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**IMPLEMENTATION COMPLETION REPORT**

**CHINA**

**GANSU PROVINCIAL DEVELOPMENT PROJECT**

**(LOAN 2812-CHA/CREDIT 1793-CHA)**

**PART I—AGRICULTURE COMPONENT**

January 23, 1997

Rural and Social Development Operations Division  
China and Mongolia Department  
East Asia and Pacific Regional Office

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## CURRENCY EQUIVALENTS

Currency Unit = Yuan (Y)  
Y 1.00 = \$0.12 (1996)

1986 (appraisal)	\$1 = Y 3.71
1987	\$1 = Y 3.71
1988	\$1 = Y 3.71
1989	\$1 = Y 3.71
1990	\$1 = Y 4.72
1991	\$1 = Y 5.22
1992	\$1 = Y 5.38
1993	\$1 = Y 5.45
1994	\$1 = Y 8.70
1995	\$1 = Y 8.31
1996	\$1 = Y 8.30

## FISCAL YEAR

January 1 - December 31

## WEIGHTS AND MEASURES

Metric System

## ABBREVIATIONS AND ACRONYMS

DAP	- Di-Ammonium Phosphate
ERR	- Economic Rate of Return
GPIO	- Gansu Project Implementation Office
ICB	- International Competitive Bidding
ICR	- Implementation Completion Report
ITC/CNTIC	- International Tendering Company/China National Technical Import/Export Corporation
NCB	- National Competitive Bidding
O&M	- Operation and Maintenance
PLG	- Project Leading Group
PMO	- Project Management Office
SAR	- Staff Appraisal Report
TBM	- Tunnel Boring Machine
UNDP	- United Nations Development Programs

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## FORWARD

1. **Project Background.** The Gansu Provincial Development Project comprises three components for agriculture, education and industrial diversification. The Project was identified based on the findings of a 1986 Bank study, *Growth and Development in Gansu Province*, carried out to assist the Central and Provincial Governments in developing an overall strategy for income growth and poverty reduction. In the early 1980s, 41 percent of Gansu's population lived in poverty, compared to 13 percent nationally, and rural per capita incomes were the lowest nationwide. The Bank study identified a range of issues facing the province but found three problems acute. First, incomes and living standards in the province's upland region of Dingxi were found particularly low. Dingxi had 30 percent of the provincial population -- almost all employed in agriculture, a larger proportion of rural poor, irrigation of only 13 percent of the cultivated area and a shortage of drinking water, and an urgent need for land rehabilitation to counter erosion of the loess soils and to introduce appropriate agricultural production systems. Second, restrictions on labor mobility combined with unsustainable pressure on the province's fragile natural resource base argued for the development of labor-intensive rural industries relying on low-cost labor. Third, improvement of the educational system, particularly of teacher training in basic education, was identified as critical, in view of international experience showing education's prime role in allowing mobility to more remunerative nonagricultural employment, adoption of improved agricultural technology, and -- for women -- fertility reduction, improvement in family health and retention of children in school.

2. **Project Design.** To address these problems, three separate projects were prepared and appraised. However, when the amount of Bank Group assistance for education and industrial diversification had to be scaled back to reflect provincial repayment capacity, the three operations in different sectors were processed together as components of a single Gansu Provincial Development Project, financed by Ln. 2812/ Cr. 1793-CHA. The agriculture component received \$130 million equivalent of credit proceeds, the education component \$20 million equivalent of IDA funds, and an IBRD loan of \$20 million and credit proceeds of \$500,000 equivalent went to industrial diversification.

3. The project's agriculture component comprised construction of the technically challenging 57,000-ha Yindaruqin irrigation scheme, settlement of the irrigated area by 15,000 poor farm families from nearby resource-poor areas, land improvement over 75,000 ha in Dingxi's Guanchuan River Basin, and institutional support. The education component included upgrading of facilities for training primary school teachers, expansion of facilities for training lower secondary school teachers, increased in-service teacher training via expansion of television training facilities, improved science education in 400 lower secondary schools in poor counties, and support to enhance education administration and management. In support of industrial diversification, the project provided a \$20 million line of credit to finance small- and medium-sized subprojects in rural and light industry, as well as training and technical assistance for the enterprises

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assisted and the project financial intermediary, the Gansu Investment and Trust Company (GITC). While the province assumed the interest rate and exchange rate risks on the Bank loan, GITC bore the commercial risk.

4. **Project Outcome.** The project's agricultural and education activities were, overall, successfully implemented, although a two-year extension of the credit was required to complete the agriculture component's Yindaruqin Irrigation Subcomponent. That subcomponent, entailing major tunneling works with difficult site conditions and complex engineering, suffered from poor performance by some contractors, lack of counterpart funds, and bureaucratic land settlement processes. Some on-farm works and land settlement activities are still ongoing with local funding. The Guanchuan subcomponent in Dingxi raised farmers' incomes by almost 250 percent three years after completion of works, while net incomes of farmers in the Yindaruqin area have eventually increased by 136 percent for the low-income group and by 55 to 60 percent for others. The land rehabilitation program tested under this and other projects has been subsequently refined and used in the Loess Plateau Watershed Rehabilitation Project (Cr. 2616), among others.

5. The education component, the first Bank Group education operation focused on only one province, increased the number of qualified primary and lower-secondary school teachers, improved the quality of science teachers and education in poor counties, and improved the capabilities of education administrators in the design, development, and implementation of educational programs. The capacity building for educational administrators and managers was important for continued improvement of the system. The administrators and managers trained under this project helped design and implement the subsequent Third Basic Education Project (Cr. 2831-CHA).

6. The industrial diversification component attempted to raise rural incomes in resource-poor areas with limited agricultural potential and a population surpassing the carrying capacity of the land. Since labor migration in China at the time was allowed only in the context of limited, officially sanctioned programs like the one under this project's agriculture component, the project attempted to provide in-situ assistance to the rural poor by promoting nonagricultural employment. While the provincial study cautioned planners "to look carefully at the policy and institutional environment that would facilitate development of productive nonagricultural jobs in Gansu" (para. 3.01), implying inadequacy in the current environment, the severity of rural poverty in Gansu, where some parts of the population had to rely on government provision of grain, water and fuel relief, was considered adequate justification for piloting limited support to employment diversification.

7. Implementation of the component showed the project's goals in the sector to be overambitious and the study's warning to be justified. While 17 subprojects received funding for modern equipment and technology and small civil works, financial performance of the beneficiaries -- 55 percent of which were non-state rural enterprises -- suffered from many problems. Among these were subborrowers' inexperience in enterprise management, shortages of counterpart funds during implementation and of

working capital during production, and economic reforms introduced during the project period that caused enterprise costs to rise significantly and demand for their products to fall. With most project enterprises still producing at less than 50 percent of capacity, their loan repayment to GITC suffered as did GITC's financial condition. Positively, however, technical assistance and training provided under the project introduced provincial planners to the concepts of financial and economic analysis of investments, and this appreciably improved local planning capabilities.

8. **Assessment of Project Strategy.** The project responded appropriately to provincial needs as identified in the Bank Group study. It also provided experience with various types of sectoral interventions aimed at poverty alleviation. Although this project predates introduction of the current Bank Group poverty alleviation strategy in China, with its targeting of whole operations to specific poor counties identified by the central and provincial governments, the agricultural component was well focused by emphasizing the Dingxi Region. The education component addressed the province's general need for better qualified teachers and did target poor counties for improved science teaching. Moreover, it was followed by the poverty-targeted basic education project series, including the Third Basic Education Project which covers Gansu and six other provinces. The industrial diversification component required about half of the subprojects to be in rural areas.

9. The issues with respect to rural industrial development are its difficulty as well as its value relative to other possible interventions for poverty alleviation. Experience internationally indicates a high failure rate in town and village enterprises, and the ongoing China Southwest Poverty Reduction Project (Ln. 3906/Cr. 2744-CHA), a well planned, integrated multi-sectoral initiative in Guangxi, Guizhou and Yunnan Provinces, has in its first year disbursed little for a small township and village enterprise development component. This suggests the difficulty in using rural industrial development as a poverty alleviation tool.

10. The Gansu Provincial Development Project's highly successful land development component in Guanchuan proved the effectiveness of using a package of measures to improve loess soils. In much of the Loess Plateau, covering 640,000 square kilometers of Gansu, Shaanxi, and Shanxi Provinces and the Autonomous Regions of Inner Mongolia and Ningxia, good new land can be readily and cost-effectively created by mechanized and manual terracing of the soft soil, where slopes are not too steep and population has not yet exceeded carrying capacity. Using the approach tested under this project, the Bank Group-financed Loess Plateau Project (Cr. 2616-CHA) being carried out in several provinces including Gansu, the Shanxi Poverty Alleviation Project (Cr. 2834-CHA) and the Gansu Hexi Corridor Project (Ln. 4028/Cr. 2870-CHA) are raising agricultural productivity and the incomes of very poor farmers over a wide area of the Yellow River basin.

11. **Summary.** Although the Gansu Provincial Development Project lacked some of the design sophistication now brought to the Bank Group's poverty reduction efforts in China, it significantly improved the incomes of very poor farmers, enhanced educational

quality in poor and other areas of the province, and demonstrated the difficulty of rural enterprise development. The land improvement package tested under the project proved a highly effective means of raising agricultural productivity and reducing poverty. The follow-up Loess Plateau, Shanxi Poverty Alleviation and Gansu Hexi Corridor Projects are now replicating and building upon the significant achievement of the earlier initiative.

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**IMPLEMENTATION COMPLETION REPORT**  
**CHINA**  
**GANSU PROVINCIAL DEVELOPMENT PROJECT**  
**(LOAN 2812-CHA/CREDIT 1793-CHA)**  
**AGRICULTURE COMPONENT**

**PREFACE**

This is the Implementation Completion Report (ICR) for the Agriculture Component of the Gansu Provincial Development Project in China, for which a credit in the amount of SDR 102.87 million (\$130 million equivalent) were approved on May 12, 1987, and made effective on January 19, 1988.

The credit was closed on June 30, 1996. Final credit disbursement took place on October 31, 1996, at which time the balance of SDR 86,543.89 was canceled. Total disbursements amounted to SDR 102.79 million for the Agriculture Component.

The ICR for the Agricultural Component was prepared by missions comprising Lang S. Tay (Task Manager) and Qun Li (Consultant Economist) of the Rural and Social Development Operations Division, China and Mongolia Department. The Report was reviewed by Messrs. Joseph Goldberg (EA2RS Division Chief) and Yo Kimura (EA2 Project Advisor). The Borrower provided comments, which are included as Annex C to the ICR.

Preparation of the ICR was completed following the various Bank ICR missions, and is based on materials in the project files and meetings with project staff in the field. The Borrower contributed with views and data requested, its own evaluation of project's execution, and comments on the draft ICR.



**CHINA**  
**GANSU PROVINCIAL DEVELOPMENT PROJECT**  
**(LOAN 2812-CHA/CREDIT 1793-CHA)**  
**AGRICULTURE COMPONENT**

**EVALUATION SUMMARY**

**Project Objectives and Description**

1. The main objective of the component was to raise the living standards and income levels for about 96,000 poor households in Gansu Province through increased agricultural production achieved through: (a) 57,000 hectare (ha) irrigation development and improvement, and land settlement by voluntary migration of the newly irrigated land; and (b) improvement of rainfed agriculture on some 76,000 ha in Guanchuan River Basin through soil and water conservation, and improved farming practices. The main features of the project were: (i) construction of the Yindaruqin Irrigation Scheme to serve about 57,000 ha through completion of a 90-km long feeder channel, two main canals, a network of branch, lateral and sublateral canals and drains, and the development of service units covering about 250 ha each; (ii) settlement of the newly irrigated land by about 15,000 poor farm families from the surrounding resource-poor areas; (iii) land improvement of existing rainfed agriculture in Guanchuan River Basin, Dingxi Prefecture, including benching and terracing of about 76,000 ha cultivated land, benefiting about 39,000 families (205,000 people); and (iv) institutional support and strengthening through provision of operation and maintenance machinery and equipment, staff training and consultants' services.

2. The project concept and objectives were generally well designed and appropriate to Gansu's strategy of reducing poverty and increasing agricultural production for the province. The formulation of the project was preceded by a detailed review of agricultural development issues and potentials in Gansu, as part of the Gansu Provincial Study (Report No. 6064-CHA—Growth and Development in Gansu, China).

**Implementation Experience and Results**

3. The implementation of the Guanchuan River Basin Subcomponent was completed according to schedule, with some of the physical targets exceeding the original estimated quantities. Due to its sheer size of work magnitude, difficult site conditions and engineering complexity, the Yindaruqin Irrigation Subcomponent was completed two years beyond the original schedule with some of the on-farm works and land settlement remaining to be completed during 1997-99 with local funding. The Yindaruqin Subcomponent also experienced delay caused by contractors' poor performance on the

construction of the Feeder Channel, lack of counterpart funds and the bureaucratic processes in land settlement.

4. Due to inflation and increased work items and quantities resulting from change of engineering designs to meet site conditions, the total project cost was increased by about 27 percent from \$250 million at appraisal to about \$318 million, with about \$246 million cumulative expenditures at closing. The increase in project total cost was incurred mainly in the Yindaruqin Subcomponent.

5. IDA's overall performance in identification, preparation and appraisal was considered as satisfactory, but could have been improved in the packaging of procurement of major civil works and in the formulation with the Borrower of a land settlement plan, which should have been covenanted in the loan/credit agreements. The Borrower's performance in project implementation and management was generally satisfactory but its construction supervision of major civil works in the Yindaruqin Subcomponent could have been strengthened through more adequate and competent site staff to ensure better construction work quality. Also, timely allocation of adequate counterpart funds could have expedited the project implementation.

### **Summary of Findings, Future Operations, and Key Lessons Learned**

6. **Overall Finding.** The project's overall outcome is satisfactory despite some remaining works to be completed under the Yindaruqin Subcomponent. The most significant result achieved was the increased agricultural production and farmers' incomes in the Guanchuan Subcomponent over the last three years since its completion in 1992. Farmers' net income per capita increased from Y 223 to Y 762, an increase of 242 percent. Comparable increases in income were also achieved by settler farmers in the Yindaruqin Irrigation Subcomponent. Net income per capita increased from Y 110 to Y 260, an increase of 136 percent for the low-income group, Y 310 to Y 480 (increase of 55 percent) for the medium-income group, and Y 530 to Y 850 (increase of 60 percent) for the high-income group. The economic rate of return (ERR) for the Guanchuan Subcomponent is evaluated at 27.6 percent compared to 18.6 percent estimated at appraisal. The ERR for Yindaruqin Subcomponent is 12.7 percent compared to 12.2 percent estimated at appraisal. The overall component ERR is 15.1 percent compared to 13 percent estimated at appraisal.

7. **Project Impacts.** The construction and completion of the project activities has: (a) provided opportunities to rural laborers to earn additional cash income by participating directly in project construction or working for various contractors; (b) provided impetus for economic growth to the Yongdeng County center and future expansion and development of urban and industrial centers in the vicinity of Lanzhou Airport with the availability of assured water sources; (c) trained a number of project staff in project preparation, implementation and management for Gansu Province as evidenced from the efficient preparation of the newly approved Gansu Hexi Corridor Project (Ln. 4028/Cr. 2870-CHA); (d) transferred the technology on modern tunneling techniques and equipment (e.g., use of tunnel boring machines—TBMs) to the various Chinese engineering entities who visited

the Yindaruqin Subcomponent; (e) provided better-quality drinking water to the local population and livestock in the project area, thereby reducing the incidence of waterborne diseases and improving basic health; (f) provided some induced secondary benefits of road access and rural electricity to some local population residing in the vicinity of the Feeder Channel; and (g) progressively improved the eco-environments of the project area through increasing flora and fauna resulting from forest belts established and tree planting along the canal systems.

8. **Sustainability.** The component is likely to be sustainable. The main objective conforms to the Gansu provincial government's long-term strategy for poverty reduction in the province. The provincial government is fully committed to ensure success of the project. The project beneficiaries are also motivated and responding enthusiastically to the project facilities provided. These facilities would be operated and maintained on a sustainable basis with the operation and maintenance (O&M) plan prepared and the present establishment responsible for O&M expanded to cope with the additional workload. In the Yindaruqin Subcomponent, water charges would be collected and progressively increased to meet the full annual O&M costs plus a certain amount of depreciation costs for capital works and installations. In the Guanchuan Subcomponent, completed in 1992, monitoring of the various performance parameters showed that the projected benefits have been consistently sustained except during 1995, which experienced the worst drought in 60 years.

9. **Future Operation.** The immediate task is to complete the remaining on-farm works and land settlement in the Yindaruqin Subcomponent for which the Borrower has given a firm commitment. The O&M of the completed irrigation facilities would be strengthened through the expanded establishment and full use of the O&M equipment provided under the project. Agricultural support services and credit would be provided to the settler farmers to sustain their production. A system would be established to monitor the long-term impact of irrigation on changes in water table level and soil salinity. Experiments and pilot projects to promote "high-yield, high-quality and high-value" crops would be continued and technical feasibility studies would be undertaken to explore water-saving irrigation techniques and development of mini-hydropower on the Feeder Channel and the two main canals. For the Guanchuan Subcomponent, the proposals are to expand the soil/water conservation works and land improvement with domestic funds; continue monitoring and evaluation of soil and water effects in the sampled areas, including socioeconomic monitoring of sampled project beneficiaries; and to expand and strengthen agricultural extension to train farmers in new and scientific production technology.

10. **Lessons Learned.** The key lessons learned were: (a) for a major and complex engineering project, more attention should be paid before appraisal by the Borrower and the Bank to detailed engineering investigation and design, contract packaging and realistic implementation schedules, taking into consideration the Borrower's resources and implementing capacity; (b) evaluation of bids for major civil works should be more stringent on bidders' capability and past performance (i.e., on prequalification) as opposed to major focus on price (bid evaluation); (c) adequate and timely counterpart funds are critical to ensure scheduled implementation, thereby avoiding delay and increases in project

cost; (d) time-bound implementation plans for land settlement of migrant settlers should be prepared at appraisal and covenanted in the Loan/Credit agreements for effective implementation; (e) the use of local consultants with suitable qualifications and experience could be promoted with substantial saving to the Borrower; and (f) large-scale irrigation development with land settlement for poverty reduction invariably takes a longer time to complete, Borrower's optimism and enthusiasm notwithstanding.

## CHINA

### GANSU PROVINCIAL DEVELOPMENT PROJECT

#### (LOAN 2812-CHA/CREDIT 1793-CHA)

#### AGRICULTURE COMPONENT

##### PART I: PROJECT IMPLEMENTATION ASSESSMENT

##### A. PROJECT OBJECTIVES AND DESCRIPTION

1. The main objective of the component was to raise the living standards and income levels for about 96,000 poor households in Gansu Province through increased agricultural production. This was mainly achieved through: (a) construction of the Yindaruqin Irrigation Scheme, covering 57,000 ha, and settlement of the newly irrigated land by about 15,000 poor farm families from surrounding drought-stricken areas; and (b) improvement of rainfed agriculture on some 76,000 ha in Guanchuan River Basin through soil and water conservation, and improved farming practices.

2. The main features of the project were as follows:

- (a) construction of the Yindaruqin Irrigation Scheme to serve about 57,000 ha through completion of a 90-km long feeder channel, two main canals, a network of branch, lateral and sublateral canals and drains, and the development of service units covering about 250 ha each;
- (b) settlement of the newly irrigated land by about 15,000 poor farm families from the surrounding resource-poor areas;
- (c) land improvement of existing rainfed agriculture in Guanchuan River Basin, Dingxi Prefecture, including benching and terracing of about 76,000 ha of cultivated land, benefiting about 39,000 families (205,000 people); and
- (d) institutional support and strengthening through provision of operation and maintenance machinery and equipment, staff training and consultants' services.

3. The project concept and objectives were generally well designed and appropriate to Gansu's strategy of reducing poverty and increasing agricultural production in the province. The formulation of the project was preceded by a detailed review of agricultural development issues and potentials in Gansu, as part of the Gansu Provincial Study (Report No. 6064-CHA—Growth and Development in Gansu, China).

## B. IMPLEMENTATION EXPERIENCE AND RESULTS

4. **General.** The project achieved fully its objective in the Guanchuan River Basin Subcomponent and only partially in the Yindaruqin Irrigation Subcomponent. The satisfactory performance of the Guanchuan River Basin Subcomponent has resulted in an economic rate of return (ERR) of 27.6 percent compared to 18.6 percent estimated at appraisal. On the other hand, the performance of the Yindaruqin Irrigation Subcomponent could not be fully assessed since some of its physical work have not yet been fully completed—canal network, on-farm development and land settlement. However, based on the economic analysis of typical settler households, and assuming that the remaining irrigation works and land settlement would be completed over the next three years at the estimated cost as planned, the ERR has been estimated at 12.7 percent compared to 12.2 percent estimated at appraisal. The smaller net increase in ERR value for Yindaruqin Subcomponent was due to increased capital construction cost for the main irrigation works. The overall ERR for the project as a whole is estimated at 15.1 percent compared to 13 percent at appraisal.

5. **Physical Results.** In terms of physical targets, the Yindaruqin Irrigation Subcomponent has, to date, achieved fully its planned targets for the feeder channel and the main canal system, and only partially for the branch canals, on-farm works and land settlement by farmers, despite extension of the project closing date by two years. At credit closing, 17 out of the 45 planned branch canals have yet to be constructed, 32,870 ha of on-farm works to be completed, and about 48,935 persons to be settled on the land being reclaimed. These remaining works are planned to be completed by the end of 1999 with local funding. On the other hand, the Guanchuan River Basin Subcomponent was virtually completed by the end of 1992, achieving fully its targets, and in many cases exceeding those originally planned. The land improvement through terracing, benching, afforestation, pasture development and improvement achieved a total of about 85,600 ha, which exceeded the original planned target of 76,000 ha.

6. **Agricultural Benefits.** The investment in the two agricultural subcomponents has brought about positive benefits in terms of increased agricultural yields and production. In the Guanchuan River Basin Subcomponent, the area completed and yields achieved to date have equaled or exceeded the appraisal estimate for full development year (at 2003). As for the Yindaruqin Subcomponent, although the area irrigated and settled to date is only about 40 percent of planned, the unit yields achieved so far for various crops on the newly irrigated land have exceeded substantially the preproject unit yields and show a promising increasing trend toward achieving the Staff Appraisal Report (SAR)-projected yields at full development year. Table 6 shows the area cultivated and yields achieved for Guanchuan River Basin and Yindaruqin.

7. **Poverty Reduction.** The project has effectively reduced the incidence of poverty for 39,000 households in Guanchuan River Basin and 8,876 new settler households (final target is 57,000 households including the existing 42,000 households) in the Yindaruqin Irrigation Area. The financial analyses, based on survey data from 341 farm households

drawn from predetermined areas selected for monitoring from 1986 to 1995, show substantial increases in net income per capita as follows:

	Net Income per Capita (Yuan)		% Increase
	Preproject	Postproject	
<b>Yindaruqin</b>			
(a) Low-income Group	110	260	136
(b) Medium-income Group	310	480	55
(c) High-income Group	530	850	61
<b>Guanchuan Basin</b>	223	762	242

The higher increase in net incomes for Guanchuan Basin is attributed to the earlier comprehensive completion of the project works (in 1992) and increasing benefits accruing subsequently.

8. **Other Socioeconomic Benefits.** The project also generated the following socioeconomic benefits for the project area:

- (a) **Off-Farm Employment.** During implementation the project generated temporary off-farm jobs for about 93,700 persons and 54,000 persons in the Guanchuan River Basin Subcomponent and the Yindaruqin Subcomponent, respectively. It was estimated that some 60 and 36.5 percent of these off-farm workers were women, respectively. These off-farm jobs provided the much needed cash earning, especially during the idle winter period between farming seasons.
- (b) **Safe Drinking Water.** The project provided safe drinking water to the local population and their livestock. In the Guanchuan River Basin Subcomponent, the completed 8,912 water cisterns and 1,414 ponds and wells provided clean water to 33,420 households and 42,420 heads of livestock (sheep-based unit). In the Yindaruqin Subcomponent, the diversion of comparatively clean water from the Datong River through the irrigation system to the project area provided an assured source of better-quality water for about 280,000 people and 300,000 heads of livestock. Hitherto, they have had to rely on the scarce rainfall and water brought in by government trucks. The provision of safe drinking water has contributed to substantial reduction of incidence of waterborne diseases, and saving of time and drudgery of women in fetching water.
- (c) **Rural Electricity.** In the Guanchuan River Basin Subcomponent, the rural electrification (462 km of 10 kV lines) completed provided rural electricity supply to about 34,700 households in 135 villages, 2 townships, and 693

newly developed rural enterprises. Similarly, the Yindaruqin Subcomponent benefited some 1,200 farm households (about 6,000 people) in 32 remote villages scattered along the Feeder Channel with its power lines constructed for construction purposes.

- (d) **Road Access.** New and improved rural and farm roads completed in the Guanchuan River Basin Subcomponent (226 km) and the Yindaruqin Subcomponent (80 km constructed with another 102 km to be completed) have provided better access into and from the project area. This has resulted in reduced transportation cost and time, improved access to markets for remote villages, and stimulated other economic development activities in the project area.
- (e) **Environmental Enhancements.** The soil and water conservation measures, coupled with land benching and terracing, gully plugs, tree and shrubs planting, carried out in the Guanchuan River Basin project area have increased the soil moisture retention capacity and vegetative cover, and reduced the surface water runoff and soil erosion. This has checked environmental degradation and improved the ecosystem for sustainable upland agricultural production. In Yindaruqin, when the forest belts and on-farm windbreaks are completed in full, the project area's ecosystem will be considerably enhanced through the increasing fauna and flora established.

9. **Training and Technical Assistance.** Staff training was satisfactorily carried out. Under the Yindaruqin Subcomponent, 9 overseas and 20 local study tours were conducted. Over 30 training sessions for staff were also conducted, involving a total of over 5,015 person-sessions. Training topics included tunnel construction, irrigation research techniques, salinity control and management, operation and maintenance, monitoring, and contract administration. Under the Guanchuan Subcomponent, two overseas study tours were organized to study soil and water conservation practices in Australia and Japan. Fourteen staff training sessions were also carried out, covering 2,165 staff-sessions, on technical and management skill upgrading. The Yindaruqin Project Management Office (PMO) was also assisted in the supervision of major work construction by foreign and local consultants whose performance was satisfactory, but could have been more effective had the Yindaruqin PMO paid more attention to the consultants' findings and recommendations on construction work quality control. During the final stage of project preparation, the Bank also obtained UNDP funds to engage a foreign consulting firm to assist Gansu in preparing the international competitive bidding (ICB) bid documents for the feeder channel.

10. **Procurement.** Gansu Province appointed the International Tendering Company of China National Technical Import and Export Corporation (ITC/CNTIC) to carry out the ICB procurement for the project, while the national competitive bidding (NCB) procurement for works and goods was mostly carried out departmentally by the Yindaruqin and the Guanchuan PMOs and the Gansu Provincial Project Implementation Office. For the Yindaruqin Subcomponent, three ICB and 13 NCB contracts with total value of about

\$200 million were awarded for civil works, and 16 contracts for goods with a total value of about \$11.2 million. Procurement for the Guanchuan Subcomponent was limited to two limited ICBs for 9,900 tons of DAP fertilizer with total value of about \$2.56 million. Procurement was carried out satisfactorily in accordance with the Bank guidelines and no significant problems were encountered with respect to delivery and quality. The only problem encountered was the bureaucratic delay in the internal process of obtaining approval of bid documents and bid evaluation from an administrative unit under the State Council.

11. **Disbursement.** Due to the slow initial startup of the project, changes in engineering designs, increased work quantities, and extended implementation period of the Yindaruqin Subcomponent, the overall disbursement progress for the agricultural component was generally below the original planned disbursement schedule throughout the implementation period. The Credit proceeds were reallocated twice, including an increase in the disbursement percentage for works from 42 to 59 percent. Except for a few instances of charging expenditures to wrong categories, and overdisbursement in some categories, the World Bank disbursement guidelines and procedures were generally adhered to. The last credit disbursement was made on October 31, 1996.

### C. PROJECT IMPACT

#### Yindaruqin Subcomponent

12. Apart from reducing poverty and raising income levels of poor settler farmers, the component created the following significant impacts:

- (a) By being involved in the project, a substantial number of project staff were trained in project preparation, implementation and management of major development projects. This institution building has been reflected in the efficient preparation and implementation of the Gansu Hexi Corridor Project (Ln. 4028/Cr. 2870-CHA), which will involve improvement and development of about 100,000 ha and settlement of 200,000 poor farm people.
- (b) The tunneling works completed on the 90-km Feeder Channel were a major engineering feat and successfully challenged the earlier misconceptions of many on their technical feasibility. Various technical entities in the country have visited the project to learn tunneling techniques and equipment used, and ICB contract administration and management. In part, the project has transferred technology on modern tunneling techniques and equipment (TBM) to China.
- (c) During construction of various project works, the project created substantial employment opportunities for local labor, and stimulated local supply of goods and services. This in turn provided impetus for economic growth of Yongdeng Township, the Yongdeng county center.

- (d) The afforestation established along the canals and drains, upon full development, would improve the ecoenvironments of the project area through increasing flora and fauna.
- (e) The diversion of comparatively clean water from the Datong River through the irrigation system to the project area provided a better-quality source of water for over 280,000 people and about 300,000 head of livestock, thereby improving their basic health. Hitherto, the people and animals had to rely on scarce rainwater and poor-quality groundwater for consumption. During droughts, water had to be brought in by government water trucks. In addition, the availability of assured and better quality of water will provide impetus for future expansion and development of urban and industrial centers in the vicinity of Lanzhou Airport.
- (f) The construction of access roads and power lines to facilitate construction and subsequent operation of the feeder channel located in a mountainous region provided access and electricity supply to remote villages located along the Feeder Channel.

### **Guanchuan Subcomponent**

13. The soil and water conservation measures completed under the project improved the environment. Based on six-year results of monitoring of sampled watersheds, the average annual runoff has been reduced by 33 percent and silt load by 39 percent. These proved the positive results of land terracing and benching, and afforestation in reducing soil erosion and increasing the soil moisture retention capacity. The increased agricultural production virtually eliminated the annual food deficit in the project area, and, to a large extent, checked further degradation of environments by preventing farmers from cultivating large areas with low unit yield and cutting of vegetative cover for fuel as practiced in the past. The access roads, safe water and rural electricity provided also improved significantly the quality of life in the project area.

### **D. MAJOR FACTORS AFFECTING THE PROJECT**

14. **Implementation Schedule.** The project was approved in May 1987 and scheduled to be closed in June 1994 (the closing date was subsequently extended twice, one year each, to June 30, 1996). The original implementation schedule was overly optimistic and had not adequately considered the implementation capacity and resources of Gansu Province in undertaking projects of this size and complexity for the first time with Bank financing.

15. **Slow Startup.** The project experienced a rather slow startup with the Loan and Credit Agreements signed in September 1987, some four months after Board approval. The Loan and Credit only became effective in January 1988. Moreover, during 1987 the Gansu Provincial Government did not include budgetary provision for the project for implementation in 1988 and this resulted in late allocation of funds to start the project in 1988. In all, some 9 to 12 months were lost in the project startup.

16. **Change of Project Management.** Initially, the Gansu Provincial Bureau of Water Resources was responsible for project implementation and management of the Yindaruqin subcomponent. In July 1989, the Gansu Provincial Government established the Yindaruqin Command, headed by a Vice Secretary-General, to take over project implementation and management. The senior leadership was changed and strengthened to provide better coordination and integration with other provincial bureaus. The new leadership under the Yindaruqin Command proved to be effective in accelerating project implementation, which had a slow initial startup.

17. **Inflation and Cost Overrun.** The high inflation in the country since 1989, coupled with depreciation of the local currency (Yuan) against the US dollar, led to substantial price increases in construction materials and labor wages. This resulted in higher contract prices, especially those contracts awarded after 1990. Together with the change in designs and increased work quantities, the inflation contributed to substantial cost overrun of the feeder channel (about 250 percent) and the two main canals (200 percent). The problem of cost overrun was further exacerbated by the shortage of counterpart funds.

18. **Lack of Counterpart Funds.** Gansu is a poor province with annual budget deficits. The lack of adequate and timely allocation of counterpart funds affected the implementation progress frequently, especially during the initial years. This resulted in slower progress payments made to contractors, and this in turn affected progress of contract works. Some of the scheduled project works and activities had to be deferred to a later date, and some work contracts were scheduled unduly long in order to ease contract payments.

19. **Poor Performance of Local Contractors.** Domestic contractors were awarded one ICB and several NCB contracts for the construction of the feeder channel and the two main canals. Performance of some of these local contractors on the Feeder Channel was generally not up to required standards and slow due to inadequate equipment and obsolete construction methodology. This was further aggravated by the lack of supervision by project management due to the lack of adequate and competent site supervisory staff and too many work contracts going on at the same time. Remedial measures recommended by the various Bank supervision missions were instituted and effective in bringing improvements, but progress was affected.

20. **Engineering Complexity and Difficult Site Conditions.** The 90-km feeder channel presented unique engineering construction complexity in having 33 tunnels, two inverted siphons, nine aqueducts, open and covered canals through mountainous terrain with varying geological conditions. The complexity and site conditions were underrated in drawing up the three ICB and three NCB contracts whose periods for completion were too optimistic. Consequently, some of the contracts could only be completed on extended time. Inadequate detailed engineering investigation and design, especially on the tunnels, also contributed to delay in completion as a result of design changes made during construction and additional work quantities and cost.

21. **Inadequate Planning and Design of Land Settlement.** The land settlement of the newly irrigated land with 15,000 poor families was not adequately prepared during the project preparation. There was no specific settlement plan prepared for the project appraisal as this activity was to be funded locally and based on the ongoing process of settling poor households under the provincial poverty reduction program being implemented by the Two Xi Commission. A settlement plan was finally prepared and approved by the Gansu Provincial Government after some urging by Bank supervision missions and delay in reaching agreement in allocating quotas of settlers between the provincial, city and county governments. Moreover, land settlement is a time-consuming process requiring close coordination of various government agencies in implementation. The belated start of land settlement has resulted in only about 31,070 people settled to date, with the remaining 48,930 people to be settled from 1997 to 1999. However, a firm commitment has been given by Gansu Provincial Government to complete the land settlement program (see Annex B).

#### E. PROJECT SUSTAINABILITY

22. Gansu Government at all levels has a strong commitment to ensure sustainability of the project, which represents the key economic development project to increase foodgrain production and reduce incidence of poverty in the province. The project is also part of Gansu's long-term poverty-reduction plan, which is in line with the State's strategy and priority to develop the resource-poor regions in northwest China. Thus, continued support from the Government to sustain the project seems assured.

23. The Yindaruqin Irrigation Subcomponent would be sustainable when all the remaining works and land settlement are fully completed by the end of 1999. Judging by the initial results of the area irrigated in the 1994 and 1995 seasons, the increases in yield and production were very positive compared to nonirrigated areas outside the project area. During 1995, Gansu experienced the worst drought in 60 years and the areas irrigated under the Yindaruqin Irrigation Area were not affected but achieved higher yields than the previous year.

24. An O&M plan has been prepared for the whole irrigation area, including the collection of water charges that would be progressively increased to meet the full annual O&M costs plus a certain amount of depreciation costs for capital works and installations. The existing establishment responsible for O&M has also been restructured and expanded to cope with the increased O&M workload. If fully implemented, these steps would ensure that the irrigation facilities would be operated and maintained on a sustainable basis.

25. The settlement of the irrigated land by poor farmers would also be sustainable due to the large number of absolute poor households (4.2 million people) in the province and their strong desire and determination to improve their economic well-being through settlement on good agricultural land. The average 2.5 mu per capita of irrigated land provided to the poor farm families would not only ensure their basic food needs but also provide opportunities to raise their income levels through surplus agricultural production.

The current demand for settlement in the Yindaruqin irrigation area has exceeded the supply capacity.

26. With extensive and long-term irrigation, there is potential risk of a rise of the water table level, leading to secondary salinization of soils, which can reduce crop yields. Close monitoring of the water table level and mineralization of groundwater will be required and appropriate drainage measures adopted to control the rise of water table levels in the irrigated areas. This provision has been included in the future operation plan (para. 35).

27. The Guanchuan River Basin Subcomponent was completed in 1992 and has been in operation for the last four years. Monitoring of the various performance parameters shows that the benefits have been consistently sustained except for the year 1995, which was significantly affected by the worst drought in 60 years. Since this subcomponent only improved the rainfed agricultural practices, the risk of drought affecting yield and production still exists. This risk would need to be minimized through continued strengthening of upland management practices and agricultural support services.

#### **F. IDA PERFORMANCE**

28. IDA's overall performance in project identification, preparation and appraisal was satisfactory, but some aspects could have been more thorough. The implementation schedule and the procurement of major civil works were rather too optimistic, and no detailed land settlement plan was prepared. The project was selected from options identified in a review of agricultural development issues and potentials in Gansu province, as part of the Gansu Provincial Study (Report No. 6064-CHA—Growth and Development in Gansu, China). It also conformed to Gansu's preference to develop the project area, which had failed on three previous attempts by Gansu, to provide an impetus of economic growth closer to Lanzhou, the provincial capital.

29. In all, IDA carried out 11 supervision missions of the project, one to two missions a year since 1989. These missions reviewed implementation progress, helped to resolve implementation issues and problems, and provided technical advice, especially on the construction of the complex feeder channel. The Yindaruqin and Guanchuan PMOs found the missions to be useful and generally followed up on the missions' recommendations. The missions' main contributions were in: (a) technical recommendations on tunneling work on the Feeder Channel with respect to methods of construction, safety and quality of construction, especially on tunnel lining and crown supports; (b) ICB contract administration and management, and enforcement of technical specifications to ensure work quality; (c) preparation of O&M manuals for the Feeder channel and the two main canals; and (d) review and preparation of a land settlement plan for poor farmers, covering the selection process, work programs and cost estimates. A Mid-Term Review was also conducted to consider reallocation of Credit proceeds and assess the time frame to complete the project.

environments. Sample surveys show that they are achieving increasing incomes over the years.

## I. FUTURE OPERATION

### Yindaruqin Subcomponent

35. The immediate task is to complete the remaining works over the next three years, consisting of 17 branch canals, on-farm works covering 32,870 ha and settlement of about 48,930 people on the newly developed irrigated land. Barring any unforeseen circumstances, these works should be completed as scheduled.

36. The next important task is to organize and strengthen O&M of the completed irrigation facilities. This would require: (a) completion of the O&M manual for the two main canals to complement the manual already compiled for the feeder channel; (b) recruiting and posting of O&M staff to the initial 800 posts approved by the Gansu Provincial Government; (c) collection of irrigation water charges to meet at least the annual full O&M costs; (d) distribution and use of O&M machinery and equipment already procured; and (e) establishment of a monitoring system to monitor the water table levels and soil salinity in the irrigated area so as to assess the extent of secondary soil salinization. The handing and taking over of completed irrigation facilities should be expedited as O&M has been somewhat lacking during this transitional period.

37. Equally important is the need to provide agricultural support services to the new settler farmers so that optimum agricultural productivity would be achieved as planned. The services would include training and extension services to farmers, provision of credit for purchase of inputs, supply of quality seeds and other planting materials. Diversification of crops in the near future would also be necessary to enhance income levels of farmers presently growing mainly food crops. Such support services could be provided by the departments concerned through their annual budgetary provision and work plans.

38. A system should be established to monitor and assess the performance of the project and track the socioeconomic well-being of existing and new settler farmers in the project area. The data and information collected would be useful for conducting a performance audit of the project in the future.

39. The promotion of "high-yield, high-quality and high-value" crops through experiments and pilot projects is laudable and encouraging. However, this should not take priority over efforts to first stabilize new settler farmers on the new land. Similarly, the proposed future study of water-saving irrigation techniques could be looked into so that the present irrigation area could be further expanded under the command of the East Main Canal No. 2.

40. There is potential for mini-hydropower development on the Feeder Channel and the two main canals. However, additional capital investment would be required. Revenue from

### **G. BORROWER PERFORMANCE**

30. This was the first Bank Group-financed project undertaken by Gansu Province, which had no prior experience of implementing projects according to Bank/IDA procedures and requirements. The overall performance during implementation of the Yindaruqin Subcomponent is rated as fairly satisfactory, taking into consideration the various difficult engineering problems and funding constraints encountered. For the Guanchuan River Basin Subcomponent, the performance was highly satisfactory and generally free of problems.

31. The project organization for implementation and management was sound and effective. The top provincial Project Leading Group (PLG), headed by the Governor, was effective in providing the leadership and policy guidance for project implementation. The Gansu World Bank Projects Implementation Office (GPIO), an executive arm of the PLG, controlled and managed the project funds efficiently, including the applications for disbursement of the World Bank loan and credit proceeds. The provincial leadership and project staff have all made great effort in ensuring the smooth project implementation despite various constraints.

32. Gansu's performance in the Guanchuan River Basin Subcomponent was even better. The project was implemented successfully and completed according to schedule in 1992 without serious problems. The Guanchuan PMO was efficient and effective. This was due partly to the commitment of the project staff in project execution and partly to the keen enthusiasm and participation of the project beneficiaries in project implementation. Moreover, the project work and activities on upland management and rainfed agriculture improvements had been successfully carried out in the past in the area, and therefore presented very few problems in implementation. The Guanchuan PMO was also innovative in establishing early a monitoring and evaluation system to track the performance of the project and the economic well-being of sampled beneficiaries.

33. The Borrower complied promptly and completely with the few covenants prescribed in the legal agreements. Half-yearly progress reports, audited project accounts together with the auditor's reports were also regularly produced and received generally on time.

### **H. ASSESSMENT OF OUTCOME**

34. Under various constraints, Gansu Province made serious efforts to implement the project. The project's overall outcome is considered as satisfactory. The Guanchuan Basin Subcomponent was successfully implemented, achieving its primary objectives and operating on a sustainable basis. Due to its sheer physical size and compounded by engineering complexity and lack of timely adequate counterpart funds, the Yindaruqin Subcomponent, although only partially completed, is showing positive results in the area developed and irrigated to date. The crop yield and production from the irrigated area is dramatic compared to preproject conditions. The irrigation system performed well in the 1995 drought, which was the worst ever experienced in the last 60 years. The poor farm households settled on the newly irrigated land have also responded well in their new

the sale of electricity to the rural areas could be used to subsidize the O&M cost of the irrigation facilities.

### **Guanchuan Subcomponent**

41. To sustain the project in its future operation, the Guanchuan PMO has proposed the following measures:

- (a) Continuation of the Guanchuan PMO to operate and maintain the project works, as well as to plan and execute future expansion works.
- (b) Using the provincial water and soil conservation funds to continue land improvement for rainfed agricultural production through terracing of 10,000 ha of cropland, tree planting of 10,000 ha and pasture improvement of 19,000 ha from 1996 to 2002.
- (c) Continuation of monitoring and evaluation of soil and water effects on sampled areas established under the project; and socioeconomic monitoring and assessment of sampled project beneficiaries in collaboration with the Dingxi Statistics Department.
- (d) Expand and strengthen training of farmers on new and scientific production technology through integrated efforts by county governments so as to achieve optimum benefits of project facilities provided.

### **J. KEY LESSONS LEARNED**

42. The key lessons learned from the project are summarized below:

- (a) In retrospect, the project preparation should have been more thorough by both the Borrower and the Bank/IDA with respect to more detailed engineering investigation and design on the tunnels, contract packaging for major civil works, and the overall implementation schedule, taking into consideration the Borrower's resources and implementation capacity.
- (b) The evaluation and award of ICB and NCB contracts for the construction of the Feeder Channel should have been more stringent in assessing the contractor's capability and capacity, especially the local contractors whose equipment was inefficient. Low bid prices<sup>1</sup> do not necessary mean that the bidders can carry out the contract on time and within the bid price awarded.

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<sup>1</sup> During the economic recession years of 1989-90, bid prices received from local contractors for civil works on the Feeder Channel were unduly low and seemed to have been deliberately reduced below cost in order to win bids.

Contractors with either joint-venture or consortium arrangements were less efficient than smaller sole contractors due to frequent internal disputes and work stoppages as experienced in the construction of the Yindaruqin Subcomponent.

- (c) The adequate and timely allocation of counterpart funds is a prerequisite to smooth implementation of a project according to schedule; the lack of which would inevitably lead to implementation delay and increase in project cost.
- (d) The settlement of newly developed irrigated land with poor farmers is a time-consuming process and needs careful planning and adequate logistic support in implementation. A time-bound land settlement plan should have been prepared and assessed during appraisal for the Yindaruqin Subcomponent with its implementation covenanted in the Development Credit Agreement. This would have avoided the necessity to prepare an ad hoc plan, which was then subject to undue delay in reviewing and reaching agreement by the provincial, city and county governments on the allocation of quota of settlers among the administrative jurisdictions.
- (e) Local consultants with suitable qualification and experience could be effectively used, as demonstrated by the 13 local consultants engaged by Yindaruqin PMO with substantial saving in consultancy fees; moreover, these local consultants have a good understanding of the local conditions and engineering practices.
- (f) Large-scale greenfield irrigation development, to serve in turn as the basis for large-scale irrigation and land settlement by poor population, invariably takes longer than standard Bank project periods. This is true, independent of the optimism and enthusiasm of the sponsoring jurisdictions and agencies. This lesson was applied in the planning of the FY96 Gansu Hexi Corridor Project (Ln. 4028/Cr. 2870-CHA).

**PART II: STATISTICAL TABLES**

**TABLE 1: SUMMARY OF ASSESSMENTS**

A. Achievement of Objectives	Yindaruqin				Guanchuan			
	Substantial	Partial	Negligible	Not Applicable	Substantial	Partial	Negligible	Not Applicable
Macroeconomic Policies				X				X
Sector Policies				X				X
Financial Objectives	X				X			
Institutional Development		X				X		
Physical Objectives		X			X			
Poverty Reduction	X				X			
Gender Issues		X				X		
Other Social Objectives		X				X		
Environmental Objectives		X				X		
Public Sector Management				X				X
Private Sector Development				X				X
<b>B. Project Sustainability</b>	Likely	Unlikely	Uncertain		Likely	Unlikely	Uncertain	
	X				X			
<b>C. Bank Performance</b>	Highly Satisfactory	Satisfactory	Deficient		Highly Satisfactory	Satisfactory	Deficient	
Identification	X				X			
Preparation Assistance		X				X		
Appraisal			X			X		
Supervision		X				X		
<b>D. Borrower Performance</b>								
Preparation		X				X		
Implementation			X		X			
Covenant Compliance		X				X		
<b>E. Assessment Outcome</b>		X			X			

**TABLE 2: RELATED BANK LOANS/CREDITS (AGRICULTURE COMPONENT)**

Loan/Credit No. And Title	Purpose	Year of Approval	Status
<b>Preceding Operations:</b>			
1. North China Plain Agriculture (Cr. 1261-CHA)	Irrigation Development & Land Improvement	FY82	Completed
2. Pi-Shi-Hang Chaohu Area Dev. (Cr. 1606/Ln. 2579-CHA)	Irrigation & Area Development	FY85	Completed
<b>Following Operations:</b>			
3. Northern Irrigation (Cr. 1885-CHA)	Irrigation Development & Improvement, & Settlement	FY88	Closing 12/97
4. Irrigated Agri. Intensification (Ln. 3337/Cr. 2256-CHA)	Irrigation Development & Improvement	FY91	Closing 06/97
5. Yangtze Basin Water Resources (Cr. 2710/Ln 2874-CHA)	Irrigation & Area Development	FY95	Closing 12/2001
6. Gansu Hexi Corridor (Ln. 4028-Cr. 2870-CHA)	Irrigation & Land Development, & Settlement	FY96	Closing 12/2006

**TABLE 3: PROJECT TIMETABLE**

Steps in project cycle	Date planned	Date actual/estimated
Identification	04/85	04/85
Preparation/Preappraisal	n.a.	n.a.
Appraisal	03/86	03/86
Negotiations	03/87	03/23/87
Board presentation	04/87	05/12/87
Signing	06/87	09/14/87
Effectiveness	08/87	01/19/88
Project completion	12/31/93	12/31/95 <sup>/a</sup>
Loan/credit closing	06/30/94	06/30/96 <sup>/b</sup>

<sup>/a</sup> Full project completion is expected 12/99.

<sup>/b</sup> Extended twice of one-year extension each.

**TABLE 4: LOAN/CREDIT DISBURSEMENT: CUMULATIVE ESTIMATE AND ACTUAL (\$'000)**

	FY88	FY89	FY90	FY91	FY92	FY93	FY94	FY95 <sup>/a</sup>	FY 96 <sup>/a</sup>
Appraisal estimate	2,000.0	39,000.0	74,000.0	95,000.0	111,000.0	125,000.0	130,000.0	130,000.0	130,000.0
Actual	4,433.0	21,844.7	42,489.0	53,315.6	71,001.9	92,800.3	119,246.7	128,413.4	143,091.6 <sup>/b</sup>
Actual as % of estimate	221.7	56.0	57.4	49.7	64.0	68.4	86.1	98.8	110.1
Date of final disbursement									10/31/96

<sup>/a</sup> Closing date extended.

<sup>/b</sup> Higher cumulative disbursement in US dollar terms than estimated at appraisal was due to net cumulative depreciation of the US dollar against the SDR.

**TABLE 5: KEY INDICATORS FOR PROJECT IMPLEMENTATION**

Item/Description	Unit	SAR estimate	Completed at proj. closing	Balance to complete	Completed as % of SAR est.
<b>YINDARUQIN SUBCOMPONENT</b>					
<b>I. CIVIL WORKS</b>					
(1) Feeder Channel:					
Tunnels	km	49.5	59.4	0	120.0
Channel	km	13.1	9.5	0	72.5
Aqueducts	km	1.4	0.93	0	66.4
Siphons	no.	2	2	0	100.0
Drainage channels	no.	10	8	0	80.0
Other structures	no.	n.a.	52	0	
(2) Irrigation & Drainage:					
Main canals	km	113	104	0	92.0
Submain canals	km	0	0	47.6	
Branch canals	km	700	451	401.5	64.4
Tunnels	no.	39	39	39	100.0
Aqueducts	no.	19	20	13	105.3
Pumping stations	no.	6	0	6	0.0
(3) Other facilities:					
Main drainage channels	km	100	0	100	0.0
County roads	km	50	80	102	160.0
(4) On-farm Works:					
Lateral canals	km	1,100	727	989	66.1
Sublateral canals	km	1,000	856	1,196	85.6
Branch drains	km	900	340	560	37.8
Field channels and drains	km	12,000	4,811	6,025	40.1
Ancillary structures	no.				
Land reclamation and leveling	ha	57,000	24,430	32,870	42.9
(5) Construction machinery & equipment:	sum (Y mln)	26	86.38	0	332.2
(6) Settlement of farmers	person	80,000	31,066	48,934	38.8
<b>II. GOODS</b>					
(1) Urea fertilizer	ton	0	7,400	0	
<b>GUANCHUAN BASIN SUBCOMPONENT</b>					
<b>I. CIVIL WORKS</b>					
(1) Terracing	ha	13,380	15,043	0	112
(2) Benching	ha	1,667	1,683	0	101
(3) Tree and shrub planting	ha	21,300	23,318	0	109
(4) Nursery	ha	233	242	0	104
(5) Pasture:	ha				
Establishment	ha	20,387	24,099	0	118
Improvement	ha	19,687	21,459	0	109
(6) Water cisterns	no.	8,910	8,912	0	100
(7) Gully plugs <sup>/a</sup>	no.	136,500	145,425	0	107
(8) Drainage outfalls protection	no.	12,410	12,709	0	102
(9) Retention ponds	no.	1,412	1,414	0	100
(10) Access roads	km	205	226	0	110
(11) Rural power lines	km	400	462.2	0	116
<b>II. GOODS</b>					
(1) Fertilizer (DAP)	ton	n.a.	9,900	0	

<sup>/a</sup> In the SAR the quantity estimated was expressed in total length of 2,400 km instead of in numbers.

**TABLE 6: KEY INDICATORS FOR PROJECT OPERATIONS**

**A. Crops**

Item Description	SAR Estimated @ Full Dev.		Actual for Year 1995	
	Area (ha)	Yield (tons/ha)	Area (ha)	Yield (tons/ha)
<b>Yindaruqin</b>				
Wheat	21,800	4.5	15,800	4.0
Grain legumes	3,400	3.0	1,700	3.5
Oilseeds	5,700	2.3	1,000	1.7
Summer cereals	2,300	5.5	1,350	4.0
Melons	5,700	10.5 (1.1)	150	27.0
Vegetables	14,800	11.0	1,800	26.0
Fodder	14,300	3.0	640	7.8
Orchard (fruit, roses,)	4,900	10.5 (1.8)	150 (100)	8.0 (2.5)
Windbreaks	10,300			
<b>Total</b>	<b>83,200</b>		<b>22,590</b>	
<b>Guanchuan River Basin</b>				
Wheat	25,600	2.4	23,433	1.94
Grain legumes	8,900	1.7	11,579	1.10
Oilseeds	23,700	1.5	7,038	0.95
Potatoes	1,800	14.0	6,675	10.79
Summer cereals	1,800	5.5	9,658	1.10
Fodder	4,800	3.7	4,232	3.75
Grassland	56,400		60,420	
Shrubs and trees	44,000		45,170	
<b>Total</b>	<b>167,000</b>		<b>168,205</b>	

**TABLE 6: (CONT'D)**

**B. Animals**

Item/Description	SAR estimated @ full dev.		Actual for year 1995	
	Number (head)	Annual production (tons)	Number (head)	Annual production (tons)
<b>Yindaruqin</b>				
Sheep	57,000		41,900	
Wool		230.0		293.3
Meat		1,140.0		256.2
Pig	57,000		62,100	
Meat		2,570.0		5,278.5
Cattle /a	17,000		3,600	
Meat		5,100.0		288.0
Milk		11,200.0		3,420.0
Draft animals /b	11,500		33,400	
<b>Guanchuan River Basin</b>				
Sheep	120,000/c		56,900	
Wool		480.0		312.3
Meat		2,400.0		850.4
Pig	18,000/c		82,900	
Meat		820.0		6,632.0
Draft animals /b	2,000/c		10,000	

/a Mainly for draft purposes.

/b Donkeys, mules, horses.

/c The number was estimated too high in the SAR.

**TABLE 7: STUDIES INCLUDED IN PROJECT**

No studies were included in the Project Component at appraisal. However, during project implementation, Bank supervision missions recommended groundwater and soil salinity monitoring of a pilot irrigated area to assess the long-term impact of irrigation on groundwater level and soil salinity changes. The pilot area study is being continued. Gansu also obtained a former township forestry station in the project area and contracted with Gansu Provincial Academy of Agricultural Sciences to conduct a three-year experiment and demonstration of agricultural practices in “high-yield, high-quality, and high-value” crop production. So far, the results have been promising and the experiments are being continued. The production techniques are being extended to project farmers

**TABLE 8A: PROJECT COSTS IN \$ MILLION**

Item/Description	SAR Estimate			Revised Estimate			Actual at Closing			Balance to compl.
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	
<b>I. YINDARUQIN IRRIGATION</b>										
Feeder channel	24.70	57.60	82.30	56.88	70.19	127.07	55.05	70.19	125.24	1.83
Irrigation & drainage	40.90	33.50	74.40	80.36	46.06	126.42	28.56	46.06	74.62	51.80
On-farm works	10.70	1.20	11.90	8.61	2.90	11.51	1.70	2.90	4.60	6.91
Engineering supervision	1.40	0.00	1.40	10.92	3.99	14.91	1.57	3.99	5.56	9.35
Construction mach. & equip.	0.70	6.30	7.00	0.00	10.87	10.87	0.00	10.87	10.87	0.00
Land Settlement	4.30	0.00	4.30	2.86	0.00	2.86	0.45	0.00	0.45	2.41
Subtotal	<b>82.70</b>	<b>98.60</b>	<b>181.30</b>	<b>159.63</b>	<b>134.01</b>	<b>293.64</b>	<b>87.33</b>	<b>134.01</b>	<b>221.34</b>	<b>72.30</b>
<b>II. GUANCHUAN BASIN</b>										
Land rehabilitation/development	8.50	1.20	9.70	10.00	3.00	13.00	10.00	3.00	13.00	0.00
Pasture establishment	2.10	0.50	2.60	1.30	0.37	1.67	1.30	0.37	1.67	0.00
Roads and electricity	3.50	3.40	6.90	3.30	1.20	4.50	3.30	1.20	4.50	0.00
Fertilizer	0.20	1.30	1.50	0.00	2.60	2.60	0.00	2.60	2.60	0.00
Supervision and management	0.00	0.00	0.00	0.60	0.00	0.60	0.60	0.00	0.60	0.00
Subtotal	<b>14.30</b>	<b>6.40</b>	<b>20.70</b>	<b>15.20</b>	<b>7.17</b>	<b>22.37</b>	<b>15.20</b>	<b>7.17</b>	<b>22.37</b>	<b>0.00</b>
<b>III. TRAINING &amp; CONSULTING</b>	<b>1.00</b>	<b>1.20</b>	<b>2.20</b>	<b>0.10</b>	<b>2.16</b>	<b>2.26</b>	<b>0.10</b>	<b>2.16</b>	<b>2.26</b>	<b>0.00</b>
<b>Base Cost</b>	<b>98.00</b>	<b>106.20</b>	<b>204.20</b>	<b>174.93</b>	<b>143.34</b>	<b>318.27</b>	<b>102.63</b>	<b>143.34</b>	<b>245.97</b>	<b>72.30</b>
Physical contingency	13.60	14.70	28.30							0.00
Price contingency	8.40	9.10	17.50							0.00
<b>TOTAL PROJECT COST</b>	<b>120.00</b>	<b>130.00</b>	<b>250.00</b>	<b>174.93</b>	<b>143.34</b>	<b>318.27</b>	<b>102.63</b>	<b>143.34</b>	<b>245.97</b>	<b>72.30</b>

**TABLE 8B: PROJECT COSTS IN Y MILLION**

Item/Description	SAR Estimate			Revised Estimate			Actual at Closing			Balance to compl.
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	
<b>I. YINDARUQIN IRRIGATION</b>										
Feeder channel	91.40	213.20	304.60	282.97	350.19	633.16	267.99	350.19	618.18	14.98
Irrigation & drainage	151.50	123.90	275.40	624.50	260.75	885.25	199.76	260.75	460.51	424.74
On-farm works	39.60	4.40	44.00	67.43	16.77	84.20	10.79	16.77	27.56	56.64
Engineering supervision	5.30	0.00	5.30	85.62	15.80	101.42	8.85	15.86	24.71	76.77
Construction mach. & equip.	2.60	23.40	26.00	0.00	88.38	88.38	0.00	88.38	88.38	0.00
Land Settlement	16.00	0.00	16.00	23.37	0.00	23.37	3.63	0.00	3.63	19.74
Subtotal	<b>306.40</b>	<b>364.90</b>	<b>671.30</b>	<b>1,083.89</b>	<b>731.89</b>	<b>1,815.78</b>	<b>491.02</b>	<b>731.95</b>	<b>1,222.97</b>	<b>592.87</b>
<b>II. GUANCHUAN BASIN</b>										
Land rehabilitation/development	32.30	3.60	35.90	44.80	11.30	56.10	44.80	11.30	56.10	0.00
Pasture establishment	7.70	1.90	9.60	5.90	1.20	7.10	5.90	1.20	7.10	0.00
Roads and electricity	12.80	12.80	25.60	14.30	4.70	19.00	14.30	4.70	19.00	0.00
Fertilizer	0.00	5.50	5.50	0.00	11.40	11.40	0.00	11.40	11.40	0.00
Supervision and management	0.00	0.00	0.00	2.20	0.00	2.20	2.20	0.00	2.20	0.00
Subtotal	<b>52.80</b>	<b>23.80</b>	<b>76.60</b>	<b>67.20</b>	<b>28.60</b>	<b>95.80</b>	<b>67.20</b>	<b>28.60</b>	<b>95.80</b>	<b>0.00</b>
<b>III. TRAINING &amp; CONSULTING</b>	<b>3.60</b>	<b>4.40</b>	<b>8.00</b>	<b>0.20</b>	<b>9.08</b>	<b>9.28</b>	<b>0.20</b>	<b>9.08</b>	<b>9.28</b>	<b>0.00</b>
Base Cost	362.80	393.10	755.90	1,151.29	769.57	1,920.86	558.42	769.63	1,328.05	592.87
Physical contingency	50.00	54.20	104.20							0.00
Price contingency	108.20	117.30	225.50							0.00
<b>TOTAL PROJECT COST</b>	<b>521.00</b>	<b>564.60</b>	<b>1,085.60</b>	<b>1,151.29</b>	<b>769.57</b>	<b>1,920.86</b>	<b>558.42</b>	<b>769.63</b>	<b>1,328.05</b>	<b>592.87</b>

**TABLE 8C: PROJECT FINANCING**  
(\$ million)

Item/Description	SAR Estimate			Actual on Closing			Balance to compl.
	Local	Foreign	Total	Local	Foreign	Total	
<b>I. Yindaruqin Irrigation</b>							
World Bank	0.00	123.00	123.00	0.00	136.05	136.05	0.00
Central		0.00	0.00	17.30	0.00	17.30	26.71
Province		0.00	0.00	58.43	0.00	58.43	42.54
Prefecture		0.00	0.00	11.60	0.00	11.60	3.05
County		0.00	0.00	0.00	0.00	0.00	0.00
Others		0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	<b>101.50</b>	<b>123.00</b>	<b>224.50</b>	<b>87.33</b>	<b>136.05</b>	<b>223.38</b>	<b>72.30</b>
<b>II. Guanchuan Basin</b>							
World Bank	0.00	7.00	7.00	0.00	7.29	7.29	0.00
Central		0.00	0.00	0.00	0.00	0.00	0.00
Province		0.00	0.00	10.30	0.00	10.30	0.00
Prefecture		0.00	0.00	1.20	0.00	1.20	0.00
County		0.00	0.00	1.40	0.00	1.40	0.00
Others		0.00	0.00	2.40	0.00	2.40	0.00
Subtotal	<b>18.50</b>	<b>7.00</b>	<b>25.50</b>	<b>15.30</b>	<b>7.29</b>	<b>22.59</b>	<b>0.00</b>
<b>TOTAL PROJECT</b>							
World Bank /a	0.00	130.00	130.00	0.00	143.34	143.34	0.00
Central	80.00	0.00	0.00	17.30	0.00	17.30	26.71
Province	40.00	0.00	0.00	68.73	0.00	68.73	42.54
Prefecture	0.00	0.00	0.00	12.80	0.00	12.80	3.05
County	0.00	0.00	0.00	1.40	0.00	1.40	0.00
Others	0.00	0.00	0.00	2.40	0.00	2.40	0.00
<b>Total</b>	<b>120.00</b>	<b>130.00</b>	<b>250.00</b>	<b>102.63</b>	<b>143.34</b>	<b>245.97</b>	<b>72.30</b>

/a Due to the net aggregated appreciation of SDR against the US dollar over the project implementation period, the actual total investment financed by the World Bank in US dollars has exceeded the US dollar equivalent of \$130 million estimated in the SAR.

**TABLE 9: ECONOMIC COSTS AND BENEFITS**

Economic Rate of Return (ERR)	Appraisal Estimate (%)	ICR Estimate (%)
<b>Project as whole</b>	<b>13.0</b>	<b>15.1</b>
Yindaruqin component	12.2	12.7
Guanchuan component	18.6	27.6

**TABLE 10: STATUS OF LEGAL COVENANTS**

Agreement	Section	Covenant type	Present Status	Original fulfillment date	Revised fulfillment date	Description of covenant	Comments
Credit	2.02(b)	1	C			Open and maintain a Special Account in a bank acceptable to IDA	
	Schedule 3, Section II, 1 & 2	5	C			Use and selection of consultants to be based on "Guidelines for the Use of Consultants by World Bank Borrowers and by the World Bank as Executing Agency, August 1981"	
Project	2.02	5	C			Establish and maintain Gansu Project Implementation Committee and Project Implementation Office	
	2.06	5	C			Submission of training program not later than June 30, 1988 for Part A.5 (Agriculture)	
	3.01(b)	1	C			Submission of audited project accounts and auditor's report to IDA not later than June 30	

*Note:* The above covenants are only applicable to the Agriculture Component of the Project.

**Covenant Class:**

- 1 = Accounts/audits
- 2 = Financial performance/revenue generation from beneficiaries
- 3 = Flow and utilization of project funds
- 4 = Counterpart funding
- 5 = Management aspects of the project or executing agency
- 6 = Environmental covenants
- 7 = Involuntary resettlement

- 8 = Indigenous people
- 9 = Monitoring, review, and reporting
- 10 = Project implementation not covered by categories 1-9
- 11 = Sectoral or cross-sectoral budgetary or other resources allocation
- 12 = Sectoral or cross-sectoral policy/regulatory/institutional action
- 13 = Other

**Status:**

- C = covenant complied with
- CD = complied with after delay
- CP = complied with partially

**TABLE 11: COMPLIANCE WITH OPERATIONAL MANUAL STATEMENTS**

Not applicable

**TABLE 12: BANK RESOURCES: STAFF INPUTS (ALL COMPONENTS)**

Stage of Project Cycle	Planned		Revised		Actual	
	Weeks	\$'000	Weeks	\$'000	Weeks	\$'000
Preparation to Appraisal						297.5
Appraisal						408.2
Negotiations to Board Approval						62.4
Supervision						561.1
Completion						24.0
<b>Total</b>						<b>1,353.2</b>

**TABLE 13: BANK RESOURCES: MISSIONS**

Stage of project cycle	Month/ year	Number of persons	Days in field	Specialized staff skills represented <sup>/a</sup>	Performance rating <sup>/b</sup>		Type of problems <sup>/c</sup>
					Imple- mentation status	Devel- opment objectives	
Identification through Appraisal	04/85 to 03/86	4	n.a.	A,E,I,IE	-	-	-
Appraisal through Board Approval	03/86 to 05/87	4	n.a.	A,E,I,IE	-	-	-
Supervision 1	09/87	4	7	A,E,I,IE	2	1	M,EGR,F
Supervision 2	06/88	4	14	A,E,E,IE	2	1	EGR,F
Supervision 3	09/89	2	9	IE,PR	2	1	M,EGR,F
Supervision 4	09/90	4	10	A,E,IE,TS	3	1	M,EGR,F
Supervision 5	09/91	2	7	IE,TS	2	1	EGR,F
Supervision 6	04/92	1	4	IE	2	1	F
Supervision 7	04/93	2	7	IE,TS	2	1	EGR,F
Supervision 8	04/94	2	7	IE,TS	2	1	EGR,F
Supervision 9	05/95	2	7	IE,TS	S	HS	F
Supervision 10	10/95	1	4	IE	S	HS	F
Supervision 11/ICR	05/96	2	7	IE,E	S	S	F
ICR	09/96	2	5	IE,E	-	-	-

<sup>/a</sup> A=Agriculturist, E=Economist, I=Institution Specialist, IE=Irrigation Engineer, PR=Public Relations Specialist, TS=Tunnel Specialist.

<sup>/b</sup> 1=problem-free or minor problems, 2=moderate problems, 3=major problems; HS=highly satisfactory, S=satisfactory, US=unsatisfactory.

<sup>/c</sup> M=Management, EGR=Engineering, F=Counterpart funding.

## ANNEX A: MISSION AIDE MEMOIRES

### I. SUPERVISION NO. 11 AND ICR MISSION, MAY 11 TO 15, 1996

1. A Bank mission comprising Mr. L. S. Tay and Ms. Li Qun visited Gansu Province to review implementation progress of the Yindaruqin Irrigation Subcomponent and initiate preparation of the Implementation Completion Report (ICR) for the agricultural component. The mission held discussions with the Gansu WB Projects Implementation Office (GPIO), Yindaruqin Engineering Construction and Management Bureau (YECMB) and Guanchuan Project Management Office. The mission also visited the project site on May 12 and 13. The mission thanks all project officials for the hospitality and cooperation extended to the mission. The following paragraphs record the understandings reached for the project supervision and preparation of the ICR:

#### A. SUPERVISION

2. **Remaining Works.** The remaining works to be done after the project closing date (6/30/96) are: (a) 17 branch canals out of the total of 45 planned in addition to the 9 branch canals currently under construction; (b) buildings for Water Control and Dispatch Center and O&M site offices on the Trunk Canal, East Main Canal No. 1 and No. 2; and (c) on-farm development of 460,000 mu and settlement of 65,000 persons. The branch canals and buildings are expected to be completed by the end of 1998, and the farm and land settlement by the end of 1999. All the remaining works would be financed by local funds at an estimated cost of about \$85 million. GPIO is requested to furnish details of the budget and work programs for the remaining work as soon as they have been approved by the provincial government.

3. **Disbursement.** The Credit would be fully disbursed at the project closing. The current balance is about \$120,000 on "training and consultants' services." The mission agreed that all past local training expenditures should be compiled for disbursement with the remaining credit available. Applications for disbursement of expenditures incurred before the closing date still can be made within the four-month period after the project closing.

4. **Operation and Maintenance.** The mission expressed concern over the delay in handing and taking over of the irrigation works and the follow-up operation and maintenance. This is evident from the field visits to the irrigation area where some of the branch canals need repair and maintenance, and proper irrigation water management. The mission recommends the following actions to be taken:

- (a) Handing and taking over of completed irrigation works should be phased in progressively after the works have been inspected and accepted for operation;
- (b) The O&M staff establishment (about 850 posts approved initially) should be filled and staff distributed to all levels of operation and maintenance units; and
- (c) Adequate annual O&M funds should be secured early.

5. **O&M Manual for East Main Canal No. 1 and No. 2.** The O&M plan prepared for the East Main Canal No. 1 and No. 2 should be revised into a permanent manual for reference and use by the operation and maintenance staff. The revised manual should be similar to the manual prepared for the Trunk Canal. The revised draft should be sent to the Bank for review before issuing to the O&M staff.

6. **O&M Machinery and Equipment.** Almost all the O&M machinery and equipment procured recently have been delivered and stored at the Yongdeng store. The mission recommends that, except for the heavy machinery to be centralized at Yongdeng store, the smaller machinery and equipment should be distributed to the O&M units on the canal system (Trunk Canal, East Main Canal No. 1 and No. 2). Full utilization of these machinery and equipment should be planned, including their upkeep and repair. As for the communication equipment delivered, the mission urged that the building to house this sensitive equipment should be completed early for the contractor to install, test and commission the complete communication system under the terms of the contract.

7. **Agricultural Support Services.** The agricultural support services should be intensified and expanded in the irrigation areas so as to achieve the targeted yields and production. Although one or two experimental and demonstration areas have been in operation, the results should be disseminated through the agricultural extension system. The mission recommends that agriculture, animal husbandry and forestry departments be consulted as to the provision of increased support for the project areas under their respective annual budget plans and work programs.

8. **Performance and Impact Monitoring.** With the completion of the irrigation works, the project starts to derive benefits progressively. The project performance and impact would need to be closely monitored so that they can be assessed and evaluated in the near future and compared with the original planned targets. The mission recommends that YECMB establishes a monitoring system immediately to monitor the performance and impact. The system used by Guanchuan Project Management Office could be adopted with changes to the monitoring indicators. This project may be subject to performance audit review by the Bank's Operations Evaluation Department (OED) and early collection of essential data on benefits and impact would facilitate such audit review by the Bank's OED.

## B. ICR PREPARATION

9. The mission reviewed the ICR draft reports prepared by YECMB and Guanchuan PMO and agreed that the following items be completed before June 1, 1996. PMO will complete, per ICR format, the necessary background data and analysis as discussed with the mission. A brief summary of those tables and related information requirements follows:

- (a) Completing the project cost and benefit analysis by finalizing:
  - (i) the actual investment costs by year;
  - (ii) the actual crop budgets by year;
  - (iii) the actual area developed and sown under irrigated, dry and terraced land by year and crops; and
  - (iv) incremental revenue from production of crop, grass/livestock, and forestry, as well as soil improvement.
- (b) Formulating farm household survey data for each subcomponent and especially for typical beneficiary families of low-, medium-, and high-income households, including detailed income estimates from crop production, sideline and others, and expenditure for self-consumption, investment and operation cost, tax, and other charges with and without project.
- (c) Finalizing the completed investment costs, procurement, disbursement and financing plan for the whole component as well as each subcomponent.
- (d) Complete a summary table of actual investment on Training and Technical Assistance (cover all programs and topics).

[A list of the detailed tables has been provided to the PMO (Yinda and Guanchuan) by the mission. Since the schedule is tight, the mission suggests that the PMO completes the final version of the tables, and send it to the RMC immediately.]

10. The mission suggested the following areas that need to be strengthened and /or supplemented with the information required for the ICR:

- (a) Poverty alleviation and/or other social economic benefits. Details regarding:
  - (i) drinking water provided for farmers and their livestock;
  - (ii) rural roads and electricity supplied to the villages/households;

- (iii) Improved living standard and income levels for about 96,000 households; and
  - (iv) incremental employment opportunity for farmers and role of women.
- (b) Environmental benefit from soil conservation and forestry development;
  - (c) Comment on the technical assistance provided to Yindaruqin component by foreign engineers and experts;
  - (d) Project sustainability;
  - (e) Factors affecting implementation and key lessons learned;
  - (f) Future operation:
    - (i) Provide a three-year implementation plan for remaining civil, on-farm and settlement works of Yindaruqin subcomponent, and complete the relevant tables for cost estimation and financing plan;
    - (ii) Assurances need to be obtained from the Yindaruqin PMO to set the procedure for initially setting and periodically adjusting the water charge to ensure that water charge will meet at least the full annual O&M costs.

11. Draft ICR prepared by the Bank is expected to be completed before October 1, 1996, and will be forwarded to both project offices for their comments in early October and comments back to the Bank by November 1, 1996. This would require GPIO to finalize the completion reports from Yindaruqin and Guanchuan River, and forward a consolidated report to the Bank by July 1, 1996.

12. **Outstanding Issues.** Based on the mission's findings, there are three major issues that need to be resolved as early as possible:

- (a) Assurance should be obtained from provincial and local governments that adequate funds would be made available to the Yindaruqin component in a timely fashion for the remaining canal construction, on-farm works, and resettlement; the estimated annual amount of counterpart funds necessary for the project completion should be identified and discussed with the PMO in order to ensure that proper attention is paid to the financing of the remained works (total about \$85.18 million for three years);
- (b) To achieve project objectives (the targets of incremental agriculture production), agricultural support services have to be carried out by PMO or local agriculture bureau in the project area, such as supply of improved

quality seeds, credit and use of fertilizers, irrigation techniques, and general training for settlers on irrigated agriculture.

- (c) PMOs in Yindaruqin and Guanchuan should start and continue to monitor components progress and evaluate the economic benefits and overall social impact (to measure current levels of inputs and production, crop yields and farm incomes, changes resulting from the project, and etc.); IDA will continue to monitor progress of the actions to be taken by the PMOs, especially for remaining works of Yindaruqin component, during supervision of Hexi project in Gansu.

Dated: May 15, 1996  
(Revised 5/31/96)  
Lanzhou, Gansu Province

## II. FOLLOW-UP ICR MISSION, SEPTEMBER 1996

1. A Bank mission, comprising Lang S. Tay (Task Manager) and Li Qun (Consultant Project Analyst), visited Gansu Province from September 17 to 18 to follow up on the preparation of Implementation Report (ICR) for the Agricultural Component of the Gansu Provincial Development Project, which was closed on June 30, 1996. The mission met the Gansu World Bank Projects Implementation Office (GPIO), the Yindaruqin and the Guanchuan Project Management Offices and reviewed the draft ICRs prepared by the Rural and Social Development Operations Division (EA2RS) and GPIO after the initial ICR mission in May 1996. The mission wishes to thank GPIO, Yindaruqin and Guanchuan PMOs for the cooperation and hospitality extended to the mission.
2. The following record the topics discussed and their agreement reached:
  - (a) GPIO and the Bank mission agreed to revise and update their respective draft ICRs based on the discussion held over the main text of the report and the attached table;
  - (b) The Bank mission agreed to provide a copy of the revised draft to GPIO before the mission leaves Lanzhou;
  - (c) GPIO will review consistency of their revised draft with the draft ICR provided by the Bank mission and submit their draft to the Bank by October 15, 1996 together with any other further comments on the draft ICR provided by the mission;
  - (d) GPIO will arrange to obtain an official commitment in writing from the Gansu Provincial Government to provide adequate funds to complete the remaining on-farm irrigation works by the end of 1998 and land settlement by the end of 1999. This official commitment document will be included as an annex in the final ICR to be printed by the World Bank.
3. The Bank mission and GPIO agreed to cooperate with each other in the finalization of the ICR.

Dated: September 18, 1996  
Lanzhou, China

**ANNEX B: COMMITMENT LETTER FROM GANSU  
PROVINCE TO COMPLETE THE REMAINING WORKS**

## **ANNEX C: BORROWER'S CONTRIBUTION TO THE ICR**

### Summary Assessment

The World Bank has taken part in the overall works of the project, and has provided full support and cooperation in respect of Project identification, preparation, appraisal, supervision. Under direct leadership of Gansu Provincial Government, and with great supports of the provincial departments concerned such as Planning Committee, Construction Committee, Finance Bureau, Water Resources Bureau, Liangxi Construction Commanding Office, Banks and the Auditing Bureau and the relevant prefecture, municipality and counties, the Special Project Implementation Offices were responsible for implementation of the project.

#### A. Project Objectives

The Main objectives of Agriculture Component of the Development Project were to raise the living standards and income levels for poor households in the drought-stricken & arid areas of Gansu Province.

Construction of Yindaruqin Irrigation Scheme was to irrigate 57,000 ha farm land, and to move 15,000 poor households from surrounding drought-stricken areas to the new Irrigation Area. The other part of the project was to promote development of rain-fed agriculture in 76,000 ha land in Guanchuan River Basin through soil and water conservation and improved farming practices. The main features of the Project were as follows:

To complete construction of Feeder Canal, main canals, a network of branches, laterals and sub-lateral canals, farm roads networks and drains in Yindaruqin Irrigation Area, and construction of terraced land and check dams in Guanchuan River Basin. To improve the rural access roads and provide rural electricity supply. To provide training on water resources management and agriculture to upgrade the technical and management skills, and to provide necessary consulting service for project management. After overall completion of the Project, 127,000 tons of wheat, other grains and oil crops will be increased yearly, 179,000 tons of vegetables, melons & fruits and melon seeds, 11,000 tons of pork, beef, mutton, 640 tons of sheep's wool, and certain quantity of leather, milk and timber will be produced every year. The project would provide drinking water to the local population and livestock. And the project would provide enough shrub fuel forest and other fuel wood to solve present fuel shortage problem. The project would improve living standards and income level of 96,000 households. The average income would be increased by RMBY 425 in Yindaruqin Irrigation Area and RMBY 415 in Guanchuan River Basin respectively.

The project was a model for development of irrigated agriculture, rain-fed agriculture and land settlement which conformed to Gansu's Strategy for agriculture development. It shows that the selection of the project was correct, and the project objectives were proper and practical.

#### B. Implementation Experience and Outcome

The main works of Yindaruqin Project were completed prior to October 1995, through successful water conveyance trial of Feeder Canal, East Main Canals No. 1 and No. 2. In July 1995, an earthquake with magnitude 5.8 occurred in Yongdeng where Yindaruqin irrigation facilities were located, and there were no any effects to the project. Up to June, 1996, the Project has been safely operated for two years, the total irrigated land was 22,730 ha. And 31,066 persons were settled, the unit yield in the Irrigation Area was 2.25 times higher than that in dry sandy land, the average income per capita increased from RMBY 150 to RMBY 530. Construction of some branch canals, sub-pumping branches and on-farm development works have not been completed, so that the benefit has not been fully achieved yet. A three-year-plan was put forward by Yindaruqin Management Bureau, and it was submitted to the World Bank for confirmation. It is planned to complete the remaining works of the project before the year of 1998, and to complete the land settlement work before the year of 1999. Guanchuan River Basin Sub-component was virtually completed by the end of 1992, and 12 construction targets determined during project appraisal were fully achieved in time, and in many cases exceeded comparing with original plan. Through comparison between pre-project and post-project, in six years, soil runoff was reduced about 3,960,000 tons, water storage capacity was increased to 11,400,000 cubic meter, the rate of land utilization was raised from 60% to 87%. The outstanding outcome was achieved in respect of soil erosion control, promotion of agriculture production, improvement of people's living standards. Average yield per capita was raised from 291 kg to 406 kg, the net income per capita increased from RMBY 223 to RMBY 747.

After completion of the Project, the governments at various levels will continue to give more attention & supports, and action measures of policy, and investment environment will be improved. Therefore, it is fully guaranteed to maintain the achieved great targets and to realized the normal long term operation.

The total planned loan of the project was USD 130 million (Equivalent to SDR 102.86 million), the actual disbursement was USD 143.34 million (equivalent to SDR 102.86 million). The planned counterpart fund was RMBY 521 million (equal to USD 120 million), the actual counterpart fund was RMBY 558.42 million. RMBY 592.87 million will be invested (equivalent to USD 72.3 million) to ensure completion of the remaining works.

The key factors for having the successful project were as follows:

The government pay more attention to the project, and organizations are complete and perfect; funds supply in time; scientific management, supervision and supports by the

World Bank are also very important. Especially in the course of implementation of the project, advanced management experiences and technology by the World Bank were effectively utilized, such as FIDIC conditions on contract management, bidding procurement, experts for consulting, staff training, staged monitoring, and economic appraisal. Though the engineering works were complicated and tough some works needed to be completed, with some unforeseeable problems. Thanks to the above-mentioned favorable factors, all these difficulties can be overcome. The remaining works will be fully completed soon. It could be considered that all the major objectives and great development outcome were achieved in the project without any defects.

In the course of implementation of Yindaruqin Sub-component, many difficult technical problems were resolved, many unpredicted difficulties were overcome. Some experiences in respect of using the World Bank loan, applying FIDIC conditions in construction management were accumulated. Due to various reasons, project progress was little later than the schedule in the Appraisal Report, the benefit has not been fully achieved, but the total outcome was outstanding and significant.

### C. Key Lessons Learned and Future Operation

The major experience was to renew conception and ideas, renovate the old management patterns according to the management procedures, mechanism and methods to implement the project. This was the primary condition for ensuring the Project to achieve high efficiency and best quality. The main lessons were: Underestimating of engineering complications and difficulties, potential problems, price escalation of construction materials and change of exchange rate caused increase of work quantity and investment at large extent, which also adversely affected the progress of the Project.

Respective plans for future operation of the two sub-components management offices were produced, detailed objectives and assuring measures were worked out. The main works are as follows: to raise funds to complete the remaining works within a definite time, to strengthen produced operation and maintenance, management & staff training, to increase scientific and technology inputs, to perfect the monitoring system and operation standards so as to achieve all targets in the full development period of the project.



