SECTOR SYNTHESIS OF POSTEVALUATION FINDINGS

IN THE

IRRIGATION AND RURAL DEVELOPMENT SECTOR

May 1995

ABBREVIATIONS

BME	-	Benefit Monitoring and Evaluation
DMC	-	Developing Member Country
DTW	-	deep tubewell
EA	-	Executing Agency
FMIS	-	Farmer Managed Irrigation Scheme
HYV	-	high-yielding variety
IRD	-	Irrigation and Rural Development
O&M	-	operation and maintenance
PCC	-	Project Coordinating Committee
PCU	-	Project Coordinating Unit
SSPF	-	Sector Synthesis of Postevaluation Findings
STW	-	shallow tubewell
TA	-	Technical Assistance
TPAR	-	Technical Assistance Performance Audit Report

WUA - Water Users' Association

NOTES

In this Report, "$" refers to US dollars.

SS:IRD-1

I. INTRODUCTION

1. The Sector Synthesis of Postevaluation Findings (SSPF) in the irrigation and rural development sector provides a summary analysis of Bank's postevaluation experience in the sector. The Report identifies the key factors affecting project performance and highlights the major issues and lessons that are of operational relevance and significance to ongoing and future projects/programs in the sector. This SSPF is based primarily on the review of the findings of postevaluation reports in irrigation and rural development which were prepared by the Post-Evaluation Office (PEO), including Project/Program Performance Audit Reports (PPARs), Technical Assistance Performance Audit Reports (TPARs), Impact Evaluation Studies, Reevaluation Studies, Special Studies, and the Country Syntheses of Postevaluation Findings (CSPFs). It also takes into account the information and data stored in the Postevaluation Information System (PEIS).

II. BANK OPERATIONS IN THE IRRIGATION AND RURAL DEVELOPMENT SECTOR

A. Overview

2. Bank operations in irrigation and rural development (IRD) have generally been directed towards surface and groundwater development and expansion and upgrading of rural infrastructure including health, water supply, and road facilities. The operations were largely aimed at assisting developing member countries (DMCs) achieve food self-sufficiency and at promoting rural employment opportunities by providing necessary capital investment. Irrigation subsector constitutes one of the primary areas of Bank intervention in view of its importance for improving agricultural productivity, including crop yields and cropping intensities, and expanding areas under agriculture.[1] Rural development, another important subsector that received considerable Bank support, focused on a variety of interrelated economic activities covering agriculture and basic social services such as roads, rural water supply, agricultural support services, health, and other community facilities.

3. The first Bank loan for irrigation and rural development amounting to $0.99 million for the Tajum Irrigation Project in Indonesia (Loan No. 012-INO) was approved on 17 June 1969. As of December 1994, the total loans to the IRD sector amounted to $6.0 billion (see Appendix 1) or 11.8 percent of total Bank lending, distributed among 177 projects.[2] The largest share of Bank assistance to the IRD sector amounting to $3.17 billion (52 percent) for 86 projects went to Group A countries, while Group B and Group C countries received $2.35 billion (39 percent) and $521 million (9 percent), respectively.[3] Indonesia received the largest share, accounting for 24.7 percent of total lending in IRD sector covering 34 projects, followed by Pakistan and Bangladesh, each

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1 The word "irrigation" is defined to include irrigation, drainage, flood control, and other water resources development activities which support agricultural production.

2 Including 15 program loans amounting to $554.4 million.

3 See Appendix 1 for details.

receiving 23.7 percent and 17.0 percent, covering 22 and 25 projects, respectively.

4. A total of $3.5 billion or 59 percent of lending to the IRD sector came from the Asian Development Fund (ADF), while funding from Ordinary Capital Resources (OCR) was $2.5 billion or 41 percent. Bank operations intensified during the period 1981-1990, when over 59 percent of the total IRD portfolio was approved. Loan sizes ranged from a low of $280,000 (South-East Sulawesi Transmigration Area Development [Loan No. 272-INO]), to a high of $185 million (Chashma Right Bank Irrigation [Loan No. 1146-PAK(SF)]), with the average loan size at around $30 million. Table 1 presents a brief overview of the Bank's IRD loan operations.

Table 1: Loan Approvals in the IRD Sector

Item	No. of Projects	Amount ($ million)	Percent
Source of Funding			
from OCR	77[a]	2,474.5	40.9
from ADF	121[a]	3,567.9	59.1
Year of Approval			
1969-1970	7	25.6	0.4
1971-1980	64	1,219.5	20.2
1981-1990	81	3,536.8	58.5
1991-1994	25	1,260.5	20.9
Loan Size ($ million)			
less than 50	144	3,053.7	50.5
between 50-150	31	2,633.7	43.6
above 150	2	355.0	5.9

[a/] Includes 8 supplementary projects and 13 projects funded under both sources.

5. IRD loans have been supported by 268 technical assistance (TA) grants which, as of December 1994, amounted to $114.2 million or about 1.9 percent of the total amount of IRD loans approved. Of these TAs, 169 (amounting to $63.4 million) were project preparatory, while 99 (amounting to $50.8 million) were for advisory and operational purposes.

B. Postevaluation Operations

6. As of December 1994, a total of 57 IRD projects or about 32 percent of approved projects, totalling $2.8 billion and covering 13 countries, had been postevaluated (see Appendix 2). The projects included 12 program loans, 10 rural development projects, and 35 irrigation projects, approved during the period 1969-1987 and completed between 1973-1992.[1] A TPAR and five

[1] Twenty-two of the postevaluated projects were from Group A countries, 25 from Group B, and 10 from Group C countries. Indonesia (11) and the Philippines (10) had the most number of IRD projects postevaluated, followed by Bangladesh and Pakistan with 6 projects each.

impact/reevaluation studies on the irrigation sector were also prepared (see Appendix 2).

C. Objectives and Scopes of Postevaluated Projects

7. The major objectives of the postevaluated projects were to increase agricultural production and improve the economic and social conditions of the rural population. In particular, the projects were aimed at achieving food self-sufficiency, especially in rice; increasing farm incomes; and improving employment and living conditions in rural areas. These objectives were to be achieved through the provision and/or improvement of irrigation facilities, increased availability of agricultural inputs and support services, generation of rural employment opportunities, and higher cropping intensities and crop yields.

III. IMPLEMENTATION EXPERIENCE AND PERFORMANCE RESULTS

8. This section reviews the implementation experience and performance results of postevaluated projects and technical assistance operations in IRD. In particular, the impacts of changes on project design and scope, institutional capabilities of implementing agencies, broader physical achievements including factors affecting performance, socioeconomic and environmental impacts, and the overall sustainability and performance classification of postevaluated projects are discussed.

A. Implementation Experience

1. Project Design

9. Implementation experience suggests that performance of irrigation projects had been largely conditioned by the adequacy and effectiveness of system designs, robustness of structures and technical relevance and operational viability of canal systems and farm-level irrigation networks. The performance of rural development projects, similarly, depended on the appropriateness of project designs and the competence of implementing agencies. About half of the projects in the irrigation and rural development subsectors experienced major changes to their original designs and scope during implementation. The changes were largely the result of inadequate planning; paucity of geographical, topographical, and hydrological data; and lack of understanding of the sociocultural ethos and practices of the local communities.[1] Several irrigation projects postevaluated in Indonesia, Thailand, Sri Lanka and in the Republic of Korea also

[1] For example, in the Kankai Irrigation Project in Nepal, inadequate information on the river and minor stream flows led to a major design defect in the intake of the irrigation system, resulting in the diversion of large amounts of silt into the scheme and causing reduced flow capacity. On the other hand, in the Irrigation Sector Project in Bali, traditional flow dividers were replaced with modern hydraulic structures without adequate consideration of the presence of traditional hill irrigators and *subak* (water user) organizations. This led to the breakdown of traditional hill irrigation practices and to problems in operation and maintenance.

reflected a lack of understanding of hydrological and environmental factors affecting irrigation system efficiency. Major design deficiencies which hampered the implementation of the rural development projects included, among other things: (i) plurality of complicated components in a single project; (ii) multiplicity of executing/implementing agency arrangements with inadequate provision for coordination; (iii) unrealistic expectations of the capabilities of executing agencies; (iv) lack of adequate plans for implementation phasing; (v) inadequate provision for policy dialogue with the governments; and (vi) weak policy content of projects/programs.

10. Although the appropriateness and relevance of designs played a crucial role in determining the implementation efficiency of projects, a number of other critical variables such as a weak policy environment and adverse organizational, ecological and technological factors also impeded the adoption of more effective strategies for strengthening project implementation. The adoption of inappropriate pricing policies including unregulated subsidy components contributed to less than satisfactory project outcomes in projects such as the Lower Citanduy Irrigation Project in Indonesia, and the Crop Intensification Program in Bangladesh. Weak organizational arrangements severely constrained project implementation in a few projects such as the Integrated Rural Development Project in Nepal, and the Palawan Integrated Area Development Project in the Philippines. Overall, the impact of design elements on the implementation efficiency of projects should be considered in association with other internal and external factors that impinged on project performance.

2. Physical Achievements

11. The physical infrastructure/components of the postevaluated IRD projects were generally completed as envisaged during appraisal or as reformulated during implementation. The physical infrastructure supported under the projects included: (i) the construction or rehabilitation of dams/diversion weirs and other irrigation-related structures, flood control and drainage systems, agricultural research stations and warehouses, roads and bridges, and office buildings and residential quarters; (ii) the installation of shallow and deep tubewells (STWs and DTWs), minor surface irrigation schemes and village water supply; (iii) the provision of equipment, vehicles, livestock, and rural credit; (iv) the procurement/distribution of fertilizers, pesticides, and seedlings; (v) land clearing and development; and (vi) the provision of agricultural support services including training and consultancies.

12. The provision of flood control facilities reduced the incidence of flood and encouraged farmers to intensify production such as in the case of the Tulungagung Drainage Project in Indonesia. However, flood protection could not be sustained in many projects due to poor maintenance of related infrastructure such as the sluice gates, and heavy siltation in the drainage canals. Compared with large-scale surface irrigation systems, significantly better results were obtained in groundwater irrigation projects, with about 80 percent of STWs and DTWs performing well in Bank-financed projects in Nepal and Bangladesh. Although the use of groundwater irrigation has intensified in recent times, necessary institutional arrangements are not in place for supervising and monitoring well installations. On the other hand, some major constraints observed included: (i) underutilization of STWs and DTWs due to the small size of farm landholdings, and (ii) high operation and maintenance (O&M) costs relative to the financial capability of the farmers. Improved utilization could be achieved through water sharing/selling among small and medium-sized farmers.

13. Provision of physical infrastructure, substantially as planned, did not always result in IRD projects attaining their original targets of irrigated areas. This was because reductions in scope and cost saving measures employed during construction (such as limited desilting operations and unlined canals) affected irrigation operations. For example, in the Tan An Integrated Agricultural Project in Viet Nam, actual irrigated area of about 1,100 ha, as determined during postevaluation, was only about 14 percent of the appraisal target of 8,200 ha. The substantial reduction was attributed to the exclusion of acid sulphate soils from the command area, the downward revisions in scope and area coverage, and inefficient operation and/or neglect of facilities. On the other hand, in Namgang Area Development (Republic of Korea), Nong Wai Pioneer Agriculture (Thailand), and Bali Irrigation Sector (Indonesia) Projects, the actual areas irrigated ranged between 70-90 percent of appraisal projections. Overall, excluding extreme cases of over and under achievement, the ratio of actual versus targeted irrigated areas for the postevaluated projects, ranged between 65 to 105 percent, or an average of about 85 percent.

3. Project Cost

14. The total cost of the postevaluated projects amounted to $2.8 billion. Cost underruns, which averaged at 25 percent, were experienced in about 51 percent of the projects, and ranged from about 0.3 percent in the Chashma Right Bank Irrigation Project in Pakistan, to about 61 percent in the Second Crop Intensification Program in Bangladesh (see Appendix 3). Substantial cost overruns were also noted in six projects.[1] The factors that contributed to the cost variations included: (i) changes in scope and design; (ii) implementation delays; (iii) deficient cost estimation at appraisal including under/over provision for price escalation and contingencies; and (iv) other developments external to the projects such as inflation, impact of civil disturbances, and price and exchange rate fluctuations.

4. Implementation Period

15. The average implementation period estimated at appraisal for IRD projects ranged between three and four years. During implementation, all except two programs and one project,[2] experienced delays averaging at three years or about 80 percent of the estimated implementation period (see Appendix 3). Projects in the irrigation subsector had the longest average time overrun of 3.7 years, followed by 2.8 years for rural development projects and 0.9 years for program loans. Major reasons cited for time overruns comprised: (i) implementation delays arising from shortage of counterpart funds, institutional deficiencies including poor coordination among executing/implementing agencies, and land acquisition and procurement difficulties; (ii) optimistic assumptions of implementation period made at appraisal; (iii) repairs and remedial works; (iv) changes in scope and design; (v) lack of farmer participation during implementation; and (vi) other external factors such as civil disturbances, political instability, inadequate capability of local contractors, and shortage of local supplies and materials.

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1 These were the Gambarsari-Pesanggrahan Irrigation Rehabilitation (500 percent), Wampu River Flood Control and Development (276 percent), Sempor Dam and Irrigation (191 percent), Davao del Norte Irrigation (177 percent), Kankai Irrigation and Diversion Structure (126 percent), and Angat-Magat Integrated Agricultural Development (101 percent).

2 These were the Second and Third Crop Intensification Programs in Bangladesh and the Terengganu Smallholders Development Project in Malaysia.

B. Performance Results

1. Crop Production

16. IRD projects contributed significantly to improving agricultural performance, particularly in paddy production. However, actual achievements in terms of cropped or planted areas ranged mostly between 60 and 85 percent of appraisal projections, largely because of reduced irrigation service areas, breakdown of irrigation facilities and equipment, water shortages, inadequate beneficiary involvement, and inappropriate pricing policies. On the other hand, cropped area targets were exceeded (ranging from 7 to 24 percent) in four projects,[1] consequent to expansion in project scope, and changes in land use and cropping patterns. Although there were significant differences among projects, most projects were able to achieve an average of about 180 percent of cropping intensity as compared with a range of 150 to 300 percent anticipated at appraisal. Yield per hectare, particularly of paddy, improved substantially during and after project implementation, in some cases exceeding appraisal targets by 10 to 30 percent. While this may be partly attributed to the infrastructural facilities provided under the projects, other factors such as the introduction of high-yielding varieties (HYV), technological improvements in agriculture and price incentives also contributed to higher yields and improved cropping intensities. Notwithstanding increases in yields and cropping intensities, overall crop production fell short of appraisal projections in many projects because of the shortfall in the cropped area targets.

2. Organization and Management

17. Because of the multisectoral and inter-disciplinary focus of IRD projects and the participation of several implementing agencies, Project Coordinating Units/Committees (PCUs/PCCs) were established in most postevaluated projects to assist executing agencies (EAs) in project implementation. Such organizational arrangements frequently failed to generate the level of coordination and supervision necessary for effective implementation of project activities. The major problems encountered in this regard generally comprised: (i) cumbersome administrative procedures among cooperating Government institutions; (ii) lack of competent staff and poor staff mobility; (iii) ineffectiveness of PCCs; and (iv) differences in the priorities of federal and state agencies. In addition, lack of proper records combined with inadequate management information and reporting systems, seriously undermined the capacity of EAs to undertake regular program monitoring.

18. Bank supervision of IRD projects was considered generally adequate in most projects, more so in countries where the EAs had no previous experience in implementing externally-funded projects. However, in several instances, more specifically, in the case of complex rural development projects and program loans which required systematic policy dialogues with the

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[1] These were the Lodoyo Irrigation, Gambarsari-Pesanggrahan Irrigation Rehabilitation, and Sempor Dam and Irrigation Projects in Indonesia; and the Medium-Scale Irrigation Package Project in Thailand.

governments, intensive Bank supervision was considered necessary to enhance implementation efficiency and improve delivery of project outputs. Bank Review Missions generally focussed more on the physical, technical, and financial, including procurement and disbursement aspects, and paid limited attention to the qualitative aspects of project performance.

3. Institutional Development

19. Bank assistance to institutional development comprised, among other things, the provision of TA support to strengthen capabilities of institutions through consultant services, training of staff, and establishment of systems and procedures for enhancing project supervision and monitoring. The results obtained have been mixed depending on the stage of development of the country/institution concerned. Some success was achieved in enhancing the capabilities of executing agencies such as the Department of Irrigation in Nepal. On the other hand, the problems faced in implementing institutional development activities in many countries included: (i) the absence or lack of adequate institutional mechanisms for inter-agency coordination; (ii) budgetary constraints; (iii) limited duration or level of consultancy services/training; (iv) staffing and manpower constraints; and (v) lack or absence of interest among participating groups. In general, institutional development components focused on quantitative targets (e.g., number of training activities to be conducted, etc.) rather than on qualitative aspects of capacity building.

20. The impact of institutional development efforts in developing capabilities of beneficiaries at the project level has been limited. Lack of appreciation of the need to develop linkages with target groups, as well as organize farmers through water users' associations (WUAs) hindered the development of a participatory approach to project implementation. Exceptions were observed in a few subprojects in the Imjin Area Development Project in the Republic of Korea and the Medium-Scale Irrigation Package Project in Thailand. However, the need for a more concerted effort to involve beneficiaries at all stages of project preparation, implementation, and operation was highlighted in most PPARs. This is an area in which more dynamic approaches are being experimented in projects approved in the late 1980s and early 1990s.

4. Economic Results

21. The reestimated economic internal rates of return (EIRRs) at postevaluation were generally below appraisal estimates (see Appendix 3), except in the case of the Andong Dam Multipurpose Development and the Nakdong River Basin Development Projects in the Republic of Korea which indicated higher rates of return. The major reasons for the shortfall in EIRR were (i) reduction in cropped/irrigated areas, (ii) implementation delays, (iii) cost overruns, (iv) delays and shortfalls in the realization of project benefits, (v) increased opportunity cost of water, (vi) unexpected and/or increased recurrent costs, and (vii) lower output prices.

22. Considerable variations have been noted in the assumptions used for estimating EIRRs at appraisal, project completion, postevaluation, and reevaluation. The Impact Evaluation Study of Bank Operations in the Irrigation Sector in Nepal (1994) reviewed critically the methodology, including the basic assumptions used for estimating EIRRs for ten projects. Substantial differences were seen in the assumptions about crop yields, cropping intensities and prices, not only between projects but also for the same project at various stages of reporting. The Study highlighted the need for the Bank to reexamine the current procedures for economic analysis

of irrigation projects, with a view to providing a common methodology that establishes a set of measurable and objectively verifiable parameters for estimating EIRRs of projects at all stages of the project cycle.

5. Socioeconomic Impact

23. Almost all projects contributed to improved farm incomes (in constant terms). Increased incremental income was obtained by higher production achieved through improved crop yields and higher cropping intensities. The overall increase in crop production ranged from 20 to 100 percent compared with the situation that prevailed at appraisal. While owners of large farm landholdings benefitted more in terms of increased output, small and marginal farmers experienced significant increases of household incomes. For example, under the Crop Intensification Program in Nepal, it was noted that the percentage contribution of farm income to total income increased to 35.9 and 52.6 percent from 19.7 and 36.6 percent, respectively, for the marginal and small farmers during the program period. Medium and large farms also experienced increases from 60.3 and 66.6 percent, to 65.8 and 69.8, respectively. However, additional incomes received were still insufficient to improve significantly the living standards of the small farmer beneficiaries in the project areas.

24. The projects provided additional employment opportunities, particularly to marginal or subsistence farmers, directly in construction work during implementation and subsequently in farm and off-farm work as hired labor. Increased demand for hired labor consequent to increased agricultural activities resulted in higher farm wages and to more intensified use of family labor in the smaller farms. Another positive outcome, although not entirely due to the projects, was the increase in the capital value of land which added to the net worth of the landowners/farmers. The distribution of income among the beneficiaries was not equitable as the size of landholdings determined their levels of income. For example, in Nepal, the average farm income of large farmers in project areas was found to be three to five times higher than that of small farmers. Income from medium-sized farms was about double that of small farmers.

25. An overall improvement in the living conditions of farmers/beneficiaries was observed in most projects although the improvements cannot entirely be attributed to project investments. For example, the poverty levels among project beneficiaries were reported to be lower than among those in nonproject areas. The provision of good quality and accessible water supply, sanitation and health facilities, roads and bridges, and flood control infrastructure enabled the beneficiaries to enjoy greater convenience and spend less time on household chores. Improved living conditions were evident from better housing structures, ownership of more household furniture and equipment, and presence of rural electrification. However, some negative developments attributed partly to project interventions included: (i) increased intercommunity conflicts arising from limited water resources; (ii) greater dependency on government programs; (iii) disruption to traditional social structures; and (iv) increased land disputes including unauthorized encroachment on public/private lands.

6. Impact on Women

26. Women were not specifically targeted in most IRD projects approved in the 1970s and the early 1980s. However, provision of additional amenities such as improved water supplies resulted in time savings for women. They were also able to attend to their household chores and participate more actively in farm operations including income generating activities created under the projects. The employment opportunities generated under the irrigation projects for women however, generally tended to be menial in nature and included tasks such as weeding and transplanting. Technology transfer, credit, and institutional development programs were generally directed at the head of the household, only a small percentage of whom were women. The involvement of women in decision making at the level of EAs and at the project level was found to be minimal.

7. Environmental Impact

27. The effects of IRD projects on the environment were mixed. In general, the construction and rehabilitation of irrigation systems had a favorable impact, in that the enhanced use of arable areas for cropping mitigated pressures to extend cultivation into fragile marginal lands where reduction in vegetative cover would have been detrimental. However, irrigation projects in upland areas, such as the Hill Irrigation Project in Nepal, contributed to undermining soil stability because of blasting and cross-sectional cuts in the mountains for building irrigation canals. In the Kankai Irrigation and Diversion Structure Project, the placement of the diversion weir and canal structures aggravated downstream erosion, induced riverbed regression, and constricted natural drainage flows. Common problems experienced in large irrigation schemes included siltation and sedimentation, seepage from canals, oversaturation or water logging of crop lands, and poor management of water.

28. Compared with large irrigation schemes, adverse environmental impacts arising from the establishment of STWs, DTWs and low lift pumps (LLPs) have been considerably less. Hydrological constraints to large-scale groundwater development were found to be minimal. However, indiscriminate siting and spacing of STWs and DTWs could result in shortage of surface water, especially during the dry season, as experienced under the Low Lift Pump Maintenance Program in Bangladesh.

29. The positive environmental impacts of IRD projects comprised: (i) soil conservation and reforestation; (ii) reduction in flooding; (iii) mitigation of soil erosion; and (iv) controlled migration and settlement. These benefits were tempered by negative effects which included: (i) land slides along constructed roads; (ii) encroachment of forests due to increased mobility provided by road infrastructure; (iii) degradation of watersheds due to forest encroachments and lack of proper watershed management; and (iv) river channelization caused by the installation of flood dikes and drainage systems along riverbeds. Fertilizers and agro-chemicals provided under Bank-financed programs were generally considered to have had no adverse effects on the environment as they merely sustained traditional and approved levels of application.

8. Performance Rating

30. The overall performance of projects in the IRD subsector has been less than satisfactory. Less than half (40.4 percent) were rated generally successful, 47.4 percent were rated partly successful and about 12.2 percent were regarded as unsuccessful (see Appendix 4). In the case of the Kankai Irrigation Project which was considered generally successful at the time of postevaluation, a reevaluation study, conducted five years later, invalidated earlier optimistic expectations on the Project. General neglect, unsatisfactory implementation of a follow-on project, and unfavorable trends in relative input/output prices had resulted in the Project being rated unsuccessful. Two other reevaluation studies covering the Lodoyo Irrigation Project in Indonesia and the Laguna de Bay Development Project in the Philippines supported earlier PPAR findings which had rated them as partly successful and unsuccessful, respectively.

31. Projects in Group A countries had the lowest rate of generally successful projects at 36.4 percent, and the highest rate of unsuccessful projects at 13.6 percent (see Appendix 4). Group B countries had the highest success rate at 44.0 percent, while Group C countries had the lowest rate of unsuccessful projects at 10 percent. Partly successful projects among the three country groups ranged between 44 and 50 percent. In terms of investment costs, 42.5 percent of the investment generated successful projects, 47.2 percent partly successful projects, and 10.3 percent unsuccessful projects. A review of performance of IRD projects in relation to the year of loan approval shown in Table 2 indicates a decreasing rate of success in the more recently approved projects. The decreasing trend has to be understood in the context of declining commodity prices, increased complexity of project components, and a deteriorating macroeconomic environment.

Table 2: Analysis of Project Performance

Year of Approval	No. of Projects	Performance Rating of Projects (in percent) GS	PS	US
1969 - 1970	5	40.0	60.0	nil
1971 - 1980	35	42.9	42.8	14.3
1981 - 1987	20	30.0	55.0	15.0

Notes: 1. Supplementary and special assistance projects were considered separately.
2. GS = Generally Successful; PS = Partly Successful; US = Unsuccessful

9. Sustainability

32. At postevaluation, serious concerns were raised regarding the sustainability of some of the IRD projects because of the rapid deterioration of the physical infrastructure, shortages of water, especially during the dry months, competing claims for water from the urban areas, and the conversion of agricultural lands to other uses. An issue which was constantly highlighted was the importance of effective O&M of facilities for ensuring sustainability of operations and benefits. Adequate and sufficient O&M of the facilities became difficult in many projects because of poor cost recovery arising from lack of commitment and capacity on the part of the water users to pay for irrigation services, inadequate recurrent funding support from the government, lack of interest or

inability of the beneficiaries to operate and maintain the facilities, and institutional deficiencies of implementing agencies. A number of projects such as the Palawan Integrated Area Development Project in the Philippines, the Second, Third and Fourth Crop Intensification Programs in Bangladesh, and the Command Area Development and Hill Irrigation (Western Region) Projects in Nepal suffered from these weaknesses. On the other hand, projects which had adequate beneficiary participation, enlightened inter-agency collaboration, and effective recurrent funding support from the Governments, succeeded in achieving operational sustainability.

33. Lessons of experience suggest that the following considerations are important for ensuring project sustainability: (i) development of effective and cohesive WUAs; (ii) adequacy and reliability of water supplies; (iii) efficiency of water distribution; (iv) stability in the relative real prices of agricultural inputs and outputs, wages, and exchange rates to ensure adequate producer incentives; (v) provision of institutional support to water users, farmers and project beneficiaries; and (vi) timely availability of BME data on key parameters such as crop production and water use. The sustainability of policy reforms supported under the rural development programs required the firm commitment of the governments to the broader principles and concepts underlying them.

IV. ISSUES AND LESSONS LEARNED

A. Key Issues

34. A number of key issues that have continuing relevance to ongoing and future Bank operations in the IRD sector were identified. These issues relate to project design, pricing policies and agricultural support services, capacity building, including strengthening of WUAs, participatory management and O&M, cross-cutting issues, water resources development and management, and benefit monitoring and evaluation.

1. Design of IRD Projects

35. IRD projects focused largely on the technical and engineering aspects of irrigation and rural development, and gave inadequate attention to the political, institutional and sociocultural environment of the DMCs. Most projects were conceived as technical and "hardware" endeavors, focusing on the provision or improvement of physical facilities, while giving low priority to eliciting beneficiary involvement and developing their capabilities in operation and maintenance. Capital intensive and technologically complex projects were designed without due regard to the absorptive capacities of the DMCs. Technical designs were often based on insufficient topographical, geographical, and hydrological information. These inadequacies led to major revisions in scope, substantial cost overruns, and to investments in repairs and rehabilitation.

36. About 60 percent of the projects/programs experienced changes in design or upward/downward revisions in scope. In general, the factors that contributed to reformulation of designs or to revision of scopes comprised the following: (i) limited availability of funds for local cost financing; (ii) protracted implementation delays due to institutional inefficiencies, political disruptions, and security problems; and (iii) design deficiencies arising from lack of information or poor understanding of local conditions at appraisal. Changes in design were generally viewed as

desirable and justified for expediting the process of implementation and for achieving the overall project objectives. However, where cost reduction was the underlying reason for the revisions, the changes resulted in less than satisfactory project outcomes. This is exemplified by the Hill Irrigation Project in Nepal where the deletion of some components affected canal stability, reduced crop and livestock production, and undermined environmental protection.

37. The long gestation of IRD projects warrants the need for the adoption of a process approach which provides greater flexibility in the design, implementation, and operation and management of projects. Flexibility is important to ensure adaptability to changing global and local conditions. The benefits of a process approach become highly relevant particularly when local capabilities are limited or constrained by financial, technical, and sociocultural factors. Uncertainties and risks need to be adequately examined and assessed during project formulation in order to provide for more realistic costs and implementation targets. Important design considerations would include: (i) an assessment of the absorptive capacity of the country concerned; (ii) adaptability of the technology employed (e.g., simple versus complex schemes) to local conditions; (iii) beneficiary participation and involvement in project preparation; and (iv) formulation of a comprehensive and integrative design framework reflecting agricultural policies and support services. Overall, the effectiveness of project designs should be determined on the basis of their resilience, flexibility, and their suitability for eventual transfer and ownership by the beneficiaries themselves.

2. Pricing Policies and Agricultural Support Services

38. Pricing policies have generally been characterized by (i) large subsidies on inputs, such as fertilizers; and (ii) regulated crop prices, particularly for rice. While price support mechanisms may be justified on the grounds of welfare and the need to compensate for distortions elsewhere in the economy, they have often proved to be uneconomic in the long term. Benefits were often biased against the small and marginal farmers, as in the case of fertilizer subsidies wherein traders and large farmers benefited more. Such equity issues became further compounded when marketing or distribution mechanisms for subsidized inputs were not well established.

39. Postevaluation experience indicates that provision of irrigation infrastructure would need to be complemented with an effective agricultural support services structure to obtain the benefits of improved technology, including the use of HYVs of seeds, fertilizer, and other inputs. Despite substantial emphasis on irrigation development in the past, improvements in productivity were not commensurate with investments made because of the slow adoption of technological innovations by the farming community. Lack of qualified extension staff, inadequate farmer training programs, lack of institutional credit, and weak linkages between agricultural extension and research have been cited as major constraints to improving agricultural productivity.

3. Strengthening Institutional Capacity

40. The complex nature of IRD projects highlighted the need for greater institutional linkage and coordination between government agencies, farmer beneficiaries, WUAs, and other nongovernment organizations (NGOs). The responsibility for constructing, operating, and maintaining project facilities needs to be a joint effort of the Government and the beneficiaries. While the provision of physical infrastructure facilities falls generally within the purview of the

governments, operation and maintenance of the facilities, particularly the secondary and tertiary canal systems, would need to be increasingly borne by the beneficiaries. This entails the formation of active WUAs for improving equity in water distribution, resolving water disputes, collecting water charges and maintaining tertiary canals. WUAs could also perform routine O&M functions and take over gradually the ownership of small-scale irrigation schemes. Postevaluation experience confirms that capacity building is central to improving performance of IRD projects and that Bank efforts should be directed at three levels of intervention: executing agencies at the central level; regional units at the district level; and farmer organizations at the project/program level.

4. Improving O&M through Participatory Management

41. The susceptibility of irrigation facilities to rapid deterioration due to natural causes such as siltation and sedimentation, highlights the importance of effective and efficient O&M. In many IRD projects, cost recovery has remained a difficult issue because of farmers' unwillingness to pay water charges in the absence of reliable irrigation services. However, proper services cannot be provided without adequate funds for system maintenance. Thus, the problem becomes cyclical in nature. With the recent thrust on small and medium-scale irrigation systems, a participatory approach to O&M through farmer managed irrigation schemes (FMISs) has been considered a viable and effective option in countries such as the Philippines and Nepal. FMISs are considered more sustainable because they are small and are able to establish cohesive links with farmer beneficiaries. In order to foster farmer responsibility for O&M, it is also important that a strong sense of ownership is developed among them - the absence of a sense of ownership has contributed to perpetuating the "dependency syndrome" noted in some of the government or agency managed systems. Concurrently, efforts should be made to introduce revenue earning measures, either directly or indirectly, to support maintenance operations of larger schemes. Suggestions have been made to introduce either a land betterment tax on farmers who receive irrigation water or collect a minimum indirect tax or cess from consumers/users of farm products.

5. Cross-Cutting Issues

42. Cross-cutting issues such as women in development, environmental protection, and poverty alleviation did not figure prominently in most IRD projects, as these became emerging concerns only in projects approved in the late 1980s and thereafter. Specific target group approaches focusing directly on the beneficiaries, i.e., the rural poor and women, were rarely attempted in those projects approved in the 1970s and the early 1980s. However, the efforts made to improve productivity and develop institutional capacities yielded some positive results in countries such as Thailand, Indonesia, and Nepal. A recent impact evaluation study undertaken in Nepal confirmed that the poverty level in project areas was considerably lower than in nonproject areas. It is now increasingly recognized that direct interventions are necessary through better designed projects to improve the living conditions and environment of the bulk of the rural people, including women, in the DMCs.

6. Water Resources Development and Management

43. The increasing demands on water resources, consequent to rapid industrialization

and urbanization of DMCs, have highlighted the need to adopt an integrated water resources planning, development and management approach for effective utilization of this scarce resource. It is important that all sources and demands for water within entire river basins and watersheds are considered in a rational and coordinated manner to ensure that all competing uses are optimally and equitably served. Inadequate attention to coordinating water resources management could compromise the longer term technical viability of IRD structures. Measures such as rotational water distribution, replacement of irrigated rice with high-value crops using less water, installation of water measurement devices, and correct water pricing would have to be considered more thoroughly in future IRD projects.

7. Benefit Monitoring and Evaluation

44. The collection, analysis and interpretation of data on a regular and systematic basis are vital for effective long-term management and operation of IRD projects. The importance of the concept of Benefit Monitoring and Evaluation (BME), however, was neither well articulated nor clearly enunciated in Bank documents until the 1980s. Consequently, in the projects approved before the early 1980s, the need for continuous monitoring and evaluation of agricultural development activities during and after project implementation, was not adequately addressed at the project formulation and design stages. In instances where the concepts were explained, the usefulness of BME as a management tool was not properly understood and appreciated by the national and local level agencies. This, in part, could be attributed to the complex design of BME systems which were beyond the capability of government agencies to comprehend and implement because of staffing, funding, and other technical constraints. Unless capacity building efforts are vigorously pursued through appropriate technical assistance support, and the importance of institutionalizing BME is recognized by the beneficiaries themselves, limited success will be achieved in improving agricultural performance and sustaining project/program benefits in the long term.

B. Lessons Learned

45. The highlights of major lessons learned in the IRD sector are summarized below. A list of selected postevaluation findings and lessons learned in the IRD sector is presented in Appendix 5.

(i) A major factor that militated against better project performance was inadequate preparation and design. The lack of feasibility studies or poor feasibility study preparation combined with inadequate consideration of the socioeconomic, institutional, sociocultural, topographical, geographical, and hydrological conditions in the project areas at the formulation stage, and non-involvement of beneficiaries in project selection contributed to less than satisfactory outcomes. The long gestation period required for IRD projects to yield their full potential warrants a design mode that favors the adoption of a process approach which enhances opportunities for phased implementation and improvement of performance. **Lessons of experience, therefore, suggest that there is a need to improve project formulation and design.**

(ii) The success of IRD projects has depended, among other things, on the efficiency and effectiveness of the policy base governing the agricultural sector. To guide

policy reforms and facilitate implementation of appropriate pricing policies and structural changes, policy covenants need to be time-bound, specific, monitorable, and action-oriented. The Bank, on its part, should have continuing dialogues with the governments to ensure that policy-based reforms are clearly understood and appropriately implemented. **IRD projects would be more successful if the policy environment and the institutional support structure for agriculture are conducive to economic growth.**

(iii) The multisectoral and interdisciplinary character of IRD projects places substantial burden on the institutional capability of EAs. Performance of projects suffered because of inadequately trained staff, poor incentive support structure, and a weak monitoring framework. The institutional weaknesses were compounded by inadequate beneficiary participation in the planning, implementation, and operation and management of people-centered projects. Greater participatory management would require more institution building efforts and training in system operation and management for farmers and other beneficiary groups. **Lessons of experience confirm that institutional support and capacity building efforts are vital for the success of IRD projects.**

(iv) Lessons of experience have demonstrated that the involvement of beneficiaries in the design, implementation, and management of small and medium-scale projects fosters a sense of ownership and cooperation among them and promotes self-reliance and less dependence on already constrained government resources. With greater beneficiary involvement in the day-to-day operations and maintenance of irrigation systems, cost recovery could be improved. The beneficiaries would need to be assured that water charges are equitably based on water benefits received and that funds collected would be used for the O&M of the respective scheme. **A lesson learned is that increased beneficiary participation at all stages of the project cycle improves project performance.**

(v) For BME to be effective, **the inherent constraints to implementing such systems**, such as lack of understanding of the conceptual parameters, inadequate logistical support, poor staff capabilities, and complexity of the system designs **should be addressed during project formulation and appropriate remedial measures should be built into the framework of project designs.**

(vi) Competing demands for water arising from urbanization and industrialization of DMCs necessitate a total water resources management approach during project design. This will help identify priorities in relation to the varied needs for irrigation, domestic use, energy generation, and other industrial uses. **A comprehensive approach to water resources management and development would need to be considered in the design of new irrigation projects.**

(vii) Lessons of experience confirm the need for increased Bank supervision. The diversity of Bank operations in IRD projects necessitates more frequent visits to project sites, a multidisciplinary approach to project/program supervision, and an increased skill mix in the composition of Bank missions. **Effective Bank supervision of IRD projects demands more comprehensive mid-term reviews and a multidisciplinary focus in project supervision.**

(viii) Complex implementation procedures, substantial O&M costs and inadequate staff and maintenance capabilities of EAs, are some reasons why large irrigation projects

are less favored over small and medium-scale irrigation systems. Groundwater irrigation projects (STWs and DTWs) have been found to be more environment friendly and easier to operate and maintain by the farmer beneficiaries. **In view of the Bank's operational thrust to promote small and medium-scale irrigation projects, the relative advantages and greater viability of such projects should be more seriously considered in designing future projects in the irrigation sector.**

V. CONCLUSIONS

46. Postevaluation experience has highlighted the complex character of irrigation and rural development projects, and the difficulties associated with implementing projects which are essentially people-centered. Although Bank operations in the IRD sector have contributed to improvements in agricultural productivity and farm incomes, there is further scope for enhancing agricultural production and alleviating rural poverty by designing simpler, more process-oriented projects that elicit greater beneficiary participation at all stages of project planning and implementation. Equally important is the need to address more directly the issues relating to gender, poverty, and the environment.

APPENDIXES