

**ASIAN DEVELOPMENT BANK**

**SECTOR SYNTHESIS OF EVALUATION FINDINGS**

**IN THE**

**FISHERIES SECTOR**

**December 1998**

## ABBREVIATIONS

EA	-	executing agency
EIRR	-	economic internal rate of return
FIRR	-	financial internal rate of return
IFFS	-	inland freshwater fisheries station
OCR	-	ordinary capital resources
PCR	-	project completion report
PEO	-	Postevaluation Office
TA	-	technical assistance

## NOTE

In this report, "\$" refers to US dollars.

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## EXECUTIVE SUMMARY

This sector synthesis presents and analyzes the key factors affecting the implementation and performance of Bank-assisted projects in the fisheries sector. As of 30 June 1998, 27 projects in the fisheries sector (17 marine fisheries, 8 aquaculture, and 2 with both marine fisheries and aquaculture components) had been evaluated by the Postevaluation Office (PEO). More than half of these projects had been approved in the 1970s and completed in the 1980s. Only one technical assistance (TA) grant has been evaluated by PEO so far, viz., Fishery and Coastal Marine Resources Management and Development in the East China Sea. In addition, project/program completion reports for ten projects/programs in the fisheries sector that had not been evaluated by PEO were reviewed to find out whether the lessons learned from the PEO-evaluated projects had been considered in formulating/implementing succeeding ones, and to capture the lessons learned from these projects/programs.

Bank operations in the fisheries sector commenced in 1969. As of the end of June 1998, the Bank had extended 58 loans to this sector, totaling \$1.2 billion, to finance 54 projects/programs. The total amount of TA reached \$30.7 million as of 30 June 1998. The majority of the TAs approved were advisory and operational, reflecting the Bank's efforts towards improving technical, managerial, and financial capabilities in the sector.

All of the completed projects/programs (whether evaluated by PEO or not) in the marine fisheries and aquaculture subsectors were aimed at (i) increasing production to meet domestic and export demand, (ii) improving the socioeconomic conditions of fishers and associated workers by increasing employment opportunities and income levels, and (iii) strengthening institutional capacity/infrastructure in the sector.

Most of the PEO-evaluated projects had deficiencies in design that could be traced largely to insufficient preparation and research at the formulation stage. As a result, most underwent changes in design, scope, location, or a combination of these, reflecting some degree of flexibility. Other factors that triggered changes in project scope included (i) insufficient demand; (ii) cost overruns; and (iii) changes in the environment such as political and economic difficulties, demographic/ecological pressures, trend towards fishing away from the shore resulting in the need for larger vessels, and changes in government policies.

All except one PEO-evaluated project in the aquaculture subsector experienced overall implementation delays averaging 2.4 years or a 60 percent delay. In spite of the time overruns, more than three fourths of all the projects registered cost underruns averaging 33 percent, with the aquaculture projects posting an average underrun of 37 percent compared with 10 percent for marine fisheries projects. This was attributed to (i) reduction in project scope, (ii) devaluation of the local currency against the US dollar, (iii) lower level of physical achievements than envisaged at appraisal, (iv) sizable physical and price contingencies at appraisal, and (v) underutilization of credit lines. For six marine fisheries projects, total project costs were higher than expected at appraisal, averaging 31 percent. The causes of such overruns were (i) high inflation rates, (ii) implementation delays, (iii) additional and/or changes in scope and design, (iv) underestimation of costs at appraisal, and (vi) introduction of government taxes.

The physical contribution of the marine fisheries projects ranged from fishing vessels and related gear, refrigerated fish carriers, refrigerated trucks, ice plants, and diesel engines to fishing port and landing facilities as well as cold storage facilities. The aquaculture

projects resulted in fish and shrimp hatcheries, nurseries, ponds, and pens as well as water monitoring stations, rehabilitated canals, and fish inspection centers. These physical achievements were generally below appraisal estimates, as (i) the majority of the PEO-evaluated projects experienced reductions in scope and/or changes in design, (ii) some components were dropped, and (iii) local funds were inadequate. The quality of physical outputs was mixed.

Overall, the performance of most PEO-evaluated projects fell short of appraisal expectations. Of the 27 evaluated projects as of June 1998, one third were rated as generally successful, one third partly successful, and one third unsuccessful. The marine fisheries projects were largely responsible for the low success rate in the sector, with 41 percent rated unsuccessful; five were generally successful, while another five were partly successful. The aquaculture projects performed more favorably, as half of them were generally successful, 38 percent partly successful, and only one project unsuccessful. The two remaining projects, which had both marine fisheries and aquaculture components, had mixed results, one being partly successful and the other unsuccessful. The lone TA that was evaluated by PEO achieved its objectives and was considered generally successful.

While most of the projects approved in the 1970s were unsuccessful, more than 50 percent of those approved during the last decade were generally successful. This suggests that lessons learned from earlier Bank-financed projects were considered in the preparation and implementation of succeeding ones.

The majority of lessons learned from these projects related to project preparation and design. When considering large-scale investments in fishing vessels, biological assessment of the resource potential should be undertaken. Attempts towards more accurate stock assessment should be made, as this will become the main basis for determining the optimum vessel mix. The seasonal and annual distribution of fish resources needs to be sufficiently researched and reliably established. Specifically, uncertainties about average catch rates necessitate the greater use of sensitivity analysis in order to examine the impact of different assumptions of average catch rates on the financial and economic viability of projects. In addition, increasing production should not always be the primary concern in fisheries projects.

When there is (i) insufficient information needed to prepare a project (such as average catch rates and stock assessment), (ii) lack of required skills and experience (such as people who are accustomed to a systematic and regular work effort and the rigors associated with large-scale fishing operations), or (iii) a new concept or approach to be taken (such as a new fishing vessel design), caution should be exercised in formulating and designing a project. A pilot project is preferable in such cases, as this will allow for flexibility, i.e., possible changes in design or scope can be made as necessary. Greater supervisory inputs from the Bank, especially for projects involving the introduction of new technologies, is needed. In addition, the institutional capability of an executing agency should be carefully assessed to ensure that it can effectively carry out its responsibilities. Furthermore, preferences of beneficiaries have to be assessed carefully. Participation and involvement of the private sector should be encouraged, especially in areas where it has a comparative advantage. Moreover, the lending criteria for subloans have to be affordable to subborrowers.

## I. INTRODUCTION

1. This sector synthesis aims to identify and analyze the key factors specifically affecting the implementation and performance of Bank-assisted projects in the fisheries sector. Lessons learned from these projects/programs can in turn be fed back into the project cycle with the objective of improving future projects/programs. This report is a synthesis of evaluation findings and is based on a review of project performance audit reports, impact evaluation studies, country syntheses of evaluation findings, and one technical assistance performance audit report. It takes into account the information and data stored in the Postevaluation Information System. Project/program completion reports (PCRs) were also reviewed to ascertain whether the findings and lessons learned from Bank-assisted projects evaluated by the Postevaluation Office (PEO) had been considered in the formulation/implementation of subsequent ones, and to capture the findings and lessons learned from completed projects/programs that had not been evaluated independently by PEO.

## II. BANK OPERATIONS IN THE SECTOR

2. Bank operations in the fisheries sector commenced in 1969 with a loan to Taipei, China of \$10.0 million from the Bank's ordinary capital resources (OCR). As of 30 June 1998, the Bank had approved 58 loans for a total amount of \$1.2 billion to finance 54 projects/programs in its developing members (Appendix 1). More than half of the total amount of these loans was sourced from the Bank's OCR, although more than half of their number (53 percent) were approved from the Asian Development Fund. While Group A economies received the largest number of loans, Group B accounted for one half of the total amount of Bank lending to the sector, reflecting a relatively bigger average loan size.

3. In addition to these loans, the Bank had also extended technical assistance (TA) grants to the fisheries sector totaling \$30.7 million as of 30 June 1998 (Appendix 1). Reflecting the Bank's efforts towards improving technical, managerial, and financial capabilities in the sector, the majority of the TAs approved (and about 62 percent in terms of amount) during the review period were advisory and operational in nature.

4. A noticeable shift in the Bank's lending operations in the fisheries sector has been observed during the last decade, with increasing focus on policy reform, environmental impact and resource assessment, community and beneficiary participation, and capacity building, as well as research and training. In September 1997, the Bank's *Policy on Fisheries* was published.

## III. PROJECT COVERAGE, OBJECTIVES, AND SCOPE

### A. Coverage

5. As of 30 June 1998, 44 of 54 projects/programs in the sector had been completed, and 27 (61 percent) had been evaluated by PEO (Appendixes 2 and 3). The majority of the PEO-evaluated projects (59 percent) were approved in the 1970s and were completed in the 1980s. Of the \$639.7 million invested in the PEO-evaluated projects, \$322.9 million (51 percent) was financed by the Bank, reflecting its significant role in the development of the fisheries sector in its members. Moreover, for more than a third of the PEO-evaluated projects, it was the Bank's first experience in the sector for a particular member, implying quite a

bit of learning on the part of the Bank in its operations in this sector. Eight of the 27 projects were in the aquaculture subsector, 17 in the marine fisheries subsector, and 2 had both aquaculture and marine fisheries components. So far, only one TA (Fishery and Coastal Marine Resources Management and Development in the East China Sea) in the sector has been evaluated by PEO.

6. Of the nine completed projects and one completed program loan that have not been evaluated by PEO, five were in marine fisheries and three in aquaculture, while two had both marine fisheries and aquaculture components. These projects/programs, which were approved mostly during the latter half of the 1980s and early 1990s, were completed in the 1990s. Total investment costs<sup>1</sup> amounted to \$181.4 million, of which \$102.4 million (56 percent) was financed by the Bank.

## **B. Objectives and Scope**

7. All of the completed projects/programs (whether evaluated by PEO or not) in the marine fisheries and the aquaculture subsectors were aimed at (i) increasing production to meet both domestic and export demand (and thus to increase local consumption of animal protein and maintain if not generate additional foreign exchange earnings); (ii) improving the socioeconomic conditions of fishers and associated workers by increasing employment opportunities and income levels; and (iii) strengthening the institutional capacity/infrastructure in the sector. In addition, projects/programs that have not been evaluated focused on the need to (i) rehabilitate coastal fisheries resources; (ii) improve fisheries support services such as research and development, training, and extension; and (iii) develop/promote private sector involvement.

8. In the marine fisheries subsector, these objectives were to be achieved through the acquisition and modernization of fishing vessels, gear, and equipment, as well as through support for postharvest facilities and other related infrastructure, establishment of artificial reefs, provision of training and consulting services, and improvement of extension services. Some of these projects also included a credit component. The scope of the aquaculture projects included (i) construction/expansion/upgrading of ponds and hatcheries/nurseries plus related infrastructure; (ii) extension, research, and training programs as well as consulting services; and (iii) provision of credit.

## **IV. EVALUATION**

### **A. Quality at Entry**

#### **1. Project Design**

9. Most of the PEO-evaluated projects had deficiencies in design that could be traced largely to insufficient preparation and research at the formulation stage. Specifically for aquaculture projects, the digging of new ponds and construction of hatcheries and nurseries

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<sup>1</sup> Project cost data were available for nine of the ten completed projects/programs.

encountered numerous problems, as these were based on substandard technical criteria. For example, the shrimp culture pilot farm component of the Aquaculture Development Project in Pakistan had suboptimal soil quality and insufficient fresh and salt water for flushing and regulating salinity. In addition, adoption of a standard model proved to be dangerous, especially when such a model was not applicable in its entirety. In the case of the Brackishwater Shrimp Culture Development Project in Thailand, the design of the hatcheries, selection of unit sizes, and materials used were based on a "standard shrimp hatchery model" that was inherited from the Bank's earlier Aquaculture Development Project in the same country. The adoption of this model resulted in overlooking industry innovations and led to overdesign and to uncompetitive production costs and selling prices for shrimp fry; nonetheless, these design deficiencies were rectified in time, and overall project performance was rated as generally successful at postevaluation.

10. For marine fisheries, a number of projects suffered from inadequate assessment of resources during project preparation. Although difficult to do because of the open access nature of most marine fisheries resources, a careful assessment is needed to arrive at the appropriate level and mix of vessels. This would avoid forcing vessels to fish in waters different than anticipated at appraisal due to lack of fisheries resources. This was the case in the Riau Fisheries Development Project and the Irian Jaya Fisheries Project (both in Indonesia), among others. In the case of the Fisheries Development Project in Pakistan vessels trawled in waters within their capability, but catch rates were low.

11. A number of design deficiencies applicable to both marine fisheries and aquaculture projects were identified. Some projects involved new technology or approaches (such as the introduction of integrated farming under the Aquaculture Development Project in Thailand, skipjack fishing under the Fisheries Development Project in the Republic of Korea, and the construction of vessels with unproven design under the Fisheries Development Project in Solomon Islands). Considering that these approaches/technologies had not yet been tried, a pilot scheme could have been more appropriate than a full project. This would have allowed for the expansion of the project in stages, as experience unfolded.

12. A good point in the design of the Laguna de Bay Fish Pen Development Project in the Philippines (although rated unsuccessful at postevaluation) was that the executing agency (EA) was provided with the flexibility to select the best mix of pen sizes after initial testing in demonstration modules.

## **2. Borrower/Beneficiary Participation and Ownership**

13. In the Laguna de Bay Fish Pen Development Project, the unfamiliarity of extension officers with engineering principles resulted in poor advice on design and construction aspects given to farmers. A shortcoming in the design of some of the PEO-evaluated projects in both the marine and aquaculture subsectors was the lack of beneficiary participation. Preferences of beneficiaries have to be factored into the design of fishing vessels so as to ensure acceptability of the project as well as its appropriateness under prevailing conditions. The design of a credit component likewise has to consider the socioeconomic conditions of the subborrowers, i.e., their preferences and ability to meet the lending criteria. Otherwise, credit utilization will be very low if not nil, as in the case of the Brackishwater Aquaculture Development Project in Indonesia and the Baluchistan Fisheries Development Project in Pakistan.

## **B. Implementation Experience**

### **1. Implementation Period**

14. All except one PEO-evaluated project in the aquaculture subsector experienced overall implementation delays. The average delay was recorded at 2.4 years (60 percent) (Appendix 4), with projects in Indonesia posting both the shortest (0.3 year or 12 percent in the case of the Irian Jaya Fisheries Development Project) and longest (6.5 years or 241 percent in the case of the Java Fisheries Project) delays. Some such delays can be traced to the unsatisfactory performance of boatyards, which resulted not only in construction delays, but also in substandard vessels.

15. The Aquaculture Development Project in the Philippines was the only PEO-evaluated project completed ahead of schedule (six months prior to the appraisal target). Although implementation slowed for a number of reasons including typhoons and political uncertainty in 1986, the project was completed earlier than expected as a result of a strong organizational start and a substantial reduction in scope (with actual project cost at \$6.4 million compared with \$36.4 million at appraisal).

16. Most of the projects/programs not evaluated by PEO likewise experienced overall implementation delays, except for one that had both marine and aquaculture components. For the aquaculture projects, longer than expected implementation periods were a result of delays in land acquisition. Another contributing factor common to both marine fisheries and aquaculture projects was changes in the project environment, including outbreaks of fish/shrimp diseases.

17. The Second Fisheries Industries Credit Project in Indonesia (not evaluated by PEO) was completed slightly ahead of schedule. It was envisaged to provide credit to finance both the direct and indirect foreign exchange requirements of eligible small and medium fishery enterprises. However, it was underutilized, as it was characterized by low subloan commitments vis-à-vis subloan cancellations. This was attributed partly to the reluctance of participating banks to lend to the fisheries sector, as developments at that time increased the risks in the sector.

### **2. Bank Supervision**

18. The effectiveness of Bank supervision varied among the PEO-evaluated projects, although it was assessed as generally satisfactory for most. The Bank's involvement facilitated implementation of some projects. For instance, in the Aquaculture Development Project in Thailand, potential problems of deteriorating water quality were consistently reported by review missions, and corrective action was initiated to monitor the problem. Under the Aquaculture Development Project in Sri Lanka, although inadequate Bank supervision was noted during the first three years, an improvement was observed during the later years, particularly in 1990, when the Bank responded promptly to the Government's unexpected change in policy of withdrawing support from all inland fisheries activities. On the other hand, the Fisheries Development Project in Bangladesh experienced review missions that did not

address fundamental issues and did not recognize the EA's inability to increase fish catch from its fleet of vessels prior to 1979. After 1979, this situation was rectified.

### **3. Changes in Scope**

19. As a result of deficiencies in design, most of the projects evaluated by PEO (24 or 89 percent) underwent changes in terms of either design, scope, or location (or a combination of these). A number of aquaculture projects experienced a scaling down in the area/number of ponds, hatcheries, and nurseries as well as a cancellation of the credit component. A number of marine fisheries projects also underwent changes in scope, e.g., (i) reduction/deletion in the number/amount of fishing vessels, gear, equipment, and postharvest facilities such as refrigerated and ice-making complexes; (ii) changes in site/location of fisheries installations/refrigerated complexes and related facilities; and (iii) cancellation of the credit component.

20. Other factors that triggered changes in project scope included (i) insufficient demand, (ii) cost overruns, and (iii) changes in the environment such as escalating political and economic difficulties, onset of demographic/ecological pressures, trend towards fishing away from the shore resulting in the need for larger vessels, and changes in government policies.

### **4. Cost Variations**

21. The \$639.7 million investment in the 27 projects was 23 percent below appraisal estimates. Twenty-one projects (78 percent) experienced cost underruns, at an average of about 33 percent (Appendix 5). This was attributed mainly to a reduction in the scope of more than 70 percent of the projects with cost underruns. Some projects had no changes in scope but had some components reduced to a much smaller scale. In addition, actual implementation of three projects (14 percent) was below appraisal estimates. Actual costs of all the aquaculture projects were below appraisal estimates, the average cost overrun being 37 percent. The Aquaculture Development Project in the Philippines posted the largest overrun (82 percent), attributed mainly to the substantial reduction in its scope. For the marine fisheries projects, actual costs, on the whole, fell short of appraisal estimates by an average of 10 percent. Eleven of 17 projects registered lower than expected actual costs. The two projects with both marine fisheries and aquaculture components posted actual costs averaging 18 percent less than appraisal estimates. Other factors contributing to the overall cost underruns experienced by the PEO-evaluated projects included (i) devaluation of the local currency against the US dollar; (ii) sizable physical and price contingencies at appraisal; and (iii) underutilization of credit lines.

22. On the other hand, the remaining six PEO-evaluated marine fisheries projects exceeded appraisal cost estimates by an average of 31 percent. The Fisheries Development Project in Solomon Islands posted the highest cost overrun, mainly because of overruns in vessel construction and consulting services. Actual person-hours required for each boat reached 95,000, which was about double the appraisal estimate. Other factors responsible for the higher than expected total costs of these projects included (i) high inflation rates, (ii) implementation delays, (iii) additional and/or changes in scope and design, (iv) underestimation of costs at appraisal, and (v) introduction of government taxes.

23. Project cost data are available for only nine of the ten completed (but not PEO-evaluated) projects/programs. All nine registered cost underruns from a low of 19 percent (Second Marine Fisheries Development Project in Pakistan) to a high of 88 percent (Second

Fisheries Industries Credit Project in Indonesia). These could be attributed mainly to a substantial reduction (if not cancellation/deletion) in scope as well as to the non-implementation/utilization of some components. For projects/programs with credit components, the cost underruns were a result of (i) uncompetitive interest rates; (ii) outbreak of diseases, which undermined investment confidence as well as the willingness of the financial institutions to lend to the sector; (iii) rigorous subloan appraisal requirements; and (iv) communication and coordination problems.

## **5. Executing Agencies**

24. Organization and implementation arrangements were for the most part complied with in most of the PEO-evaluated projects. The only problem somewhat specific to fisheries was the lack of communication and difficulty in monitoring and supervision due to the distance of project sites from project offices, some of which were set up in the country's capital.

## **C. Quality at Exit**

### **1. Outcomes**

25. The physical manifestation of the PEO-evaluated marine fisheries projects ranged from fishing vessels and related fishing gear, refrigerated fish carriers, refrigerated trucks, ice plants, and diesel engines to fishing port and landing facilities as well as cold storage facilities. The aquaculture projects resulted in fish and shrimp hatcheries, nurseries, ponds, and pens as well as water monitoring stations, rehabilitated canals, and fish inspection centers. The physical contributions of both types of projects were generally below appraisal estimates, as (i) the majority of the projects experienced reductions in scope and/or changes in design; (ii) some components were dropped, experience from pilot subprojects pointing to their lack of viability; and (iii) local funds were inadequate. The quality of physical outputs was mixed. For instance, while the fish hatchery/nursery complex under the Laguna de Bay Fish Pen Development Project in the Philippines was designed and constructed to a high standard, a large number of the fishing vessels under the Riau Fisheries Development Project were of substandard quality as reflected by their very rapid deterioration; some vessels exhibited extensive rotting of hulls after 5 years, although the expected fleet life was 10 years.

26. The only TA evaluated by PEO, Fishery and Coastal Marine Resources Management and Development in the East China Sea, produced a comprehensive report on policies and strategies, and an action plan providing the basis for adopting a set of policy decisions essential for the management and development of the fishery and marine resources in the Zhoushan fishing ground.

27. Overall, the performance of most of the PEO-evaluated projects fell short of appraisal expectations (although an improvement over the years has been noted as discussed in para. 50). In particular, the performance of project fishing vessels as reflected in the trend in fish catches was generally below appraisal targets. The underachievement of these vessels could be attributed to the (i) lack of fisheries resources in the project area, which resulted in longer duration and greater distance of fishing trips; (ii) unsuitable design or substandard construction, which led to excessive repair and maintenance requirements, in turn resulting in more down time than expected; (iii) inadequate fishing skills; (iv) fuel-intensive technology used

in the earlier project vessels, which necessitated a cutback in the number of trips during the off-season; (v) optimistic forecasts at appraisal; and (vi) pilferage at sea. Given the capacity of the vessels, particularly those used by small fishermen, the tendency was to concentrate fishing activities close to the shore, resulting in the depletion of marine resources in the area. This created a need to fish farther away from the shore to reach more productive grounds, but a significant number of the projects' fishing vessels did not have the capacity to go into deeper waters due to design constraints.

28. Shore facilities, which included refrigeration complexes and fishing ports, were also generally underutilized due to low fish landings, failure of fishers to purchase project vessels (which were expected to make use of the shore facilities), absence of supporting services such as ice plants and refrigeration facilities (in the case of some fishing ports), lower than expected demand, institutional constraints, and keen competition from the private sector (which is often more cost effective than public entities).

29. Most of the credit components that were utilized suffered from high levels of arrears. This was an offshoot of poor financial performance of the subborrowers, and the lack of follow-up by the project and participating financial institutions due to the dispersed location of the subborrowers. One of the factors that contributed to the poor financial performance of the subborrowers was the centralized procurement of fishing equipment, particularly boats, following the Bank's *Guidelines for Procurement*<sup>1</sup> (which did not take into account the preferences of end users). Consequently, the equipment procured and delivered to end users often did not meet their requirements, and was difficult to operate and maintain.

30. On the other hand, the combination of a number of factors including the inability of fish farmers to comply with the requirements of lending institutions resulted in low utilization and even non-utilization of other credit components. For instance, the tambak operators under the Brackishwater Aquaculture Development Project in Indonesia were not in a position to comply with the lending criteria, as they did not have certified land titles to offer as collateral. Other factors that made the credit facilities offered by the projects unattractive included (i) limitations on available loan size relative to the required investment, particularly in converting from extensive aquaculture farming to semi-intensive farming; and (ii) preferences of potential subborrowers such as the reluctance of some farmers to take up intensive aquaculture and obtain funds from the project (where alternative sources were available).

31. The performance of most of the fish hatcheries was short of appraisal expectations due to the smaller pond area actually constructed, delays in implementation, changes in government policy, and civil unrest. Specifically, the hatcheries and the inland freshwater fisheries stations' (IFFS) pond-rearing facilities under the Aquaculture Development Project in Sri Lanka were significantly affected by the 1990 policy reversal that stopped all government-sponsored inland fisheries activities. This policy change resulted in the initiation of a program of privatization of all IFFSs. In addition, the seasonal tank program under this project was terminated after the 1990 policy change, as the supply of fingerlings from the IFFSs was stopped and there was no other private supplier of fingerlings for these tanks.

32. On the other hand, shrimp hatcheries were generally successful, with their production exceeding appraisal estimates. Hatcheries that performed below par encountered problems such as poor supply of seawater and fresh water, diseases, low soil quality, and poor quality broodstock.

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<sup>1</sup> The *Guidelines* were revised in March 1989 to accommodate end user preferences.

33. The training components for most projects in both subsectors were implemented as planned.

34. In general, the financial and economic performance of the projects was not very encouraging, as shown by the reestimated financial and economic internal rates of return (FIRRs/EIRRs) (Appendix 3). For seven of eight PEO-evaluated aquaculture projects, FIRRs were reestimated, and for six of these, EIRRs were reestimated; of those six, five or 83 percent registered lower FIRRs/EIRRs upon evaluation by PEO compared with appraisal estimates, with one project posting a negative reevaluated FIRR/EIRR. The lower than expected rates of return could be largely attributed to implementation delays, higher than estimated investment costs, and lower than expected levels and price of output (such as fingerlings/shrimp fry) in both the local and export markets.

35. FIRRs were reestimated for only 8 of 17 marine fisheries projects. Of the eight, seven or 88 percent had lower FIRRs the second time. EIRRs were calculated at postevaluation for 14 projects, only 12 of which had had EIRRs calculated at appraisal. Eleven of the 12 EIRRs were lower at the later date. The generally lower FIRRs/EIRRs can be traced mainly to (i) substantial cost overruns, (ii) implementation delays, (iii) low rates of utilization of project facilities including the refrigerated complexes, (iv) low catch rates of fishing vessels, (v) lower level of exports vis-a-vis less favorable export prices, (vi) non-implementation of a number of project components, and (vii) additional costs identified at the time of reevaluation.

36. In summary, of the PEO-evaluated projects with reestimated EIRRs, 16<sup>1</sup> had EIRRs lower than appraisal estimates, seven of which were negative. EIRRs for six projects were not calculated. A reestimation of EIRRs for some projects was not done, since a meaningful or positive EIRR was not expected in the process. In addition, the lack of relevant data and difficulties in accurately attributing benefits to a particular project prevented the recalculation of EIRRs for other projects.

## 2. Institutional Development

37. A major institutional impact of some of the PEO-evaluated projects was the establishment of public sector enterprises such as P.T. Karya Mina, P.T. Usaha Mina, and P.T. Tirta Raya Mina in Indonesia and the National Fisheries Development Ltd. in Solomon Islands. While the last and P.T. Karya Mina rapidly developed into major employers, the other two encountered problems that necessitated remedial measures. As the Bank's experience has shown that the private sector can be in a better position to handle some specific areas such as fish production, processing, and marketing, this approach of supporting government-owned corporations in the fisheries sector has been subsequently abandoned by the Bank. The focus of the Bank has shifted to more active participation of the private sector especially in areas where the latter has a comparative advantage, with the government's role focused in areas where private sector involvement is not appropriate or feasible.

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<sup>1</sup> This excludes two projects for which EIRRs were recalculated only for a specific component.

### 3. Socioeconomic Impact

38. On the whole, an enhancement in the socioeconomic conditions of fisherfolk was noted, although at a smaller scale than expected at appraisal. In the marine fisheries subsector, income improvement was brought about by a number of factors including additional employment, relatively higher fish landings due to availability of better fisheries infrastructure, larger vessels, and lower level of wastage with the more efficient handling (increased use of ice) and transport of fish. With the larger vessels and additional infrastructure such as refrigerated and ice-making complexes, additional labor was employed specifically for activities related to landing, cleaning, transporting, and cold storage. In addition, boat owners hired artisanal fishers as crew. As for aquaculture projects, increases in production brought about by the larger area of ponds as well as the provision of related facilities such as hatcheries and nurseries (which in turn helped produce better quality fingerlings) were also translated into improved farmer income. In addition, some of the aquaculture projects played a catalytic role in the development of the subsector. Specifically, the design and concepts used under some projects served as models for private sector aquaculture operations.

39. Furthermore, relatively higher fish and shrimp production from both the marine fisheries and aquaculture projects resulted in the greater availability of these products for local consumption. As an example, to further encourage consumption in the case of the Fisheries Development Project in Bangladesh, the Pagla Complex was required by the government to sell fish at a regulated price (which was generally below the open market level), especially during the lean season, to help make fish available to low-income consumers.

40. Additional benefits were derived from the provision of research and extension services as well as training to farmers and students. Particularly in the aquaculture subsector, the private sector followed the design and approach used for some projects.

41. On the other hand, credit facilities provided to the private sector under the aquaculture projects were not successful in reaching the targeted subborrowers. The lending requirements were generally too stringent, resulting in low utilization. Some marine fisheries projects also had a credit component, but the credit terms were not affordable to artisanal fishers. As a result, previous vessel owners, who were generally the more affluent members of society, benefited from these credit facilities.

42. Most of the PEO-evaluated projects (mostly approved in the 1970s) did not especially focus on women either as participants or beneficiaries, since the role of women in development was not given specific emphasis by the Bank at that time. In addition, fishing has been mainly a male occupation, as the work necessitates strenuous physical effort. Nonetheless, women have benefited from the improvement in household incomes. In addition, some projects employed women in the processing, packaging, and exporting of marine products as well as in laboratories and offices. Women in fishing households were engaged in weaving and repairing of fishing nets. Evaluated aquaculture projects that were approved in the 1980s had a focus on women. The Brackishwater Aquaculture Development Project in Indonesia extended training to some women, who became extension officers, technical trainees, and management officers. In addition, training programs under the aquaculture development projects in Pakistan and Sri Lanka included seminars for women in the areas of aquarium fish rearing and shrimp production/brackishwater culture, respectively.

#### **4. Environmental Impact**

43. At appraisal, no specific reference was made to the environmental impact of a number of the projects. Nevertheless, the majority of those evaluated by PEO had no or minimal adverse impact on the environment. For aquaculture projects, undesirable environmental impacts included (i) conversion of mangrove areas into ponds, resulting in the loss of valuable ecosystems (particularly in Java, where mangrove stands are scarce); (ii) pollution (including the inappropriate discharge of wastewater mainly from shrimp ponds/prawn farms and discharge of effluents into ditches leading to the sea); and (iii) spread of shrimp diseases. These unfavorable effects on the environment could be attributed partly to a lack of focus on environmental impact at appraisal and to the weak enforcement of regulations aimed at protecting the environment. Also, an inadequate assessment of fisheries resources during project preparation for marine fisheries projects forced some vessels to overfish in shallow waters.

44. Some of the projects had a positive impact on the environment. A number of aquaculture projects contributed to the restocking of natural and artificial water bodies. The integration of fish farming with duck and pig production was beneficial to the environment, as it recycled animal waste. However, the viability of this scheme is still questionable due to the high cost of artificial feed. In the Philippines, the very presence of the Northern Palawan Development Project inhibited illegal operators in the project area as well as provided an alternative means of livelihood to slash-and-burn agriculture.

45. Conversely, some aquaculture projects were adversely affected by changes in the environment. Typhoon damage to the Laguna de Bay Fish Pen Development Project in the Philippines was exacerbated by the presence of water hyacinth and long grow-out periods resulting from the lake's declining primary productivity and drastic changes in its composition. The physical, chemical, and biological conditions of the lake contributed to poor growth rates, high feed requirements, and fish mortality. In the Aquaculture Development Project in Thailand, water quality for some subprojects was affected by the waste residues from other industries.

46. As the completed projects/programs in the fisheries sector that have not been evaluated by PEO are relatively new, i.e., approved in the second half of the 1980s and in the early 1990s, the appraisal process treated possible environmental impacts as a major concern (unlike in earlier loan approvals). Consequently, the PCRs for these projects/programs reported very minimal negative effects, if any, on the environment. Specifically, an improvement in the design and implementation of the aquaculture projects was observed. For instance, mangroves were not destroyed. Instead, shrimp culture development under the Second Aquaculture Development Project in Bangladesh took place in areas formerly used as seasonal rice farms. In addition, some marine fisheries as well as the combination of marine and aquaculture projects/programs had positive impacts on the environment through the rehabilitation of coastal marine resources, resulting in the return of important species, greater biodiversity, and larger catches.

#### **D. Overall Achievement and Results**

47. On the whole, this examination revealed the relatively limited success of Bank-financed projects in the fisheries sector (although an improvement in performance over the

years was noted as discussed in para. 50). Of the 27 PEO-evaluated projects as of June 1998, one third were rated as generally successful, one third partly successful, and one third unsuccessful (Appendix 6). Almost 46 percent of project investments and 40.5 percent of Bank financing were channeled to partly successful projects, indicating the inability to maximize benefits from such investments. Projects in Group B countries showed a relatively less favorable performance, as fewer than one fourth of the 13 projects were generally successful.

48. The marine fisheries projects were largely responsible for the low success rate in the sector, with 41 percent (7) rated unsuccessful. Five were generally successful, while another five were partly successful. The aquaculture projects (8) turned in a more favorable performance, as half of them were generally successful, 38 percent partly successful, and only one project unsuccessful. The two remaining projects, which had both marine fisheries and aquaculture components, had mixed results: one was partly successful while the other was unsuccessful.

49. The overall performance of most of the PEO-evaluated projects was lower than expected. All (except one) of these projects suffered from delays. Despite longer implementation periods, more than three fourths of them experienced cost underruns, mainly as a result of significant reductions in scope. Largely as a result of the shortfall in project benefits, recalculated EIRRs and FIRRs were below appraisal estimates. Nonetheless, these projects generated a substantial amount of unquantifiable benefits, which have been translated mostly into improvement in the socioeconomic conditions of the beneficiaries.

50. An improvement was noted over the years. Almost 60 percent of the PEO-evaluated projects in the fisheries sector were approved in the 1970s, with the remainder in the 1980s. While most of the projects approved in the 1970s were unsuccessful, more than 50 percent of those approved during the last decade were generally successful. In the marine fisheries subsector, more than three fourths of the evaluated projects were approved in the 1970s. Of these, 6 or 46 percent were unsuccessful. But 50 percent of the projects approved in the 1980s were generally successful, with only one classified as unsuccessful. Similarly, the performance of aquaculture projects approved in the 1980s was more impressive than those approved in the 1970s, as all the newer projects showed some level of success (80 percent generally successful and 20 percent partly successful).

51. This trend is further shown in the performance of completed fisheries projects that have not yet been evaluated by PEO. Based on the PCRs of ten completed projects/programs, 40 percent were generally successful and another 40 percent partly successful; the percentage of unsuccessful projects dropped to only 20 percent. This suggests that the lessons learned from earlier Bank-financed projects/programs have been considered in the preparation and implementation of succeeding ones. For instance, in contrast with the failure of the first Aquaculture Development Project, the success of the Second Aquaculture Development Project in Bangladesh was attributed to the relative simplicity of its objectives, scope, and implementing arrangements. However, an exception was the Second Fisheries Industries Credit Project in Indonesia, which was a failure compared with the first project (which was rated partly successful). Although lessons learned from the first project were considered in formulating and implementing the second one, several external factors (such as the growing aversion of participating banks to lend to the fisheries sector and the lower than expected number of eligible subborrowers and subprojects in the subsectors outside the shrimp industry) had a negative impact on the latter. Some weaknesses in project identification and preparation, i.e., inadequate sector assessment, overestimation of project benefits, unsatisfactory forecasting of demand for credit, were, however, highlighted in some of the completed projects.

52. A shift in the focus of Bank-assisted projects in the fisheries sector has been noted. Emphasis is currently given to assisting the Bank's developing members in improving their institutional capability and suitable policy framework for fisheries resource planning and management as well as in identifying viable approaches to improving small-scale fisheries through community participation in project design and implementation.

## V. ISSUES AND LESSONS LEARNED

### A. Key Issues for the Future

53. The key issues specific to fisheries projects/programs relate mainly to project identification and preparation, environmental and socioeconomic impact, the role of the government, and provision of credit.

#### 1. Project Preparation

54. A number of projects point to the importance of statistics, which are needed for a more accurate assessment of fisheries stocks in a project area, upon which the design of the project depends. Detailed designs should be developed prior to loan approval. Moreover, more in-depth studies should be conducted before the scope of a project is determined. Specifically, where design of a project is experimental or is subject to potential technical improvements, this would be more appropriately implemented on a pilot basis.

55. The Bank must be extra careful to avoid aggravating the overfishing situation, as stated in *The Bank's Policy on Fisheries*. Other measures that would help increase the available supply of fish and fish products — such as reduction in postharvest losses; and developing, improving, and disseminating appropriate technology for storage, processing, and distribution — should be targeted.

#### 2. Environmental Impact

56. Commercial fisheries must be managed very closely. Leaving them in the open access domain will ensure the continuing destruction of stocks. The possibility of transferring fishing vessels from overfished to relatively underexploited areas should be considered. Moreover, alternative fishing methods are needed to reduce the level of discards and bycatch. Sound management will usually require significant legal and institutional reforms, in addition to basic fisheries research. When an effective management structure is in place, it should be possible to guide the recovery of at least some depleted fish stocks that have not completely collapsed, which should result in both improved economic efficiency and increased fish production.

57. Promotion of more intensive aquaculture methods, on the other hand, while generating important benefits, could also contribute to the degradation of the coastal ecosystem due to residues of chemical pesticides, nutrient-laden effluents, and suspended solids from prawn ponds. The buildup of sedimentation from suspended solids is believed to be blocking waterways and reducing the volume of replenishment water to coastal areas. Moreover, some mangrove plantations may be converted into aquaculture ponds, although this will no longer be

supported by the Bank. Overall, there is a need for (i) a detailed environmental appraisal of targeted areas, and (ii) a plan for water management systems for aquaculture development. Also, more appropriate technology for intensive aquaculture as well as regulatory measures concerning the disposal of aquaculture wastes need to be developed. Improvements in the legal and institutional controls in aquaculture development, including zoning restrictions, are also needed.

### **3. Socioeconomic Impact**

58. Although originally seen as a source of employment and income for the poor (particularly artisanal fishers), marine fisheries and aquaculture have grown into an attractive investment for both entrepreneurs and governments. Thus, a balance is needed between the objective of generating employment/income and the need to conserve aquatic resources. Alternative means of employment have to be identified to help marginal fishers look for other sources of income. Such activities should be near the fishing communities to avoid the dislocation of the fishers and their families.

### **4. Roles of the Government and the Private Sector**

59. A line must be drawn between the role of the government and that of the private sector, which the Bank has emphasized in its *Policy on Fisheries*. Experience shows that activities related to production and postharvest are better undertaken by the private sector. Thus, active participation of the private sector in the development of fisheries should be encouraged, particularly in the areas of processing, marketing, and exports. This would rule out Bank financing of fishing vessels, which has been a major project component. The government, in turn, has to continue providing the policy, institutional, and regulatory framework to support private sector operations. For instance, involvement of the private sector could be facilitated by the privatization of government-owned production and processing facilities. In addition, the government has to continue intervening in areas where private sector participation is not appropriate or feasible, including providing some of the necessary infrastructure such as ports and auction halls as well as support mechanisms such as research and training. These interventions should, however be coordinated with private operations. In the past, many port facilities were underutilized because of lack of such coordination.

### **5. Provision of Credit**

60. In aquaculture, the requirements for collateral and a previous credit record with a financial institution discriminate against small farmers and the landless, with the result that medium to large farmers benefit. Improved access of small farmers to formal credit is needed. The same applies to small-scale marine fishing operations. This highlights the need to consider the banking practices of domestic financial institutions and the socioeconomic conditions of prospective borrowers in designing a project. If poverty reduction is to be facilitated, a suitable approach that enables the landless, marginal and small farmers, and small-scale fishers to significantly benefit needs to be adopted.

61. Credit systems should be explained by participating financial institutions to subborrowers in detail to make them aware of the potential risks and of their obligations as well as benefits. This is necessary to address the indifference of some subborrowers in the rural sector towards funds borrowed from projects and/or the government.

## **B. Major Lessons Learned**

62. Experience from past projects/programs in the fisheries sector has highlighted a number of lessons that could help improve the preparation of future projects and the implementation of future as well as ongoing projects. The majority of these lessons relate to project preparation and design.

### **1. Assessment of Resource Potential**

63. Experience affirms the importance of project preparation and design. Objectives should be simple, and projects designed to meet objectives with minimum risk. Specifically, when considering large-scale investments in fishing vessels, assessment of the biological resource potential should be undertaken. Although difficult to do because of the open access nature of fisheries resources, attempts towards more accurate stock assessment should be made, as this will become the main basis for determining the optimum vessel mix. The seasonal and annual distribution of fish resources needs to be sufficiently researched and reliably established. Specifically, uncertainties about average catch rates necessitate the greater use of sensitivity analysis in order to examine the impact of different assumptions on the financial and economic viability of projects. More comprehensive project preparatory TA could be helpful. Detailed preparatory studies could help minimize delay, avoid unnecessary investment cost, and avert adverse environmental consequences. As a result, *The Bank's Policy on Fisheries* requires that projected catches, revenues, and scale of infrastructure be based on the most accurate and realistic assumptions possible.

64. It is important to adequately assess not only the status and trends of stocks of target species, but also trends in the fishing industry that may change the pressure on those stocks. Too often, the tendency is to divert efforts from overfished (inshore) stocks to more distant (offshore) stocks, about which very little is understood. The result is usually much smaller returns than expected. The development of national fisheries research capabilities is a long-term effort worthy of Bank support. It cannot be overstressed that fisheries management requires constant effort, given the fluid and vulnerable nature of the resource. To be effective, fisheries management must be responsive first and foremost to the welfare of fish stocks. When social and economic considerations routinely take precedence over fish stock maintenance, then stock depletion is virtually guaranteed, which will result in long-term adverse economic and social impacts, as opposed to the temporary impacts associated with proper stock maintenance.

### **2. Holistic Approach to Project Design**

65. In designing a project, its overall impact on the economy should be considered. Specifically, the costs and benefits to the environment must be weighed so as to have a better understanding of the tradeoffs. Increasing production should not always be the primary concern in fisheries projects; coastal fisheries projects should not aim solely at increasing catches but should also promote integrated coastal resource development and management to prevent the depletion of resources. The Bank should adopt a holistic approach in the design of fisheries projects, incorporating environmental, social, and other costs and benefits not included in the conventional cost-benefit analysis. The Bank's environmental guidelines should be rigorously

applied in developing and implementing fisheries projects to mitigate any possible adverse environmental impact.

### **3. Use of the Project Framework**

66. The continued use of the project logical framework approach will be helpful. More recent projects (prepared since 1995) have used this approach not only during project planning but also for improving project implementation, monitoring, and evaluation. It helps in setting proper objectives, defining indicators of success, identifying key activity clusters, defining critical assumptions, identifying means of verifying accomplishments, and defining resources required for implementation. The project framework ensures that verifiable input and output indicators are specified and monitored. In addition, it facilitates the adoption of a holistic approach in project design, as the nonquantifiable costs and benefits of a project are likewise considered.

### **4. Phased Approach to Project Design**

67. When there is (i) insufficient data needed to prepare a project (such as average catch rates and stock assessment), (ii) lack of required skills and experience (such as people who are accustomed to a systematic and regular work effort and the rigors associated with large-scale fishing operations), or (iii) a new concept or approach to be taken (such as a new fishing vessel design), caution should be exercised in formulating and designing a project. A pilot project is preferable in such cases, as this will allow for flexibility, i.e., possible changes in design or scope can be made as necessary. This will enable the adoption of a phased approach as experience is gained. This could have been a better approach for the Fisheries Development Project in the Republic of Korea, given the experimental nature of skipjack fishing in that country.

68. Projects involving vertical integration should likewise be phased so that downstream project units can be designed on the basis of the actual performance of upstream components. In the case of the Java Fisheries Development Project, an effective fishing fleet was a prerequisite to the success of the other project components, without which the rest of the assets were bound to be underutilized. The phased approach was adopted later during project reformulation.

### **5. Process Project Approach**

69. A fisheries project should be seen as an open system that calls for a process project approach. The process approach to projects emphasizes the following elements: (i) ownership and commitment of stakeholders is essential to project success, and therefore stakeholders should be involved from the inception stage; (ii) the project process must be a joint learning process among stakeholders; and (iii) learning implies the ability to reflect on current practice within a project, and if necessary to change procedures and approaches.

### **6. Greater Bank Supervision**

70. During project formulation and initial implementation, there is a need for greater supervisory inputs from the Bank, especially for projects involving the introduction of new

technologies. In addition during the initial critical years of project implementation, Bank supervision needs to (i) identify emerging problems at a much earlier stage, and (ii) react with appropriate assistance in a more timely manner. In the case of the Aquaculture Development Project in Sri Lanka, although the problem of recruiting a full-time project director was identified in 1985, it was not resolved until 1989. Experience underscored the usefulness of reviewing and, whenever necessary, modifying project design in the light of experience gained during implementation. In this regard, project design should take full account (on a continuing basis) of government policies and programs that may affect a project's operations. Various implementation problems beset the Aquaculture Development Project in Sri Lanka. However, the earlier review missions did not examine the need for changes in design/scope to overcome design flaws. Experience supports the need for flexibility in project implementation to account for risks and uncertainties in the design and implementation phases. Midterm reviews are now required for all fisheries projects to enable appropriate changes when called for.

## **7. Formulation of Executing Agency Arrangements**

71. The institutional capability of an EA should be carefully assessed to ensure that it can effectively carry out its responsibilities. This has been recognized in more recent projects. Specifically, EAs without prior experience in implementing Bank-financed projects often encounter difficulties due to their unfamiliarity with Bank procedures. In addition, EAs may lack the staff support with the necessary expertise for carrying out a project. In such cases, strengthening of the EA prior to loan approval or during implementation may be considered. If the EA fails to perform satisfactorily during implementation despite Bank supervision, it may be more appropriate to provide a package of TA midway during implementation than to provide limited assistance through Bank follow-up/review missions.

## **8. More Active Beneficiary Participation**

72. Active beneficiary participation not only during project preparation but also during implementation is one of the factors ensuring project success. Preferences of beneficiaries have to be assessed carefully. For instance, in designing boats, preferences of the fishers should be considered to ensure not only acceptance but also the usefulness of the vessels given the prevailing conditions (this is addressed in the Bank's *Guidelines for Procurement*). Participation and involvement of the private sector should be encouraged, especially in areas where it has a comparative advantage. The Bank has responded to this lesson in its *Policy on Fisheries*, which calls for a participatory approach to project design and implementation. Moreover, fish production, processing, and marketing will be undertaken primarily by private sector entities, with governments focusing on the provision of (i) a suitable policy, institutional, and regulatory framework; and (ii) support services including research, training, and extension.

## **9. Design of Credit Schemes**

73. The success of credit schemes in the fisheries sector depends largely on the (i) flexibility of the credit terms and wider credit availability, and (ii) appropriateness of the credit scheme to the targeted subborrowers, given their socioeconomic characteristics. The lending criteria for subloans have to be affordable to the subborrowers.

## APPENDIXES

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