THE WORLD BANK OPERATIONS EVALUATION DEPARTMENT

The World Bank's Assistance for Water Resources Management in China

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ACRONYMS

AAA	Analytic and Advisory Activities
BOT	Build, operate and transfer
CAS	Country Assistance Strategy
CWRAS	China Water Resources Assistance Strategy
ERR	Economic rate of return
ES	Evaluation summary
ESW	Economic and sector work
IRBM	Integrated river basin management
M&I	Municipal and industrial
MOC	Ministry of Construction
MOF	Ministry of Finance
MWR	Ministry of Water Resources
NCP	North China Plain
OED	Operations Evaluation Department
O&M	Operations and maintenance
PPAR	Project performance assessment report
RBC	River basin commissions
SEPA	State Environmental Protection Agency
SIDD	Self Financing Irrigation Development Districts
SNTP	South-North Transfer Project
TA	Technical assistance
TGDP	Three Gorges Dam Project
WRM	Water resource management
WRMP	Water resource management policy
WRSS	Water resource sector strategy
WS	Water supply
WTO	World Trade Organization
WUA	Water user association
WWTP	Wastewater treatment plant

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1. China's Water Crisis

1.1 China has an ancient tradition of hydraulic engineering but in the past half century the intensity of exploitation of water resources has accelerated as a result of population and economic growth. The three major issues for Chinese water management are water shortages, flood control and pollution. The World Commission on Dams noted that since 1949 the number of large dams in China had increased from 22 to 22,000, almost half the global total. China has over 80,000 reservoirs and 240,000 km of dikes. Most rivers and streams are now used for irrigation, power generation, transport, urban water supply or waste disposal, some for all of these purposes. The term "water crisis" is often used—as much to stress the importance of timely action to prevent events far in the future as to indicate an imminent and unusual catastrophe.[1] Flooding and droughts have always been a problem in China but the scale and the economic impact, increasing frequency and water pollution costs have put water issues high on the domestic political agenda. The gigantic South North Transfer Project is now underway and will, at uncertain cost, reduce the pressures to re-allocate water away from the low efficiency irrigation sector. While doomsday scenarios largely ignore the adaptive mechanisms in the economy complacency is not justified and both environmental health and economic impacts rightly remain prominent issues. The pace of economic growth is driving water resources depletion, exacerbated by watershed degradation, organic and chemical pollution. Freshwater resources are renewed by rainfall run-off and snowmelt, but both manmade and natural reservoirs (e.g. groundwater and lakes) permit users to consume at a rate above recharge, at a cost to nature and future generations. For instance in 1996, Haihe groundwater usage was 146 percent of recharge, and the Luanhe Basin 191 percent.[2] The hydrogeology is complex and problems localized, but the exhaustion of un-renewable fossil aquifers combined with falling grain reserves are widely perceived as consequences of a risky strategy of growth at any cost. It remains to be seen if the new leadership's commitment to sustainable development principles will be translated into effective regulation and more demand responsive allocation of water resources.

1.2 China's most serious water problems are experienced in four river systems that dominate life in the eastern third of the country. On the NCP (North China Plain) 3-H Basins (Huang, Huai and Hai rivers), a densely populated agricultural and industrial region, groundwater levels in some large areas have dropped 20 to 30 meters, and in a few isolated areas as much as 100 meters over 30 years. Regional Bank staff estimates that in most areas water table levels for unconfined aquifers are dropping 0.5 meters per year and are presently in the range 20-30 meters. The available water, both surface and ground, has been allocated both by deliberate policies and unregulated appropriation—the implicit values in different uses are far removed from economic realities. The value to users of untreated but usable water for municipal and industrial (M&I) and household demand is a multiple of 10 to 40 times that in agriculture. There is a chronic dry-season excess demand, while tariff reforms have been slow in coming, and until recently were seen purely as a financial matter, not as a means of addressing water resource constraints.

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[1] The author wishes to express special thanks to Jeremy Berkoff for his critical comments on an earlier draft. He is of course absolved from responsibility for the views presented here.

[2] Zhang Guang-xin and Deng Wei, "The groundwater crisis", *Water and Environment Management*, April 2002, page 15.

Siltation has been a very serious problem for centuries and erosion has been getting worse with deforestation, turning flood-control and storage/irrigation objectives into moving targets. Falling groundwater levels mean a higher cost of construction and pumping, even though the water itself is a gift of nature. Low-value crops such as grains are becoming unprofitable. In drought areas the burgeoning urban demand has been met by mining of fossil groundwater resources and diversion of water from agricultural use. Available supplies are often allocated by arbitrary institutional responses from fragmented agencies, unrelated to economic or social priorities. The demand and supply for water services are so out of balance, and water pollution so bad, that economic growth and the quality of life are suffering. Water supply is a bottleneck limiting economic growth and has only been partially addressed by increased abstraction, improving efficiency and increasing storage capacity. A new and binding constraint is the absorptive capacity of the environment and the running down of existing groundwater reserves, despite attempts at increased efficiency and storage capacity.

1.3 The main problems for the Yangtze Basin are flooding, erosion and water pollution**.** Pollution of water sources diminishes supply available for both M&I and irrigation. Reduced quality has similar effects to shortage and is directly related to a river's absorptive capacity. The Yangtze for instance has a total annual runoff volume of nearly 1,000 km^3 making water quality problems more tractable. The Hai River, on a densely populated, highly polluted and drought-prone NCP, has only .028 km^3 and some watercourses contain only wastewater in the dry season. In key industrial areas surface and groundwater pollution have been so bad as to cause widespread sickness, requiring that central government intervene to compensate for ineffective enforcement of environmental regulations. Priority issues in the Yangtze Basin are of localized shortages, inadequate flood control security, ineffective pollution control, and failure to halt the process of erosion. Damming of rivers in many places for hydropower has sometimes frustrated other water management objectives, filling reservoirs with silt and reducing their capacity.

1.4 China faces problems found in many countries—those of coordination of upstream and downstream users, overlapping jurisdictions and conjunction of quality and allocation problems. The principle that demand management has a much lower economic cost than augmenting supply.

Source: Ministry of Water Resources and "Resource Oriented Water Management", Wang Shucheng. Beijing: China WaterPower Press, 2002.

is widely accepted by central government. It was during the 1990s that Bank assistance paralleled the transition from a WRM strategy focusing on major hydraulic infrastructure to control ("*taming rivers*") and manage water resources, to the broader approach. Megaprojects such as the Three Gorges and the South North Transfer are a legacy of this earlier period. More efficient water allocation using prices to constrain demand, effective groundwater and water quality regulation, and the reform of institutions, were not the priorities they should have been. While application of engineering expertise, money and commitment to construction have helped meet energy, agricultural production and poverty alleviation targets, this has been at a high environmental and economic cost compared to the benefits. The economic tradeoffs have become starker as demands for municipal and industrial (M&I) uses have increased dramatically. A central planning system, driven by capital budgeting of supply-augmenting investment was ineffective at achieving conservation and reduced pressures for demand management. Demand management requires decentralization of decision-making and a transparent and widely accepted system of volumetric charging for use – something more easily accomplished by existing urban water supply institutions, than the dispersed tubewells and irrigation systems serving millions of groups of farmers.

1.5 The decentralization of political and economic power, to separate riparian provinces on the great river systems, has made central government control over allocation of water resources more difficult. Many water management decisions are "upstream-downstream" issues cutting across administrative boundaries e.g the top-end capture of river flows, waste disposal downstream by urban polluters, how to share the costs and benefits of expensive hydraulic infrastructure between provinces. The existing water management framework is a result of history and is now insufficiently comprehensive or unified to optimize uses and resolve conflicts in a socially and economically optimal manner. Negotiation is the key discipline for mediating between sector and regional interests (e.g. industry and agriculture, upstream-downstream), and between the ministries responsible for different aspects of WRM and planning. There are multiple political jurisdictions and the provinces compete with each other. Central government has played a major technical and leadership role especially when large projects pose difficult engineering problems and beneficiaries are distributed between multiple riparian provinces. A river basin is the most appropriate unit for negotiation and water resources management. This requires institutions corresponding to basins, rather than provinces, and these have proved very difficult to establish, despite much central government commitment and awareness.

1.6 The Ministry of Water Resources (MWR) has been effective at supply-side interventions, and is nominally responsible for harnessing big rivers, protecting and exploiting water resources through river basin authorities. But water is not an economic sector like industry, transport or agriculture. The MWR has limited control over the uses and exploitation of water resources. Despite its long history and technical strengths MWR alone is unable to overcome the daunting political and institutional challenges of water reform. Water management agencies have the technical skills, but internal incentives are not well-matched with institutional mission. De-facto authority for the management of water resources, and to a great extent their development, has passed to provincial water resources departments that are strongly influenced by particularistic interests. For physical planning and operation of water infrastructure the most effective

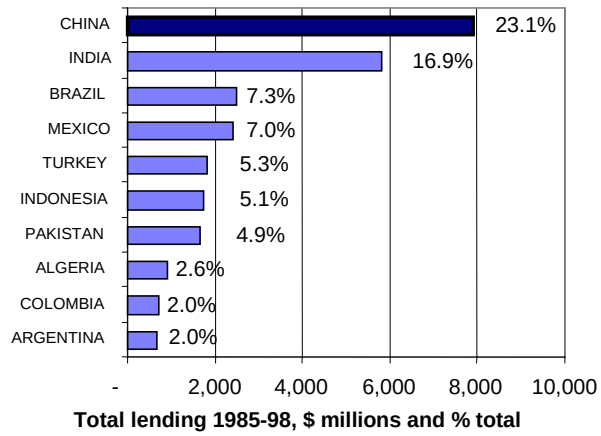
unit for WRM is a river basin - so-called integrated river basin management (IRBM). The MWR-controlled river-basin commissions (RBC) continue to operate with large staffs, but with declining authority and reduced ability to manage integrated water resources development. Incremental progress in designing institutions for river basin management has been made, but limited implementation achieved.

1.7 The main constraints to integration of WRM arise from the interaction of fairly objective needs for new institutions, incentives and procedures, on the one hand, and bureaucratic interests and political resistance to demand management on the other. China's water problems are not unique, involving a balancing act between economic growth and resource depletion, protection of the environment, health and other non-economic objectives, mediated by strong governments at both central and federal (provincial levels). This paper focuses on the role that the World Bank operations have played in changing WRM policy and strategy during the 1990s.

2. Lessons Learned from Bank Operations

2.1 Freshwater is a limited resource and the available supply and demand vary widely over time and space. The Bank has now added water to environment and poverty, as a cross-sectoral theme; WRM impact must now be considered for all projects, and there is both a formal Bank WRM Policy (WRMP) and Sector Strategy (WRSS.) Water resources planning and management fall across traditional sector boundaries. Since 1990, 82 China projects (with at least 25 percent of the cost being water investments), accounted for $37 billion in total costs, of which the Bank funded 34 percent. The corresponding figures for all Bank lending to China were $103 billion project costs with 35 percent Bank funding. Total infrastructure lending, including, transport, telecommunications and energy is 83 percent of the Bank's China portfolio. China is the main customer for all Bank water-related loans, and accounts for 23 percent of the global water portfolio.

Figure 2.1: Bank Lending for Water is Heavily Focused on a Few Countries



2.2 This paper uses project and sector studies conducted by the Bank's Operations Evaluation Department (OED), and outside sources. The review is part of a Country Assistance Evaluation (CAE), conducted by OED, a department that is independent of the Bank's operational management and the Chinese government agencies. OED reports are delivered to the World Bank's Board, represented by the Committee on Development Effectiveness (CODE.) OED "products" include routine evaluation summaries of completion reports (ES), more intensive project performance reviews (PPAR) and ad-

hoc thematic or sector reports. Most OED evaluations measure compliance and performance with respect to appraisal designs, objectives and Bank safeguards. While non-routine reports evaluate overall sector performance in particular countries, they rarely use WRM as a unifying theme.[3] The Bank has not even conducted sector reviews for important China lending categories—agriculture (irrigation), water supply and sanitation and environment. The Bank does not have an identifiable WRM loan portfolio, but projects in traditional urban and rural sectors (as well as conservation and protection of public, private and environmental assets) have significant WRM implications. The following Bank sector categories all have high WRM relevance: -

- Land/Watershed Management and Forestry;
- Water Resources / Flood Control;
- Agriculture and Irrigation/Drainage;
- Multipurpose and Hydroelectric Dams;
- Inland Waterways;
- Urban Water Supply & Wastewater (household, industrial and commercial users); and
- Rural Water Supply.

Only Energy, Forestry and Transport have been the subject of comprehensive OED evaluation studies.

2.3 Complementarities and conflicts between WRM and sector objectives are largely played out in the financing, implementation and outcomes of the single sector projects. As the Bank's WRSS[4] puts it—"*while the details of the water-using sectors are appropriately managed at the sector level, the linkages between resource management and the service sectors are central to overall resource management.*"

2.4 ***Land/Watershed Management/Forestry***: Neglect of land and watershed management over hundreds of years has caused severe and widespread erosion, land degradation and desertification. Bank-supported projects made major contributions to increased efficiency of water-use by demonstrating that profitable orchard and mixed farming models are compatible with watershed rehabilitation and soil preservation. Terracing and erosion control projects in the larger basins also have significant downstream benefits, reducing silt loads and increasing incomes. Building, inter-alia, on the Bank-supported central Loess Plateau and Red Soils Projects in the South East, these technologies have been replicated. China is making progress with complementary aforestation projects upstream, although they have been primarily commercial plantations. The future of such forestry and upland development programs depends on the viability of farming systems, and also supplying environmental and other non-marketed services to those downstream. Basin level management is needed to design and implement incentives for upstream areas to supply these services. Watershed and forestry projects are essential for sustainable long-term WRM and they facilitate more efficient use of limited water resources.

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[3] The one exception is the FY 2000 global report "Bridge Over Troubled Water, Assessing the Water Resources Strategy Since 1993", OEDST, 2000 (http://www.worldbank.org/oed/water

[4] *Water Resources Sector Strategy: Strategic Directions for World Bank Engagement*, March, 2002.

2.5 ***Water Resources/Flood Control***: Flood protection is of great importance to China and has for millennia been a responsibility of central government. It is not surprising that major flood control projects and components have been an avenue through which the Bank has obtained wide experience of water resources issues. Many of the pre-1978 investments in flood control did not achieve high security standards, 15-20 year floods being common. With economic growth and urbanization there is now a mismatch between the value of the assets protected (especially urban) and the degree of flood protection. A noted Bank success story was the Taihu Flood Control Project, praised by the Vice Minister of MWR for reducing losses during the 1998 floods.

2.6 The following six Bank-supported projects approved in the last 7 years, have included major integrated WRM components :-

- The *Yangtze Basin Water Resources Project* (1995) incorporated both Self Financing Irrigation Development Districts (SIDD) to improve O&M, and an integrated river-basin development component. The major costs were for civil works. While its role in influencing China's Yangtze WRM has diminished, the Bank has had to make assumptions about flood protection and stream flow as a result of the Three Gorges Dam Project (TGDP), remaining engaged in WRM issues. Upstream the Bank has financed extensive wastewater treatment for Chongqing, while downstream there is a new Yangtze Dikes Flood Protection Project.
- The *Tarim Basin I &II* Projects (1992/1998) in the western Xinjiang Uygur Autonomous Region have the best-developed framework for integrated water management – both the financial components of SIDD and a comprehensive set of procedures/regulations for integrated WRM.
- *Irrigated Agriculture Intensification II* (1999) incorporates the SIDD concept and complements a national program to test it in 131 counties. This project has a unique organizational structure, which is overseen by both MOA and MWR, with coordination by Ministry of Finance (MOF).
- The *Water Conservation Project* (2000) combines SIDD with a major countrywide project to test and disseminate water conservation in agriculture. The project is promoting maximization of economic productivity per unit of water *consumed* through evapo-transpiration (netting out drainage and percolation losses which are recaptured.) The project hopes to promote a new conceptual basis for management and a move away from MWR's tendency to see irrigation technology as "the" solution. To make it work will require enforcing groundwater regulations and using price signals to allocate water and induce technological change, An important component is preparation of pilot groundwater management plans in four counties in North China.
- *Jiangxi Integrated Agricultural Development* (2003) also contains a component that addresses water management issues and replication of the SIDD model in another province.
- "*The Hai River Basin*" a GEF pipeline project, focuses on China's most complex and intensively developed basin. The project, an institutional one, will attempt to build the components for river basin management under some favorable

conditions—tractable size, the full range of institutional and water problems, and the political will to do something about them (Beijing, the site for the 2008 Olympics, lies in the basin.)

2.7 Progress in designing new institutions for river basin management owes much to the Tarim Project and multi-donor, Bank-coordinated assistance for development of NCP's[5] water resources over the next 50 years. The Bank's recent China Environmental Report (*Air, Land and Water,2001*), however, concluded "*There is wide acceptance among technical experts that a more integrated, river-basin approach is required to manage water resources in the most heavily conflicted catchments …..But no significant progress is being made toward achieving that objective.*" China has been reticent to borrow for TA to support river basin institutional development but the Bank and other donors have coordinated assistance in a very cost-effective manner. Working on what was a shoestring budget relative to the economic consequences of the decisions, Chinese and Bank staff, supported by leading international consultants, have developed a comprehensive quantitative plan built around a "*dynamic optimizing model*."[6] The predictions of the model are based upon assumptions such as demand elasticities and groundwater potential. There are wide margins of uncertainty for these exogenous parameters, but the model itself represents the state of the art as far as analytic and technical engineering approaches to WRM.

2.8 ***Agriculture and Irrigation/Drainage***: Prior to opening up in 1978, China already had a very extensive irrigation program.[7] But construction also left a legacy of poor construction from inefficient project management. While many projects had been identified, the quality of preparation was often not up to the standards of the multilateral lending agencies. The scale of Bank involvement in irrigation has been very limited but has had a positive effect on Chinese practices for procurement, project management and more recently irrigation management, especially at provincial level. Irrigation has usually been a component of an integrated area development project. Early projects were overloaded with unrelated and sometimes unprofitable enterprise components, leading to them being described as "Christmas trees." The design and degree of true integration of these projects improved over time, and most have had a significant impact on incomes and the planning/management capacity of provincial agencies. Geographical poverty-targeting has been refined to county and township levels, accompanied by some concessionary IDA funding and full loan-recovery from the beneficiaries. The emphasis on sound finance and making good loans (ones that will be repaid), is a characteristic of most Chinese development projects and has been effective at motivating project participants from governors on down. The need to repay the Bank through the central government created a cascade of accountability and responsibility for results, from project managers who have to collect levies, down to beneficiaries, who have to pay them.

2.9 Poor and under-funded irrigation operation and maintenance (O&M) are still problems and Bank projects have addressed them. The organization of farmers into

[5] NCP – North China Plain

[6] "Agenda for Strategy for North China" – available on the Beijing website – worldbank.org.cn

[7] The boundary between irrigation and water resources investments is usually at the head of the system where an offtake or a dam/reservoir, is the water source.

groups within SIDD on Bank and non-Bank supported projects has improved management and accountability, empowering farmers, through legal contracts to pay for and receive water services, both from local government agencies and publicly owned bulk-water companies. The imposition of even nominal water charges has led to markedly reduced consumption and insistence on more timely delivery, in some cases causing problems for bulk water supply agencies. Water User Associations (WUAs) are part of SIDDs, playing a key role in many aspects of improved water resources management that can increase productivity. Although China already had many different local variations of farmer participation in water management, the scope, detailed design and wide applicability of SIDDs indicate a new focus on governance. WUAs take responsibility for operation and maintenance of irrigation and drainage systems, transparent volumetric water charging, irrigation scheduling, agricultural improvements, farmer capacity building and other key functions.

2.10 The Bank has become increasingly committed to improving water conservation, more specifically the efficiency of irrigation, which is a core agricultural policy for water-short areas. Technical solutions (drip irrigation, water stress resistant varieties) are essential for increased conservation and improved efficiency of water-use demand. But they are not sufficient and must be supplemented by conservation-oriented pricing, agricultural engineering support services, and much-improved inter-agency cooperation. These innovations have been incorporated in Bank supported projects but have not been replicated on a wide scale. Water conservation projects have gone beyond simply targeting irrigation efficiency (e.g by reducing losses through canal lining) to optimizing basin-level efficiency, which is what is relevant for the economic allocation of water resources. The Bank has articulated an approach that distinguishes crop consumption (evapo-transpiration), unrecoverable losses, and basin-level recapture from drainage flows/percolation.

2.11 There were three areas of complacency in the Bank's earlier WRM approach:

- Failing to allow for a very high opportunity cost of water in the economic analysis of irrigation projects largely undermined the claimed high rates of economic return and efficiency. For instance, appraisal of run-of the river pumping schemes on the upper reaches of the Yellow River should have subtracted the opportunity costs (to high-value M&I users in the lower reaches) for water supplied during the dry season. This hidden cost needed to be made explicit to the client, even if a low rate of economic return were to lead to rejection by the Board. It would also have been more intellectually honest for the Bank to point out the trade-off between poverty alleviation, regional and resource conservation objectives—it is not always a "*win-win*" situation.
- A seeming disregard of conservation of natural resources, exemplified by the mining of groundwater resources on the NCP. A recent Bank audit notes the impact of the demand on groundwater of the Hebei Project [8] that put in 30,000 new wells, financed by revolving funds and also financed rehabilitation of 70,000 more. Conservation aspects do not appear to have been high on the agenda at this time. Even the

[8] "China: A Review of Development Challenges Across Selected Sectors and Performance Assessment Reports", April 30, 2002. (Sector and Thematics Studies Group, OED.)

economic benefits have been overstated, as the anticipated supply of irrigation water cannot be sustained.

- Not identifying earlier the key role of bottom-up initiatives to develop water-user organization and management to establish the principles of volumetric charging for water necessary for efficient WRM.

2.12 ***Multipurpose and Hydroelectric Dams***: Large dams built with finance and assistance from the Bank have been part of the energy sector program and met their objectives efficiently. Of particular importance was the introduction of modern project management methods and use of the international engineering consultants to resolve difficult technical problems. Most of the investments do not appear to be part of integrated WRM plans for the catchments concerned. Bank energy project documents tend to equate water resources with "hydroelectric resources." In other cases like Xiaolangdi and Jiangya (Yangtze Basin) there have been overt WRM components, and flood protection benefits for poor people. There are both complementarities and conflicts between energy and WRM objectives, but these have not been systematically weighed in decision-making. While hydropower may substitute for polluting thermal power plants, provide flood control and storage, there are also costs associated with silt accumulation in reservoirs, environmental damage, resettlement, loss of cultural heritage and potential conflicts between peak energy demand and water supply/irrigation priorities.

2.13 World Bank-supported dams in many parts of the world have attracted widespread international criticism of resettlement and adverse environmental impact. China has received particular attention from the International Rivers Network[9] although it has generally addressed resettlement and environment issues in Bank projects satisfactorily. The World Commission on Dams in its major report considered that foreign-supported projects dealt with resettlement much more satisfactorily than domestically funded ones .."resettlement is not given adequate attention and more emphasis is placed on construction work." China has also applied some of the Bank environmental, resettlement safeguards and participatory processes on projects of its own. A global OED study on resettlement ranked China highly.[10]

2.14 Evidence of learning by doing is shown by improved environmental, resettlement and local development performance. The Xiaolangdi Dam, supported by the Bank, has been credited with drastically reducing silt and enabling continuous flow in the lower reaches of the Yellow River, something, which has not been achieved in the previous ten years. Built primarily for power, silt and flood control, this dam has turned out to have a key role in meeting dry season M&I water demands, at a time when the energy market is depressed. An OED review of the completion report concluded that "*At a time when dams are rightly receiving a high degree of critical scrutiny, the success of Xiaolangdi shows a value in continued Bank involvement in both dam construction and assistance with water resources policy*." Dam critics do not attribute improvements to "learning by doing" on the part of the Bank and China, but to the result of their own public relations efforts to expose malpractices.

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[9] http://www.irn.org/programs/china/

[10] Involuntary Resettlement: Comparative Perspectives, Robert Picciotto, Warren van Wicklin & Edward Rice (eds.), 2001.

2.15 ***Inland Waterways****:* There have been 3 projects supporting the largest system of inland water transportation systems in the World. An internal quality at entry report for the Second Inland Waterway Project noted the absence of any effort to engage government in a policy dialogue, an action program on key sector issues, or an institutional component. There is no evidence that broader water resources issues were seen as important or conflicting/ complementing other WRM objectives.

2.16 ***Urban Water Supply (WS) and Wastewater Treatment Plants (WWTP):*** Because of China's high population concentrations, urbanization and rapid growth, WS and WWTP present major WRM problems. Economic and health impacts of poor WRM are major costs to society and have been estimated variously at 5-15 percent of GNP, a substantial welfare offset to the value of increased material consumption. Water supply and water quality issues are intertwined but corresponding management and regulatory systems are fragmented. At least three government ministries, MWR, Ministry of Construction (MOC) and the ministry-level State Environmental Protection Agency (SEPA), have overlapping responsibilities. SEPA's implementation arm for provincial regulation are the Environmental Protection Boards (EPBs), but staff are paid by the province and have divided loyalties—their environmental mandate may conflict with financial interests, private and public. Pollution control mechanisms often lack economic logic and do not incorporate effective financial incentives. Bank WS/WWTP projects usually had components that address ubiquitous pricing, efficiency and institutional issues, but these have not significantly changed the prevalence of local political interference, weak commercial management, distorted tariffs, variable legal and regulatory frameworks, unstable central-local relations and lack of long-term local finance.

2.17 For WS, China's sector performance relative to developing country benchmarks put her in the "*best practice*" quintile of Bank clients. But OED has judged the outcomes of China WS/WWTP projects to be "*moderately satisfactory*" with respect to overall development objectives, which are themselves described as "*modest*." [11] While it is not unusual, even in the developed countries, for water supply to be treated as a quasi social sector, the degree of subsidy in China has had important implications for resource allocation and promoted unsustainable water consumption levels. When the cost of new water sources are very high, the gap between the tariffs now, and those that are necessary to finance the new supply, are very large.

2.18 A proposed South-North Transfer Project (SNTP) would require a water tariff of Y2 -14/m3 to recover costs depending on assumptions made about both the difficulties likely to be encountered and the terms of finance.[12] The Region disputes the upper end of the range, while the maximum tariff level achieved, even in the most seriously affected cities, is still in the range Y1-2/m3.[13] During droughts, supplies to commercial users are allocated by quantity rather than price, and further distortions arise because some SOE customers do not face a "*hard budget constraint*" (i.e. they are not forced to pay their bills.) Unaccounted for water and physical losses are at a much higher level than official statistics indicate. The lack of transparency in accounting and unreliable data make efficient supply management very difficult. Cost-recovery and pricing policies have been covenanted on Bank projects, but there is still a lot of wastage and unaccounted for water, while real financial autonomy for utilities, or involvement of the private sector in distribution, are unusual.

2.19 Since 1985 the Bank has committed $2.2 billion of total project costs of $7.7 billon to finance major water investments (water conveyance, treatment, and distribution and WWTPs.) OED[14] rated project outcomes for the combined WS/WWTP sector "*satisfactory*" in terms of efficacy and standards of construction, but efficiency only marginally so, and the institutional impact, "*modest* "or "*negligible*." The Bank approach has supported capacity building with relatively little control over the quality of institutional reform. Projects still live in both a non-market and an under-regulated environment. For water supply there has been no significant difference between Bank and non Bank-supported utilities, leading to a questioning of whether there is really any Bank value-added. Only 5 out of 26 approved WS/WWTP projects have been completed

[11] *"Sector Thematic Review of China Urban Water Supply and Wastewater Assistance (2002)"*
[12] The Government has stated that it thinks there is insufficient evidence to support this statement.
[13] Jeremy Berkoff, "China: The South–North Water Transfer Project—is it justified?" Water Policy 5 (2003) pp 1–28
[14] "Sector Thematic Review of China Urban Water Supply and Wastewater Assistance (2002)"

and subject to any kind of review. Of these, 4 have a rating of "*Modest*" for Institutional Development Impact and the 5th has not been rated. But of the 4, 3 still have "*Satisfactory*"outcomes.

2.20 As a global rule of thumb the costs of treating and disposing of wastewater are as high as the costs of conveying, treating and distributing M&I WS. While high industrial discharges have been brought under control, urban, non-point, and small industry sources as well as sewerage/ wastewater contribute to unacceptable pollution levels. Bank WWTPs, which are described as "urban environmental management" projects, have not had the hoped for environmental impact. Overlapping responsibilities of MOC, MWR, SEPA and EPB are part of the explanation but are confounded by conflicts with local financial interests and a desire to avoid the social unrest of closing high-polluting industries.

2.21 In anticipation of a future investment program of as many as 400 WWTPs, an independent study was conducted under Canadian Aid for MOC [15] and 16 locations were selected by the Ministry. Although the 3 Bank-supported WWTPs were among the best operated, many plants were far from completion due to a lack of the supporting wastewater/ sewage collection networks (to households and industries) and inadequate finance. Only 13 of the 16 WWTPs were functioning while others operated well below capacity. And these were some of the better facilities located in major cities in relatively prosperous areas of China. The study confirmed anecdotal evidence that there are significant technical and financial problems with WWTPs—generally an absence of timely sewer connections, poor design and use of expensive combined treatment plants, a lack of effluent guideline enforcement and grossly inadequate funding from service fees. Design capacity has often been significantly overestimated—implying that "*40-60 percent of the capital invested in the existing WWTPs is not being utilized*." Adoption of inappropriately high treatment standards on many projects has led to dependence on expensive, albeit higher quality, imported equipment.

2.22 Concentrated efforts by the Bank to assist Shanghai have been more promising and China's wealthiest city has integrated water agencies and corporatized utilities to tame its three water dragons. Nonetheless even in China's most reform-minded metropolis water is still subsidized and quality issues threaten "*environmental competitiveness*." An $800 million Adjustable Program Loan in the Bank pipeline includes support for 3 Shanghai WWTPs. Introduction of private sector investment and operation have often been advocated by the World Bank as the only means of increasing efficiency in publicly owned WS utilities in developing countries. The Bank has not been involved in privatization in China and government has adopted a cautious approach. While government recognizes the need for private capital to meet ambitious capacity targets, and to improve the efficiency of management of existing assets, reforms are hostage to the playing out of SOE and financial sector reforms, a constant backdrop to water policy. The misallocation of project risks between public and private sectors has limited the scope for non-recourse project-based lending—much vaunted BOTs[16] are in

[15] " Preliminary Assessment of Municipal Wastewater Treatment Plant Operations and Biosolids Management in China", Merv Palmer, Lanqing Jia, Zhang Yue, Wang Lin and Jack Fritz, draft Dec 2001.
[15] Build Operate and Transfer.

reality a non-competitive form of public procurement (returns are guaranteed, the assets are largely for bulk-water and remain in public control, while water distribution is off-limits to investors). One thought for China's planners is that the controversial South-North Transfer Project might not even be necessary if tariffs were raised to the levels that will be needed to pay for the SNTP (Y6-14/m3 depending on who you ask.) But predicting the demand response to changes in tariff, requires accurate measurement of consumption, as well as control and collection systems, and these are not well understood. It is surprising given the centrality of these demand parameters that more resources have not been devoted to improving the accuracy of elasticity estimates.

2.23 ***Rural Water Supply****:* The Bank has supported four Rural Water Supply and Sanitation (RWSS) projects, mainly in poor counties. Designs have evolved by combining the strengths of existing village administrations and community financial participation, with international best practices. Design concepts include appropriate technology, financial cost-recovery, decentralization of regulation, and financial autonomy. This contrasts with the more popular approach of justifying non cost-recovery tariffs in poor communities by claiming the "*beneficiaries are willing but not able to pay*." In the latest generation of these RWSS projects the investment cost for water supply is 75 percent paid for by-cost recovery, and 95 percent of villages abide by the tariff covenant. The average cost of Y2/m3 (about 25 cents) provides startlingly clear evidence that even the poor can and are willing to pay tariffs that raise eyebrows when proposed for urban consumers. Rural consumers supplied by Bank-supported RWSS consume an average of 28 liter per capita per day (lcd.) While lower than UN standards of minimum daily need, this level of consumption and the implied tariff, captures most of the consumer surplus generated by RWSS services. The high cost-recovery, sustainability, and good quality, continuous service at a cost-recovering tariff, have increased welfare. Consumers, averaging 5 per household, are willing to pay a higher price for a better quality product, and to adjust their consumption downwards to fit the household budget. The oft-quoted "*affordability index*" for this project was that water charges were 3 percent of disposable income. If the UN definition of supply or need had been used for planning purposes, then the affordability index would have been nearly 12 percent and the project would presumably have been rejected as "*unaffordable*." [17]

3. OED Evaluations of Bank Water Related Projects

3.1 As part of a global study of WRMP implementation, ("*Bridging Troubled Waters*") , OED sampled 18 of 35 water projects for China and rated them for compliance with the Bank's 1993 WRMP. China projects showed a higher degree of compliance than for any other large country (See Annex A – Database of Bank Ratings.) The research design involved measuring the degree to which WRM issues were incorporated in the Staff Appraisal Report, and task-managers' project supervision reports, although it was too early to evaluate the ultimate impact on water sector performance. This study and further favorable evaluations of the Bank's China project design and supervision, conducted on a sample basis by the Bank's Quality Analysis

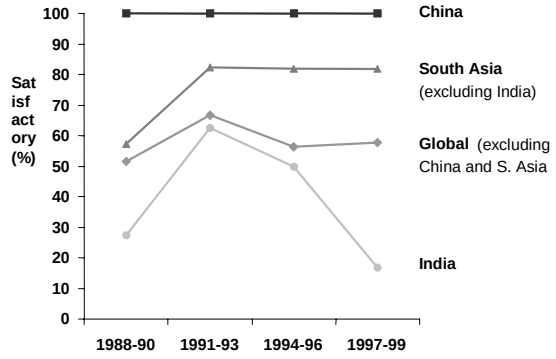
[17] Willingness to Charge and Willingness to Pay: The World Bank-assisted China Rural Water Supply and Sanitation Program 10/9/2002 (www.wsp.org)

Group (QAG), refer to specific projects, not overall sector level performance. The quality of OED's evaluations is constrained by:

- Limited access to direct observation, beneficiary interviews, dissenting opinions and probing field-level investigations in China. Secondary data goes unchallenged even when there are strong doubts as to its accuracy (for instance China's official percentage of unaccounted-for water is lower than Singapore's.) This is a generic issue that arises on many Bank-China projects.
- The Bank's largest client is relatively "*under-audited.*" PPARs are often clustered, with up to 8 projects in one report, rather than one audit per project. When frequent logistic problems make it impossible to mount a field-based audit at a mutually convenient time for Bank and Borrower, a weaker desk study may result.
- Standards may be applied unevenly. In many Bank client countries water projects perform very poorly by OED criteria. China is a model client and hence there may be a tendency to apply a higher standard.
- Out of 82 approved water related projects only 29 have been completed and subject to any kind of independent evaluation (ES or PPAR.)

3.2 Performance, both at project, program and country level is judged by OED in relation to both Bank and country policies, which may not be the same, introducing a strong subjective element into evaluation of factors such as "*relevance*". Bank policies are enshrined in:-

Figure 3.1: Outcome Trend – moderately satisfactory or Satisfactory



- OP 4.07 or "*Operational Policy 4.07 Water Resources Management*", which is the operational counterpart of the 1993 WRMP Paper.
- Eleven safeguard policies, including environment resettlement and indigenous people.

3.3 China is the best client as measured by evaluations of completed projects. Table 1 Shows the combined results for both ES/EVM and PPAR. The cells show the number of completed projects that have been rated in the top two rating classes for each evaluation criteria – i.e.. "*Highly Satisfactory*" or "*Satisfactory*" for Outcome (there are from 4 to 6 ratings for each criterion, see Annex A.)

Table 3.1: Summary of OED Evaluation Ratings

Type of Project	Coverage			Ratings in 1st two grades				
	ES/EVM	PPAR	Completed /Total Approved Projects	Outcome	Institutional Developmen	Sustainabilit y		
I. Land/Watershed Management and Forestry		3	3/9	3	2	2		
II. Water Resources / Flood Control;	0	0	0/4	-	-	-		
III. Agriculture and Irrigation/Drainage	5	7	12/23	11	7	11		
IV. Multipurpose and Hydroelectric Dams	6	0	6/13	6	5	5		
V. Inland Waterways;	1	0	1/3	1	1	1		
VI. Urban Water Supply & Wastewater)	2	2	5/26	3	0	3		
VII. Rural Water Supply.	1	1	2/4	2	2	2		
Total	14	13	29/82	26	17	24		

4. An Evaluation of Water Resources Assistance to China

What did the Bank do?

4.1 From 1982 to 1993, before the Bank formally adopted the WRMP, operations responded almost entirely to the Borrower's own investment priorities, financing projects that had already been identified and designed by the Chinese. The policy dimensions of Bank-supported projects were not derived from an overarching methodology, a water policy or water strategy. Rather, the approach was pragmatic and ad-hoc with incremental reforms introduced on pilot projects. The large number of projects and wide scope of issues, have expanded the range of "*ad-hoccery*" considerably. There was little evidence of any early strategic perspective on WRM issues or ESW/AAA.

4.2 Relations between the World Bank and its partners in the Chinese technical, financial and planning ministries, at both central and provincial level, have been productive, despite formidable technical and political challenges. OED has consistently acknowledged the high quality of completed projects. In return for substantial transfer of some kinds of knowledge, access to specialist expertise, and financing, the Chinese tolerated what are felt to be intrusive Bank covenants and burdensome procedures ("*high transactions costs*".) China does have a partnership with the Bank, but the nature of that partnership casts the Bank in a more humble role than it is accustomed to. The Chinese have their own philosophy, and senior professionals often have different water

management paradigms to the Bank's. While this can lead to miscommunication of unfamiliar ideas to both parties, there has also been flexibility with Bank-supported projects encouraged to pilot new approaches in key water reform areas. Bank staff have also had an unrivalled access to senior decision-makers and held a leadership position among the donors. Bank-China cooperation on water is widely seen by China and the region to have been mutually beneficial, with the Borrower firmly in the driving seat, and both sides trying hard to maintain a mutually sustaining relationship.

The Bank's "Special Relationship" with China

4.3 The Bank's relationship was special when viewed against its own framework that has three elements (a) Country Assistance Strategies (CAS); (b) Economic and Sector Work (ESW), now called Analytic and Advisory Assistance (AAA); and (c) the formulation and negotiation of projects and programs:-

4.4 The *Country Assistance Strategy* (CAS) is a summary of the Bank and Borrower's shared goals and strategy. A CAS should also highlight differences between Bank and Borrower policies but in practice often turns out to be full of generalities and platitudes. These paper over cracks in policy disagreements both within the Bank, and with the client. The CAS is a consensual document – something that is negotiated and "*comes out of a smoke-filled room*", not necessarily pleasing anyone. The Board reviews every new application for a loan with reference to the CAS, but unless there is a visible political profile to the project, agreement is more or less assured. According to the Bank, the body of both local and global ESW/AAA should be embedded in program and project design. But pushing a policy agenda tends to be a global function generated by Washington. Demand for ESW has originated from the client's needs which may or may not match Bank priorities. In China demand for ESW/AAA exceeds resources that the Bank feels able to supply to support it.

4.5 **Before the early 1990s, water projects showed little influence of a water policy framework.** When the Bank first engaged China it did not go in for the "*big bang*" approach adopted in the former Soviet Union. It got on with financing a lengthy pipeline of projects, most of which were at an advanced stage of preparation. There is no evidence of a comprehensive lending strategy for the individual sectors such as irrigation and water supply, let alone for something as amorphous as "*integrated water resources management*." The Bank's in-country strategy made no attempt to coordinate all water-related projects within some overall planning framework. The Bank's initiatives have responded to the client's sense of urgency, not the Bank's. Even if the Bank had wanted to, it could not dictate policy to China. Maybe the Bank underestimated its negotiating power, but leverage through funding of the water or even country portfolio was not perceived to be great. China is a very large country and generates much of its own savings. The Bank was a minority participant averaging a share of 30 percent of total project costs, while overall the Bank funded only 2-3 percent of water-related investments.

4.6 **Much of the ESW was contained in project documents with limited circulation.** While there is a paucity of ESW/AAA work for the earlier period, significant studies with a policy dimension appeared in the 1990s. In 1991, Bank staff

had introduced a new project loan to the Board (Tarim Basin I) saying that the Bank was providing "*intellectual and financial support for reforms*" and "*had begun to address reform explicitly, not only in its sectoral dialogue, but also in formulating individual investment operations. The integration of comprehensive water resources development with environmental protection and enhancement was to be the focus for sustainable growth under the project.*" The Yellow River Basin Planning Study in 1993 contained substantive and prescient remarks about the opportunity cost of abstracting water, and elaborated views widely held among Bank staff about the sustainability of water resources for the NCP.[18]

> *"Sooner, rather than later, Yellow River planners will have to squarely face equity vs. efficiency issues…. Policymakers seem to be operating under the assumption that the Yellow River is a free good with low opportunity costs or none… The present schedule over-allocates water to the upper reach provinces, which are not able to use it because of the lack of demand or the lack of structures to divert water….Until there are realistic allocation provisions that YRCC can enforce, the upper and middle reach regions will probably continue to follow what we have termed the "first-come, first-served" rule, to the potential detriment of basin-wide economic performance.*"

4.7 IRBM was added as a theme for Bank-China cooperation and the Yangtze Basin Water Project of 1995 was the first truly integrated water resources project for the Bank. The Bank's "*Clear Water, Blue Skies*" was part of the "*China 2020: Development Challenges in the New Century.*" This however concentrated on environmental aspects of air and water. An agricultural sector paper "*Accelerating China's Rural Transformation*" in 1998 contained a chapter on irrigation issues. The 2001 "*Air, Land and Water"* report discussed water issues from an environmental perspective. Most of the Bank's contributions are contained in un-circulated project documents and project reports or so-called "grey literature." Published Regional ESW was of little significance. In the early 1990s the Bank had a strong technical interest in regional ESW for river-basin management and its senior advisors advocated a comprehensive and integrated approach. The Asia Technical Department studies published from 1991 to 1993 included China. The reports were of a high standard and very comprehensive but had little influence on China operations, being driven by an outside agenda of the Asia Technical Department as it was then known. The report on China recommended a holistic approach from the start, but was something of a counsel of perfection:

> "*Borrowers should initiate a comprehensive review to reform their water resources institutions, including legislation, policies, the functions and organizations of government and the participation of the public and beneficiaries. Solutions to narrow issues are introduced on an urgency basis in large part because it is considered that comprehensive institutional reform is too difficult …The nature of reform of water institutions demands a will to attack the situation in a coherent, comprehensive manner. Piece-meal or simple solutions do not exist.*" [19]

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[18] "Yellow River Basin Planning Study, June 1993

[19] See "Principles and Practices for Dealing with Water Resources Issues" and "River Basin Management, Principles and Priorities", Frederiksen, Berkoff and Barber, 1992.

4.8 Followed to a logical conclusion, the approach advocated by the Asia Technical Department would have required the provinces that wanted Bank loans, and the central government, to have the foresight and political will to address water reform head-on. For instance, enforcing pollution regulations on SOEs and TVEs [20], tariff reform, privatization, charging farmers the full cost for water, stricter groundwater licensing, establishing measurement and charging for irrigation, and taking water allocations away from poorer upstream riparian provinces. China's approach to WRM was incremental and not as demanding as the Bank's recommended approach.

4.9 An internal quality assurance group has criticized some of the region's ESW for the urban sector and environment (including water resource issues) for inadequate quality and failing to follow quality assurance procedures. However, the region and the client do not put such a high value on "textual analysis" and "peer-reviewing." For formal ESW/AAA products (work with a Project ID and budget) the culminating event (a seminar or formal presentation to the stakeholders) was considered more important by the Region than the final edited and polished report. The budget available for the urban ESW was only $60,000. While not exactly hostile to HQ-directed ESW, a regional memo commenting on the CAS for China says, "*In our non-lending services, we are shifting from the writing of long reports to working closely with our Chinese counterparts on informal reports, workshops and seminars on emerging issues, bringing in highly credible experts to share experience and lessons learned from other relevant countries*." But most of the Bank's considerable influence has been conveyed through professional interactions at the project-management level, a high quality of technical advice, staff continuity and a discerning client, very eager and able to learn. The region's ESW has been driven more by the needs of the client than the policy diktats of the Bank in Washington. Just as importantly, with limited funds, the stress has been on outcomes rather than publications.

4.10 Historically there was no obvious link between the CAS, technical initiatives from the outside, and the progress of reform within. The 1997 country assistance strategy for China did not discuss water specifically, which is surprising given the Chinese Government has long acknowledged water to be a key problem area. CAS references to "*water*" place it in a subsidiary role, a supply-bottleneck constraining economic growth. Early country strategies for China highlighted macroeconomic concerns and discussed water in the context of poverty alleviation in the northwestern provinces, not resource conservation. The new 2003 CAS places much more explicit emphasis on WRM.

4.11 In the past the Region was not deeply involved in headquarters technical initiatives. Participation by China at Bank events like Water Week was restrained but has picked up in the last two years. The ministries of agriculture and environment were not conspicuous at events such as these and the World Water Forum of 2000. The region's credibility and ability to promote new ideas in China has been achieved by closely identifying with the needs and aspirations of MWR. Early efforts at getting high marks for technical competence, and dogged support for delayed and sometimes over-ambitious provincial projects have matured into a more equal relationship. There has been a high level of entrepreneurship at the level of task-manager but strategies have not been explicit

[20] The town and village enterprises which were such an essential element of economic reform and decentralization.

– there have been no printed strategy documents or independent reviews of major Bank irrigation and water resources projects. The implications of projects for overall water resources and environmental management have been aired to some extent within the confines of close relationships between Bank staff and MWR. There was no explicit strategy for WRM that had been endorsed by Bank Management.

4.12 This is the backdrop—an earlier difficult period of learning and, hence, mistakes. The Bank can claim some credit for promoting and championing such issues as water conservation, financial sustainability, river basin management and SIDD. The 1993 Bank water policy paper was important and useful to the Region – "we used the Policy Paper in our discussions, and it has had a major impact on the course of our China water program and project design, in many aspects."[21] The Chinese provided most of the funds for Bank-supported projects, which piggybacked innovative institutional components on what were largely conventional WS, WWTP, irrigation, drainage, and flood control projects. These new components were seen to be effective and have subsequently been replicated.

Impact of the Bank on Water Reform

4.13 Bank staff who were interviewed about the Bank role offered a wide range of opinions. The critics saw the Bank as merely a passive partner, providing funds for constructing mega-projects and being driven by a supply-led Chinese approach to water. Critics lump the World Bank together with the "*iron triangle*"[22] of politicians, bureaucrats, and the construction industry, that support an unashamedly "supply and hardware-led" approach to water development. International NGOs have accused the Bank of supporting projects that have done environmental damage, fed corruption, and supported involuntary resettlement. The Bank is criticized by some NGOs as being an uncritical supporter of a Chinese Government that is embroiled in controversy over projects such as the TGDP, the SNTP, the Qinghai component of the Western Poverty Project and now the hydro-dam at Zipingpu on the Min River,"[23] The Bank , however, has not committed funding to any of these projects. Both TGDP and SNTP have been discussed for decades inside and outside China. TGDP has been criticized on both technical grounds (the size of their supposed benefits), ballooning costs, and potential environmental, cultural, and social damage. The Bank was invited to participate in the TGDP but declined after agreement could not be reached on the construction of giant ship locks that added a lot to the costs for only a marginal increase in benefits.

4.14 Many staff more directly involved in China projects have a more positive assessment of the relationship, attributing a major role to Bank, assistance for China's reforms. Although water is not cited three senior Bank staff judged that:

> "*It would be fair to say that the World Bank's professional knowledge, access to the highest levels of the government and objective analysis has helped to articulate pros and cons of important macroeconomic and sectoral policy issues, provided*

[21] Staff Interview
[22] A phrase popularized by the famous Chinese journalist Dai Qing
[23] "which *may end the 2,200-year working life of one of China's engineering marvels: the Dujiangyan irrigation and flood-control system*." Far Eastern Economic Review, May 23, 2002.

> *quantitative, intellectual support to the reformers in China in a transparent manner and perhaps helped speed up the reforms and their implementation where there already was considerable internal segment of opinion in favor of such reforms. Examples include fiscal and tariff reforms, grain price increases, liberalization of commodity markets and reform of the state enterprises."*[24]

4.15 There may or may not have been an implicit strategy, but the Bank has earned trust and been responsive, giving timely advice on evolving issues raised by the client. The deteriorating water situation has done more than anything to persuade China that demand really does have to be managed much more aggressively, and the river basin management paradigm implemented with new or modified institutions. One interviewee said that the Bank's technical performance, assisting the Chinese master technical and managerial problems of major investments in water resources/irrigation and WS/WWTP/sewerage, had "*earned them a seat at the table.*" Official pronouncements now emphasize water conservation at the county level and the Bank is supporting this with its new water conservation project.

What were the Reasons for the Good Relationship?

4.16 A good place to start is to examine the reason for a good relationship—complementary needs. High-quality Bank professionals have been attracted to China operations and a core of long-term staff has provided continuity. In fact it would not be an exaggeration to say that there was competition among Bank staff both to work in China and to secure a project for their own sector. Investment in relationships (*guanxi*) is very important to doing business in China. Bank staff continuity has been an effective counterpoint to China's own strengths of "*internal stability, continuity in the government including low turnover of government officials, as well as a significant share of idealism and nationalism.*"[25] The Bank provided a high-level consulting capacity for the MWR and SDPC, and it is hard to believe that in private they did not tell their client what they thought, rather than what the client wanted to hear. The Bank also performed a useful job in a period of changing relationships between center and province—that of intermediary. To some extent the Bank could be an "*honest broker*" and "*convener*" even on issues with which it was not directly involved. Personality and diplomatic skills facilitated an effective relationship between two bureaucratic elites of Bank and PRC.

4.17 China has obtained funding of infrastructure using long-term debt capital with the IDA component supplied at concessionary rates. Margins for on-lent Bank funds have also been a source of off-budget income for the MOF. The Chinese have been introduced to, and mastered, the demanding project preparation and supervision requirements of the Bank. This has led to "*a more structured approach to planning design and procurement…The Bank involvement has often resulted in as much as 20-25 percent savings in procurement… Implementation organization arrangements are also much more transparent and driven by technical and economic judgments rather than political.*"[26] The skills acquired by central and provincial agencies will be useful in future

[24]. See Uma Lele, Al Nyberg and J. Goldberg, "Multilateral Institutions in China's Agriculture Production and Trade", 1998.
[25] Lele et al, op cit
[26] Project information document for the Water Conservation Project (2000.).

negotiations with private sector investors. The Bank has been generous in financing training and technical cooperation, allowing Chinese staff to travel internationally.

4.18 China offered unprecedented opportunities for the kind of technical challenges that attracted many of the Bank's best engineers. Not only does China have enormous capacity but it has problems that do require large-scale engineering solutions—sophisticated water modeling and simulations, flood control works, waterlogging, salinization, wastewater, reservoirs, water conveyance, deteriorated, partially finished irrigation infrastructure, and dams. For most of the period the Bank played its traditional specialist role of infrastructure banker, financing a seemingly endless pipeline of self-prepared large public projects from China. Also, despite China's protestations about transaction costs and lending rates, the combination of IBRD, IDA and Global Environment Fund (GEF) funding is far less costly than international market rates. Indeed there is no private sector source of equivalent long-term debt of comparable risk.

4.19 One staff member even observed that a unique aspect of the Bank-China relationship was that China saw WB as much like any commercial bank, and hence found it difficult to understand the Bank's seeming pre-occupation with development issues that did not necessarily contribute to the likelihood of loan repayment. For the Bank itself, such a big borrower was also attractive - *"the Bank needs China more than China needs the Bank*." A $35 billion portfolio in relatively large loans supports substantial fixed costs—even a .5 percent spread would amount to nearly $200 million annually to contribute to the overhead costs of loan origination, marketing, supervision and HQ establishment costs. Unfortunately the actual supervision funds are inadequate. The Bank's limited room for policy dialogue has facilitated staff concentration on the narrower technical functions of projects. With the Bank now trying to move away from a project approach, to focus on broader developmental goals (environment and poverty) and upstream policy, a more conventional development-banking role, as exemplified by past China operations, is less appropriate.

Strengths and Weaknesses of the Bank's Operation in China

Strengths of the Approach

4.20 Some of the major contextual factors have already been mentioned – a low-key, client-centered approach, ensuring good project performance by requiring cost-recovery from beneficiaries, and taking risks that projects might not perform as intended. Critics would cite these same factors as being weaknesses—particularly the risk that the beneficiaries will be saddled with foreign exchange risk and that flexibility in procurement compliance will be exploited.[27] The Bank was persistent at promoting WRM institutions, river-basin planning, and financial sustainability. That probably had more to do with staff continuity and motivations than WRMP. Neither the appraisal reports for multipurpose dams in the energy sector, waterways, nor many early

[27] Although corruption is never discussed explicitly, there is a reference in a 1998 country strategy review - "Procurement issues have arisen in several projects over the past year, and this is receiving increasing attention by both Government and the Bank." References in the press, including Chinese, are less restrained and , China's premier coined a new term, 'bean curd' to describe projects that crumble because of shoddy workmanship or sub-standard materials. *Asiaweek*, April 9, 1999.

WS/WWTP projects showed much concern for integrated WRM. But there has been much improvement. The 1993 policy paper was useful for Bank staff in China even if it provided no new knowledge. It strengthened the position of those who saw institutional reform and economic issues as central to China's water problems. The success of the Bank's attempts to influence water reforms in China also owes much to its humility in the policy sphere, continuity of high-level professional staff and earning the respect of its clients, rather than assuming it. The shared Bank/China cross-sectoral "China Water Resources Assistance Strategy"(CWRAS, 2003), provides a strategic vision for future cooperation on WRM. A workshop discussing the draft CWRAS was held on June 5th, 2002.

Weaknesses

4.21 The OED commented on lack of explicit procedures for gender and participation in its study of water policy compliance on China projects. The Bank started by emphasizing cost-recovery in a mechanical fashion, stressing cost-recovery target percentages and the preparation of O&M plans and manuals, while neglecting the underlying incentive problems and financial governance. While there may have been limits to leverage, the Bank compromised its commitment to sound economic analysis in the evaluation of some irrigation projects. The analysis of expected economic rate of return (ERR) neglected important factors such as sustainability of water resources and their downstream opportunity cost. Failure to make an adjustment helped ensure a viable ERR, and Board approval, but did not indicate the true economic cost of the projects, which the client needed to know. The issue was not whether the Bank should fund uneconomic projects (it often does), but whether it should pretend that the project was a "*win-win*" situation satisfying both economic and regional equity objectives. The region's appraisal of its own negotiating position as weak with respect to policy and covenants is somewhat inconsistent with its view that the client values the Bank relationship highly.

4.22 In the past The Bank was not sufficiently focused in its advice or forthright in criticism of the sustainability of China's hydraulic structures. But PRC has now made a course correction and is putting more emphasis on WRM and less on new infrastructure. In future the Bank would do well to focus on the mantras of demand and river-basin management. The structural engineering approach to meeting excess demand will probably remain a major donor and PRC response to water problems, especially when weighed by the monetary and human resources allocated. n water development 10 years is a short time, yet the planning horizon of China's water planning is often only 10 to 20 years.[28] On the other hand in countries with conditions similar to China, especially where groundwater has been over-abstracted, decisions are based on sustaining supplies for 50 or even 100-years.[29] By being a willing financier for "*off the shelf*"projects, the Bank has been accused of exacerbating rather than solving China's water problems. While there is obviously much need for continued construction, especially rehabilitation, the number one unsolved problem has become the need to manage the demand for

[28] For instance a prime objective of the Xiaolangdi Dam was silt control. It is estimated that beyond 10 years the capacity to capture silt may be exhausted

[29] E.g. urban areas in the USA such as in Arizona.

groundwater resources, perhaps followed by flood control and improved water quality. The Bank cannot offer methodological advice on the tradeoffs between short term economic gain and long-term resource conservation. For instance the WRMP commits to sustainability of water sources for all uses but using the kinds of discount rates the Bank does for project appraisal (10-15 percent), any excess of costs over benefits beyond 20 years has little effect on the decision.

4.23 Finally the lack of coordination between Bank sector units is a recurrent theme, which is being addressed by the CWRAS. On China's side this weakness at coordination between sectors has been frustrated by the lack of a natural home for WRM and river basin projects "owned" by institutions that can transcend parochial sector and provincial interests. Given the enormity of the issues it is disappointing that so little money has been applied to critical high-return software projects addressing institutional reform and demand management.

5. The Future of the Bank-China Partnership

5.1 In the past the scope for policy dialogue was perceived to be narrow and progress has come incrementally by embedding and testing reforms in projects, rather than using conditionality to try to force changes in policy. The Bank has influenced policy by being a "knowledge bank" to its Chinese clients. But the Region's sometimes self-assumed mandate of intermediary between China and the Bank, has not been clearly defined. The development of the relationship requires an increased willingness on the part of PRC to conduct a strategic dialogue on water policy at a higher level, escaping the confines of the primarily MWR orientation of existing water operations. The duplication of data collection and divided responsibilities between agencies frustrate WRM and must be rationalized through institutional reform, new administrative processes, and incentives matched more closely to sustainable development. Hence fundamental reforms are needed and not just changes in policies within a given institutional and regulatory framework.

5.2 Much of what needs doing has been identified but progress at reforms has been slow. The coordination of water management responsibilities and decisions between ministries will not be resolved without a supra-ministerial body to push through reforms and mediate. Similar problems arise with environment, poverty, economic reform and now the implementation of WTO. Given the hierarchical nature of China's system of governance only higher-level units, for instance of the State Council, CCP or leading groups, have the authority to override ministries. Ministries themselves face a problem in relating to provinces, which are at the same finely layered level of power and authority. A leading group for water also has to have representation from the different economic sectors, government agencies and stakeholders. World-Bank PRC partnership in WRM, which up to now has been fragmented between the Bank sector units and line ministries, needs high-level oversight, perhaps at the level of the State Council, to implement the CWRAS.

5.3 WRM interventions to promote reform should be strategically targeted and given increased political support. This does not mean a highly centralized approach but

designing workable solutions to fit the differing conditions both within and between sectors and across administrative boundaries. Future success in Bank-China cooperation should continue to be based on pragmatism and pilot testing of new ideas, where they are most needed and most likely to succeed. This will often require letting local organizations take control of problems they are capable of handling (the subsidiarity part of the Dublin Principles). Where they are not capable, rules and decision-making procedures must be developed and embedded in new or modified institutions. The Bank's skills as an intermediary, reputation as an "*honest broker*" and unrivalled access to knowledge allow it to add value to China's own immense technical and scientific resources. The future program of cooperation will requires a lot of ingenuity, experimentation, and local initiative, rather than a blueprint.

5.4 Under-funding of ESW/AAA is a frequent complaint from Bank staff. For some water projects, the proportion of total project commitments going to technical assistance, management, and other institutional components has risen since 1993. For example, there has been an increase in non-construction components for agriculture and irrigation projects. However to equate the Bank's knowledge transfer or impact on institutional development with the monetary value of institutional project components, is simplistic. Many important institutional inputs are not treated as project and program costs, and the existing governance infrastructure, supporting project preparation and implementation, are not priced. But China does need to recognize the high economic value of essential and scarce skills while retaining its own discrimination as the customer. Bank procurement policies and procedures may be less helpful for identifying sources of "*high quality TA*" for policy and institutional reform, than for more clearly defined construction and equipment needs. The past reluctance on the part of China to use loan funds for technical assistance and other "*soft*" or non-revenue generating components, and the shortages of counterpart funds also need to be addressed.

5.5 It is unrealistic to expect China to swallow the World Bank's WRMP whole. China is not likely to, and does not need to totally abandon expansion of hydraulic infrastructure and needs to support industrial growth and increased domestic consumption. China's extensive hydro resources are underutilized and a source of clean energy. Neither will China adopt a full cost-recovery strategy or make an unreserved commitment to privatization, when it conflicts too much with other objectives. In the West the water resources sector has been heavily subsidized from general taxation, often driven by sectoral interests who co-opt political actors.

5.6 The Bank should continue to give priority to the following initiatives:

- Watershed Management
- River Basin Planning and Management
- Self Financing Irrigation Districts
- Demand Management and Pricing

5.7 There are other complementary activities that would enable the Bank to play a more explicit knowledge management role. For example, an area crying out for attention is that of institutional integration of a single unified database for both for water quality and allocation. "The Chinese have a great deal of raw data on water problems and the

impact of agricultural runoff or industrial pollution on water quality and health, but this data is not entered into databases and manipulated."[30] An integrated database usable for managing both water quality and allocation is a strong candidate for a Bank-led initiative, building on existing but fragmented experience in both areas. Another area for further experimentation and cooperation is trying new methods of decentralized demand management, such as issuing water use rights and trading. Allocation is particularly difficult to achieve by command and control measures alone. It would be a shame if the momentum built up from past cooperation, particularly in the areas of financial sustainability, river-basin planning, institutions and irrigation for the drier Western provinces, were to be lost. It is also of some concern that the so many senior Bank staff working on China are now retiring. There is a shortage of technical specialists to implement an expanding agenda, and lack of foresight in human resource development will impact the feasibility of the CWRAS.

5.8 The theme of the review has been that the World Bank has been an assiduous partner working across multiple ministries, but that its overall WRM contribution has only recently been coordinated. At worst it has neglected to sufficiently criticize egregious examples of unsustainable development of water resources, and acquiesced in supporting a supply-led program of water management. Current planning exercises offer both China and the Bank an opportunity to agree on a more strategic and upstream policy agenda for Bank assistance. In the past the Bank has accommodated the demand for hardware projects, earning it a seat at the table and an input into policy and institutional aspects. But past progress in working with China on implementing reforms and refining strategy was limited and attached to project activities managed at the task/project manager levels. At times the inclusion or exclusion of institutional and economic components from projects has had more to do with the inclinations of individual project managers than Bank policies. More focus is needed to augment straightforward project finance with the Bank's "*convening*" and "*honest broker"* capabilities to help China tackle overarching institutional and management issues. The credibility and trust built up from past cooperation can now be a foundation for a more coherent strategy, and the integration of China more closely into efforts to resolve the global crisis of WRM.

5.9 While there is a need for more water control structures, the major unsolved problems are with groundwater resources, the quality of surface water and the institutional framework to implement solutions. China itself is struggling with developing a new water paradigm and it does not have to be identical with the Bank's. In its efforts to develop a CWRAS the Bank must be careful to recognize the emerging and distinctive cultural and institutional expression of China's WRM thinking, plans and strategies. In the past there has been a tendency sometimes for China's programs to become more remote (except in specific technical contexts) from Bank concepts of water policy reform. If China has really reversed its earlier unregulated drive to exploit water resources and tame nature, then it must surely be considered an example of successful reform. If this policy can now be implemented, further exposure of China's experience can do nothing but improve the prospects for global water reform.

[30]US Embassy Website

5.10 The Bank played a significant role in construction, capacity building and knowledge transfer in the past. It has been less effective achieving policy, demand management and institutional reforms, but can point to significant innovations, which could end up being replicated all over China. SIDDs and WUAs, the Loess Plateau approach to watershed management and new approaches to water saving have been taken beyond the pilot stage and prospects for extending them nationwide are good. River Basin management for Tarim and the Li river (a tributary to Yangtze under the Yangtze Basin Project) has taken hold, providing practical examples to other more complex basins. Demand management with increased tariffs is beginning to take hold in water supply although even the high annual increases (20-30 percent) leave a wide margin between price and opportunity cost. Both the client and the Bank recognize the need for a more strategic approach—the upcoming CAS and CWRAS, supported by recent Bank/China cooperation in ESW promises to sustain the relationship. But if there is to be a new Bank-China water- partnership both partners must face up to some difficult questions:-

- To what extent are the history, ideology and political economy of water in China, compatible with the Bank's market-oriented water policies?
- China's graduation from concessionary IDA funding makes the Bank a less attractive lender. Should the Bank in turn be concentrating its resources, human and financial, on more needy client regions and countries in Africa and South Asia?
- China has been loathe to borrow from the Bank for non-revenue producing environmental, social, capacity building, TA or poverty projects. Will this policy continue in future if the Bank and China cooperate in development of the poorer Western provinces?
- What degree of scrutiny is China willing to tolerate for what it considers internal matters and to what extent is the Bank willing to turn a blind eye?
- Will the costs of mega-projects like the TGDP and SNTP crowd out counterpart funding for other investments?

Annex A: Database of World Bank Water Related Projects in China

Evaluation of China's Compliance with the World Bank's 1993 WRMP (1993. Source : "Bridge Over Troubled Water, Assessing the Water Resources Strategy Since 1993", OEDST, 2000 (http://www.worldbank.org/oed/water)

Table 2: Degree of Compliance with 1993 Policy	***Average Rating - Maximum Score 4.0***				
	Agriculture/ Irrigation	***Hydro/WR***	***Waterways***	***Urban Environment***	***Rural WS&S***
Number of Projects Reviewed	***5***	***4***	***1***	***6***	***1***
Analytic Framework					
National/ State Level - characteristics of strategy for water resources	3.0	3.4		3.5	3.3
Basin/Region Level - degree of integration in planning/management	3.5	3.5		3.5	3.3
Infrastructure - How much the project designs reflect the framework	3.6	3.6	2.5	3.5	3.7
Institutional and Regulatory Systems					
Legal, Policy & Planning for Water Resources	3.5	3.5		3.5	3.5
Legal Policy & Planning for WS&S	3.3	3.4		3.5	3.6
Management & Regulatory Framework for Water Resources	3.5	3.5	3.0		3.5
Management & Regulatory Framework for Water Supply/Sanitation	3.3	3.5		3.5	3.4
Water Service Provision - compliance with governance, regulations, subsidiarity	3.0	3.4		3.5	3.3
Economic and Social Issues					
Finance and Subsidies - appropriate financing for public/private goods	3.2	3.5		4.0	3.4
Service Charges - financial autonomy, hard budgets and cost-recovery	3.5	3.5	3.0	4.0	3.3
Poverty/Gender - special efforts to address the needs of all stakeholders	2.5	2.1	3.0	3.0	2.5
Overall Weighted Averages	***3.2***	***3.3***	***2.9***	***3.6***	***3.3***

Annex B: OED Evaluation Criteria

The Operations Evaluation Department assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, OED annually assesses about 25 percent of the Bank's lending operations. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming studies or country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons. The projects, topics, and analytical approaches selected for assessment support larger evaluation studies.

A Project Performance Assessment Report (PPAR) is based on a review of the Implementation Completion Report (a self-evaluation by the responsible Bank department) and fieldwork conducted by OED. To prepare PPARs, OED staff examine project files and other documents, interview operational staff, and in most cases visit the borrowing country for onsite discussions with project staff and beneficiaries. The PPAR thereby seeks to validate and augment the information provided in the ICR, as well as examine issues of special interest to broader OED studies.

Each PPAR is subject to a peer review process and OED management approval. Once cleared internally, the PPAR is reviewed by the responsible Bank department and amended as necessary. The completed PPAR is then sent to the borrower for review; the borrowers' comments are attached to the document that is sent to the Bank's Board of Executive Directors. After an assessment report has been sent to the Board, it is disclosed to the public.

About the OED Rating System

The time-tested evaluation methods used by OED are suited to the broad range of the World Bank's work. The methods offer both rigor and a necessary level of flexibility to adapt to lending instrument, project design, or sectoral approach. OED evaluators all apply the same basic method to arrive at their project ratings. Following is the definition and rating scale used for each evaluation criterion (more information is available on the OED website: http://worldbank.org/oed/eta-mainpage.html).

Relevance of Objectives: The extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). *Possible ratings:* High, Substantial, Modest, Negligible.

Efficacy: The extent to which the project's objectives were achieved, or expected to be achieved, taking into account their relative importance. *Possible ratings:* High, Substantial, Modest, Negligible.

Efficiency: The extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. *Possible ratings:* High, Substantial, Modest, Negligible. This rating is not generally applied to adjustment operations.

Sustainability: The resilience to risk of net benefits flows over time. *Possible ratings:* Highly Likely, Likely, Unlikely, Highly Unlikely, Not Evaluable.

Institutional Development Impact: The extent to which a project improves the ability of a country or region to make more efficient, equitable and sustainable use of its human, financial, and natural resources through: (a) better definition, stability, transparency, enforceability, and predictability of institutional arrangements and/or (b) better alignment of the mission and capacity of an organization with its mandate, which derives from these institutional arrangements. Institutional Development Impact includes both intended and unintended effects of a project. *Possible ratings:* High, Substantial, Modest, Negligible.

Outcome: The extent to which the project's major relevant objectives were achieved, or are expected to be achieved, efficiently. *Possible ratings:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Bank Performance: The extent to which services provided by the Bank ensured quality at entry and supported implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of the project). *Possible ratings:* Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

Borrower Performance: The extent to which the borrower assumed ownership and responsibility to ensure quality of preparation and implementation, and complied with covenants and agreements, towards the achievement of development objectives and sustainability. Possible ratings: Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

Annex Table 1: Agriculture/Irrigation/Land /Watershed Management and Forestry Projects

	ProjectId	*Project Name	Project Status	Approval FY	Closing FY	IBRD %	IDA%	**Total Project Cost	Latest evaluation type	Latest evaluation date	Outcome (M/S=Moderately/Satisfac	Sustainability L-Likely H-highly U- Unlikely	Institutional dev impact Sub-Substantial M- Modest	APPI	World Bank Water Policy Rating (/5)	Bank Quality at Entry NR-NR S-S	Bank Supervision	Bank Overall	Borrower PrePPARation	Borrower Implementation	Borrower Compliance
		Agriculture/ Irrigation																			
1	P003411	North China Plains Agricultural	C	1982	1988		33.8	177.5	PPAR	Apr-89	S	L	Sub	8.25		NR	NR	NR	NR	NR	NR
2	P003440	Aquaculture Project	C	1986	1992		30.3	197.7	PCR/ICR	Sep-93	H S	L	Sub	10		NR	S	NR	S	S	NR
3	P003441	Pishihang - Chaohu Area	C	1985	1992	6.5	28.5	263.5	PCR/ICR	Jun-93	S	L	M	7.25		NR	S	NR	UnS	S	S
4	P003474	Northern Irrigation Project	C	1988	1998		44.0	234	PPAR	Jun-00	S	L	Sub	8.25		S	S	S	S	S	S
5	P003489	Gansu Provincial Development	C	1987	1996	6.2	46.6	323.1	PPAR	Jun-99	M S	L	M	6.5		UnS	S	UnS	UnS	UnS	UnS
6	P003490	Xinjiang Area Development Project	C	1987	1995		60.9	115	EVM/ES	Jun-96	S	L	M	7.25		S	S	NR	S	S	S
7	P003513	Jiangxi Agricultural Development	C	1990	1996		49.3	121.7	EVM/ES	Mar-97	S	L	Sub	8.25		S	S	S	S	S	S
8	P003551	Shaanxi Agricultural Development	C	1989	1997		44.6	237.5	PPAR	Jun-00	UnS	U	M	4.5		UnS	S	S	UnS	UnS	NR
9	P003552	Shandong Agricultural Development	C	1989	1995		40.0	272.3	EVM/ES	Jun-96	S	L	M	7.25		S	S	NR	S	S	S
10	P003556	Tarim Basin	C	1992	1998		58.9	212.1	PPAR	Jun-00	S	L	Sub	8.25		S	S	S	S	S	S
11	P003558	Hebei Agricultural Development	C	1990	1998		48.4	309.6	PPAR	Mar-02	MS	L	M	8.25		S	S	S	S	S	S
12	P003560	Henan Agricultural Development	C	1991	1999		56.1	196	PPAR	Apr-02	S	L	Sub	8.25		S	S	S	S	S	S
13	P003561	Sichuan Agricultural Development	C	1993	2000		51.1	287.6	ES	Aug-00	S	H L	Sub	8.25		S	S	S	S	S	S
14	P003582	Irrigated Agriculture Intensification	C	1991	1998	24.8	31.6	593.8	ES	Aug-99	S	L	Sub	8.25	3.5	S	S	S	S	S	S
15	P003596	Yangtze Basin Water Resources	C	1995	2002	18.1	19.9	551.9							3+						
16	P003594	Gansu Hexi Corridor Project	A	1996	2007	23.1	34.7	259.2													
17	P003649	Shanxi Poverty Alleviation Project	A	1996	2003	54.7		182.8							3						
18	P046563	Tarim Basin Project (02)	A	1998	2005	33.0	22.0	272.6													
19	P049665	Anning Valley Agricultural	A	1999	2005	37.5	12.5	239.8													
20	P049700	Irrigated Agriculture Intensification	A	1998	2004	35.3		849.3													
21	P051888	Guanzhong Irrigation Improvement	A	1999	2005	40.0	10.0	200													
22	P056516	Water Conservation Project	A	2001	2006	39.9		185.7													
23	P065463	Jiangxi Integrated Agricultural	P	N/A		64.1		155.9													
		Total 23 Projects				18.3	28.3	6439													
		Land/Watershed Management/Forestry																			
24	P003412	Heilongjiang Land Reclamation	C	1983	1989	13.0	16.6	271	PPAR	May-92	S	L	Sub	8.25		NR	NR	NR	NR	NR	NR
25	P003430	Forestry Project	C	1985	1992		34.8	135.8	PPAR	Jun-95	S	U	M	6.75		S	S	NR	S	S	S
26	P003488	Red Soils Area Development	C	1987	1992		32.7	122.2	PPAR	Jun-93	S	L	Sub	8.25	2.5	NR	S	NR	S	S	S
27	P003557	Forest Resource Development and	C	1994	2002		56.2	356													
28	P003540	Loess Plateau Watershed	A	1994	2003		100.0	150													
29	P003595	Red Soils Area Development	A	1994	2003		50.6	296.4													
30	P046952	Forestry Development in Poor	A	1998	2006	27.5	27.5	364													
31	P056216	Loess Plateau Watershed	A	1999	2004	39.7	19.8	252													
32	P064729	Sustainable Forestry Development	P	N/A		43.8		214.6													
		Total 9 Projects				15.2		2162													

Annex Table 2: Urban Water Supply and Wastewater Projects

	ProjectId	*Project Name	Project Status	Approval FY	Closing FY	IBRD %	IDA%	**Total Project Cost	Latest evaluation type	Latest evaluation date	Outcome (M/S=Moderately/Satisfac	Sustainability L-Likely H-highly U- Unlikely	Institutional dev impact Sub-Substantial M- Modest	APPI	World Bank Water Policy Rating (/5)	Bank Quality at Entry NR-NR S-S	Bank Supervision	Bank Overall	Borrower PrePPARation	Borrower Implementation	Borrower Compliance	Borrower Overall	ICR Quality	DO at Exit
	Urban Water Supply and Wastewater																							
49	P003449	Shanghai Environment Liquid	C	1987	1996	10.2	22.7	441	PPAR	Sep-99	S	L	M	7.25		S	S	S	S	S	S	S	S	S
50	P003460	Liaoning Urban Infrastructure	C	1991	1997		60.5	128.6	PPAR	Sep-99	S	L	M	7.25		S	H S	H S	S	S	S	S	S	S
51	P003473	Zhejiang Multicities Development	C	1993	2002		47.6	231	PCR/ICR		S	HL	Sub			HS		HS				HS		
52	P003509	Changchun Water Supply and	C	1993	1999		47.7	251.4	ES	Apr-00	UnS	U	M	4.5		UnS	UnS	UnS	UnS	UnS	S	UnS	Exem	UnS
53	P003564	Beijing Environmental Project	C	1992	1999	15.1	26.8	298.7	ES	Aug-00	Mod	L	M	6.5		S	S	S	S	S	S	S	S	S
54	P003580	Southern Jiangsu Environmental	C	1993	2001	100.0		250			U	L	N									U		
55	P003586	Shanghai Environment Project	C	1994	2002	35.0		456.6							3-									
56	P003598	Liaoning Environmental Project	A	1995	2003	31.4		350.8							3-									
57	P003599	Yunnan Environment Project	A	1996	2003	40.6	8.1	307.6							3+									
58	P003602	Hubei Urban Environmental Project	A	1996	2002	33.8	6.8	370.2							3									
59	P003646	Chongqing Industrial Pollution	A	1996	2003	35.6		478.1																
60	P003648	Shanghai Sewerage Project (02)	A	1996	2002	37.4		667.9							3									
61	P036414	Guangxi Urban Environment Project	A	1998	2005	41.1	11.4	175							3.5+									
62	P040185	Shandong Environment Project	A	1998	2004	47.5		200																
63	P042109	Beijing Environment Project (02)	A	2000	2007	27.8		1255																
64	P043933	Sichuan Urban Environment Project	A	1999	2006	43.3	0.6	346.7																
65	P045910	Hebei Urban Environmental Project	A	2000	2007	51.2		293																
66	P047345	Huai River Pollution Control Project	A	2001	2005	46.5		226.9																
67	P049436	Chongqing Urban Environment	A	2000	2007	37.3		535.9																
68	P051859	Liao River Basin Project	A	2001	2008	49.1		203.6																
69	P064924	Second Beijing Environment Project	A	2000				1200																
70	P040599	CH-TIANJIN URBAN DEV & ENVMT	P	2003																				
71	P066955	CN-ZHEJIANG URBAN ENVIRONM	P	2003																				
72	P070191	Shanghai Urban Environment	P	N/A		24.1		1293																
73	P074409	Liao River Basin Project (02)	P	N/A		47.3		287.7																
74	P075035	Hai Basin Integrated Wat. Res. Man.	P	2003				0																
						31.8	5.5	10249																

Annex Table 3: Multipurpose/ Hydroelectric Dams; Inland Waterways; Water Resources/Flood Control; Rural Water Supply

	ProjectId	*Project Name	Project Status	Approval FY	Closing FY	IBRD %	IDA%	**Total Project Cost	Latest evaluation type	Latest evaluation date	Outcome (M/S=Moderately/Satisfac	Sustainability L-Likely H-highly U- Unlikely	Institutional dev impact Sub-Substantial M- Modest	APPI	World Bank Water Policy Rating (/5)	Bank Quality at Entry NR-NR S-S	Bank Supervision	Bank Overall	Borrower PrePPARation	Borrower Implementation	Borrower Compliance	Borrower Overall	ICR Quality	DO at Exit
	Multipurpose/Hydroelectric Dams																							
33	P003425	Lubuge Hydroelectric Project	C	1984	1992	17.9		811.7	PCR/ICR	Nov-93	S	L	Sub	8.25		NR	S	NR	S	S	S	NR	NR	H S
34	P003470	Yantan Hydroelectric Project	C	1986	1994	5.0		1033	EVM/ES	Dec-95	S	L	Sub	8.25		S	S	NR	S	S	H S	NR	NR	S
35	P003484	Shuikou Hydroelectric Project	C	1987	1993	12.9		1088	EVM/ES	Mar-97	H S	L	Sub	10		H S	H S	H S	H S	H S	S	H S	S	H S
36	P003492	Daguangba Multipurpose Project	C	1992	1999	44.7	55.1	67.1	ES	Apr-00	Mod	U	M	6		S	S	S	S	UnS	UnS	UnS	Exem	S
37	P003506	Ertan Hydroelectric Project	C	1992	1997	20.2		1886	EVM/ES	Oct-97	H S	L	Sub	10	3	S	H S	S	S	H S	S	H S	S	H S
38	P003507	Ertan Hydroelectric Project (02)	C	1996	2002	18.2		2200																
39	P003526	Shuikou Hydroelectric Project (02)	C	1993	1998	31.2		321	ES	Jun-99	H S	L	Sub	10		H S	H S	H S	H S	H S	S	H S	Exem	H S
40	P003562	Xiaolangdi Multipurpose Project	C	1994	2001	20.0		2295	ES	Aug-01	H S	L	Sub	10	4	H S	S	H S	H S	H S	S	H S	Exem	H S
41	P003616	Tianhuangping Hydroelectric Project	A	1993	2002	46.7		641.8																
42	P034081	Xiaolangdi II Multipurpose Project:	A	1997	2004	19.1		2248																
43	P056424	Tongbai Pumped Storage Project	A	2000	2008	35.4		904.1																
44	P068049	Hubei Hydroelectric Project	P	N/A		53.9		232																
45	P068058	Yixing Pumped Storage Project	P	N/A		23.5		680																
		Total 14 Projects						14407																
	Inland Waterways																							
46	P003493	Inland Waterways Project	C	1995	2001	37.7		556.8																
47	P003619	Inland Waterways Project (02)	A	1998	2005	42.5		289.3							3-									
48	P056199	Inland Waterways Project (03)	A	2001	2008	45.4		220.2																
		Total 3 Projects				40.6		1066																
	Water Resources/ Flood Control																							
75	P003597	Taihu Basin Flood Control Project	C	1993	2002	19.2	19.2	520																
76	P036405	Wanjiazhai Water Transfer Project	A	1997	2003	29.6		1351							3.5									
77	P063123	Yangtze Flood Emergency	A	1999	2002	30.2	30.2	132.5																
78	P064730	Yangtze Dike Strengthening Project	A	2000	2005	38.5		545.5																
		Total 4 Projects						2549																
	Rural Water Supply																							
79	P003438	Rural Water Supply Project	C	1985	1992		38.1	210.2	PPAR	Jun-94	S	L	Sub	8.25	3+	S	S	NR	H S	S	S	NR	NR	H S
80	P003587	Rural Water Supply and Sanitation	C	1992	1999		58.2	189.1	ES	Aug-99	S	L	Sub	8.25		S	S	S	S	S	S	S	S	S
81	P003637	National Rural Water Supply Project	A	1997	2003		50.0	140																
82	P057352	Rural Water Supply and Sanitation	A	1999	2005	17.4	32.6	92																
		Total 4 Projects				2.5	45.9	631.3																
	All 82 World Bank Supported Water Projects					24.0	9.7	37503																