



<b>1. Project Data:</b>		<b>Date Posted :</b> 09/30/2003	
PROJ ID: P003596		<b>Appraisal</b>	<b>Actual</b>
<b>Project Name:</b> Yangtze Basin Water Resources Project		<b>Project Costs (US\$M)</b>	
<b>Country:</b> China		<b>Loan/Credit (US\$M)</b>	
<b>Sector(s):</b> Board: RDV - Flood protection (37%), Irrigation and drainage (27%), Renewable energy (25%), Animal production (6%), General agriculture fishing and forestry sector (5%)		<b>Cofinancing (US\$M)</b>	
<b>L/C Number:</b> C2710; L3874			
		<b>Board Approval (FY)</b>	
<b>Partners involved :</b>		<b>Closing Date</b>	
<b>Prepared by :</b>	<b>Reviewed by :</b>	<b>Group Manager :</b>	<b>Group:</b>
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**2. Project Objectives and Components**

**a. Objectives**

The five objectives of the project were to :

1. raise agricultural production and incomes in Hubei and Hunan Provinces and in the Middle Yangtze River Basin;
2. reduce the risk and impact of floods in these areas;
3. introduce a more sustainable and cost-effective system for O&M of irrigation and drainage schemes of the two provinces;
4. promote institutional reform and strengthening in the water sector, including : (i) self-financing irrigation and drainage districts based on farmer participation, (ii) improved planning and environmental monitoring, and (iii) comprehensive river basin management.

**b. Components**

The project had two components in Hubei and Hunan Provinces with various subprojects :

**(a) Hubei Province Component** (US\$142.3 million, 32% of total base cost):

1. essential repair and rehabilitation works to upgrade four existing irrigation schemes - Zhanghe, Dongfeng, Yindan, and Wenxia - 217,200 ha (US\$66.3 million, 15%);
2. improvement of flood control over 336,000 ha and drainage facilities for some 28,000 ha in the Sihua area (US\$35.6 million, 8%);
3. non-water subprojects on aquaculture, forestry, grassland development and soil improvement (US\$40.4 million, 9%); and
4. institutional development to (i) establish self-financing irrigation districts, and (ii) strengthen the Hubei Water Resources Department (WRD) (cost not shown in SAR/ICR).

**(b) Hunan Province Component** (US\$314.4 million, 68%):

1. completion of two partly-constructed irrigation systems - Tieshan and Liuduzhai, about 50,000 ha (US\$64.4 million, 14%);
2. construction of the large Jiangya Multipurpose Dam mainly for flood control and power in the Lishui River Basin (US\$244.3 million, 54%);
3. technical and support and research to improve design and management of Dongting Lake;
4. drainage facilities - 250,000 ha (US\$2.3 million, 0.05%);
5. institutional development for establishment of the Lishui Hydro and Power Corporation (LHPC) (owner/operator of the Jiangya Multipurpose Dam and as manager of the Lishui River Basin (US\$2.2 million, 0.05%); and
6. institutional development to (i) establish self-financing irrigation districts and (ii) strengthen the Project Management of the Hunan Hydro and Power Department (HPD) (US\$1.3 million, 0.03%).

After an early MTR in late 1997 some minor adjustments were made to sub-components: under the Hubei component

livestock activities switched to breed improvement as there was little demand for grassland development; the soil improvement sub-component was restructured to focus more on upgrading fertilizer plants; and some changes were made to the aquaculture activities and the Dongfeng sub-project. Under the Hunan component the height of Jiangya dam was raised 3 meters to 131 meters, and engineering changes were made to three other sub-projects. Otherwise components and objectives remained unchanged.

**c. Comments on Project Cost, Financing and Dates**

Project costs were 20% over appraisal estimates; the Loan closed a year late, while the Credit was extended to May, 2004 to allow remaining funds (US\$0.2 million) to be used for the SARS emergency.

**3. Achievement of Relevant Objectives:**

This large and complex project achieved or exceeded all its major objectives with only relatively minor shortfalls.

**4. Significant Outcomes/Impacts:**

**(a) Overall:**

1. The project met all of its original targets in terms of irrigated area improvement and institution building, and both provinces had started spreading the SIDD reforms, especially WUAs, outside the Bank-financed project before project completion;
2. The Jiangya dam made major contributions to Yangtze basin flood control as detailed below;
3. Irrigation works were completed down to the sub-branch, lateral and on-farm works levels;
4. The project developed farmer management of operations and maintenance through Water User Associations (WUAs) with dedicated Water Supply Corporations (WSCs) to manage reservoirs and main canal systems under a general irrigation management reform concept called the Self-financing Irrigation and Drainage District (SIDD). These were successfully introduced for the first time in China under the project;
5. The economic performance of all irrigation subprojects substantially exceeded appraisal estimates.
6. Water sales by volume promoted water as a commodity and contributed to water savings of up to 30%;
7. Household data indicate that institutional reform in irrigation management through WUAs contributed strongly to nearly doubling household income in project areas between appraisal and ICR. This includes that the establishment of SIDDs/WUAs led to substantial savings of household labor normally used for water guarding (including by women), allowing off-farm employment of up to half of farm labor;
8. The project provided significant agricultural benefits, including doubling of agricultural yields, expansion of irrigated areas and cropping intensification; and
9. Efficient water management by WUAs helped alleviate the impacts of the 2001 drought, with most WUA areas suffering little or no drought damage compared to adjacent non-WUA areas which were hit hard.

**(b) Hubei component:**

1. Farmer-run WUAs impacts as detailed in the ICR were: "increased yields and production, increased area irrigated, water measurement and delivery by volume, water saving, reduced water management labor requirements, more off-farm employment by farmers, poverty alleviation and gender benefits by ensuring proper water deliveries to poor and vulnerable groups and to households headed by women, crop diversification, reduced maintenance costs by eliminating farmer damage to facilities, reduced overall water costs for farmers even though water charge rates had to be raised slightly to cover WUA costs, increased ownership and responsibility for facilities among the farmers, and reduced burden of handling water management conflicts for local townships and villages administrations";
2. "The WSCs established unified system management based on hydraulic (instead of administrative) boundaries, eliminated government intervention in irrigation management, improved water charge collection rates and revenues, and eliminated the substantial diversion of water charges inherent in collection by government administrative units";
3. "Transparent water charges based on measured water volumes sold by WSCs to the WUAs, which is a core concept of the SIDD system, were highly favored and supported by both farmers and WSC management and led generally to much higher water charge collection rates compared to non-WUA areas"; and
4. All non-water sub-components in Hubei, except Grasslands and Soil Improvement, met their original development objectives and achieved profitability and sustainability. Non-water institutional innovations have produced considerable positive institutional impacts, especially the development of the Hubei Fish Farmers' Association with 50 branches; innovations include animal breeding technology; silvicultural techniques for economic forestry and for production of millable timber; and advanced techniques and self-funded technical extension in aquaculture.

**(c) Hunan component:**

1. Jiangya Dam was completed on schedule and has equaled or exceeded appraisal targets in terms of construction speed and benefits (it is one of the tallest roller compacted concrete dams in the world). An innovative improved method of laying down roller compacted concrete was pioneered during construction. By reducing flows into the huge Dongting Lake which is connected to the Yangtze River, Jiangya provided significant flood control benefits in Hunan during the massive Yangtze River floods of 1998 even before it was complete, and helped lower the peak flood crest on the Yangtze River itself. The dam lifted slightly on lake filling but steps were taken to monitor this effect closely and to control a possible contributor to dam risk, such that the Dam Safety Review Panel has concluded that dam safety is not impaired;

2. The detailed benefits of the WUAs and WSCs were similar to those in Hubei . However, the institutional strength and impact of the WUAs and WSCs in Hunan are probably somewhat greater in Hunan, in part because as the irrigation systems were new there were less institutional and social constraints;
3. WUAs participated in the planning and layout of their local systems, which by itself produced more ownership among the farmers and generated large benefits due to local layout and design changes by farmers such as increased irrigated area for little or no extra cost and reduced costs with better performance;
4. The SIDD concept of self-management and self-financing of irrigation by farmers is well established in Hunan as a result of the project and serves as a model for water sector reform in China;
5. Institutional impacts at the project level exceeded appraisal expectations, most recently with the allocation of responsibilities for regulation, technical assistance, planning and monitoring to the new comprehensive Bureau of Water Affairs at Yueyang City, and for irrigation O&M to the WSCs and WUAs;
6. Institutionally, the project in Hunan provides the basis for future projects using a program approach with the SIDD model, which has been proven reliable, is strongly supported locally, and deals with many long -standing irrigation management issues;
7. The Dongting Lake Study and Decision Support System for Hunan were completed in 2002 under the project, albeit with a year's delay, and contributed to flood management of the serious floods in Dongting Lake in 2002;
8. The establishment of the Lishui Hydro and Power Corporation (LHPC) as an independent corporation which was suitably empowered for unified river basin management, rather than just for operation of a large new dam as is the standard practice in China, was a major institutional innovation and provides a new model for better river basin management; and
9. Farmer training is well established and includes not only irrigation and water management but also intensification and diversification of agriculture . Training is estimated to have benefited half of project area farmers.

#### **5. Significant Shortcomings (including non-compliance with safeguard policies):**

There were a few significant shortcomings:

1. Bundling large complex multi-component operations for two provinces in one unwieldy project made adequate supervision difficult and impossible after supervision resources were cut back in 1998. The ICR believes this reduced the effectiveness of the Bank's assistance in later years (total supervision costs were low for such a large and technically complex project). Including the non-water sub-components in the Hubei Component was also unwise as it was beyond the Bank's ability to provide expertise and staff time later to assist the borrower adequately on these activities .
2. Counterpart funding shortages and delays slowed progress at times, affected technical standards, and a few sub-components had to be trimmed such that their impacts were reduced . Even so, larger than planned beneficiary contributions made up for some of the shortages . The counterpart funding requirements of the project as appraised were well beyond what the borrower normally was prepared to contribute to such developments, which the Bank should have known with more careful preparation and the Borrower should have made clear at negotiations .
3. There was a costly oversight by the Bank and borrower (in their technical reviews of the bids for the body of the Jiangya dam) in not spotting (by comparison with other bids or the market) that the lowest evaluated bid (by a wide margin) had an unrealistically low unit rate for a major material - aggregate. When the contractor threatened to withdraw after construction started, a supplement of US\$ 14.9 had to be paid to avoid re-bidding.
4. The finish of irrigation works was not always up to standard, there were inadequate controls on material choice and quality, and there is serious leakage in some canal reaches (up to 50%).
5. Some key institutional aspects of WUAs need further attention : the quality of WUAs varies; water charges are too low and their collection and use lacks transparency, and is not yet under WUA control as intended; maintenance funding is thus lower than needed .
6. Benefits of the irrigation developments would generally have been greater had there been more secure funding for, and more attention to, downstream and on-farm improvements.
7. The grasslands and soil improvement sub-components in Hubei were notable failures and appear to have been weakly prepared in terms of having unrealistic expectations and not being strongly supported by stakeholders .

<b>6. Ratings :</b>	<b>ICR</b>	<b>OED Review</b>	<b>Reason for Disagreement /Comments</b>
<b>Outcome :</b>	Satisfactory	Satisfactory	Borderline Highly Satisfactory were it not for some shortcomings which reduced impact and may be attributable largely to questionable Bank performance in some areas.
<b>Institutional Dev .:</b>	Substantial	Substantial	Could have been rated High if not for some unresolved problems with WUAs .
<b>Sustainability :</b>	Likely	Likely	

<b>Bank Performance :</b>	Satisfactory	Satisfactory	Might have been highly satisfactory were not for unwieldy project packaging and skimped supervision later .
<b>Borrower Perf .:</b>	Satisfactory	Satisfactory	Although the borrower should have been more forthcoming in advising the Bank of its counterpart funding constraints .
<b>Quality of ICR :</b>		Satisfactory	

**NOTE:** ICR rating values flagged with '\*' don't comply with OP/BP 13.55, but are listed for completeness.

**7. Lessons of Broad Applicability:**

1. In packaging projects Bank managers must take into full account both supervision requirements and whether the project design (especially the project scope, location and range of technical topics ) permits adequate and appropriate supervision by the Bank given expected staff resources available for the project .
2. The Bank must ensure that particularly careful review is carried out of a lowest evaluated bid when it is notably below other conforming bids, to ensure that the bid is sound and realistic, especially that it does not contain mistakes or improbable unit rates .
3. Estimates of counterpart funding requirements must be carefully checked for realism against budget expectations, customary practice and political acceptability .

**8. Assessment Recommended?**  Yes  No

**Why?** As the first comprehensive water resources project in China which established the model in China for transfer of irrigation system O&M to farmer organizations .

**9. Comments on Quality of ICR:**

Satisfactory, albeit very long (at 33 pages of main text). Also, staff weeks for supervision should hve been included in Annex 4 as supervision inadequacy was a major issue raised by the ICR .