

Project Name CHINA-Second Tianjin Urban Development...  
and Environment Project

Region East Asia and Pacific Region

Sector Sewerage (45%); Sub-national government  
administration (25%);  
General transportation sector (20%); Flood protection (10%)

Project ID P040599

Borrower(s) PEOPLE'S REPUBLIC OF CHINA

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#### 1. Country and Sector Background

1. Cities of China have undergone breathtaking growth and transformation over the last two decades, economically and physically. Radical decentralization of fiscal and administrative authority in the early 1980s unleashed sustained heavy investments going into infrastructure and housing, which had deteriorated badly during the preceding two decades but now can be considered at least adequate for most cities of China. As rapid urban economic growth is expected to continue well into the future, the pressure for further expansion of infrastructure would continue. On the other hand, the singular focus on expansion is yielding to broader and more qualitative issues of sustainability, efficiency, and equity.

2. The rapid industrial and urban growths are also increasing the concern for environmental sustainability. The government has taken a more forceful position for environmental protection since the late 1980s, compared with most other matters largely delegated to local governments. This policy attention and industrial renovation have slowed the environmental deterioration and, in many large cities, reversed it. Nevertheless, water pollution remains serious and growing, due mainly to increasing wastewater from domestic and semi-urban sources. The pollution is especially grave in three river (Huai, Hai, and Huang) basins and the Bohai Bay in Northern China, where water scarcity constrains economic growth yet most water courses are rated unfit for any productive use. The government has made the clean-up of the Three Rivers, Three Lakes (Tai, Dianchi, and Chao), and Bohai Bay as a high priority national program; embarked on a program to increase water conservation and reuse in the region; and mandated all municipalities in the country to treat 50% of

wastewater, and the larger ones to treat 70%, by 2010.

3. While much remains to be done, especially for environmental protection, the extensive urban reconstruction over the last two decades has reduced most glaring infrastructure deficiencies while increasing the resource requirements to operate and maintain the enlarged stock of infrastructure. At the same time, the on-going downsizing of the government and the state-owned enterprise sectors is constraining the fiscal and quasi-fiscal resources. These increase the importance of ensuring efficiency and sustainability in infrastructure investment and utilization. Examples of common inefficiencies found in China include idling of wastewater treatment plants due to overdesign or lack of operating funds, and low utilization of road capacity due to weak traffic management and public transportation. To increase the efficiency and sustainability of infrastructure, the government has been promoting the full-cost recovery and commercialization of infrastructure services. Regulatory and planning capacities need to be strengthened for healthy market-based infrastructure provision.

4. Expansion of infrastructure and services remains a dominant issue, however, for new or small urban areas of China. As a group, smaller cities, towns, and semi-urban areas have been experiencing much faster economic and demographic growth than larger cities but their infrastructure and services have not kept pace, partly as the current fiscal system of China allows little borrowing or redistribution of fiscal and technical resources. As a result, small urban areas face a serious and growing deficit in infrastructure, services, and the environment. This imbalance between growth needs and supporting services and between small and large urban areas represents an inefficient allocation of resources and a growing threat to the environment. It also presents a major equity issue as most of the jobs to absorb rural surplus labor have been created in the small urban areas.

#### Urban Development and Environment in Tianjin

5. Tianjin Municipality is a provincial-level jurisdiction located between Beijing to the west and Bohai Bay to the east. It consists of six urban districts that make up the Tianjin "city proper" as well as nine suburban districts and counties, with a total population of about 10 million. First developed as a gateway to Beijing, the city has grown into a premier industrial and transportation center of North China. It now anchors a diversified metropolitan area, with fast industrial developments in suburban Districts. The city itself remains compact, and most of its 5.5 million residents live within about 225 km<sup>2</sup>.

6. The municipality provides vivid exhibits of many key urban development and environmental issues facing cities of China today. Traversed by the Hai River, bounded by the Bohai Bay, and heavily industrial, it is a focal point of the national campaign to improve water quality and maximize the use of water resources. Physical compactness of the central city and its limited fiscal resources, still largely based on struggling old industries, heighten the need for efficiency in infrastructure investments and utilization. Continued rapid development of suburban areas holds the key to the municipality's economic future as well as equity and environment.

7. Tianjin has been a prominent national model of quality and innovations in urban development and environmental protection. Following its impressive recovery from the devastating 1976 earthquake, in the 1980s it became the first city in the nation to successfully build and operate a large scale (200,000 m<sup>3</sup>/day) wastewater treatment plant, intercept most of the industrial wastewater from the natural river, develop low-cost housing and housing exchanges, and complete a three-ring road system. It was also one of the first to develop competitive construction and development industries, and experiment with automated area traffic control systems and subways. The Bank assisted Tianjin's continuing innovations through the Tianjin Urban Development and Environment Project (TUDEP1, 1993-2000), which helped introduce a market-based resettlement system, high (at the time) sewerage tariffs, competitive public bus services, an industrial pollution control fund, a large-scale sanitary landfill, all of which became national models. More recently, Tianjin became the first among large Chinese cities to raise water tariff to over Y 3/m<sup>3</sup>, to commercialize wastewater treatment plants, to commercialize heating services and tariffs, and to pilot a large-scale urban use of reclaimed water.

## 2. Objectives

1. The project will support measures to enhance the efficiency and equity of urban wastewater management and transportation systems, and thus facilitate the sustainable development of Tianjin and serve as models for other cities in China.

2. Growth of cities and towns is key to the country's continued economic growth and restructuring as well as improved equity in the future. Large infrastructure investments in the past two decades have made the availability of basic infrastructure and resources less of a concern at least in large cities of China, than their efficiency and sustainability, and their distribution among different income groups and different areas. Examples illustrating these issues include: the pollution of waterways that not only damages the ecology but also deprives cities and farms of the necessary water resources; lack of environmental management in newer urban areas on the one hand but underutilization of the capacity in the cities on the other; institutional and financial frameworks for infrastructure lagging the growth of the assets and expenditures; and the low utilization of the limited urban road capacity due to low levels of bus services and traffic management. The proposed project will support measures to address these issues for wastewater management and transportation, for which largest shares public investment are planned for the next decade in Tianjin, typical of most cities of China.

3. Many of these programs -- wastewater utility commercialization, suburban wastewater management, sewage canal rehabilitation, water reuse, and bus priority measures -- represent significant innovations that are financed for the first time in China by the Bank and will serve as important experiments and demonstration for advances in urban management in China.

## 3. Rationale for Bank's Involvement

1. The proposed project would put the Bank's financial, technical, and institutional resources all to good use. Although TMG has large overall fiscal resources (about \$2.3 billion a year), it has a very broad mandate

and cannot easily finance lumpy capital investments in an efficient sequence. For example, Dagu canal has been periodically dredged and repaired in small sections, but these piecemeal efforts are not efficient as the sections become contaminated again with materials from other parts of the system. With such piecemeal works, it has also been difficult to afford the necessary analysis and safe remediation measures including the landfill. The Bank's mobilization of international experts and the financing bring the necessary resources together to achieve fundamental and efficient remediation. Similarly, due to interdependence of road sections, piecemeal improvements of sections are wasted until connected sections are fully improved.

2. The Bank's role as a knowledgeable third party is put in good use for the refinement of the commercialization framework that TMG established but wishes to improve, and for promotion of necessary but institutionally difficult interventions such as the establishment of the proposed transportation coordination mechanism and the small town sewerage systems. The latter is another good example of the strategic use of the Bank's financial and technical resources on areas where these resources are critically lacking due to the current institutional and economic framework.

#### 4. Description

The project consists of the following environmental, transportation, and institutional development components.

##### Environmental Components:

(a) City Drainage and Sewerage: Construction of storm water drains, sanitary sewers, and pumping stations in Nanbeicang and Fukanganlu areas, complementing the wastewater treatment plant (WWTP) being financed by JBIC and ADB; drains and sewers in the south suburb district of Tianjin. These facilities will complete the drainage system envisioned by Tianjin drainage master plan. The Nanbeicang and south suburb district are recently annexed areas with many small industries and lower-income residents.

(b) Shuanglin Wastewater Treatment Plant. Construction of a WWTP of a 200,000 m<sup>3</sup>/day capacity, in Shuanglin, serving the South Suburb Area.

(c) Urban Wastewater Reuse: Construction of water reclamation (tertiary treatment) plants attached to the Dongjiao and Shuanglin WWTPs; and reclaimed water distribution systems mainly for industrial and landscape uses.

(d) Dagu Canal Rehabilitation: Dredging of sediment and rehabilitation of cross-sections, bridges and culverts, and three pump stations of Dagu Canal (70 km) and its associated tributaries of Xinfeng (20 km) and Jizhuangzi canals. These are main wastewater canals for the southern part of Tianjin City, draining directly into the Bohai Sea since 1960. The project will remove, treat, and dispose of about 2 million cubic meters of sediment, up to half of which is estimated to be contaminated with heavy metals, in an environmentally sound manner. This will prevent recontamination of treated wastewater (three of the new Tianjin wastewater treatment plants will discharge into the Dagu canal), and also restore its

storm water conveyance capacity.

(e) Suburban Sewerage: Creation of municipal wastewater collection and treatment systems in about two suburban towns of Tianjin municipality on a programmatic basis, to initiate and set models for the wastewater management in the suburban areas, which are growing rapidly but without proper urban environmental management systems. A proposed GEF-financed project for an improvement of Bohai water quality will include a direct support for this and the Dagu rehabilitation as well as complementary measures of groundwater management and water conservation.

#### Transportation Components:

(f) Urban Roads: Construction of interchanges at two major intersections of the Middle Ring Road (MRR), and low cost traffic engineering improvements on selected locations along the Inner Ring Road (IRR) and the Eastern and Southwestern parts of the MRR.

(g) Traffic Management: Extension of the existing Area Traffic Control System to 300 new intersections -- 89 on or within IRR and the rest within the MRR, with channelization and often in connection with bus priority measures.

(h) Public Transportation: Preparation and implementation of bus priority measures on selected corridors, including bus ways and traffic engineering measures, to increase the efficiency of bus operations and to contribute to increasing the modal share of the bus system.

#### Institutional Development

(i) Technical Assistance and Training for:

- (1) Development of infrastructure information systems;
- (2) Reform and development of sewerage institutions and finance;
- (3) Establishment of a mechanism or organization to coordinate urban transportation planning and management;
- (4) Improvement in the traffic forecast model; and
- (5) Bus routes restructuring and design of bus priority measures.

#### 5. Financing

Total ( US\$m)

BORROWER \$185.50

IBRD \$150.00

IDA

Total Project Cost \$335.50

#### 6. Implementation

1. The overall project will be coordinated by the Urban and Rural Construction Commission (URCC), supported by its Project Management Office (PMO). They will report to and be guided by the Project Leading Group consisting of a TMG vice mayor and heads of related commissions and bureaus. URCC will also directly manage technical assistance components in cooperation with line agencies directly in charge, such as MEB, Urban Planning and Real Estate Bureau, and Traffic Management Department.

2. Preparation and implementation of other components are the responsibility of the following line agencies traditionally in charge of the respective subsectors:

Municipal Engineering Bureau: urban sewerage and drainage, wastewater reuse, Dagu canal rehabilitation, urban roads, bus priority measures;  
Traffic Management Department (TMD) of the Public Security Bureau: traffic signal control system;  
Suburban Districts and the TEDA Water: suburban sewerage.

3. MEB is responsible for preparation and implementation of the major part of physical investments under the project. However, it will work with other agencies in construction and management of the assets, as follows:

The Tianjin Drainage Company will manage the stormwater and sewage collection systems on completion.

Various options are being considered for the Shuanglin wastewater treatment plant, including TDC management, management contract, and privatization. An institutional analysis will be undertaken under the Sewerage Sector Study to help the TMG decide on the most appropriate arrangements (refer to the preceding Section.)

For Dagu Canal rehabilitation, MEB will work under the direction of a Steering Committee consisting of representatives from URCC, the municipal environmental protection bureau (EPB), the municipal water resources bureau (WRB), and the three suburban districts which the Dagu Canal runs through. WRB will be closely involved in the rehabilitation of the three Dagu pump stations and dredging works, and in the operations including the distribution of reclaimed wastewater. EPB will play a key role in the treatment and disposal of contaminated sediment.

The two wastewater reuse facilities will be managed by a subsidiary of CYE, or another institutional alternative to be considered during the project.

For bus priority measures, MEB will work under the technical guidance of the Public Transportation Management Department of URCC and the TMD.

## 7. Sustainability

The proposed project will contribute to the sustainability of Tianjin's overall development by helping to protect water resources in the metropolitan area and by helping to relieve the congested urban streets.

This will depend, however, upon the sustainability of the services and facilities, which in turn depends critically upon adequate financing, as discussed in Section E2. In short, the large and rapid build up of urban wastewater management, especially the treatment facilities financed in parallel to the project, will greatly increase the financing needs, far above the current levels of funding available to the sector, and therefore poses a large risk to the sustainability of the system. TMG took a major step to put the wastewater treatment operations on a commercial footing in an attempt to ease the constraint, but it is not clear whether it would achieve that objective. Therefore the project will include major institutional and financial improvement actions to ensure efficient and sustainable pricing, financing, and regulation of the wastewater services.

In the case of the urban transportation system, the sustainability will

depend mainly on continued development of measures similar to those included in this project under an integrated, updated plan. The project will help ensure such development with the initiation of bus priority measures, coordinated planning of the components, and a support for the development of an institution for comprehensive management and planning of urban transportation.

#### 8. Lessons learned from past operations in the country/sector

1. Experience from a full range of projects financed by the Bank points to the importance of borrower ownership, quality and efficiency of design of capital investments, and financial and institutional arrangements for proper operation and maintenance. The project incorporates these lessons as it makes efficiency and sustainability as a main project objective, and its components are based on TMG's long-standing official plans and project proposal.

2. The Bank's latest comprehensive review of experiences in water and sanitation sector operations is old (1992) and focuses on water supply. Therefore the project design relied mainly on lessons from the recent similar Bank operations in China and a few recent Bank studies, mainly on water quality and WWTP performance in China. They found a widespread tendency to over-design WWTPs beyond the sewage flow that can be delivered through the collection system or beyond the financial capacity for operation. This issue existed to a small extent with the existing WWTPs in Tianjin, but would have increased drastically with new plants being built with ADB and JBIC financing, without the additional collection system proposed under the current project. Another key finding was that water pollution is serious and growing faster in suburban areas surrounding large cities than in the central cities themselves. Thus addressing suburban wastewater issues is a necessary complement to sewerage investments in the city of Tianjin.

3. The latest (1997) comprehensive review of the Bank-financed urban transportation projects around the world identified five key inadequacies which the Bank should help to address: road infrastructure; traffic management; public transportation; institutions; and policy and regulatory framework. The design of this project addresses all these issues to varying degrees necessary in Tianjin and feasible under the project, with the focus on promoting public transportation. In the case of public bus system, the Review noted that giving buses exclusive rights to curbs and other road infrastructure is effective where the rules are enforced strongly and the demand is thin. Difficulties of bus priority measures in Chinese cities may be attributed to the weakness of these conditions. It would therefore be a challenge, and interdepartmental coordination would be essential, to design and implement bus priority measures that would be effective.

4. The Bank's review of institutional development assistance (1995) found high rates of unsuccessful or unclear outcomes, and attributed it mainly to the weak ownership by the implementing agencies, which in turn is often due to weak match between the institutional development needs and technical assistance (TA) design, and the lack or frequent change of champions. Experiences in China also indicates a similarly weak outcomes of TA programs in general. In addition to the lack of ownership, difficulties that international consultants face in understanding local

situations and communicating with counterparts appear to be a major additional risk factor, as well as the weak skills in managing consultant contracts. TA components proposed under the project are limited to issues for which there is a strong and well-defined TMG desire for resolution, and are structured to utilize local expertise to the maximum extent available, and with independent experts to help manage the TA components.

#### 9. Environment Aspects (including any public consultation)

Issues : 1. About 80% of the project investment is directed to improving and protecting water quality in Tianjin municipality and the Bohai Bay. The intended benefits, beneficiaries and responsible institutions are identified and discussed in Chapter C. Even the transportation components are shown to have positive environmental impacts as they are designed to reduce idling times and overall traffic demand. However, they may also increase air pollution in some localized areas. These effects were analyzed with the use of an airshed model, various modifications have been incorporated to minimize the adverse impacts. Construction noise and dust would be another, temporary environmental impacts. Measures to control these will be incorporated in construction contracts.

2. Rehabilitation of Dagu Canal poses significant environmental challenges in the characterization, removal, treatment, and disposal of the contaminated sediment. Substantial physical, chemical, and toxicological sampling of the sediment has been done under the direction of a top international limnologist, and a conservative estimate is that not more than half the sediment contains hazardous substances that require special treatment. But its heterogeneous nature leaves considerable uncertainty. A detailed Environmental Management Plan (EMP) will be followed during the implementation, to ensure intensive sampling and analysis section-by-section of the canal, and the use of proper dredging, treatment and disposal techniques. During dredging, sections of the canal will be closed off and the flow routed around the section. This will ensure that toxic compounds released from the sediment during dredging will not escape downstream. Water caps will also be used during dredging, as required, to reduce odor. Various methods will be adopted for sediment disposal depending on the degree of contamination including: disposal in two hazardous waste landfills, use as earth construction material, and disposal on agricultural land. Sites for the landfills have been secured, and they have sufficient space to dispose of all of the sediment, contaminated or not, in the event other disposal options are not possible.

3. Use of reclaimed water for municipal and industrial use is a new activity and precautions will need to be observed to ensure that there are minimal public health risks. To minimize the risks, microfiltration system will be used and the reclaimed water will be provided only to non-residential users. Reclaimed water distribution systems will also be marked different colors to avoid accidental cross-contamination, and water quality monitoring will be more intensive for reclaimed water than for the normal water supply system.

4. Key stakeholders for Dagu rehabilitation are people living along the canal, whose number is small because it runs through mainly rural areas; people living near the proposed landfill sites; and farmers who may choose to apply the non-contaminated, nutrient rich, sediment on their fields.

The public consultation on EA involved these people. Coordination of Dagu Canal work has been, and will continue to be, carried out by a Steering Committee consisting of representatives from TMG, MEB, EPB, WRB, and the three districts crossed by the Canal.

5. The second most important safeguard issue is resettlement. The project design has been adjusted to minimize resettlement, and the components in the city is currently estimated to require resettlement of 66 households (156 persons), 60 shops and offices with 270 workers. No job loss is expected. The project also would require acquisition of some 31 ha of farmland affecting 433 farmers, and 17 ha of other land. Full compensation has been committed to. Since the urban sewer component supports WWTP investments financed with JBIC and ADB loans, resettlement for the latter has been examined and found to be consistent with the RAP for this project. Dagunan interchange, suburban sewerage, and bus corridor component designs will be finalized during the project implementation. When they are finalized, individual RAPs will be prepared under the Resettlement Policy Framework (RPF) to be agreed upon.

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Note: This is information on an evolving project. Certain components may not be necessarily included in the final project.

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