41,344		IRR	36.6%				

Sensitivity Analysis. The financial outcome of this project is highly sensitive to the expected fish and shrimp yields (Table 4). The project would not provide an adequate return on the investments if the production of fish were 40 percent lower than the current assumptions. The current level of production is feasible since past projects have also had similar production factors. However, a substantial reduction is also possible since fish and shrimp are prone to various diseases which could threaten overall production. Therefore, careful planning, implementation, and monitoring of the fish and shrimp production is necessary in order to ensure results similar to the base case analysis. The possibility of a change in the production factor is further simulated in the risk analysis.

Table 4. Sensitivity Analysis of Financial NPV to a Reduction in Production Factor (Yield) and Investment Cost Overruns

Production Factor (% change from base case)	Financial NPV 1998 Taka Lakhs	Investment Cost Overruns (% change from base case)	Financial NPV 1998 Taka Lakhs
0	41,344	0	41,344
-5	35,510	10	39,105
-10	29,676	20	36,866
-15	23,841	30	34,627
-20	18,007	40	32,388
-25	12,173	50	30,149
-30	6,338	60	27,910
-35	504	70	25,671
-40	(5,330)	80	23,432
-50	(16,999)	90	21,193
-60	(28,668)	100	18,954

The project's outcome does worsen if it were to experience larger investment costs than originally planned. For example, a 20% increase in investment costs would reduce the financial NPV of the project by over 10%. It would take an investment cost overrun of 185%, however, to compromise the financial viability of the project. However, a combination of cost overruns and other volatile variables may result in a negative NPV.

The fishing costs account for significant portion of the expenditure incurred by the fishermen. If these costs were to rise from the current Taka 8 per kg to Taka 10 per kg, the financial NPV would be reduced by 8% (Table 5). It is reasonable to expect some fluctuation in the fishing cost since these costs are determined by market forces.

The project outcome can be further altered if revenues were to change as a result of a change in the price of fish. All the financial benefits of the project are based on the yield and the price of fish and shrimp. The analysis indicates that a 10% change in the selling price of fish can alter the financial NPV by as much as 13%. The price of fish, however, is not expected to decline significantly in the future since the demand for fish, which is a staple food that provides substantial nutritional intake for the people in Bangladesh, is expected to remain constant.

Table 5. Sensitivity Analysis of Financial NPV to Fishing Costs and Price of Fish

Fishing costs Per Kg (in Taka)	Financial NPV 1998Taka Lakhs	Fish Price (Taka)	Financial NPV 1998Taka Lakhs
6	44,596	30	27,739
7	42,970	32	30,460
8	41,344	34	33,181
9	39,719	36	35,902
10	38,093	38	38,623
11	36,468	40	41,344
12	34,842	42	44,066
13	33,217	44	46,787
14	31,591	46	49,508
15	29,966		

The largest impacts on the financial NPV result from changes in the production factor and investment cost overruns. Therefore, it is helpful to assess the impact of simultaneous changes in these variables on the project's financial outcome (Table 6). The sensitivity analysis indicates that a 30% decrease in yield coupled with a 30% increase in investment cost would result in a negative NPV. Table 6 illustrates other combinations of decrease in yield and cost overruns that would compromise the financial viability of the project.

Table 6. Sensitivity Analysis of Financial NPV to Production Factor (Yield) and Investment Cost Overruns (in 1998 Taka Lakhs)

Percentage increase in yield	Percentage increase in investment cost							
	0%	10%	20%	30%	40%	50%	60%	
0%	41,344	39,105	36,866	34,627	32,388	30,149	27,910	
-5%	35,510	33,271	31,032	28,793	26,554	24,315	22,076	
-10%	29,676	27,437	25,198	22,959	20,720	18,481	16,242	
-15%	23,841	21,602	19,363	17,124	14,885	12,646	10,407	
-20%	18,007	15,768	13,529	11,290	9,051	6,812	4,573	
-25%	12,173	9,934	7,695	5,456	3,217	978	(1,261)	
-30%	6,338	4,099	1,860	(379)	(2,618)	(4,857)	(7,096)	
-35%	504	(1,735)	(3,974)	(6,213)	(8,452)	(10,691)	(12,930)	
-40%	(5,330)	(7,569)	(9,808)	(12,047)	(14,286)	(16,526)	(18,765)	
-50%	(16,999)	(19,238)	(21,477)	(23,716)	(25,955)	(28,194)	(30,433)	
-60%	(28,668)	(30,907)	(33,146)	(35,385)	(37,624)	(39,863)	(42,102)	

3. Economic Analysis

The initial step in conducting the economic analysis is to estimate the economic or the shadow price of all the main project inputs and outputs. Then, we are able to derive conversion factors, which show the ratio of economic price to financial price, which can be applied to the financial cash flows to derive the economic benefits and resource costs.

The economic premium placed on foreign exchange due to various trade distortions is also estimated. First, the premium that result from trade taxes is estimated. This is then enhanced by accounting for the effect of the consumption taxes that exist in the country.

The domestic consumption of fish is expected to have the same economic value as the financial value. This is because the project is not expected to alter the price of fish as a result of the project, which will generate additional consumer surplus. Furthermore, the consumption of fish in Bangladesh is not taxed or subsidized, which may cause the economic value to deviate from its financial equivalent.

Project input costs such as the purchase of fingerlings and fishing costs also have conversion factors of 1.00 indicating the absence of fiscal distortions. The sale of shrimp, on the other hand, provide an economic benefit that is greater than the financial price of shrimp due to the foreign exchange premium gained by the Government through its export.

Many other project components have economic values that are different from their financial costs due to taxes and tariffs. Since these distortions are transfers within the economy, they do not constitute a true resource cost to the economy. Therefore, the economic prices are lower than their financial equivalents, as indicated by conversion factors that are less than one.

The economic cost of labor is also distorted by income taxes. Accounting for the tax effect results in conversion factors that are less than one. Estimated conversion factors are detailed in one of the reports (An Integrated Project Analysis) in the Project File.

Results of the economic analysis are presented Annex Table 7. The project's overall net present value (NPV) is Taka 5,263.4 million (about US\$106.6 million) and the overall economic rate of return (ERR) is 48%. The ERRs for each component are much higher than 12%, the estimated opportunity cost of capital in Bangladesh. The project significantly enhances the net economic wealth of Bangladesh. The increase in availability of fish for domestic consumption, and the foreign exchange earned through export of shrimp generate substantial benefits to society. In fact, the economic NPV is larger than the financial return on investment.

Inland open-water fisheries component, including the training program, enhances the net wealth of the economy through the increase in fish production. The people in Bangladesh are better off, since the project is able to increase the supply of a staple food. ERRs for the inland open-water fisheries sub-components range from 30% (fish passes and regulators) to 183% (aquatic sanctuaries). The shrimp component shows a marked improvement since the economic value of the shrimp exports is higher than the export price, due to the foreign exchange premium gained through exports. The investment costs are lower as well, since the economic costs of most of the investments are lower than their financial values. Therefore, the economic NPV of the shrimp component is 50% greater than the financial NPV. ERRs for the shrimp sub-components are 70%, 22%, and 59% for completion of TFP polders, development of a new polder, and training of shrimp fry collectors, respectively. Freshwater aquaculture extension component has an NPV of Taka 1,149 million and ERR of 77%. *Hilsa* conservation shows a high ERR of 282% due to high returns associated with low investments. Net economic benefit flow statement is presented in Table 8.

**Table 7: Results of Economic Analysis
(in Taka Lakhs)**

	ENPV 1998 Taka Lakhs	ERR %
COMPONENT 1 – OPENWATER FISHERIES		
Community-based Stocking	3,503	42
Restoration of Fish Habitats	991	35
Aquatic Sanctuaries	2,738	183
Fish Passes and Regulators	2,396	30
Completion of TFP Polders	21,424	70
Development of New Polder	1,686	22
Improvement in Shrimp Fry Collection Methods	1,025	59
Aquaculture Extension and Training	11,490	77
<i>Hilsa</i> Management	13,747	282
Conservation and other Studies	-1,336	
Project Management Unit	-5,030	
TOTAL ENPV @ 12%	52,634	48

Table 8: Net Economic Benefit Flow Statement
(in Taka Lakhs)

YEAR	1	2	3	4	5	...10	...15	...20
COMPONENT 1 - OPENWATER FISHERIES								
<i>COMMUNITY BASED STOCKINGS</i>	(124)	(589)	(422)	49	977	831	831	831
<i>RESTORATION OF FISH HABITATS</i>	(59)	(343)	(245)	(84)	438	459	-	-
<i>AQUATIC SANCTUARIES</i>	(71)	20	299	365	411	469	469	469
<i>FISH PASSES AND REGULATORS</i>	(196)	(905)	(728)	542	713	725	725	725
<i>HILSA CONSERVATION</i>	(174)	(101)	2,153	2,186	2,186	2,159	2,159	2,159
COMPONENT 2 - COASTAL SHRIMP								
<i>COMPLETION OF TFP POLDERS</i>	(1,330)	(1,120)	701	2,479	4,275	4,322	4,322	4,322
<i>DEVELOPMENT OF NEW POLDER</i>	(108)	(822)	(827)	(72)	(112)	827	824	824
<i>IMPROVE. IN SHRIMP FRY COLLECTION</i>	(102)	(12)	33	79	124	226	226	226
COMPONENT 3 - FRESHWATER AQUACULTURE								
<i>AQUACULTURE EXTENSION AND TRAINING</i>	(861)	(35)	531	1,097	2,171	2,265	2,265	2,265
COMPONENT 4 - FISHERIES STUDIES								
<i>CONSERVATION AND OTHER STUDIES</i>	(328)	(284)	(298)	(312)	(464)	-	-	-
COMPONENT 5 - INSTITUTIONAL								
<i>PROJECT MANAGEMENT UNIT</i>	(2,059)	(1,193)	(1,149)	(739)	(731)	-	-	-
TOTAL NET BENEFIT FLOWS	(5,412)	(5,384)	49	5,590	9,989	12,284	11,822	11,822
ENPV @ 12.0	52.63		IRR	48%				

Sensitivity Analysis. The economic outcome is sensitive to a reduction in production factor (yield) and cost overruns (Table 9). A reduction in the production factor substantially affects the economic outcome as well as the financial results. A catastrophe in the form of fish or shrimp disease or serious drought, which would significantly alter the expected yields would affect the economic NPV in two ways: the lower economic return due to less fish that may be available for consumption and the loss of positive economic externalities through shrimp exports which gain a foreign exchange premium. A 50% reduction in yield can compromise the economic viability of the project.

Table 9. Sensitivity Analysis of Economic NPV to a Reduction in Production Factor (Yield) and Cost Overruns

Production Factor (% change from base case)	Economic NPV 1998 Taka Lakhs	Investment Cost Overrun (% change from base case)	Economic NPV 1998 Taka Lakhs
0	52,674	0	52,634
-5	46,607	10	50,746
-10	40,541	20	48,857
-15	34,474	30	46,969
-20	28,407	40	45,080
-25	22,340	50	43,192
-30	16,274	60	41,303
-35	10,207	70	39,415
-40	4,140	80	37,527
-50	-7,993	90	35,638
-60	-20,126	100	33,750

The economic impact due to changes in the investment costs are similar to results from the financial analysis. The economic effect of an equivalent change in cost overruns is lower than its financial impact, since the economic value of investment resources are lower than the financial costs. A combination of negative changes in production and investment cost can impact the project adversely (Table 10). For example, a combined 40% decrease in fish yield and 30% increase in investment cost or 35% decrease in yield and 60% increase in cost would make the NPV become negative and ERR fall below 12%. The likelihood of such high negative changes in yield and cost occurring at the same time is low.

4. Distributive Analysis

The stakeholders in this project are the fishermen and the Government of Bangladesh (GOB) represented by DOF. The fishermen receive most of the benefits of the project, as they are able to gain all the revenues that result from the increases in yield. The costs incurred by the fishermen include lease fees and share of investment costs paid to GOB, fishing costs, and supervision costs. GOB's involvement in the project comprise of three parts. First, the government receives fishermen's contribution towards the project's investment. The lease fees are not included as an incremental income to the government, since the present lessors already remit this amount. Additionally, GOB incurs most of the investment costs as well. GOB also receives financing in the form of grants and an IDA credit, which make up the shortfall between investment costs and the significantly lower revenues from the project. Finally, GOB receives incremental tax revenue as well as the foreign exchange premium on exports as a result of the project.

As Table 11 illustrates, the fishermen in the project area stand to gain significantly as the project is designed to increase the quantity of fish in the region and train fishermen regarding better fishing methods, which together will significantly improve the yields. Specifically, the *hilsa* conservation, completion of polders begun in the previous project, and the extension and training components provide

the greatest benefits to the fishermen. Furthermore, the fishermen do not incur the costs of the fisheries studies and the institutional support components, but stand to benefit from these investments.

Table 10. Sensitivity Analysis of Economic NPV to Production Factor (Yield) and Investment Cost Overruns (1998 Taka Lakhs)

	Investment Cost Overrun							
		0%	10%	20%	30%	40%	50%	60%
Production Factor	0%	52,634	50,746	48,857	46,969	45,080	43,192	41,303
	-5%	46,568	44,679	42,791	40,902	39,014	37,125	35,237
	-10%	40,501	38,613	36,724	34,836	32,947	31,059	29,170
	-15%	34,434	32,546	30,657	28,769	26,880	24,992	23,103
	-20%	28,368	26,479	24,591	22,702	20,814	18,925	17,037
	-25%	22,301	20,412	18,524	16,635	14,747	12,859	10,970
	-30%	16,234	14,346	12,457	10,569	8,680	6,792	4,903
	-35%	10,168	8,279	6,391	4,502	2,614	725	(1,163)
	-40%	4,101	2,212	324	(1,565)	(3,453)	(5,342)	(7,230)
	-50%	(8,033)	(9,921)	(11,809)	(13,698)	(15,586)	(17,475)	(19,363)
-60%	(20,166)	(22,054)	(23,943)	(25,831)	(27,720)	(29,608)	(31,497)	

GOB, as a stakeholder in the project, needs to evaluate the budgetary impact of the project. A revenue source for GOB is the contribution that would be made by the fishermen. The analysis may overstate actual collections, however, since GOB may be unable to collect payments from some fishermen.

Table 11: Project Impact on Fishermen (in 1998 Taka Lakhs)

	Net Benefits Accrued to Fishermen
COMPONENT 1 – OPENWATER FISHERIES	
Community-based Stocking	8,212
Restoration of Fish Habitats	2,413
Aquatic Sanctuaries	4,363
Fish Passes and Regulators	5,399
<i>Hilsa</i> Management	16,425
COMPONENT 2 – COASTAL SHRIMP AQUACULTURE	
Completion of TFP Polders	23,647
Development of new Polder	3,596
Improvement in Shrimp Fry Collection Methods	1,163
COMPONENT 3 – FRESHWATER AQUACULTURE	
Aquaculture Extension and Training	14,093
TOTAL IMPACT ON FISHERMEN	79,310

Another impact is the externalities received by GOB. GOB gains incremental tax revenue on all taxable project costs. It also gains incremental tariff revenue on any importable input utilized by the project, while it bears the foreign exchange premium costs. The project provides GOB with Taka 11,290 lakh in net revenues through the externalities generated by project components, as illustrated in Table 12. The

Completion of TFP Polders provides the greatest fiscal revenue since it generates tax and tariff revenues from the large investment as well as the foreign exchange premium that result from shrimp exports. A sub-component such as the *hilsa* conservation which displays high financial and economic rates of return does not provide a significant amount of externality revenues since it does not consist of many taxable items.

**Table 12: Value of Externalities Generated by the Project
(in 1998 Taka Lakhs)**

	PV of Total Externalities Accrued to Government
COMPONENT 1 – OPENWATER FISHERIES	
Community-based Stockings	586
Restoration of Fish Habitats	148
Aquatic Sanctuaries	224
Fish Passes and Regulators	348
<i>Hilsa</i> Management	303
COMPONENT 2 - COASTAL SHRIMP AQUACULTURE	
Completion of TFP Polders	5,272
Development of new Polder	1,266
Improvement in Shrimp Fry Collection Methods	20
COMPONENT 3 – FRESHWATER AQUACULTURE	
Aquaculture Extension and Training	406
COMPONENT 4 – AQUATIC RESOURCES POLICY DEVELOPMENT	
Conservation and other Studies	386
COMPONENT 5 – INSTITUTIONAL SUPPORT	
Project Management Unit	2,331
TOTAL EXTERNALITY	11,290

GOB's fiscal budget is also affected by outflows due to project costs since GOB bears most of the investment costs. DOF only receives the fishermen's contribution to the investment. The revenues from increased production are captured solely by the fishermen. The resulting budgetary shortfall is expected to be funded through the IDA-led financing package as well as the externality revenues generated by the project. The remaining deficit, estimated to be Taka 8,810 lakh in present value terms must be supplied by GOB. The operational budgetary shortfall has a present value of Taka 6,794 lakh. Tables 13 and 14 show the project's annual impact on GOB's budget prior to and with financing and tax revenues, respectively. Thus, GOB must have a comprehensive plan to finance the operational costs it would incur on behalf of the project. This is in addition to the investment financing being arranged with the various funding agencies.

Table 13: Budgetary Impact on the Government
(in Taka Lakhs)

Budgetary Impact Prior to Financing and Tax Revenues

YEAR	1	2	3	4	5	10	15	20
<u>CONTRIBUTION FROM BENEFICIARIES</u>								
COMMUNITY BASED STOCKING	-	31	178	438	724	724	724	724
AQUATIC SANCTUARIES	-	3	17	41	67	67	67	67
Total Contribution from Beneficiaries	-	34	195	478	791	791	791	791
<u>PROJECT COSTS INCURRED BY GOVERNMENT</u>								
COMMUNITY BASED STOCKING	(137)	(1,210)	(1,360)	(1,470)	(543)	(710)	(710)	(710)
RESTORATION OF FISH HABITATS	(67)	(371)	(463)	(485)	(189)	(165)	-	-
AQUATIC SANCTUARIES	(81)	(372)	(460)	(392)	(339)	(273)	(273)	(273)
FISH PASSES AND REGULATORS	(225)	(1,428)	(1,780)	(434)	(244)	(231)	(231)	703
HILSA CONSERVATION	(196)	(105)	(423)	(389)	(389)	(424)	(424)	(424)
COMPLETION OF TFP POLDERS	(1,428)	(1,211)	(444)	(677)	(887)	(826)	(826)	(826)
DEVELOPMENT OF NEW POLDER	(123)	(880)	(887)	(81)	(236)	(319)	(319)	(319)
TRAINING OF SHRIMP FRY CATCHERS	(117)	(13)	(13)	(13)	(13)	-	-	-
AQUACULTURE EXTENSION AND TRAINING	(959)	(685)	(700)	(715)	(167)	(60)	(60)	(60)
CONSERVATION AND OTHER STUDIES	(422)	(367)	(384)	(402)	(599)	-	-	-
PROJECT MANAGEMENT UNIT	(3,707)	(1,457)	(1,399)	(923)	(913)	-	-	-
Total Project Costs Incurred by Government	(7,463)	(8,098)	(8,313)	(5,982)	(4,520)	(3,008)	(2,843)	(1,909)
NET FLOW PRE FINANCING & FISCAL IMPACTS	(7,463)	(8,064)	(8,118)	(5,503)	(3,728)	(2,217)	(2,052)	(1,118)

**Table 14: Budgetary Impact on the Government
(in Taka Lakhs)**

Budgetary Impact with Financing* and Tax Revenues

YEAR	1	2	3	4	5	10	15	20
NET FLOW PRE FINANCING & FISCAL IMPACTS	(7,463)	(8,064)	(8,118)	(5,503)	(3,728)	(2,217)	(2,052)	(1,118)
PROJECT FINANCING								
World Bank	3,730	4,068	3,682	1,422	728	-	-	-
DFID	1,425	1,691	1,804	1,407	1,284	-	-	-
GEF	527	517	550	414	435	-	-	-
TOTAL EXTERNAL FINANCING	5,682	6,277	6,036	3,243	2,447	-	-	-
NET FLOW PRE FISCAL IMPACTS	(1,780)	(1,787)	(2,083)	(2,260)	(1,281)	(2,217)	(2,052)	(1,118)
REVENUE FROM INCREMENTAL TAXES DUE TO PROJECT								
COMMUNITY BASED STOCKING	14	40	67	68	68	90	90	90
RESTORATION OF FISH HABITATS	8	28	35	37	19	17	-	-
AQUATIC SANCTUARIES	10	32	41	39	32	24	24	24
FISH PASSES AND REGULATORS	28	92	119	42	24	23	23	23
HILSA CONSERVATION	22	4	38	38	38	45	45	45
COMPLETION OF TFP POLDERS	99	91	318	608	897	886	886	886
DEVELOPMENT OF NEW POLDER	15	58	60	9	111	258	258	258
TRAINING OF SHRIMP FRY CATCHERS	15	2	2	2	2	-	-	-
AQUACULTURE EXTENSION AND TRAINING	98	73	79	85	35	22	22	22
CONSERVATION AND OTHER STUDIES	94	82	86	90	135	-	-	-
PROJECT MANAGEMENT UNIT	1,648	265	250	184	182	-	-	-
TOTAL FISCAL IMPACTS	2,051	767	1,095	1,200	1,543	1,365	1,348	1,348
NET REAL CASH FLOW ON GOVT. BUDGET	270	(1,020)	(888)	(1,060)	262	(852)	(704)	230

5. Risk Analysis

The cash flow projections in the deterministic spreadsheet model of the financial and economic analyses do not account for the uncertainties and fluctuations that may occur in various project parameters. These changes add further risks to investing in the project as their impact can alter the final outcome.

Therefore, it is helpful for project investors, planners, and implementers to attempt to assess such impacts. Monte Carlo simulations, a form of risk analysis, provide one of the most practical methods to approximate the dynamics and uncertainties of the real world.¹⁷ The risk analysis repeats the financial and economic analyses many times using distributions for the values of the most sensitive variables that affect the project. The information from the sensitivity analyses is used to help identify the variables that significantly affect the outcomes of the project. The risk variables are summarized in table 15.

Table 15: Risk Variables and their Impact and Risk Significance

Risk variables	Impact and risk significance
Production Factor	The single most important risk variable. Much of the robustness of the base case analysis is based on the high yields expected from the project.
Cost Overruns	A rise in investments will create uncertainty for the entire project, since further financing will be needed. The higher costs can also change the final outcome as well.
Price of Fish	The price of fish may change in the future, but not substantially. However, small changes can have some impact on the project's NPV.
Price of Shrimp	There may be small fluctuations in the price of shrimp based on world market trends. This is not expected to have a large impact on the project outcomes.
Inflation	Inflationary effects will also call for additional financing in nominal terms, and can affect the NPV of the project through accounts payable and cash balances.

Table 16 summarizes the various parameters that were selected for the risk analysis. The riskiness of the NPV can be inferred from the standard deviation that result from the risk analysis (Table 16). Based on the selected risk variables, the economic and the financial return are equally affected by the possible fluctuations. It is significant that neither analysis yields a probability of obtaining a negative NPV (Table 17). This does not mean that it would be impossible for this project to fail. This analysis is based on the assumptions that the project has the institutional capacity and management to operate the facilities in a manner so that costs will be contained and the production yields will be realized within the assumed range and distribution for these key variables. Efforts within project implementation are directed at strengthening this management capacity.

The risk analysis confirms the sensitivity analysis finding that the production factor can lend a substantial amount of uncertainty to the base case analysis. Ninety five percent of the variability in the outcomes was due to the volatility in the expected yields (Figure 1). The riskiness in the production factor is

¹⁷ Savvides, Savvakis, "Risk Analysis in Investment Appraisal", Project Appraisal, Beach Tree Publishing, 1994.

realistic since the entire project is substantiated based on the high expected yields. All other selected risk factors, including cost overruns, add little volatility to the outcome of the project.

Table 16: Distributions and Parameters for Risk Variables

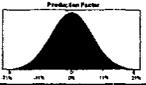
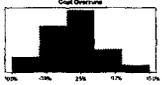
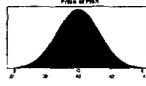
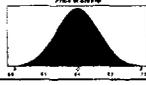
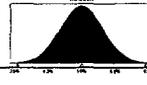
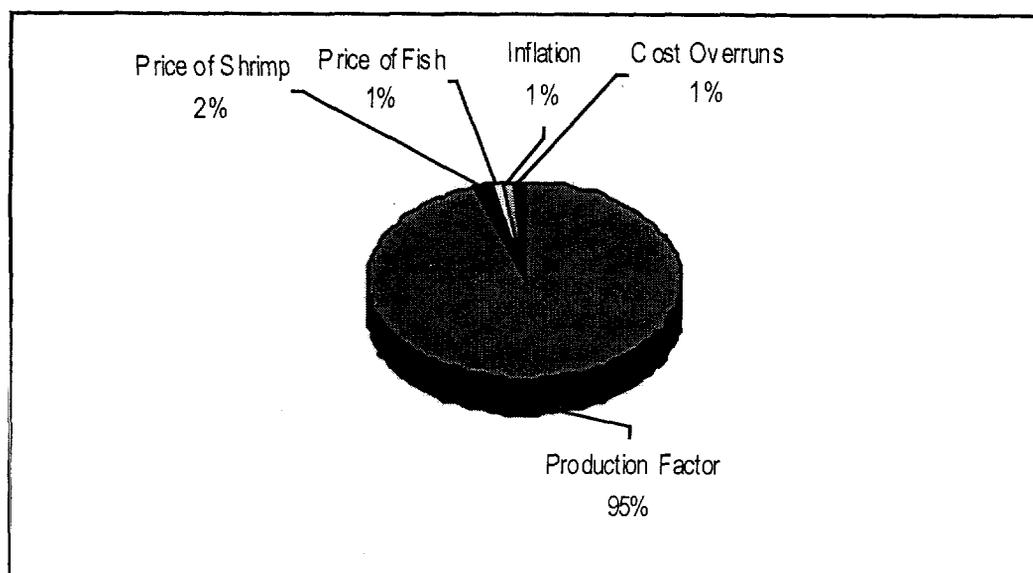
Variable	Distribution	Range												
Production Factor	Normal 	Mean 0% Standard Dev. 7%												
Cost Overruns	Custom/Step 	<table border="1"> <thead> <tr> <th>Range</th> <th>Probability</th> </tr> </thead> <tbody> <tr> <td>-10.0% to -5.0%</td> <td>0.10</td> </tr> <tr> <td>-5.0% to 0.0%</td> <td>0.30</td> </tr> <tr> <td>0.0% to 5.0%</td> <td>0.40</td> </tr> <tr> <td>5.0% to 10.0%</td> <td>0.15</td> </tr> <tr> <td>10.0% to 15.0%</td> <td>0.05</td> </tr> </tbody> </table>	Range	Probability	-10.0% to -5.0%	0.10	-5.0% to 0.0%	0.30	0.0% to 5.0%	0.40	5.0% to 10.0%	0.15	10.0% to 15.0%	0.05
Range	Probability													
-10.0% to -5.0%	0.10													
-5.0% to 0.0%	0.30													
0.0% to 5.0%	0.40													
5.0% to 10.0%	0.15													
10.0% to 15.0%	0.05													
Price of Fish	Normal 	Mean 40.00 Taka Standard Dev. 1.00 Taka												
Price of Shrimp	Normal 	Mean US\$ 6.40 Standard Dev. US\$ 0.20												
Inflation	Normal 	Mean 5.0 % Standard Dev. 0.5 %												

Table 17: Results of Risk Analysis for Entire Project

	Financial Analysis	Economic Analysis
	Taka Lakhs	Taka Lakhs
Expected NPV	40,715	52,115
Standard Deviation (σ)	8,358	8,675
Probability of NPV < 0	0%	0%

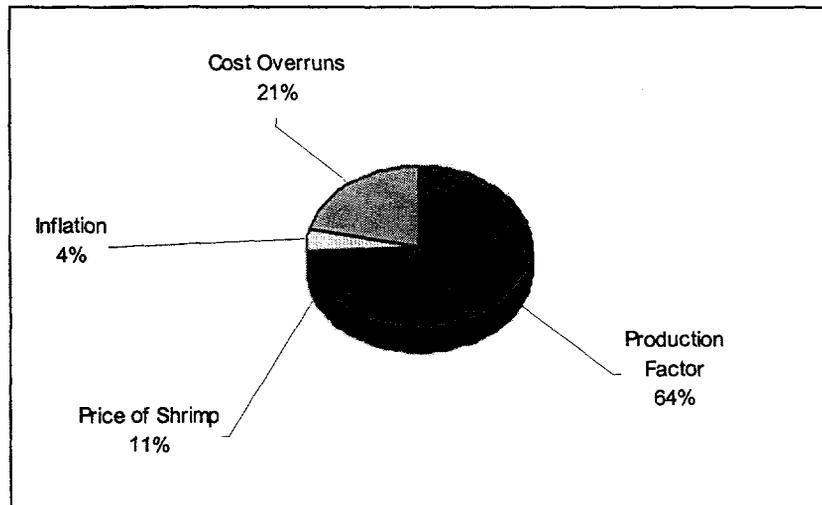
It may be more useful to isolate the risks associated with each component of the project and assess the viability of each sub-component in the face of uncertainty. Table 18 summarizes the risk analysis effects on each sub-component. The most significant fluctuations in NPV occur in the Community-based Stocking, *Hilsa* Conservation, Completion of TFP Polders, and the Aquaculture Extension and Training components. The large volatility in these components are due to their high yields and the large investment costs. The development of a new shrimp polder appears to be the riskiest sub-component. It has a 25.3% probability of a negative return despite a smaller volatility compared to other components. The much lower expected value (380 Taka Lakhs) makes the sub-component susceptible to even smaller fluctuations in the risk variables. Conservation and other studies and Project Management Unit, which are some of the sub-components without directly quantifiable benefits, fluctuate little since production factor volatility that affects revenues in other sub-components does not affect them.

Figure 1: Factors that Cause Volatility in NPV**Table 18: Results of Risk Analysis for Each Component**

	Expected FNPV (in 1998 Taka lakhs)	STD. Deviation (in 1998 Taka lakhs)	Prob. NPV<0
COMPONENT 1 - OPENWATER FISHERIES			
Community-based Stockings	2,837	1,012	0.1%
Restoration of Fish Habitats	819	240	0%
Aquatic Sanctuaries	2,485	489	0%
Fish Passes and Regulators	1,999	530	0%
COMPONENT 2 - COASTAL SHRIMP AQUACULTURE			
Completion of TFP Polders	16,034	2,701	0%
Development of new Polder	380	560	25.3%
Improvement in Shrimp Fry Collection Methods	977	79	0%
COMPONENT 3 - FRESHWATER AQUACULTURE			
Aquaculture Extension and Training	10,990	1,571	0%
COMPONENT 4 - AQUATIC RESOURCES POLICY DEVELOPMENT			
Hilsa Management	13,395	1,454	0%
Conservation and other Studies	-1,722	6	100%
COMPONENT 5 - INSTITUTIONAL SUPPORT			
Project Management Unit	-7,481	388	100%

Results of risk analysis impact on the externality to GOB is summarized in Figure 2. GOB can get affected through several risks associated with the project. The production factor (yield) and the price of shrimp affect government revenue due to the foreign exchange premium that may be gained or lost. Changes in cost overruns also impact GOB's budget as it alters the taxes and tariffs collected on investment items. It is also significant to note that higher investment costs would require additional financing from GOB.

Figure 2: Risk Analysis Impact on the Externality to Government



6. Conclusion

The integrated analysis of the project indicates that it is economically and financially viable. The project generates a substantial return on investment in financial terms. The financial benefits and costs are allocated between the two stakeholders, namely GOB and the fishermen. GOB only receives a relatively small contribution by the fishermen, not the project revenues. Therefore, it must rely on external financing and the tax revenue generated as a result of the project in order to finance the undertaking. Any shortfall needs to be funded in the form of a subsidy by GOB. The fishermen, on the other hand, pay a modest share of the investment costs, but are able to harness the revenue generated from the increase in yield.

The project also significantly enhances the net economic wealth of Bangladesh. The increase in availability of fish for domestic consumption, and the foreign exchange earned through export of shrimp generate substantial benefits to society. In fact, the economic net present value is larger than the financial return on investment. However, despite its robustness, the risk associated with the yield and possible disease outbreak makes the base case analysis volatile.

There is an opportunity cost to using credits and grant money in any project. Although grants do not require repayment, the project is utilizing financial resources that would otherwise be used elsewhere in the economy. The financing of the project with IDA credit and DFID and GEF grants can be justified in this case, however, since the project is able to increase the net economic wealth of Bangladesh.

Annex 5
Bangladesh
Fourth Fisheries Project
Financial Summary

Years Ending
(US\$ million, 1998)

	Implementation Period					Operational Period				
	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10
<u>Project Costs</u>										
Investment Costs	14.7	11.9	10.4	4.3	3.5					
Recurrent Costs	1.8	2.9	3.9	3.9	3.1					
Total	16.5	14.8	14.3	8.2	6.6					
<u>Financing Sources (% of total project costs)</u>										
IDA	48	57	53	34	21					
GEF	7	7	8	10	12					
DFID	18	24	26	34	38					
Government	27	11	10	11	6					
Beneficiaries	0	1	3	11	23					
Total	100	100	100	100	100					

Annex 6
Bangladesh
Fourth Fisheries Project
Procurement, Financial Management and Disbursement Arrangements

Procurement

Procurement methods (Table A)

Table A summarizes the project items, their related cost estimates and proposed methods of procurement. Table B summarizes the thresholds for procurement methods and prior review. Procurement of works and goods would follow procedures outlined in the Bank's *Guidelines for Procurement under IBRD Loans and IDA Credits, January 1995 (Revised January and August 1996, September 1997 and January 1999)*. Consultants financed by IDA and GEF would be recruited according to the Bank's *Guidelines: Selection and Employment of Consultants by World Bank Borrowers, January 1977, revised September 1997 and January 1999*. Other consultants financed by DFID would be recruited according to DFID's Guidelines.

Civil works are in dispersed locations and the estimated cost of each contract are small, ranging from US\$4,000 to US\$500,000 (with two exceptions in polder 32 and rehabilitation of Raipur FTC), are unlikely to attract the interest of foreign bidders, and, therefore, would be procured through National Competitive Bidding (NCB) procedures acceptable to IDA. Bidding for goods has been packaged to the extent possible and would be procured as follows: (a) individual contracts estimated to cost US\$200,000 or more would be procured using International Competitive Bidding (ICB) procedures; (b) individual contracts estimated to cost less than US\$200,000 may be procured using NCB procedures, acceptable to IDA, up to an aggregate amount of US\$4.0 million; and (c) individual purchases of off-the-shelf items may be procured, through international or national shopping procedures, in packages with an estimated value of less than US\$20,000 per contract, up to an aggregate of US\$100,000. Books and journals estimated to cost US\$10,000 would be procured directly from the publishers or their authorized agents. Procurement of fingerlings would be carried out through national shopping or direct contracting procedure by the communities. Except for auditors, all firms providing consultants' services would be selected through Quality and Cost Based Selection (QCBS) method. Auditors would be appointed through Least-Cost Selection method.

Civil Works by DOF and LGED (US\$7.60 million): Civil works executed by DOF/LGED comprise habitat restoration, aquatic sanctuaries development, DOF office buildings, and rehabilitation of FSMF/FTC. Tentative sites for habitat restoration and aquatic sanctuaries development have been identified and would be finally selected in consultation with the communities after they are organized and made aware of the benefits of the program. Civil works for these are expected to start in FY2001. Civil works for habitat restoration would be carried out in phases in 10 sites, with the estimated cost for each site being US\$143,000. The aquatic sanctuary development would be financed by GEF in about 50 sites in phases, and the estimated cost for the development of each site is US\$4,000. The construction of DOF office buildings and the rehabilitation of FSMF/FTC are expected to start in FY2000. These are estimated to cost US\$3.52 million. Before bids are invited for these works, DOF should have clear possession of land.

Civil Works by BWDB (US\$9.00 million): Civil works to be executed by BWDB comprise construction of eight fish pass (about US\$223,000 per site), conversion of five regulators to fish friendly

structures (about US\$81,000 per regulator), completion of four polders started under the Third Fisheries Project, and development of one new polder. The estimated cost for the completion of the existing polders and the development of the new polder is US\$4.0 million. Before bids are invited for civil works in the polders, agreement would be sought with the community by involving them in the design concepts, site selection, general supervision of implementation work, and operation and maintenance. In addition, BWDB should have clear possession of land.

Equipment and Vehicles (US\$7.61 million): Equipment includes office and laboratory items, and vehicles. Computers, cross-country vehicles, motor cycles and speedboats would be procured through ICB procedures. As an exception to the above and as indicated in the Procurement Plan, computers and vehicles that are urgently required for project implementation may be procured through NCB and National Shopping procedures. Other equipment costing less than US\$200,000 per contract may be procured through NCB, and those costing less than US\$20,000 may be procured following National or International Shopping procedures (i.e., by soliciting price quotations from at least three qualified bidders). Books and journals estimated to cost US\$10,000 would be procured directly from the publishers or their authorized agents.

Fingerlings (US\$6.0 million): Procurement of fingerlings will be carried out by the communities through national shopping with assistance of the Department of Fisheries (DOF) and NGOs. Each community will have a Management Committee. DOF and an NGO working with the community will be represented on the Management Committee. In order to ensure financial and quality safeguards, DOF and NGO representatives will certify that fingerlings are supplied according to technical specifications and on time. The government will pay the suppliers directly upon the receipt of such certification.

Consultants' Services (US\$21.5 million): Major consultants' services financed by IDA and GEF include design and supervision of habitat restoration, fish passes/regulators, polders, DOF office buildings, and FSMF/FTC. Further, auditors would be appointed to conduct performance audits. All firms providing consultant services, except for performance audit, would be selected using QCBS method. Selection of auditors would be undertaken through Least-Cost Selection method. In addition, DFID would finance technical assistance and training, for which their procedures would be applicable.

Miscellaneous (US\$8.00 million): This includes cost for incremental staff, maintenance of vehicles and equipment, and other operating expenses. GOB's own procedures would be followed for these expenditures.

Procurement Plan: A draft Procurement Plan has been prepared by DOF covering the total project. Based on comments from IDA/DFID, this is being revised. The revised Procurement Plan, especially for the procurement of fingerlings, was discussed and agreed during negotiations. The final Procurement Plan would be included in the PIP.

Use of Standard Documents: For ICB procurement of goods, the use of IDA's Standard Bidding Documents (SBD) is mandatory. For NCB procurement, the implementing agencies (DOF, BWDB and LGED) would use the SBDs for Goods (trial edition August 1997) and Works (trial edition January 1998), prepared by the Bank's Dhaka Office (BDO). The Bank's Standard Bid Evaluation Form for Goods and Works (April 1996, modified by BDO) would be followed for submission of evaluation reports to IDA.

Procurement Capacity Review: Procurement capacity of the three implementing agencies (DOF, BWDB and LGED) are varied. BWDB and LGED have been executing Bank and other donor funded

projects and, as such, officials have acquired expertise on procurement. Although DOF was involved in earlier IDA financed projects with support from consultants, their institutional capacity, including procurement, needs to be further strengthened for which DFID is providing TA support, including training.

IDA prior review thresholds (Table B)

Goods and Works: IDA would carry out prior review of all goods and works contracts estimated to cost the equivalent of US\$200,000 or more. In addition, IDA will carry out prior review of the first two contracts for goods and works procured under NCB, irrespective of value, for each of the three implementing agencies. All other contracts would be subject to selective post-review by IDA. Such selective post-review of contracts below the thresholds would be carried out for approximately up to five percent of the contracts awarded.

Services: IDA's prior review would be required for all Services contracts financed by IDA/GEF and estimated to cost the equivalent of US\$100,000 or more for firms. IDA would review the terms of reference (TOR) for all other IDA/GEF financed consultants' services. Appointment of individual consultants with financing from IDA/GEF is not envisaged.

Review of Procurement Performance: The procurement status and its compliance with the Bank's Guidelines, would be monitored on a continuous basis by IDA. As part of the Projects' planned mid-term review in CY2001, a comprehensive assessment of procurement performance will also be carried out. Based on this assessment, in consultation with GOB, IDA may revise the prior review threshold and the procurement methods.

Acceptability of NCB:

The NCB procedures followed by GOB have been reviewed and found to be generally consistent with the Bank's Procurement Guidelines. However, during negotiations, agreement was reached with GOB confirming that the following procedures, irrespective of the value of the contracts, will be adhered to:

- (a) notice inviting bids should be advertised in at least one widely circulated national daily newspaper. Bidders must have at least four weeks time from the date of publication of the invitation in the newspaper or the date of availability of the bidding documents, whichever is later, for submission of bids;
- (b) bidding documents must be made available, by mail or in person, to all who pay the required fee;
- (c) evaluation of bids shall be made in strict adherence to the criteria disclosed in the bidding documents, in a format and specified period agreed by IDA;
- (d) bids shall be opened in public immediately after the deadline for submission and the bid opening statement shall be shared with the bidders. Receiving and opening of bids at more than one place is discouraged. If this is unavoidable, all the bids must be assembled in one place and opened in public within one hour of the bid submission deadline;
- (e) foreign bidders shall not be precluded from bidding, and no preference (including domestic preference) shall be given to national bidders;

- (f) qualification criteria (if prequalification was not carried out) shall be disclosed in the bidding documents.
- (g) if a registration process is used, unregistered eligible foreign bidders shall be permitted to participate in the bidding. A foreign firm declared lowest evaluated bidder should be afforded a realistic opportunity to register and there must be no barriers for such registration;
- (h) contract must be awarded to the lowest evaluated bidder;
- (i) negotiations are not permitted with the lowest evaluated bidder or with any other bidder. Under exceptional circumstances negotiations may be made with the IDA's prior concurrence. This negotiation will be confined to reduction in scope and/or a reallocation of risk and responsibility, which can be reflected in a reduction of the contract price.
- (j) no bid shall be rejected on the ground of pre-established percentage (greater or less) of the estimated cost. If, in response to a properly advertised invitation to bid, a single bid is received, it is found to be technically responsive and the price is reasonable, such a bid should be considered for contract award;
- (k) re-bidding shall not be carried out without IDA's prior concurrence;
- (l) contracts based on nationally negotiated rates are not acceptable;
- (m) all bidders/contractors shall provide bid/performance security as indicated in the bidding/contract documents;
- (n) a bidder's Bid Security shall apply only to a specific bid, and a contractor's performance security shall apply only to the specific contract under which it was furnished. They shall not be applied by the purchaser against any other losses unrelated to the contract;
- (o) bids should not be invited on the basis of percentage premium or discount over the estimated cost;
- (p) extension of bid validity is not acceptable unless justified by exceptional circumstances; and
- (q) there should not be any restrictions on the means of delivery of the bids.

Financial Management Arrangements and Disbursement

Financial Management

An assessment of the financial management capacity of the implementing agencies of the project (DOF, BWDB and LGED) has been carried out to ensure that the arrangements meet IDA's requirements under OP/BP 10.02 and the guidelines under the Loan Administration Change Initiative (LACI). As a part of appraisal, the PIP has also been reviewed and found acceptable.

Roles & Responsibilities: The PMU, to be established under DOF, will be responsible for maintaining the project accounts and preparing financial statements and reports for DOF part. The respective

BWDB's Regional Accounting Centers will maintain the project accounting records and prepare the financial statements and reports for BWDB's part. A designated Accounts Officer in BWDB's Directorate of Accounts will consolidate these accounts and reports. LGED will also separately maintain their project accounts for their internal requirements. But, since they will be implementing the project on behalf of DOF, all supporting documents and vouchers will be forwarded to PMU for incorporation in the consolidated project accounts of DOF's part. Separate Project Management Reports (PMRs) will be prepared by PMU and BWDB, and submitted to IDA.

Staffing: DOF does not have adequate number of suitably qualified accounting staff. As agreed with GOB, a Budget and Accounts Officer, one Accountant and support staff will be in place by August 15, 1999. Appropriate accounting staff is not available in the divisional offices of DOF and, by December 31, 1999, an Accountant will be appointed in each of its five divisional offices involved in implementing the project. DFID will also provide technical assistance under the project. As a part of the technical assistance, they will provide, by August 15, 1999, a Financial Management Expert (FME) for the PMU. BWDB has an established accounting department having 525 accounting staff. By August 15, 1999, an Accounts Officer would be designated by BWDB for consolidating the project accounts and financial statements, and preparation of PMRs. The PIP includes an organogram showing DOF's/BWDB's financial management staffing requirements for the project and the job descriptions of those staff. In addition, the terms of reference for the FME has been reviewed by IDA and included in the PIP. LGED has adequate staff for maintaining the project accounts.

Accounting: Both DOF and BWDB maintain books of accounts manually under the cash system of accounting. This is acceptable, provided lists of outstanding liabilities are prepared by PMU and BWDB at the end of each quarter and reflected in the Project Balance Sheets. With technical assistance provided by DFID, a computerized accounting system will be designed for PMU for the computerization of the project accounts of DOF and its accounting staff will be trained to run the system. Necessary hardware and software will be procured by March 31, 2000 and computerization is expected to be implemented by June 30, 2000. BWDB's accounting system is being computerized under a Canadian International Development Assistance (CIDA) financed project, that is expected to be completed by June 30, 2000. While LGED still maintains their accounts in the field manually, all accounts are consolidated in its headquarter through a computerized accounting system. This system enables them to generate financial management reports.

Internal Controls: Adequate staffing and proper segregation of duties and defined responsibilities in PMU and BWDB will ensure the project's internal control. Policies, procedures and guidelines to safeguard project resources and achieve project goals and objectives are included in the PIP. The functional/reporting relationship among units and the implementing agencies is given in the PIP. After modernization of the financial management system under CIDA assisted project, the internal control arrangement of BWDB will improve significantly. LGED have adequate internal control arrangements in place.

Reporting System: DOF and BWDB have agreed to submit PMRs to IDA separately as per agreed formats within 45 days from the end of each quarter. LGED's project expenditure will be incorporated in the PMRs of DOF. The agreed formats are included in the PIP and were confirmed during negotiations. Each PMR will include: (a) Financial Statements, comprising Sources and Uses of Funds; Usage of Funds by Project Activities; Project Balance Sheet; Cash Withdrawals; Cash Forecasts; and Special Account Statements; (b) Output Monitoring Reports and (c) Procurement Monitoring Reports. The Output Monitoring Reports will be designed by the consultants financed by DFID, agreed with IDA, and submitted from the quarter ending December 31, 1999.

Project Audits: Separate audit reports on project accounts will be submitted for DOF and BWDB to reflect the operations, resources and expenditures incurred. The project expenditures of LGED will be incorporated in the accounts of DOF and, as such, separate audit reports for LGED will not be required. The project audit reports will include receipts and expenditures incurred through the Special Accounts and on reimbursements claimed on the basis of SOEs. The audit report shall provide a separate opinion as to whether the SOEs submitted during such fiscal year, together with procedures and internal controls involved in their preparation, can be relied upon to support the related withdrawals. All audit reports will be submitted to IDA within six months from the end of each financial year. The Comptroller and Auditor General (C&AG), through its Directorate of Audit-Foreign Aided Projects (DOAFAP), will conduct the audit of the Project Accounts, Special Accounts, and SOEs. A draft TOR for such audit has been prepared and discussed with DOAFAP. This was agreed with GOB during negotiations.

Performance Audits: In addition to C&AG's audits, GOB agreed to undertake two independent performance audits including review of the financial management system and verification of procurement. The first performance audit will be carried out by September 30, 2001 [three months before mid-term review date] while the second performance audit will be carried out by December 31, 2003. To meet these deadlines, the first auditor will be appointed by March 31, 2001, while the second auditor will be appointed by June 30, 2003. The cost for such audits will be eligible for financing under the Credit. A private firm of Chartered Accountants, with qualifications and TOR acceptable to IDA, will be appointed by PMU to conduct such audits.

Action Plan for Improvement of Financial Management Capacity: As indicated above, both DOF and BWDB do not have adequate financial management capacity. Further, since the accounts of DOF and BWDB are currently maintained manually, they are not suitable to generate accurate PMRs in a timely manner. A time bound action plan for strengthening the financial management capacity of both the organizations has been agreed with GOB and reflected in the PIP, and is provided below. Progress in implementation of the action plan will be closely monitored and, subject to satisfactory progress, PMR based disbursements will be introduced by June 30, 2001 or such later date agreed with IDA.

ACTION PLAN

Issues/Problems	Agreed Actions
<p>Inadequate Staff</p> <p>Department of Fisheries has inadequate staff for project financial management.</p> <p>BWDB needs to designate an accounting staff for consolidation of project accounts and preparation of PMRs.</p>	<p>By August 15, 1999, DOF will provide one Budget and Accounts Officer, one Accountant and other Support Staff.</p> <p>By August 15, 1999, DFID will provide, under their technical assistance component, one Financial Management Specialist for the PMU.</p> <p>By December 31, 1999, DOF will appoint one Accountant for each of its five divisional offices.</p> <p>By August 15, 1999, BWDB will designate one Accounts Officer.</p>
<p>Computerization of the Accounting Systems of PMU and BWDB is required to generate accurate and timely PMRs.</p>	<p>By March 31, 2000, DOF will procure necessary hardware and software.</p> <p>By June 30, 2000, PMU will computerize its Accounting system.</p> <p>By June 30, 2000, BWDB, with assistance from CIDA, will complete computerization of its accounting system.</p>

Disbursement

Allocation of credit proceeds (Table C)

Table C shows the allocation of IDA proceeds and the financing for the various categories of expenditures. Preparation of withdrawal applications would be the responsibility of DOF and BWDB. The closing date of the proposed project will be June 30, 2004. Disbursement estimates of IDA proceeds over a five years period is presented on page 2 of the PAD. GEF funds will be used for, consulting services and training for DOF. While consulting services and training will be financed at 100% (net of taxes), civil works will be financed at 85% of total expenditures.

Use of statements of expenses (SOEs):

Until PMR based disbursement is agreed upon, the current disbursement procedures will be applicable for withdrawal of funds from the Credit and GEF. IDA would require full documentation for prior review for those cases where contracts for civil works and goods exceed US\$200,000 equivalent, and for consulting firms exceeds US\$100,000. Expenditures below the above thresholds and expenditures on incremental and operating costs would be claimed on SOEs. Disbursement for procurement of fingerlings will be based on receipt of certification from GOB that the communities have paid their share of the cost of fingerlings as agreed.

Special accounts:

To ensure timely payments to contractors, consultants, suppliers and others for IDA's share of eligible expenses, there would be two Convertible Taka Special Accounts (SAs), one for DOF and another for BWDB. The authorized allocations to DOF and BWDB's SAs would be limited to the equivalent of US\$1.50 million and US\$ 1.00 million respectively. In addition, another SA in Convertible Taka for GEF's share of eligible expenditures, to be accessed by PMU, will also be opened. The authorized allocation will be limited to US\$250,000. All these three SAs would be opened in a commercial bank, acceptable to IDA. If, during the mid-term review, agreement is reached on PMR based disbursement, the allocations to the respective SAs would be revised.

Table A: Project Costs by Procurement Arrangements^a
(in US\$ million equivalent)

	Procurement Method					Total Cost
	ICB	NCB	OTHER/d	GEF	DFID	
Works		16.60 (14.11)		0.30		16.90 (14.11)
(a) DOF/LGED		7.60 (6.46)		0.30		7.90 (6.46)
(b) BWDB		9.00 (7.65)				9.00 (7.65)
Goods	5.50 (2.22)	1.20 (0.96)	0.91 (0.73)			7.61 (3.91)
Equipment & Vehicles						
(a) DOF/LGED	5.50 (2.22)	1.09 (0.87)	0.91 (0.73)			7.50 (3.82)
(b) BWDB		0.11 (0.09)				0.11 (0.09)
Fingerlings			6.00/b (3.10)			6.00 (3.10)
	QCBS	Least Cost		GEF	DFID	
Services	1.26 (1.26)	0.04 (0.04)		4.70	15.50	21.50 (1.30)
(a) DOF/LGED	0.96 (0.96)	0.04 (0.04)		4.70	15.50	21.20 (1.00)
(b) BWDB	0.30 (0.30)					0.30 (0.30)
Others			9.18 (5.58)			9.18 (5.58)
DOF Incremental Staff and Op. Cost			8.00 (5.58)			8.00 (5.58)
BWDB Opn. and Maintenance Cost			1.00/c			1.00
Land			0.18/c			0.18
TOTAL	6.76 (3.48)	17.84 (15.11)	16.09 (9.41)	5.00	15.50	60.8 (28.00)

/a: Figures in parenthesis are the amounts to be financed by IDA.

/b: US\$2.90 million is beneficiary financing for fingerling procurement.

/c: Not financed by IDA or other donors.

/d: US\$2.7 earmarked for CD/VAT out of GOB's contribution.

Table B: Thresholds for Procurement Methods and Prior Review

Expenditure Category	Contract Value (Threshold)	Procurement Method	Contracts Subject to Prior Review
Works	First two contracts of each of the three implementing agencies and subsequently each contract valued at US\$200,00 or more	National Competitive Bidding	Prior review
	Less than US\$200,000	National Competitive Bidding	Post Review
Goods	US\$200,00 or more	International Competitive Bidding	Prior Review
	First two contracts of each of the three implementing agencies valued at US\$200,00 or less	National Competitive Bidding	Prior Review
	Less than US\$200,000 Aggregate US\$4.0 million	National Competitive Bidding	Post Review
	Less than US\$20,000 Aggregate US\$0.10 million	National or International Shopping	Post Review
Fingerlings	Community Participation	National Shopping or Direct Contracting	Post Review
Services			
Consulting Firms	(a) US\$100,000 or more	Quality- and Cost-Based Selection	(a) Prior Review
	(b) Less than US\$100,000		(b) Only terms of reference
Auditors	All	Least-cost Selection	Only terms of reference

Table C: Allocation of Credit Proceeds

Expenditure Category	Amount in US\$ Million	IDA Financing Percentage
1. Civil Works:		85%
(a) DOF and LGED	5.85	
(b) BWDB	6.95	
2. Goods:		100% of foreign expenditure, 100% of local expenditure (ex- factory) and 80% of local expenditure
(a) DOF and LGED	3.45	
(b) BWDB	0.10	
3. Fingerlings	3.05	100% of local expenditure (excluding expenditures financed by communities)
4. Consultants' Services, including Auditors:		100% (net of taxes)
(a) DOF	0.90	
(b) BWDB	0.30	
5. Incremental Staff and Operation and Maintenance	5.00	100% on withdrawal applications (WAs) received before July 31, 2000, 80% on WAs received before July 31, 2001, 60% on WAs received before July 31, 2002, and 40% thereafter
6. Unallocated	2.40	
TOTAL	28.00	

Annex 7
Bangladesh
Fourth Fisheries Project
Project Processing Budget and Schedule

A. Project Budget (US\$000)	<u>Planned</u> (At final PCD stage)	<u>Actual</u>
	US\$335.4	380.6
B. Project Schedule	<u>Planned</u> (At final PCD stage)	<u>Actual</u>
Time taken to prepare the project (months)	12	11
First Bank mission (identification)	05/19/1997	10/17/1997
Appraisal mission departure	06/01/1998	09/03/1998
Negotiations	09/14/1998	03/08/1999
Planned Date of Effectiveness	12/30/1998	08/02/1999

Prepared by: Department of Fisheries, Ministry of Fisheries and Livestock, Government of Bangladesh, with consultancy assistance

Preparation assistance: Japanese PHRD Grants (TF029732 and TF029638)

Bank staff who worked on the project included:

Name	Specialty
Benson Ateng	Economist
Imtiazuddin Ahmad	Operations Officer
Henry Gassner	Principal Operations Officer
Ronald Zweig	Senior Aquaculturalist
Lars Soeftestad	Anthropologist
S.A.M. Rafiquzzaman	Irrigation Engineer
Gonzalo Castro	Biodiversity Specialist
Mozammel Hoque	Financial Management Specialist
Nurul Alam	Procurement Specialist
Aminul Haque	Procurement Specialist
Mohammad Sayeed	Disbursement Officer

Annex 8
Bangladesh
Fourth Fisheries Project
Documents in the Project File*

A. Project Implementation Plan

1. GOB's Project Implementation Plan

B. Bank Staff Assessments

PCD Phase:

1. Project Concept Document
2. Minutes of the PCD Review Meeting
3. Comments of Peer Reviewers

Preparation Phase:

1. Terms of Reference for Consultants Assisting GOB in Preparing the Project
2. Terms of Reference for Preparation Missions
3. Missions' Aide Memoires
4. Follow-up Letters to GOB
5. Project Appraisal Document
6. Financial and Economic Analysis -- Spreadsheets
7. An Integrated Project Analysis
8. Project Cost Tables
9. Accounting, Financial Reporting, Auditing, and Budgeting Arrangements
10. Social Framework

C. Other

Project Preparation Background Papers:

1. Openwater Fisheries Management
2. Shrimp and Prawn Aquaculture
3. Coastal Aquaculture
4. Freshwater Aquaculture
5. Fisheries Extension, Training and Research
6. Institutional/Policy Reforms in the Fisheries Sector
7. Legal and Regulatory Issues
8. Environmental Assessment
9. Social Assessment
10. Fisheries Credit
11. Aquatic Animal Health Management, July 1998. Bangladesh: Fourth Fisheries Project. Department of Fisheries. Food and Agriculture Organization of the United Nations. Rome, Italy.

*Including electronic files.

Annex 9
Bangladesh
Statement of Loans and Credits
Status of Bank Group Operations in Bangladesh
IBRD Loans and IDA Credits in the Operations Portfolio

Project ID	Fiscal Year	Borrower	Purpose	Original Amount in US\$ Millions				Difference Between expected and actual disbursements a/			Last PSR Supervision Rating b/	
				IBRD	IDA	Cancel.	Undisb.	Orig	Frm Rev'd	Dev Obj	Imp Prog	
Number of Closed Projects: 135												
Active Projects												
BD-PE-9542	1990	GOB	RURAL ELECTRIF. III	0.00	105.00	0.00	17.43	9.10	0.00	S	S	
BD-PE-9540	1991	GOB	INLAND WATER TRANSP	0.00	45.00	0.00	18.40	19.08	0.00	S	S	
BD-PE-9559	1992	GOB	TECHNICAL ASSISTANCE	0.00	25.00	0.00	2.31	1.29	0.00	S	S	
BD-PE-9470	1992	GOB	FOREST RESOURCES MGM	0.00	49.60	3.32	14.07	11.54	2.33	S	S	
BD-PE-9555	1993	GOB	FEMALE SECONDARY SCH	0.00	68.00	0.00	26.90	12.43	7.53	S	S	
BD-PE-9509	1994	GOB	JAMUNA BRIDGE	0.00	200.00	0.00	11.17	3.06	2.89	S	NA	
BD-PE-9465	1994	GOB	2ND ROAD REHAB & MAI	0.00	146.80	0.00	9.41	-14.87	0.00	HS	S	
BD-PE-9533	1995	GOB	GAS INFRASTRUCTURE	0.00	120.80	0.00	70.11	51.91	47.13	S	S	
BD-PE-9496	1995	GOB	NUTRITION	0.00	59.80	0.00	47.12	14.30	0.00	S	S	
BD-PE-9560	1996	GOB	NON-FORMAL EDUCATION	0.00	10.50	0.00	8.25	1.55	0.00	S	U	
BD-PE-9545	1996	GOB	RIVER BANK PROTECTIO	0.00	121.90	0.00	18.71	24.33	0.00	S	S	
BD-PE-9484	1996	GOB	AG. RES. MANAGEMENT	0.00	50.00	0.00	38.69	28.25	0.00	U	U	
BD-PE-9549	1996	GOB	COASTAL EMBANKMENT R	0.00	53.00	0.00	17.79	18.88	0.00	S	S	
BD-PE-40985	1997	GOB	POVERTY ALLEVIATION	0.00	105.00	0.00	44.98	-8.19	0.00	HS	HS	
BD-PE-9482	1997	GOB/DWASA	DHAKA WATER/SAN. IV	0.00	80.30	0.00	65.34	19.43	0.00	U	U	
BD-PE-9518	1997	GOB	2ND RURAL RDS & MRKT	0.00	133.00	0.00	91.22	1.13	0.00	S	S	
BD-PE-44789	1998	GOB	PRIV SEC INFR DEVT	0.00	235.00	0.00	233.71	34.77	0.00	S	S	
BD-PE-40713	1998	GOB	SILK DEV PILOT PROJ.	0.00	11.35	0.00	10.93	2.08	0.00	S	U	
BD-PE-9550	1998	GOB	PRIMARY EDUC DEV	0.00	150.00	0.00	153.87	13.01	0.00	S	S	
BD-PE-37857	1998	GOB	POP AND HEALTH V	0.00	250.00	0.00	243.55	-13.00	0.00			
BD-PE-63089	1999	GOB	EMERGENCY RECOVERYCR	0.00	200.00	0.00	202.39	0.00	0.00			
BD-PE-50745	1999	GOB	ARSENIC CONTROL	0.00	32.40	0.00	33.55	.89	0.00	S	S	
BD-PE-37294	1999	GOB	ROAD REH. MAINT. III	0.00	273.00	0.00	281.96	0.00	0.00			
Total				0.00	2,525.45	3.32	1,661.86	230.97	59.88			

	Active Projects	Closed Projects	Total
Total Disbursed (IBRD and IDA):	845.09	5,294.34	6,139.43
of which has been repaid:	0.00	388.03	388.03
Total now held by IBRD and IDA:	2,522.13	4,649.57	7,171.70
Amount sold :	0.00	.37	.37
Of which repaid :	0.00	.37	.37
Total Undisbursed :	1,661.86	8.27	1,670.13

- a. Intended disbursements to date minus actual disbursements to date as projected at appraisal.
b. Following the FY94 Annual Review of Portfolio performance (ARPP), a letter based system was introduced (HS = highly Satisfactory, S = satisfactory, U = unsatisfactory, HU = highly unsatisfactory): see proposed Improvements in Project and Portfolio Performance Rating Methodology (SecM94-901), August 23, 1994.

Note:
Disbursement data is updated at the end of the first week of the month.

**STATEMENT OF IFC's
Committed and Disbursed Portfolio
As of 31-Mar-99
(In US Dollar Millions)**

FY Approval	Company	Committed				Disbursed			
		IFC				IFC			
		Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1980	IPDC	0.00	1.05	0.00	0.00	0.00	1.05	0.00	0.00
1985/95	IDLC	0.00	.15	0.00	0.00	0.00	.15	0.00	0.00
1991	Dynamic Textile	1.86	0.00	0.00	1.48	1.86	0.00	0.00	1.48
1996	ICT-B	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	ICT-W	0.00	.38	0.00	0.00	0.00	.01	0.00	0.00
1997	DBH	0.00	.65	0.00	0.00	0.00	.65	0.00	0.00
Total Portfolio:		16.86	2.23	0.00	1.48	1.86	1.86	0.00	1.48
Approvals Pending Commitment									
		Loan	Equity	Quasi	Partic				
1998	GRAMEEN PHONE	20.00	2.50	0.00	0.00				
1998	IPDC II	10.00	0.00	0.00	0.00				
1997	JALALABAD	0.00	15.00	0.00	0.00				
1998	KHULNA	22.50	3.30	0.00	29.40				
1998	LAFARGE SURMA	35.00	10.00	0.00	0.00				
1997	SCANCEM	11.00	1.25	0.00	0.00				
Total Pending Commitment:		98.50	32.05	0.00	29.40				

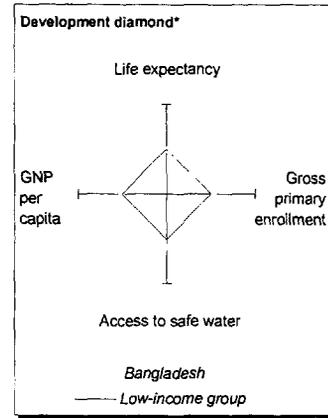
Annex 10

Bangladesh at a glance

4/27/99

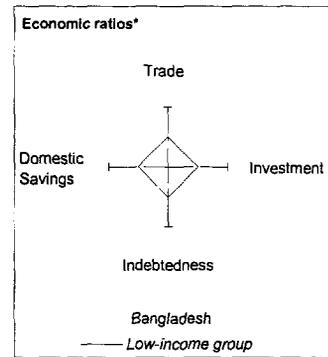
POVERTY and SOCIAL

	Bangladesh	South Asia	Low-income
1997			
Population, mid-year (millions)	123.6	1,281	2,036
GNP per capita (Atlas method, US\$)	360	380	350
GNP (Atlas method, US\$ billions)	44.1	493	712
Average annual growth, 1992-98			
Population (%)	1.6	1.8	2.0
Labor force (%)	2.1	2.3	2.4
Most recent estimate (latest year available, 1992-98)			
Poverty (% of population below national poverty line)	36	..	..
Urban population (% of total population)	20	27	28
Life expectancy at birth (years)	58	62	59
Infant mortality (per 1,000 live births)	75	77	82
Child malnutrition (% of children under 5)	68	53	..
Access to safe water (% of population)	84	81	69
Illiteracy (% of population age 15+)	62	49	46
Gross primary enrollment (% of school-age population)	96	100	93
Male	93	109	100
Female	100	90	82



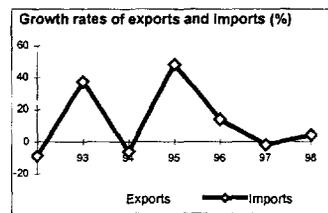
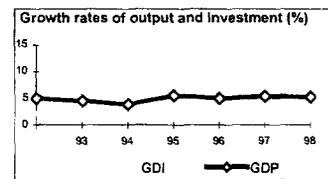
KEY ECONOMIC RATIOS and LONG-TERM TRENDS

	1977	1987	1997	1998	
GDP (US\$ billions)	9.5	23.8	41.3	42.7	
Gross domestic investment/GDP	17.0	19.0	21.4	22.2	
Exports of goods and services/GDP	5.2	5.4	12.3	13.8	
Gross domestic savings/GDP	13.1	12.5	15.3	17.1	
Gross national savings/GDP	16.1	17.3	20.4	21.0	
Current account balance/GDP	-1.8	-4.1	-2.2	-1.5	
Interest payments/GDP	0.3	0.6	0.4	0.4	
Total debt/GDP	26.4	42.7	36.6	36.2	
Total debt service/exports	27.8	28.0	10.6	9.4	
Present value of debt/GDP	..	..	20.9	..
Present value of debt/exports	..	..	129.8	..
(average annual growth)					
GDP	5.0	4.7	5.4	5.2	5.6
GNP per capita	2.6	3.1	4.1	3.4	4.1
Exports of goods and services	4.9	14.6	16.5	12.3	9.9



STRUCTURE of the ECONOMY

	1977	1987	1997	1998
(% of GDP)				
Agriculture	33.3	27.8	23.6	22.9
Industry	25.0	22.2	26.9	27.9
Manufacturing	18.5	15.2	17.2	18.1
Services	41.6	50.0	49.5	49.2
Private consumption	85.5	84.3	80.2	78.5
General government consumption	1.4	3.2	4.5	4.4
Imports of goods and services	9.1	12.0	18.4	18.9
(average annual growth)				
Agriculture	3.6	3.4	25.2	3.0
Industry	4.3	6.9	5.6	8.3
Manufacturing	2.9	7.0	6.2	9.2
Services	6.2	4.2	-2.5	4.6
Private consumption	5.3	4.4	1.0	3.3
General government consumption	5.3	5.9	6.0	-0.3
Gross domestic investment	4.4	6.1	11.6	9.5
Imports of goods and services	6.6	10.5	-1.7	4.5
Gross national product	5.2	4.9	5.7	5.0

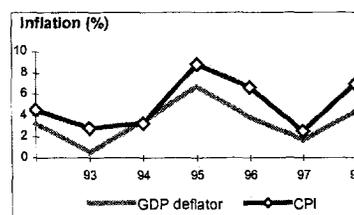


Note: 1998 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

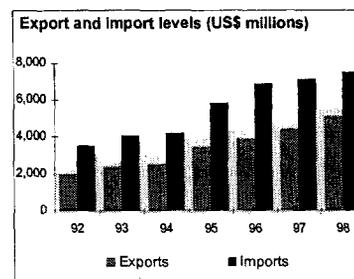
PRICES and GOVERNMENT FINANCE

	1977	1987	1997	1998
Domestic prices				
(% change)				
Consumer prices	..	..	2.5	7.0
Implicit GDP deflator	-2.1	11.0	1.7	4.3
Government finance				
(% of GDP, includes current grants)				
Current revenue	..	8.7	9.3	9.6
Current budget balance	..	..	2.2	2.2
Overall surplus/deficit	..	..	-4.2	-4.2



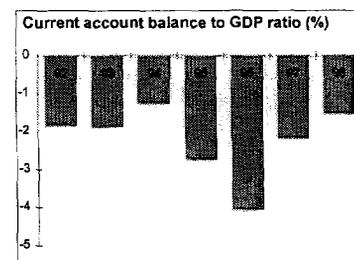
TRADE

	1977	1987	1997	1998
(US\$ millions)				
Total exports (fob)	..	1,074	4,418	5,111
Jute goods	..	104	116	113
Leather and leather products	..	135	185	188
Manufactures	..	700	3,826	4,527
Total imports (cif)	..	2,620	7,120	7,525
Food	..	413	197	350
Fuel and energy	..	230	361	507
Capital goods	..	856	2,000	1,917
Export price index (1995=100)	..	54	102	..
Import price index (1995=100)	..	79	100	..
Terms of trade (1995=100)	..	68	103	..



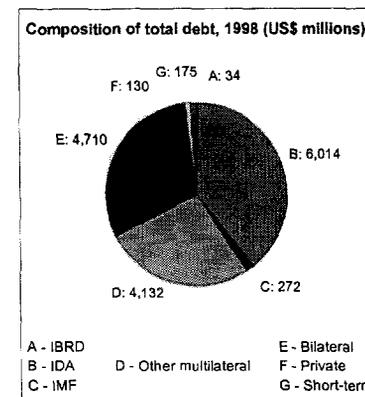
BALANCE of PAYMENTS

	1977	1987	1997	1998
(US\$ millions)				
Exports of goods and services	464	1,301	5,096	5,781
Imports of goods and services	932	2,876	7,677	8,155
Resource balance	-469	-1,576	-2,581	-2,374
Net income	-31	-122	-91	-130
Net current transfers	325	731	1,770	1,850
Current account balance	-174	-966	-902	-654
Financing items (net)	305	1,169	582	685
Changes in net reserves	-130	-203	320	-31
Memo:				
Reserves including gold (US\$ millions)	..	..	1,719	1,750
Conversion rate (DEC, local/US\$)	15.5	30.6	42.7	45.4



EXTERNAL DEBT and RESOURCE FLOWS

	1977	1987	1997	1998
(US\$ millions)				
Total debt outstanding and disbursed	2,518	10,149	15,125	15,467
IBRD	55	70	38	34
IDA	505	2,985	5,701	6,014
Total debt service	148	547	705	696
IBRD	3	5	7	7
IDA	4	35	96	105
Composition of net resource flows				
Official grants	0	662	736	589
Official creditors	274	774	326	442
Private creditors	-1	1	-28	15
Foreign investment (including Portfolio)	0	2	-120	221
World Bank program				
Commitments	202	415	460	646
Disbursements	88	348	299	373
Principal repayments	0	9	59	65
Net flows	88	339	241	308
Interest payments	7	31	44	47
Net transfers	81	308	196	261



Annex 11
Bangladesh
Fourth Fisheries Project
Environmental Impact Assessment

IDA concluded that the project is an Environmental Category B project since the project components were found to have relatively limited environmental impact potential; and for those adverse impacts which could potentially occur, there exists reasonably straightforward and understood mitigation measures which could be applied. The Category B designation was in part derived from several studies including: (a) a detailed Environmental Assessment¹⁸ (EA) of the Fisheries Sector in Bangladesh, including all of the proposed project components; (b) a study¹⁹ of the potential disease risks to fisheries and aquaculture in Bangladesh, including those that could result from the proposed project; and (c) an evaluation and design of a Global Environmental Facility (GEF)-assisted program²⁰ to formulate an action plan to conserve aquatic biodiversity and to assemble an aquatic species/ecology database for Bangladesh. The reports from these studies are in the project file. All of these studies built upon the knowledge gained in the prior three IDA-assisted operations²¹ and other fisheries and aquatic resources studies. In addition, four regional and one national workshops were held in December 1997 to review and comment on the findings in the EA.

Based on the findings and experience from the above noted studies and operations, the project was designed to contribute to the conservation of aquatic resources while concurrently contributing to the base knowledge required for optimal management of these resources, including sustainable production from inland fisheries. Accordingly, the improvement in sustainable management of the aquatic environment and fisheries in Bangladesh is one of the major objectives of the project, and the project design has been formulated to achieve this objective to the degree possible. It would further strengthen the institutional capacity of the Department of Fisheries(DOF), the Bangladesh Water Development Board (BWDP), and the Local Government Engineering Department to conserve aquatic biodiversity and improve fish productivity in their respective management, extension, training, and civil works activities, through training officers and providing consultant technical assistance via the GEF supported activities.

The EA made specific recommendations on how to minimize the chance that the project components would cause any major adverse environmental impacts that cannot be mitigated in the project design. The project activities would not impact upon critical natural habitats in the project area.

¹⁸ Annex 9: Environmental Assessment. December 1997. Fourth Fisheries Project Preparation. Global Aquatic Corporation Pty Ltd, Sidney Australia and Institute of Marine Sciences, Chittagong University, Chittagong, Bangladesh.

¹⁹ Report on Aquatic Animal Health Management. July 1998. Bangladesh: Proposed Fourth Fisheries Project. Fisheries Department. Food and Agriculture Organization of the United Nations. Rome, Italy

²⁰ GEF Project Concept Document for Aquatic Biodiversity Conservation in Bangladesh. November 1998.

²¹ The Oxbow Lake Project, the Shrimp Culture Project, and the Third Fisheries Project.

Project Setting

Bangladesh's major land forms have been characterized as floodplain areas (80%), hilly areas (12%) and terraced areas (8%) across its 14.8 million ha. Of this 9.5 million ha are used for agriculture (64%), 6 million ha are seasonally flooded to over 30 cm. The floodplain soils are comprised of deltaic deposits from the Jamuna, Padma, and Megna Rivers. The climate is sub-tropical characterized by a west monsoon from May to the end of September and dry northeast wind from November to mid-March. Maximum air temperatures occur in April-May (35-45 degree C) and minimum temperatures occur in December-January (5-12 degrees C). The annual rainfall varies across the country with an average from about 1,200 mm in the west to 6,000 mm in the northeast with maximum reported rainfall of up to 13,000 mm in some eastern areas. The country is also affected by pre- and post-monsoon cyclonic storms.

Bangladesh is endowed with vast fish resources. The total fish production of the country is about 1.3 million metric tons out of which inland fisheries contribute almost 80% (0.99 million metric tons). About 12 million people depend directly or indirectly on inland fisheries. Fish and fisheries provide 60% of the national protein, 8% of export earnings, and 3% of GDP. The importance of fisheries in Bangladesh is clearly very large, and given its strategic importance for food security and national development, the fisheries sector has received considerable attention. Since independence, the Department of Fisheries (DOF) has implemented a series of development projects with the assistance of various donors, aimed at supporting the fisheries sector while increasing the incomes of poor people.

Freshwater biodiversity, however, has been substantially impacted because of the high population densities throughout the country, pollution, and the heavy exploitation of inland fish resources. In addition, many natural freshwater habitats, ecological processes, and hydrological cycles have been altered through interference of the large-scale engineering works for agriculture, flood control, and road projects.

The project would be implemented at selected sites throughout the country.

Potential Impacts, Prevention, Monitoring and Mitigation

There are no potential significant adverse environmental impacts that could occur as a result of the proposed project. With proper implementation per the project design, the components would all either have a benign or a beneficial impact on the environment. The components to be closely monitored are some of the inland open-water fisheries management sub-components, coastal shrimp aquaculture, and freshwater aquaculture extension and training. The specific environmental aspects are discussed below.

Inland Open Water Fisheries Management. The main environmental aspects for this component pertain to the stocking of floodplains and sanctuaries with fingerlings. The issues pertain to the following:

- (a) possible adverse impacts on indigenous biodiversity due to the potential introduction of exotic species;
- (b) potential adverse impacts upon non-stocked species due to introduction of large numbers of the few stocked species released in open waters;
- (c) potential adverse impacts on genetic diversity of stocked indigenous species due to introduction of large numbers of hatchery-produced fingerlings derived from a limited gene pool;
- (d) possibilities of pathogen transmission to wild stocks due to stocking of diseased fingerlings; and
- (e) potential change in hydrology within polders in which fish passes, fish friendly regulators, and habitat restoration would be established.

Otherwise, the sanctuary establishment, fish pass construction and operation of fish friendly regulators, and habitat restoration activities proposed under the inland open water fisheries management component would have clear beneficial impacts on aquatic biodiversity in the areas taken up under the project. They would

provide and re-open migration routes between rivers, canals, and floodplains and would create protected habitats for aquatic species spawning and nurturing of juveniles. The proposed *Hilsa* Management sub-component under the Aquatic Resources Development, Management, and Conservation Studies (ARDMCS) component would also work toward the improved management of the *hilsa* and other aquatic species in the Megna River, by limiting the fishing gear to non-destructive types. The impact of the program would also be monitored under the ARDMCS. The ARDMCS would be supported by the GEF under the project.

Stocking of Exotic Species. The project would not support stocking of exotic fish species in open inland waters during the first two years of the project. The project would only support the stocking of the native *ruhi* (*Labeo rohita*), the *catla* (*Catla catla*), and the *mrigal* (*Cirrhinus mrigala*) during the initial two years. A study will be conducted during that time period to determine whether the introduction of exotic species in large numbers in inland open waters would pose a danger to aquatic biodiversity. For context, many exotic fish species have been and are used in aquaculture and open water fisheries enhancement programs, since at least the 1960s. Many fish over the years have been stocked in aquaculture ponds and often during seasonal floods and especially extraordinary flood years when many escape into the wild. The inland waters of Bangladesh are thus highly perturbed from the standpoint of the introduction of exotics. Nevertheless, a cautionary approach is being taken until it is determined from available data and studies that the introduction of exotic species does not cause a significant adverse incremental impact to Bangladesh waters. Should a decision be reached that the experience shows that the incremental impact of introducing exotic species would be negligible in the context of Bangladesh's inland waters and that individual communities would desire to stock them on a pilot basis, the project's ARDMCS would quantitatively monitor and verify whether the assumptions were correct. The main species that would be considered would be the common carp that is currently cultured in many areas of the country. Adjustments would be made to the stocking program based on the findings of this study.

Stocked Fish Species Impact on Non-stocked Species. Under the project, as noted above, fingerlings of indigenous species would be stocked in inland floodplain waters. The concern about this activity is that with the stocking of large numbers of fingerlings of the commercial species noted above, this stocking could cause an adverse impact to the other non-stocked species many of which are caught and consumed by subsistence fishers. Under the Third Fisheries Project (TFP), it was found that the stocking of commercial species resulted in significant increases in production of stocked and non-stocked species. The apparent reason for this was that, with the stocking program, the Fish Conservation Act that restricts the catch of the stocked fingerlings (below 23 cm) also had a spillover effect on the non-stocked species. The effect was that all species were able to grow to larger size and also increased their rates of survival early in the floodplain fisheries production season. Although this was not quantified on a species-by-species basis under the TFP, under the ARDMCS component of the proposed Fourth Fisheries Project (FFP), monitoring would be done to assess the impacts of stocking on aquatic biodiversity and productivity on a species-by-species basis. Also, by shifting from an annual leasing system of key fishing areas (*jalmohals*) to a gear-based licensing system, the fishing community apparently better managed the fishery due to elimination of the incentive under the leasing system to overexploit the resource each year. Also, under the proposed FFP, since the community would be directly involved in managing and paying for the stocking activities as demonstrated under the TFP, the communities would have a greater interest in optimizing fish production on a long-term basis, since the licensing system would be established for seven-year periods. Subject to review, it could be extended in future by seven-year increments. All of the above would in part be the prerequisites for the project to assist with the stocking program.

Genetic Diversity. Concern has been expressed over potential adverse impacts to the genetic diversity of the indigenous species stocked in open waters. The specific issue is that the stocked fingerlings are derived from a relatively small gene pool of the parent brood stock used in hatcheries. The numbers of fingerlings stocked that are not caught and survive to breeding size could cause a narrowing of the genetic diversity of

future generations. The concern is predicated on the assumption that the wild fish populations have been so decimated that the stocked fingerlings would result in being a significant portion of their respective populations. There is no evidence that this occurred in Bangladesh as a result of earlier stocking programs. Nevertheless, a comprehensive monitoring program under ARDMCS that would include genetic mapping of the species stocked and those subsequently caught, particularly at the end of the dry season to determine whether the genetic diversity of the surviving population is narrowed. In addition, it would be encouraged under the project that the seed for fingerlings stocked be derived from hatcheries that collect their brood stock from the wild rather than using the same parent fish for several years.

Disease Transmission. Concern has been raised over the possibility that diseased fingerlings that are released could spread disease to other wild fish in the vicinity. One particular disease, Epizootic Ulcerative Syndrome (EUS) could be spread in this manner; however, FAO has determined that it is highly unlikely that this particular disease could be spread in this manner. Nevertheless, it is possible that a hatchery or fingerling rearing farm could be a point source of disease. If disease were to be introduced in this manner, it would not only affect the non-stocked fishes but also the stocked fishes as well. This would be of serious concern to the communities investing in the stocking program. The project would provide training in and support for disease diagnosis to DOF officers, NGO staff, and community members involved in the stocking activities. All fingerlings would be screened in advance of stocking. Fish disease in selected stocked and non-stocked floodplains would be monitored under the ARDMCS.

Changes in Hydrology. With the installation of fish passes and fish friendly regulators and the restoration of aquatic habitats, the hydrological condition may be changed to some degree over the current situation. All of these interventions would increase the amount and duration of water flow into the embanked flood control areas, allowing fish to migrate in and out of the embanked areas. These measures would also return these areas to the more natural condition prior to the construction of the flood control embankments or silting up of channels, and increase the aquatic biodiversity and productivity in the affected areas, as demonstrated under on-going pilot operations (FAP 6 and 20, and Center for Natural Resources Studies (CNRS)/Ford Foundation). This could affect the areas presently under agriculture by causing somewhat earlier flooding and possibly earlier drainage. To mitigate the possibility of this being considered objectionable to the affected people, each intervention would be discussed with the potentially affected communities (fishers and farmers) to gain understanding on whether these activities would be welcome. This would further be affirmed by each community's willingness and commitment to contribute to the operation and maintenance costs of their respective sub-component(s).

Coastal Shrimp Aquaculture. Several environmental issues specifically pertain to shrimp farming under the conditions of coastal Bangladesh. The project areas (polders) that would be developed under the project at present all have shrimp farming practiced on a seasonal basis alternating with rice (southwest) and or salt (southeast). No new areas would be developed under the project, for the purpose of the project is to improve the productive and environmental management of shrimp farming at the selected sites. All shrimp farming activities would be the improved extensive type with gross production generally not expected to exceed 400 kg-shrimp/ha/yr. Therefore, only areas would be developed that presently have seasonal fluctuations in salinity and where shrimp farming would not have any incremental impacts on cattle rearing, agriculture, tree crops, or drinking water supplies. In addition, the project would finance the completion and new construction, as needed, of BWDB approved sluice gates for water intake in the shrimp farming areas to replace the existing farmers' illegal cuts through embankments which weaken the storm protection capacity of the embankments. It is important to note that prior to the construction of the embankments, the enclosed areas had been under a seasonal salinity fluctuation with near freshwater conditions during the rainy season and brackish water conditions during the dry season. The storm protection embankments created a year round freshwater environment, having eliminated the seasonal brackish water habitat for the nurturing of larvae that require shallows with this salinity. The project to some degree would re-establish the more natural conditions. The engineering would also assure that more

farmers culturing shrimp away from the perimeter of the polders would also have better access to brackish water.

The environmental issues that the project would address and resolve are that:

- (a) the shrimp culture period does not extend into the rice growing period reducing the time needed for paddy to mature; and
- (b) the collection of wild shrimp seed is done as efficiently as possible to reduce the fishing pressure on shrimp larvae and to reduce the adverse impact of the present collecting practices on other larvae.

Growing Period. Under the project, development would only take place in blocks where at least 80% of the land-owning farmers agree to covering the operation and maintenance costs of the sluice gates serving their respective block. These land owners are all involved in rice cultivation which would help assure that the shrimp farming period does not extend into the rice growing season. In the past, many farmers leased their land to outsiders during the shrimp growing period, and these lessees, much wealthier individuals, would not relinquish the leased areas in a timely manner due to their desire to grow the shrimp as large as possible. This created conflicts between the land owners and the lessees and among the land owners themselves.

Shrimp Seed Collection. A major issue concerning shrimp farming is the supply of shrimp seed in Bangladesh. Due to adverse conditions (low seasonal temperature and salinity) for cost-effective brackish water shrimp hatchery development, few hatcheries have come into operation; and most farmers are dependent upon seed collected from the wild by about 300,000 shrimp seed collectors. Under the project, two activities would address this issue. The first would be a component for training about 29,500 shrimp seed collectors in improved collection methods that minimize the harm to the shrimp seed itself and to the larvae of other species. In addition, training would be provided to about 500 shrimp seed traders on the best method for transport of shrimp seed to farmers, assuring better survival. The second aspect would be a study under the ARDMCS to assess what impact the shrimp seed collection activities has on aquatic biodiversity in coastal areas and whether the improved collection methods would better conserve biodiversity. On this aspect, there is an assumption based on the high intensity of seed collection that the shrimp seed collection activity is highly destructive to aquatic biodiversity. The results of the study would also suggest means to reduce the impacts.

Freshwater Aquaculture Extension and Training. The issues pertaining to the intensification freshwater aquaculture are similar to those for open water stocking, particularly concerning (a) the escape of exotic species, plus the potential pollution that could result from pond effluents. Intensification of fish culture (b) in ponds can also increase their level of eutrophication, making the water less usable for washing of clothes and dishes or in some cases for drinking purposes. Another recently identified issue in the country, has been the identification of high concentrations of arsenic (c) in groundwater which could possibly bio-accumulate in fish. Generally, the result of project activities would have virtually no incremental adverse environmental impacts, since aquaculture is practiced in ponds throughout the country.

Escape of Fish. The escape of exotic or indigenous species from fish ponds would be an unusual occurrence, for ponds are designed under average flooding conditions to retain the fish. Otherwise, frequent (annual) losses would make them financially non-viable.

Water Quality. As part of the extension and training activities under this component, farmers would be informed of the potential environmental impacts that intensification of fish culture in ponds can have. Concerning the increased eutrophication, this can also be a benefit, for if crops grown beside the ponds are irrigated with fertile ponds water, the plants would get the added benefit of these nutrients for their growth.

Arsenic. Fish ponds in Bangladesh are rarely filled using groundwater. They are mostly filled with seasonal rain water and are dug sufficiently deep to have adequate depth through the dry season for year round fish growth. Farmers would be informed not to use groundwater for filling or topping off ponds unless the groundwater is tested to have safe levels of arsenic for fish culture purposes or it is determined that arsenic accumulation in fish under the aquaculture methods practiced in Bangladesh is not a concern.

Institutional Arrangements

It would further strengthen the institutional capacity of the Department of Fisheries, the Bangladesh Water Development Board (BWDP), and Department of Local Governments and Rural Development to conserve aquatic biodiversity and improve fish productivity in their respective management, extension, training, and civil works activities. These agencies are relatively weak in their knowledge of and capacity to design projects to conserve aquatic biodiversity and sustain concurrently increase and sustain fisheries productivity. Accordingly, the proposed institutional and implementation arrangements for the environmental aspects of the project can be found in item 4 of Section C of this PAD. The institutional strengthening would be achieved through training officers in the respective agencies and providing consultant technical assistance via the GEF supported activities. The technical assistance would be provided by teams of expatriate and national consultants who would directly provide and train officers in the above agencies, NGOs, and project beneficiaries. The technical consultants directly involved in environmental monitoring and assessment would include three expatriate consultants [an Aquatic Biodiversity Specialist (inland), an Aquatic Biodiversity Specialist (coastal), and a Genetic Diversity Specialist] and three national Aquatic Biodiversity Specialists assessing impacts of shrimp seed collection on coastal aquatic biodiversity, habitat restoration and fish pass developments, and hilsa conservation and management. The national specialists would be recruited for the full five-year project period and would be supported under the GEF component. The expatriate Aquatic Biodiversity Specialist (inland), Aquatic Biodiversity Specialist (coastal), and Genetic Diversity Specialist would be recruited for 60, 12, and 36 man-months, respectively. They would also be required to conduct training courses in the country with the assistance of the DFID-supported Training Specialist. The respective TORs of the above consultants can be found Annex – of Project Implementation Plan. The various specialists would be supported by enumerators.

Annex 12
Bangladesh
Fourth Fisheries Project
Social Assessment

Introduction

One of the special emphases of the proposed project is rural poverty alleviation. However, experience with earlier projects, in particular Third Fisheries Project (TFP), shows that increased production alone does not necessarily guarantee a reduction in poverty, and equity aspects of increased production need to be addressed. The various negative trends identified have to be addressed simultaneously. By itself, the management of fisheries exploitation may increase poverty if alternatives are not made available to poor resource-users. The positive effects of management on the resource may be limited if those resources, and their habitat, are not rehabilitated at the same time. Enhancement of the resource to compensate the effects of overexploitation may also have little poverty impact if access and control of resources for the poor are not assured. On the other hand, "too much" access can lead to overexploitation again if appropriate controls on fishing effort are not introduced. Management may mean changing patterns of resource control that may, in turn, require an amenable policy environment and adequate management capabilities among the people and institutions concerned. The earlier experience also shows that proper management of fisheries resources in Bangladesh does not lie in the technical, administrative, and financial/economic areas alone. Equally important are cultural, institutional and social aspects, especially as they relate to the cultural/social--as well as legal--bases for granting access to, and use rights to, natural resources. Thus, the project design puts a great deal of emphasis on access to productive resources by the poor, including institutionalizing community-based management of these resources.

The project's social development goals would be achieved through targeted activities in the individual components. Project design, implementation, and operation would follow a collaborative management (also referred to as co-management) system that integrates all key stakeholders in the project. This Annex presents and discusses social assessment under the following headings: background, objectives, methods, findings, and recommendations. Specifically, the Collaborative Management Model is presented and discussed under the heading methods.

Background: A Framework for Social Assessment

Social assessment provides a framework for incorporating social analysis and participation into the design and delivery of the project. As a process it provides an integrated and participatory framework for prioritizing, gathering, analyzing, and using operationally relevant social information. Social assessment would serve several purposes in the project: (i) identification of key stakeholders, and establishing a framework for their participation in project design and implementation; (ii) ensuring that project objectives and incentives for change are acceptable to the range of people intended to benefit, and that key social differences are reflected in design of the project; (iii) assessing the social impact of the project and, in the case of adverse impacts, determining how they can be overcome or at least mitigated; and, (iv) developing capacity at the appropriate level to enable participation, resolve conflict, permit service delivery, and carry out necessary mitigation measures. The framework for social assessment in the proposed project serves two functions: firstly, social assessment was used as a guidance into project preparation and, secondly, throughout project implementation it will become part of an ongoing process of monitoring and evaluation.

Social Factors. Information was collected on a number of factors in the project areas to do a social analysis and to assist in project design. The information collected included: (i) *demographic factors*, including number of people, location, and population densities; (ii) *social diversity*, that is, access to power and resources as influenced by, for example gender, social status (resulting from differences in class,

religion and caste), and geographic location; (iii) *socio-economic determinants*, that is, factors that affect incomes and productivity such as risk aversion, land tenure, access to productive inputs and markets, and family composition and access to wage opportunities; (iv) *social organization*, that is, social organization at the household and community level affects participation in local level institutions and access to services; (v) *socio-political context*, that is, the socio-political context may affect development goals, control over resources, the priorities of implementing agencies, and commitment to project objectives; and, (vi) *needs and values*, that is, development interventions will be adopted if they are needed and wanted and consistent with beneficiary and stakeholder attitudes and values, or, where conflicts exist, if adequate mechanisms are put in place to promote awareness and provide incentives for change.

Stakeholders. There are several categories of stakeholders in the project, including the Government of Bangladesh (GOB), Department of Fisheries (DOF), non-governmental organizations (NGOs), the private sector and the rural fishing communities in the project area. In the latter category the proposed project distinguishes between beneficiaries, that is, people active in fishing in one capacity or another, and affected groups, who may not be beneficiaries but may be affected in one way or another. The latter sub-category will include the poor and the landless, and women and children.

Social assessment was carried out as part of the project preparation process, with the assistance of local and international consultants funded by a Japanese PHRD grant and DFID. Social assessment methods used during project preparation included: field visits, participatory observation, open-ended interviews, and desk reviews. The social assessment process and findings were based on work done for TFP, and also included experiences from projects implemented by other donors, including Asian Development Bank. Social assessment will be ongoing throughout the project.

As part of the ongoing social assessment during implementation, further data collection methods, including quantitative ones, would be utilized.

Objectives

One of the lessons from past fisheries projects in Bangladesh is that the full participation of all principal stakeholders at all stages is critical in developing successful fisheries management and development programs. There has been extensive consultation, collaboration, and information sharing between DOF and other government ministries and agencies, beneficiaries/community groups, private sector, NGOs, academic institutions, and donor agencies during the identification and preparation of the project. A series of participatory workshops that included all categories of stakeholders have been conducted at the local, thana, district, divisional, and national levels to share information with key stakeholders and to seek their views on project design.

The project is also designed in a way that would ensure that primary stakeholders/resource-users play a central role in identifying, planning and implementing management solutions and in monitoring the distribution of benefits that they might generate. In some cases this might mean the development of new local-level institutions (such as Beel Management Committees in the context of TFP) to manage a particular resource or group of resources and bring together concerned stakeholders. In other cases, existing local institutions, whether formal or informal, may already exist and be able to play key roles. The project design therefore pays particular attention to the inclusion and representation of vulnerable groups, such as the very poor and women, to ensure that their concerns are accommodated and that they share in the benefits generated by improved management.

The proposed project recognizes that management measures aiming at improving the sustainability of open-water fisheries will almost always have some costs for some people. These costs may be particularly heavy for poor rural fishers or other groups dependent on fisheries resources. This makes it particularly important

that consensus on management priorities be achieved and the mechanisms for bearing and mitigating costs set up to ensure that the needs of the poor are addressed. This highlights the importance of full stakeholder participation at all stages of the process. All stakeholders need to see the process of open-water management as a process where they work together with outside agencies to achieve goals that they have set for themselves.

Methods: The Collaborative Management System

A collaborative management (also referred to as co-management) system would be the key tool for project delivery. This system would integrate all key stakeholders in the project in relationships that are based upon an assessment of comparative advantages. There are three fundamental relationships in the system: (i) internal to the community; (ii) between the community and a local agent, usually an NGO; and, (iii) between the community and/or the NGO on the one hand, and the regional and national levels on the other hand. These relationships would consist of different kinds of resources that would flow one way or both ways, including: knowledge, information, funds, training, etc.

This system can build upon local values and institutional mechanisms to some extent. The experience that will guide in its construction are mostly new, and would come from, e.g., TFP as well as ongoing experiences by NGOs. The general collaborative management model, applicable to all the project's components, consist of different categories of stakeholders that are linked horizontally and vertically. The relationships between the key stakeholders are outlined and discussed below.

Local Level, Horizontal Relationships Internal to the Community. The horizontal aspect of the collaborative management system consists of relationships between people on the local level, as well as institutional mechanisms. As far as this aspect of the collaborative management system is concerned, some cultural values may come into play to the extent that they will support the system. This will, in particular, be the case within communities. Given that bona fide members of the collaborative management system on the local level will be fishermen, it is not likely that there will be large internal differences in socio-economic standing and status. The proposed Beel Management Committees (BMC) are a case in point of local management to be established that, in this way, might build upon and benefit from local values and practices. Given that the project would be operating in a situation with large differences between resource availability and needs, chances for conflict between socio-economic strata, along lines of caste, gender or religion, within or between communities, is a calculated risk. For example, the emphasis of involving women in fisheries related activities will, in the context of Bengali culture, not be able to build upon traditional values, and the potential for conflict within communities and/or between gender needs to be given attention. The project would, in close collaboration with the selected local-level NGOs, raise the awareness of the potential for, or likely implications of, involving women as direct beneficiaries. Furthermore, the gender aspects of project delivery would be specifically targeted in the ongoing social assessment during implementation.

Local Level, Horizontal Relationships Involving the Community. Extending the collaborative management system to include the relations between community organizations like, e.g. the BMCs, on the one hand, and NGOs on the other hand, there are few if any cultural precedents that can guide the content and function of this relationship. There is, however, a wealth of experiences accumulated over the last 2-3 decades by NGOs working on the local level, and this is beginning to yield clear conclusions as to what works - and why, as well as what doesn't work - and why. However, this wealth of experience is largely confined to the agricultural sector. Applied and local level work with fishing communities is fairly recent, and the experiences from this work are still emerging.

Regional/national Level, Vertical Relationships. This would include vertical relationships between local fishing communities and local (regional) NGOs on the one hand, and the nation state on the other hand.

The latter will be represented primarily by DOF (whether directly or through their regional offices), but also MOFL and MOL, and supported by donors. As a result of experiences in TFP, individual NGOs selected to work in the project will relate directly to DOF, as opposed to through an intermediary link. Beyond the individual community, an effort will be made to ensure that communities and NGOs in different localities, water bodies and regions can communicate and exchange experiences.

Monitoring Indicators. Monitoring indicators would include: (i) access to increased fish production, (ii) degree of sustaining community-based management institutions; (iii) effectiveness of local NGOs in collaborating with fishermen; (iv) increased rural employment opportunities; and (v) increased income in fishermen households.

Findings: Social Issues in the Project Components

Various components of the project have been assessed with regard to their likely social impact, both positive and negative. Results of the social assessment are summarized below.

Component 1: Open-Water Fisheries Management

The overall strategy for inland open-water fisheries management provides the local fishing communities with a variety of options to address the problems facing the sub-sector through different management measures consisting of stocking, habitat restoration, establishment of fish sanctuaries, construction of fish passes or a combination of these options. The unifying feature of these interventions would be the central role of communities in determining the appropriateness of different management measures and the subsequent assumption of responsibility for their management and, eventually, their costs. The communities, with technical guidance from the DOF, Bangladesh Water Development Board (BWDB), and Local Government Engineering Department (LGED) and NGO assistance on social issues, would be allowed to choose which of these options or combination of options is most appropriate for their circumstances. The communities would be fully involved not only in the selection of options, but also in their design and implementation.

Fisheries Stock Enhancement. TFP experience shows that stocking of floodplains with fingerlings can have a combination of positive and negative impacts, especially on the poorer resource users. The nature of the impact depends on a complex interplay of factors in which social and management aspects are clearly of paramount importance. Given this experience, the proposed project places emphasis on the development of appropriate management mechanisms at the community level. The stocking density and the species composition would largely be decided by the community. In the context of inland open-water fisheries management, the community is made up of a group of direct resource users and a series of other stakeholders who have a more indirect interest in the resource. In Bangladesh, the resource users are a diverse group with quite different sets of interests and priorities. For example, traditional fishermen have different concerns and patterns of use to occasional fishers. Both may be poor, but their way of using the resource is different and fingerling stocking would have different impacts on them. *Kua* (pits dug in the floodplains where fish tends to congregate as flood water recedes at the end of the monsoon season) owners, farmers, boatmen, and fish traders are all potential stakeholders who may have an interest in stocking. The proposed project takes a community-based management strategy because such a strategy would create a mechanism to accommodate the diverse interests of these groups in the management process.

The emphasis in the fisheries stock enhancement sub-component would be on the smaller water bodies (up to 3,000 ha water area) where fishing communities can be more easily organized into groups to manage project activities, hence ensuring that the benefits are available directly to fishermen and are equitably distributed. The TFP experience also shows that NGOs can play a critical role in helping organize fishing

communities to ensure access to water bodies. Hence an NGO would be recruited to work with each community in advance of the stocking program. The first year's stocked floodplains would largely be selected from those areas stocked under TFP. An NGO would work with each community for at least a period of six months before the stocking program starts. For new floodplains, a full year's monitoring and NGO assistance would need to be conducted and provided, respectively, in advance of stocking.

Habitat Restoration. Project design provides for creating mechanisms beforehand in communities to resolve possible conflicts that may arise from attempts to restore fish habitat. For example, people growing crops in silted up *beels* and canals may be negatively affected by the re-excavation program and they would need to be compensated in some way even though the re-excavation would be on *khas* (public) land. How this should be done would be negotiated at the community level, provided that strong management mechanisms are in place, where all stakeholders are represented and involved. As in the case of floodplain stocking, an NGO would be required to be present in the area to establish if there is community support for and willingness to participate in the activity. This component (like fish passes, see below) which would promote the in-migration of fish would increase the proportion of smaller fish sizes, to the benefit of subsistence fishermen. Re-excavation of canal and *beels* would also provide an important source of income for groups of targeted poor, including women, who are usually employed in earthworks.

Fish Passes and Fish Friendly Regulators. The site selection for fish passes and regulators would have to take into account the feasibility of establishing workable management mechanisms. These would have to mediate between the varied, and often conflicting, interests of different water user groups within the command area. A commitment from the community to cover operation and maintenance costs would be a prerequisite for implementation of this component at any particular site. As in the other sub-components of the open-water fisheries component of the project, NGOs would be called upon to work with communities in analyzing options for the water management mechanisms and establishing appropriate committees.

Aquatic Sanctuaries. In view of the economic and social consequences of permanently banning fishing over an extended period of time in large water bodies to be declared aquatic sanctuaries, the serious problems of enforcing such a ban, and the likely sustainability after the credit closes, it was decided to delineate only a portion of the fished area of a particular water body as a sanctuary for the natural spawning and nurturing of fish. This would ease the difficulties of restricting fishing by regulation and of finding alternative livelihoods for the people affected in the reserved area. Protection would be organized and provided on a voluntary basis by local fishermen. Communities would be responsible for managing the sanctuaries. An NGO would be appointed to work with each community in identifying appropriate site and mechanisms for managing the sanctuaries.

Component 2: Coastal Shrimp Aquaculture

Social problems have arisen in shrimp farming where much wealthier individuals, often from outside the local community, attempt to enforce their own priorities for management on local farmers. Land for shrimp culture has, on occasions, been expropriated by such individuals at the expense of small landowners. This has led to smallholders either being excluded from shrimp farming or being unable to practice mixed shrimp and rice farming. There have also been many cases where farmers leased their land to outsiders during the shrimp growing period, and these lessees, much more powerful individuals, would not relinquish the leased areas in a timely manner due to their desire to grow the shrimp as large as possible. This has created conflicts between the land owners and the lessees and among the land owners themselves. The component would aim at addressing, among others, some of the social problems facing this rapidly developing sub-sector and which undermine its sustainability. The thrust in the shrimp development component would be on helping smaller landowners to participate more directly in shrimp farming. Under the project, development would only take place in blocks where at least 80% of the land-owning farmers agree to covering the operation and maintenance costs of the sluice gates serving their respective block.

These land owners are all involved in rice cultivation which would help assure that the shrimp farming period does not extend into the rice growing season.

Brackish water needed for shrimp cultivation, if not properly separated from neighboring fields, can make adjacent paddy fields more saline, in some cases making them unfit for crop production and leading to conflicts between shrimp and rice cultivation. Conversion of reclaimed paddy land to brackish water aquaculture by illegal cutting of embankments has caused violent conflicts over land tenure and use rights in some coastal areas. Proper infrastructure combined with adequate management mechanisms can resolve some of these conflicts and reduce negative social and environmental impacts. Past efforts to do this have often been marred by poor design and construction and a failure to take social and institutional aspects into consideration. The involvement of local resource-users at all stages, both in designing appropriate structures and managing them is critical if the concerns and priorities of all stakeholders are to be accommodated.

The proposed project recognizes that for any intervention to be appropriate, the process would need to be community-led in much the same way that the inland open-water fisheries management component would be community-led. Community consultation and organization with the assistance of an experienced NGO is the foundation upon which this component would be implemented and is based upon prior experience in the sub-sector. Any civil works would be preceded by agreement with the community involving them in the design concepts, site selection, general supervision of implementation work, and operation and maintenance.

The training sub-component for shrimp fry collectors has potential in terms of direct gender impacts. While women would be encouraged to participate as much as possible in all project activities, the component most directly benefiting women would be the training in shrimp fry collection, an activity which provides employment to tens of thousands of poor women in the coastal areas. Because of the limited requirements in terms of skills and equipment required for fry collection, it has attracted the involvement of many poor people for whom it has come to represent either an important supplement to their incomes or their sole source of livelihood. Many women and children are known to be actively involved in fry collection. Unfortunately, despite the scarcity and high price of the product, the catch methods used, inappropriate handling and poor transportation all result in colossal wastage. Promoting more environmentally friendly collection techniques will help to make their livelihoods sustainable. Any work with the fry collector community would have to be initiated by participatory appraisals of the communities involved to identify possible avenues for action to improve shrimp fry collection methods and reduce the damaging effects of the trade. A training program for shrimp fry collectors would be developed, aimed at reducing wastage of both the fry resource and non-target organisms by promoting improved collection, handling and transportation methods for the fry. This training program would be developed in close consultation with concerned agencies working in the area and with experience of the fry collector communities. Care would be taken to identify improved methods that are accessible to poor fry collectors. Where additional expense or effort is required in the use of improved methods, means of encouraging fry collectors to adopt them would need to be developed. These would be discussed and identified in consultation with concerned agencies and the fry collectors themselves.

The expected target population for this training would up to 29,500 post-larvae collectors and 500 post-larvae and prawn fry traders. These would be trained and low cost equipment developed for temporary storage of shrimp post-larvae at the collection centers as well as scientific transportation of the post-larvae to the farming areas.

Component 3: Freshwater Aquaculture Extension and Training

There are usually questions about social impacts of demonstration activities. Experience from aquaculture extension/demonstration programs suggests that ponds tend to be chosen on the basis of those that would produce results. These are usually bigger and better ponds owned by wealthier individuals. The small borrow pits and ditches which are more likely to be available to the poorer people for aquaculture tend to be ignored. Also, the kind of resources and attention devoted to demonstration ponds can rarely be replicated by poorer sections of the community.

Inland freshwater aquaculture often results in social conflicts as a consequence of water becoming unusable for various other purposes due to the use of manure and fertilizers, and non-availability of pond water for other purposes such as irrigation. In the case of *baors*, *beels*, *haors*, and lakes conflicts may arise between farmers and fishermen because the farmers want to drain these water bodies to form agricultural land, or use the water to irrigate land, while the fishermen prefer to keep the water for fishing.

These shortcomings are recognized in the proposed project. The extension component would concentrate on promoting improved practices in smaller ponds (down to 1 *bigha*). For example, the smaller ponds and borrow pits could be used for fingerling production managed by poor people including women. The open-water stock enhancement program would create significant demand for fingerlings which would need, as far as possible, to be met locally. A program of pond-side training for groups of women and men using smaller ponds, pens, and cages could be developed to provide an additional income generation option in the communities. The proposed community approach would assist in resolving some of the social problems, for example, the community agreeing on measures to protect pond water used for domestic purposes.

There are hundreds of university graduates in fisheries and biological field in the country who are unemployed. The component would directly absorb 200 subject-matter specialists. They would be trained and used as extension agents in this component of the project. Increased aquaculture activities are also expected to create job opportunities in the rural areas.

Component 4: Aquatic Resource Development and Conservation Studies

This component is not expected to have any adverse social impacts. The results of the proposed studies would assist in planning the sector's future development. They would be used to develop policy recommendations and prepare strategic and technical action plans. An important tool to be used would be a freshwater biodiversity database to integrate, monitor and manage existing information, plan future activities and prioritize areas for action, assess dynamics and changes in freshwater ecosystems, evaluate and measure impacts on, as well as of, human activities, etc. The information generated would be used to fine-tune project activities during the life of the project, develop new policies, and serve as the basis for future fisheries projects preparation and implementation.

Implementation of a *hilsa* conservation and management plan towards the latter part of the project period, would, however, be expected to create some hardship for those who currently catch juvenile *hilsa* (known as *jatka*). It is estimated that over 3,700 metric tons of *jatka* are being captured illegally by fishermen in violation of the Fish Act. This short-term loss would be more than compensated since it is estimated that if 10% of illegal fishing were stopped, there would be an incremental production of over 23,000 metric tons per year. Since *hilsa* is the single most important fish species in Bangladesh, measures for its sustainable management and conservation are essential.

Component 5: Institutional Support

The two forms of assistance envisaged under this component – activities that are directly necessary to implement the project and activities intended for the long-term institutional strengthening of DOF – are not expected to have adverse social impacts. The preparation of this project recognizes that the skills and type of support needed for community-based fisheries management are quite different from those which DOF is used to handling. The key skills are in social and stakeholder analysis, institutional analysis and reform, consensus building, and conflict management and resolution. Effective implementation of the various project components would require social and economic skills which currently are lacking in DOF. This component would assist DOF in acquiring such skills.

Land Acquisition and Resettlement

Land acquisition needs under the project would be minimal (about 20 ha). Provision has been made in project costing for compensating those whose land may be acquired.

Recommendations

Social assessment should become part of an ongoing process of monitoring and evaluation.

Making necessary adjustments and changes in the course of project implementation is understood as key to achieving optimal results.

Regarding the issue of possible resettlement of families because of the 20 ha that would be acquired, GOB and IDA agreed during negotiations that procedures and guidelines outlined in the social framework would be followed in dealing with resettlement issues. The social framework is included in the PIP.

