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For Ministry of Health

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Asian Development Bank

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**Asian Development Bank in collaboration with The Department of Disease Control,
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Safe Drinking Water and Sanitation for the Rural Poor

最终报告
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茂迪工程顾问有限公司
Metcalf & Eddy Ltd.

联同
in association with

中国疾病预防控制中心
农村改水技术指导中心
**National Center for Rural Water
Supply Technical Guidance, China
CDC**



Safe Drinking Water and Sanitation for the Rural Poor Final Report

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词汇 (Glossary)

| 简名 | 全名 | | Full Name |
|-------|----------------|--------|---|
| | 澳大利亚国际发展署 | AusAid | Australian Agency of International Development |
| 亚行 | 亚洲开发银行 | ADB | Asian Development Bank |
| | 咨询技术援助 | ADTA | Advisory Technical Assistance |
| | 全国妇联 | | All-China Women's Association |
| | 基层社区组织 | CBO | Community Based Organization |
| | 英国国际发展部 | DFID | Department for International Development (British Government) |
| | 执行机构 | EA | Executing Agency |
| | 经济收益率 | ERR | Economic Rate of Return |
| | 财务内部收益率 | FRR | Financial Rate of Return |
| | 五年计划 | FYP | Five Year Plan |
| | 日本国际协力银行 | JBIC | Japanese Bank for International Cooperation |
| | 千年发展目标 | MDG | Millennium Development Goals |
| | 知识、态度、行为 | KAP | Knowledge, Attitude and Practice |
| | 财政部 | MOF | Ministry of Finance |
| | 卫生部 | MOH | Ministry of Health |
| | 水利部 | MWR | Ministry of Water Resources |
| 国家发改委 | 国家发展和改革委员会 | NDRC | National Development and Reform Commission |
| | 非政府组织 | NGO | Non-Government Organization |
| 全国爱卫会 | 全国爱国卫生运动委员会 | NPHCC | National Patriotic Health Campaign Committee |
| 全国爱卫办 | 全国爱国卫生运动委员会办公室 | NPHCCO | National Patriotic Health Campaign Committee Office |
| | 净现值 | NPV | Net Present Value |
| 省爱卫办 | 爱国卫生运动委员会省办公室 | PPHCCO | Provincial Patriotic Health Campaign Committee Office |
| 中国 | 中华人民共和国 | PRC | People's Republic of China |
| | 农村供水 | RWS | Rural Water Supply |
| | 农村供水及环境卫生 | RWSS | Rural Water Supply and Sanitation |
| | 指导委员会 | SC | Steering Committee |
| | 瑞典国际发展署 | SAID | Swedish Agency of International Development |
| | 联合国开发计划署 | UNDP | United Nations Development and Program |
| | 联合国儿童基金 | UNICEF | United Nations Children's Funds |
| 世行 | 世界银行 | WB | World Bank |
| 世卫 | 世界卫生组织 | WHO | World Health Organization |
| | 营运及维护 | O&M | Operation and Maintenance |





Safe Drinking Water and Sanitation for the Rural Poor Final Report

Executive Summary

A. Background and Objectives of this ADTA Strategic Study

1. The People's Republic of China (the PRC) is a large developing agricultural country. By the end of 2003, the total population living in rural areas is about 943 million people (including the population in rural townships), accounting for 72.5 % of the overall population of about 1.3 billion people. Access to safe drinking water supply and sanitation facilities in the rural poor regions has been a serious issue in the social and economic development of these areas. The rural residents are used to obtaining their drinking water supply directly from surface water sources, open wells, or distant sources due to the shortage of local water sources. Their latrines are primitive. These poor conditions of drinking water and sanitation have resulted in the high incidence rates of various water-related diseases and epidemic diseases, severely threatening the physical well-being of the rural population. It is a cause-and-effect phenomenon that unsafe drinking water and poor sanitation lead to diseases, diseases lead to poverty and poverty tolerates unsafe drinking water and poor sanitation. This is a vicious cycle which severely hampers the social and economic development of the rural poor regions in the PRC.

2. In the past 20 years, the PRC has achieved significant results in the Rural Water Supply and Sanitary (RWSS) Sector. However in the rural areas in the vast Western Region, there are still much-needed improvement works in the RWSS Sector. The Asian Development Bank (ADB) in its medium-term planning directions for the future next 5 years will promote the RWSS Sector as part of the pro-poor economic growth in the PRC. In these aspects, ADB in particular recognizes the importance in the participation of community-based organizations (CBOs) in contributing towards sustainable development in the RWSS Sector.

3. Past efforts to develop the RWSS Sector focused mainly on the construction of physical facilities. The Government is now giving more attention to strengthening sector policy, strategy and operational frameworks, institutional capability building, as well as integrated efforts in health education. Towards this initiative, the PRC Government and ADB agreed to conduct the Advisory Technical Assistance (TA), "Safe Drinking Water and Sanitation for the Rural Poor".

4. Being a key component of the ADTA, the objectives of this Final Report are to (1) review current status of RWSS, (2) assess the sector policies, regulations, institutions, organization and capacity building, identify constraints, analyze relevant government ministries' strategies and development programs in the RWSS Sector and (3) formulate policies and strategies for the RWSS Sector development including recommendations for possible investment framework and (4) suggest potential investment projects to ADB.

B. Current Profile, Issues and Constraints of RWSS Sector

5. The current status and profile of the RWSS Sector have been presented. Some major findings are summarized as follows:

- (i) The PRC is a developing country with the largest population in the world. Large population and relatively insufficient resources per capita are key constraints hampering economic and social development. In 2003, the average national annual





- disposal personal income for each urban inhabitant was RMB 8,472 (\$1,025.67) and the net income per rural inhabitants was RMB 2,622 (\$317.43).
- (ii) With a board territory crossing over both the temperate and tropical climatic regions, the climate of the PRC is extremely varied. The PRC has a wealth of river. The topography and climate, the distribution of rivers in the PRC is extremely uneven. Most rivers are found in the eastern regions with significant precipitation whereas the northwestern regions are inland arid areas with little rainfall. In the Northwest, rivers are scarce and there are vast areas without surface water bodies.
 - (iii) The average annual comprehensive consumption per capita is 428 m³. The peoples' average per capita daily consumption in urban areas is 219 lcd. The peoples' average per capita daily consumption in rural areas is 94 lcd.
 - (iv) By the end of 2003, the access to drinking water for 874 million people were improved to different extents, accounting for 92.7% of the total rural population (943 million people). Among them, the population with drinking water by piped water supply services was 58.18%. There is 37.9% of the rural population serviced with unsafe drinking water. The reasons are due to the exceedance of the following parameters: total E.Coli, total bacteria, fluoride, chromaticity, organic contaminants, nitrate nitrogen, iron, manganese, fluorine, and arsenic.
 - (v) There were 630,900 water treatment plants (stations) in the PRC. Amongst which, 10,000 are large plants with treatment capacity greater than 1,000 m³/day, accounting for less than 2% of the total. Large treatment plants are planned, designed and constructed by organized project office with better design and construction quality. Operation and maintenance, plant management and water tariff collection works are also better organized.
 - (vi) By the end of 2003, the prevalence rate of rural sanitary latrine has already reached 50.90%, representing a comparatively lower level in the world. Major sanitation latrine type are: (i) Triple Compartment Septic Tank; (ii) Double Barrel Urn Type; (iii) Methane Generation Digester Type; (iv) Separate Faeces and Urine Collector; and (v) Sewer Systems.
 - (vii) The issues in the RWSS Sector are: (i) Inadequate skilled personnel, with skill sets being too narrow; (ii) Late availability of financial resources; (iii) Failure of the water tariff policy to manage the demand of water supply thus affecting financial sustainability; and (iv) The reliability of continuous water supply and ability to meet water quality criteria are still not satisfactory for some RWSS systems.
 - (viii) The development of health promotion and health education is imbalanced amongst Western, Central and Eastern Regions and also varies from urban area to rural area. The rate of "Knowledge of Core Sanitary and Health Information" and the rate of "Formation of Hygiene Behavior" are low, especially in poverty and remote rural areas. In 2001, the national rural health education survey in 6 provinces showed that, for people with age over 15, the Knowledge of Core Sanitary and Health Information rate, is only 36%.
 - (ix) Professional health education organizations and networks in township and villages are not sufficient. Limited financial resources, inadequate quantity and quality of professional personnel are the constraints to the development of health promotion and education, and cause difficulties in integration of RWSS and health education. Following the recent economic and social development, people have more concerns on physical and mental health, social acceptance, safe drinking water and quality of living environment.
 - (x) Funding in RWSS Sector — according to statistics of NPHCC, the cumulated total





investment of the PRC from 1981 to 2002 in rural water supply reached RMB 70.57 billion (\$8.54 billion), and that in rural sanitation and latrine improvement from 1996 to 2002 reached RMB 20.21 billion (\$2.45 billion). For the period of 1996 to 2002, the total investment in RWSS Sector is RMB 62.17 billion (\$7.53 billion).

- (xi) There is a strong demand in the RWSS Sector. The rates of water tariff has not been properly set up, water plants can hardly recover the costs from water tariffs, resulting in low rates of return and even losses. The effectiveness and development of water supply are thus adversely impacted.
- (xii) The rural poor villages are located mostly in the Central and Western regions of the PRC. The economic development of these communities is lagging behind the national average. The level of individual income is low. It is difficult to raise funds. As such, majority of the funds are coming from Central government finances and from beneficiaries' contribution. Some counties sought loan assistance from the World Bank's RWSS projects and other International Donor Agencies' loans and grants.

C. Case Studies

6. The Case Studies constitute essential elements in the entire ADTA. Given the vastness and great disparities of the PRC, a generalized perspective for the RWSS Sector as discussed in Section IV will need to be supplemented by specific perspective for critical sectoral issues arising from local-specific conditions. Specific locations with their own characteristics in social, economical, demographic & ethnical, geographical, hydro-geological, technological, institutional, management aspects would be best analyzed by a Case Study approach. The Consultants' Team has conducted a total of six Case Studies:

- (i) Chuxiong City in Yunnan Province;
- (ii) Fenghuang Prefecture in Xiangxi Area in Hunan Province;
- (iii) Tianshui City in Gansu Province;
- (iv) Tumotezuqi in Inner Mongolia Autonomous Region;
- (v) Gaocheng City in Hebei Province; and
- (vi) Yuyao City in Zhejiang Province.

7. The Consultants' Team has identified of the following key issues and observations, which are evidenced after discrete analyses of the Case Studies, to be further assessed in the formulation of the RWSS sector strategy. These are:

- (i) There is an intrinsic difficulty in implementing a RWSS project in the poor rural area in Western China. The objectives of poverty alleviation and the affordability to repay loan are at loggerheads;
- (ii) The financing mix for international loan should contain the grant, low interest loans etc. to "soften" the loan;
- (iii) The concept of "property ownership" for RWSS facilities is non-existent or very slight;
- (iv) There is room for improvement in capability building for personnel and organization in RWSS projects;
- (v) The management of implementation of the RWSS projects could model the successful experience of World Bank's previous RWSS projects;
- (vi) The management of O&M of rural water supply facilities should be further strengthened.

D. Analysis of RWSS Sector Status and Constraints

8. On the basis of the review and analysis discussed in the current profile, issues and constraints as well as in the six Case Studies, the key difficulties and the constraints faced in





the RWSS Sector are summarized in the following:

- (i) There are great difficulties in the rural water supply development in the rural poor areas of the PRC. Key issues include low beneficiaries coverage rate for piped water supply, contamination of water resources, fluoride and arsenic issues, and inadequate water supply facilities. The task is arduous by measure of the volume of work i.e. over 300 million rural people remain deprived of access to safe drinking water.
- (ii) For small-scale rural water supply systems organized by local communities, the planning, design, operation & maintenance and management aspects are not satisfactory. The reliability of supply and compliance with water quality standards need improvement.
- (iii) The low prevalence rate of rural sanitary latrines is still a cause for epidemic disease and environmental contamination. About 122 million rural households remain in need of sanitary latrines.
- (iv) The development of health promotion and health education is imbalanced amongst Western, Central and Eastern Regions. The rate of “Knowledge of Core Sanitary and Health Information” and the rate of “Formation of Hygiene Behavior” are low. Professional health education organizations and networks in township and villages are not sufficient. Financial resources are limited.
- (v) The financial resources in the rural communities are inadequate, funding for RWSS projects is still a major constraint.
- (vi) Capacity building and management capability still need further improvement.
- (vii) Some RWS systems are suffering financial losses because of problems in the water tariff policy, water tariff collection, and operation efficiency.
- (viii) RWS projects cover a vast area with unbalanced development. Issues of inadequate emphasis on management, weak institutions, lack of operation and maintenance, and competence of management personnel affect the overall effectiveness of RWS projects.
- (ix) The rural poor population still represents a significant proportion, especially in the Western and Central Regions. Poverty reduction works are still arduous.
- (x) The recognition and implementation of community-based participation still need improvement. Women’s participation in management and decision-making in RWSS projects is still weak.

9. From the founding of the PRC to the end of 1980’s, the rural water supply facilities were co-ordinated through the National Patriotic Health Campaign Committee. Works mainly involved “Separation of drinking water for human and animals consumption”. From 1980’s to early 2000’s, with the participation of “Ten-Year International Drinking Water and Sanitation” campaign, the PRC Government promoted the development of centralized water supply systems comprehensively in the rural regions. Since 2000’s, the RWSS Sector in the PRC has reached a new era of safe drinking water and sustainable development.

10. The PRC is a vast country with great variability in the natural conditions as well as economic conditions with broad classification into the Western, Central and Eastern Regions. Even within a single region, there are also differences in the state of economic development. Most of the better developed economies are located in the coastal area enjoying geographical advantages, well developed transportation networks, good communication systems, highly educated societies, advance technologies, densely populated centers and high average personal income. On the contrary in the poverty areas, average personal income is low, economic production factors are poor, and the level of education is low.





11. Attributing to the disparity of regions, there is an inherent difficulty in formulating viable financing models for RWSS sector primarily due to the following factors:

- (i) relatively huge investments required in providing drinkable water to the rural poor as well as sanitation and hygiene education;
- (ii) requirement for government subsidies (both the Central and Provincial/Local levels) and reducing the burden on rural poor;
- (iii) problems of cost recovery and financial sustainability of RWSS systems in the poorer areas and
- (iv) low borrowing capacity of rural areas to finance RWSS .

12. The RWS in the past was implemented by (1) relevant Central and Provincial Government to organize the domestic and international projects and (2) Local Government and community organization. Since 1980's, the Central Government has been organizing and conducting large scale RWS projects, including NPHCCO co-ordinating RWSS projects; MoH acting as the Executing Agency for World Bank's RWSS projects; MWR for projects "Separation of Drinking Water for Human and Animals"; and MWR/MoH for "Rural Safe Drinking Water Supply 2005-2006 Implementation Plan" and MRW for projects in respective FYs.

13. Currently, majority of the RWS systems, which are constructed under projects funded by domestic and international assistance agencies, are managed by township governments or village committees. Some of them are operated by RWS project office or Water Usage Committees. The formats of management include direct responsibility of water resources department/bureau, direct appointment of individual personnel, by management set-up via shareholding, competitive management contract (out-sourcing), etc. In general, except for some large scale systems, the management and operation of most RWS systems are described as "crude". It is evident from some project experience of International Donor Agency funded projects that the enhancement on rural people's recognition and awareness of sanitation, hygienic habits and health education could be accomplished via project implementation and community based participation.

14. RWSS projects help the rural population in improving their living standards and also alleviate poverty in rural areas. The implementation of "3-in-1" concept in integrated RWSS projects bears great significance in producing tremendous social, economical and health benefits and continuous unfaltering efforts should be devoted in the further development of the RWSS Sector.

E. RWSS Sector Development Policies and Strategies in next Five Years (2006-2010)

15. The PRC Government has established very clear objectives in the development of RWSS Sector (ES Table 1):





ES Table 1 Targets and Accomplishment of Various Planning Periods in RWSS Sector

| Indicators | 9 th FY Plan | 1996-2000 | 10 th FY Plan | 2001-2005 | 11 th FY Plan | Long Term Plan | 2020 |
|---|-------------------------|------------|--------------------------|-------------|---|----------------|---------------|
| | 2000 Target | Completion | 2005 Target | End of 2003 | 2006-2010 | 2011-2015 | 2020 Target |
| Beneficiaries of RWS | 90% | 92.38% | 95% | 92.7% | N.A. | N.A. | N.A. |
| Beneficiaries coverage rate of piped RWS | 50% | 55.22% | 60% | 58.18% | 70% | Achieving 75% | About 80% |
| Prevalence of sanitary latrines | 40% | 44.84% | 55% | 50.9% | 65% | Achieving 70% | Exceeding 70% |
| Knowledge of Core Sanitary and Health Information | | | | | Eastern 80% Central 70% Western 60% | | |
| Formation of Hygiene Behaviour | | | | | Eastern 70% Central 60% Western 50% | | |

Note: The 2015 target is computed by reducing the non-beneficiaries portions in 2000 targets by half.
N.A. means not applicable.

16. RWSS Sector Development Policies and Strategies in next Five Years (2006-2010) are summarized in the following:

- (i) The PRC Government has established very clear objectives in the development of the rural water supply, sanitation, hygiene promotion and health education sector (RWSS) to ensure the quantity, quality, high reliability and convenience of access to safe drinking water.
- (ii) It is recommended that new emphasis on the issue of water supply-water conservation-wastewater collection/disposal, “3-Component” concept should be put on RWSS projects in addition to the well understood “3-in-1” concept. The successful implementation of the “3-Component” would help alleviate the stressed water resources and reduce the widespread contamination.
- (iii) Strengthen the construction of demonstration “harmless” sanitary latrines for village households, public toilets and schools.
- (iv) In the implementation of integrated RWSS projects, strengthen the hygiene promotion and health education components.
- (v) This strengthened “3-in-1” concept with components of rural water supply, rural sanitation and hygiene promotion/health education emphasizes the integrated approach for the comprehensive developments.
- (vi) For poverty alleviation programs and projects with “Public Goods” nature, the Central Government should play a leadership role and provide main source of funding.
- (vii) It is important that the model of financial mixes to fund RWSS projects should be compatible with the specific economic status of the location in question.
 - Western Poor Areas – represented by the vast Western Region yet includes rural poor areas in the Central and Eastern Regions. Central Government finances and Provincial Government finances should be the mainstay, supplemented by loans from domestic development banks, commercial sources,





- collective community contribution and beneficiaries' contribution.
 - Rural Areas in Central Region – represented by Central Region where the Central Government put forth a strategy for accelerated economic development. With better economic strength in affording loan conditions than the Western Region, Central Region has pressing needs for infrastructure development especially for those rural locations at the outer fringe of towns and cities. One form of RWS systems is to merge existing neighbouring and scattered small scale RWS systems into a larger RWS network system.
 - Rural Areas in Eastern Region – the Eastern Region has sustained major economic growth and has accumulated significant social assets. Agriculture developments, industrial developments as well as town enterprises are fairly well established. For larger scaled RWS systems, there are feasible channels to deploy private sector capital or loan from International Donor Agencies.
- (viii) The principle of full cost recovery for the loan assistance is not consistent with the poverty alleviation nature of the RWSS projects.
- (ix) The financial assistance from International Donor Agencies should be directed towards RWSS projects of a reasonable scale. It is suggested that differential loan interest rates treatment, differential counterpart funding requirements as well as differential securing and distribution of grants should be adopted in financing RWSS projects with due respect for the disparity of the Western, Central and Eastern Regions of the PRC. As ADB would not provide grants or different lending terms and conditions for the different Regions, (ADB has only OCR (LIBOR) 25 years including 5 years grace period.), the proposed terms and conditions of loans could be considered to be implemented through the PRC Government channels.

ES Table 2 Suggested Differential Interest Rate Treatment in Financing RWSS Projects Respective Regional Disparity of PRC

| Region | Loan Interest Rate | Repayment Period (year) | Distribution of Grant to respective Regions |
|---------|---------------------------|-------------------------|---|
| Western | At least 2% below LIBOR | 30 | 60% |
| Central | At least 1% below LIBOR | 25 | 30% |
| Eastern | At least 0.5% below LIBOR | 15 | 10% |

Note: Loan Interest Rate is set for respective repayment period based on London Inter-Bank Offer Rate (LIBOR).

ES Table 3 Suggested Differential Counterpart Funding Requirements in Financing RWSS Projects Respective Regional Disparity of PRC

| Region | Grant & Loan Ratio (%) | | Counterpart Central Government | Funding Provincial / Local Government | Ratio (%) Fund Raised by Beneficiaries |
|---------|----------------------------------|---------------------------------|--------------------------------|---------------------------------------|--|
| | International Donor Agency Grant | International Donor Agency Loan | | | |
| Western | 10 | 45 | 28 | 14 | 3 |
| Central | 10 | 45 | 20 | 20 | 5 |
| Eastern | 10 | 45 | 13 | 23 | 9 |

Note: Total Counterpart Funding is 45%, the split follows the ratio adopted in “Rural Safe Drinking Water Supply 2005-2006 Implementation Plan”.





- (x) It is recommended that potential areas (one Eastern Region (e.g. Zhejiang) and a few Western Regions (e.g. Yunnan, Hunan, Gansu, Inner Mongolia and/or the Western Regions) could be further investigated and identified in order to bundle them together with single lending term for a PPTA. In the Final Report Workshop in December 2005, representatives of six provinces, namely, Guizhou, Inner Mongolia, Gansu, Hainan, Hebei and Zhejiang expressed interests in applying for ADB loans for their RWSS projects.
- (xi) It is recommended to continue with the strategies in program organization, planning, implementation, operation and management strategies:

Program Organization Strategies include:

For RWSS projects funded by the Central Government finances as well as those funded by International Donor Agencies, the fundamental principles of project management are: under the leadership of various levels of governments, strengthen co-operation among ministries and department and implement management practices at national, provincial and county levels. With due respect of the scope and magnitude of the RWSS projects, develop comprehensive management policies, regulations, methods and manuals. The roles and responsibilities of Government Agencies participating in the RWSS projects have been clearly defined. For example, the National Development and Reform Commission is responsible for the examination and approval of development plans for incorporation into the social and economic development framework. The Ministry of Finance is responsible for the management and administration of national finances and the external liaison work with international funding agencies and the National Patriotic Health Campaign Committee (NPHCC) is officially responsible for coordination of government departments in the integrated management of the RWSS sector. Project implementation management as well as post-project operation management are equally essential. Sound scientific management practices and regulations shall be followed. Initiatives should be explored in introducing market elements, encouraging private sector involvement in finances, planning, construction, and operation & maintenance of RWSS projects.

Program Planning and Preparatory Phase Strategies include:

- RWS projects should be scientific in exploitation and protection of water resources, and feasible, operable and sustainable with full regards of the local conditions.
- Resolve the rural water supply problems attaching priority to high fluoride, high arsenic, high saline, leech and contaminated problems.
- Clearly define the ownership of RWS systems from the very beginning and when deciding on the post-project management model.
- Formulate policies to attract capital from rural community collective organization and from rural inhabitants, manual services in kind, shareholding formats etc.
- Reasonable scale of RWS facilities.

Program Implementation - Project Design, Procurement and Construction Management Strategies include:

- Ensure full compliance with relevant laws, regulations, standards and codes of practice.
- Select appropriate design for water conveying systems as well as water





- treatment technologies with full recognition of the local geographical, hydrological and engineering conditions.
- Procurement of equipment and materials should follow International Competitive Bidding (ICB), National Competitive Bidding (NCB) and by Quotations (Shopping). There are difficulties in implementing ICB due to long procurement cycles, exchange rate risks, change procedures etc. Considering that (1) the PRC has acceded to the World Trade Organization, (2) numerous countries are sourcing material from the PRC and (3) the equipment and material used in RWSS projects are not rare uncommon material, it is recommended that more NCB procurement should be adopted.
 - The vetting and approval of RWSS projects should be vetted and approval by national, provincial and county government authorities in according with the estimate project estimates.
 - Construction management will be mandatory for all civil engineering construction works.
 - Test and Acceptance upon completion and commissioning should be jointly undertaken by relevant bureaux and departments.
 - The accounting, reporting and audit systems shall be established and observed strictly. Special designated funds shall be handled by special designated accounts.

Program Operation – Project Facilities Operation Management Strategies include:

- Clearly define the ownership of RWS systems: large scale RWS projects: Water Resources department to organize, own and manage; or set up legal entity to own and manage; Distributed and small scale RWS projects: Village Collective organizations to organize, own and manage; Tiny scale RWS facilities such as cellar, hand pumps: household villager own and operate. Introduce market mechanisms in operation management, ensure compliance with MWR's "Village Water Supply Station Staff Organization Standards", "Qualifications Requirements for Village Water Supply Stations".
- Develop comprehensive management policies, regulations, methods and manuals, ensure scientific and regulated management practices.
- Introduce market elements, encouraging private sector involvement in finances, planning, construction, and operation of RWSS projects. Explore new operating management models such as service contract, leasing, management contract, build-operate-transfer, build-own-operate-transfer etc.
- Strengthen the qualification and training of RWS operational and management personnel.
- Set up accounting, reporting and audit systems, determine water tariff rates reasonably with due consideration of the economic factors, affordability and willingness to pay, tie tariff to consumption and separate rate structures for different uses.
- Rectify problems of unaccounted for water, reduce leakage and ensure water tariff collection.
- Protect source of water supply.
- Strengthen the monitoring of water quality of raw water at water sources and of treated water at water treatment plants and at consumption points.

(xii) Strategies for poverty, social and gender aspects include: The "3-in-1" concept in





integrated RWSS development brings great social, economic and health benefits to the poverty stricken areas. With particular emphases on alleviating the poor's burden, improving the position of the female gender and taking care of the exceptionally under-privileged people, the undertaking of RWSS projects will help to construct a harmonious society.

- (xiii) Strengthen the capacity building of the RWSS Sector, including institutional set up, roles and responsibilities definitions, organization staffing, and human resources development.
- (xiv) Clear procedures and measures should be put in place to encourage the participation of villagers and village communities in the implementation of the RWSS projects. Matters such as project planning, project design, project finances, project construction and the post project operation management.

F. RWSS Medium-Term (2006-2010) Sector Development Plan

17. The Medium-Term (2006-2010) Sector Development Plan for the ADTA consists of:

- (i) Project Preparation Technical Assistance projects to investigate the feasibility of the loan assistance project for the PRC's RWSS Sector, including R&D Subprograms.
- (ii) ADB's Sector Investment Projects for the PRC's RWSS Sector - there are substantial needs and desires in the RWSS Sector in the Western Region. For rural water supply, based on the returned information, the needs for RWS facilities are mainly centralized water supply systems targeting a beneficiary population of 32.5 million and a budgeted capital investment of \$1.1 billion (RMB 9.15 billion).
- (iii) Technical Assistance in Capacity Building for the PRC's RWSS Sector - in order to ensure sustainable development of the RWSS sector and favorable condition for execution of ADB's investment projects, there is a genuine need for good capacity building both in terms of institutions as well as human resources capital.

It is recommended that the Medium Term (2006-2010) Sector Development Plan is to be presented to National Development and Reform Commission (NDRC) for its consideration for incorporation in the 11th Five-Year Plan (11th FYP).

G. RWSS Sector Development Policies and Strategies in next Ten Years (2006-2015)

18. The central theme of the strategy in the RWSS Sector from now to 2010 is to continue with the current strategy and further enhance the "3-in-1" concept in the integrated development in RWSS. The further development in the RWSS Sector should also recognize and work in co-ordination with the social, economic, cultural and other facets of development of the rural communities and in the context of the whole country.

H. Roles of Asian Development Bank in The RWSS Sector in the PRC

19. ADB's poverty reduction strategy describes poverty as a deprivation of essential assets and opportunities. These include basic needs such as shelter, education, water and sanitation, and health care. Water scarcity impacts on health, availability of food, and the conditions in which people live. The poor are particularly vulnerable when water is either unclean or in short supply. The lack of water accentuates the hardships of the poor. ADB, being an International Development Bank, shares a lot of common interests in co-operating with the PRC. In the RWSS Sector in the PRC, ADB could play an important role in promoting further development of the sector.

20. The compatibility of the financial assistance of ADB with the status of economic development of the regions is essential. The financial assistance from ADB should be





directed towards RWSS projects of a reasonable scale. It is suggested that differential loan interest rates treatment, differential counterpart funding requirements as well as differential securing and distribution of grants could be considered to be implemented through the PRC Government channels in financing RWSS projects with due respect for the disparity of the Western, Central and Eastern Regions of the PRC. For the developed regions, the interest rate could be slightly higher, subject to the ceiling of domestic commercial rates, with a shorter repayment period. For Central Region and Western Region, lower interest rates with longer repayment periods should be considered.

21. There are significant needs in the development of the RWSS Sector in the PRC. ADB is keen to devote financial assistance to the PRC in the development of RWSS as it conforms with ADB's "Poverty Reduction Policy" and "Water for People Policy". There are mutual benefits for both the PRC and ADB.

22. As an overall conclusion, there are great, practical and feasible opportunities for the PRC Government and the ADB to cooperate and contribute to a steady, healthy and promising development in this RWSS Sector.





Safe Drinking Water and Sanitation for the Rural Poor Final Report

I Introduction

A Background of Strategy Study

1. The People's Republic of China (the PRC) is a large developing agricultural country. By the end of 2003, the total population living in rural areas is about 943 million people (including the population in rural townships), accounting for 72.5 % of the overall population of about 1.3 billion people.
2. Although the People's Republic of China (PRC) has substantially reduced overall poverty during the last two decades, inequalities between regions and within communities have increased. The Asian Development Bank (ADB) Country Strategy and Program (2003-2005) focuses on four interrelated challenges: (i) growing inequality, (ii) building an enabling environment for the private sector, (iii) environmental sustainability, and (iv) regional cooperation. To support the Government's development strategy and reflect ADB's medium-term planning directions, the PRC operational strategy in the next five years has been designed to promote pro-poor economic growth by enabling the poor to have greater access to opportunities and benefits of economic prosperity. A key constraint on reducing poverty and promoting economic prosperity in rural areas is the lack, or absence of, sustainable community-based safe water supply and sanitation systems.
3. The lack of adequate rural water supply and sanitation (RWSS) services impairs rural community health, especially among the poor. Improved access to safe drinking water and sanitation is a key objective of the PRC's 10th Five-Year Plan (FYP, 2001-2005), and will be reflected in the 11th FYP (2006-2010). Improved access to safe water and sanitation is also critical to achieve the goals of the PRC's Outline for Poverty Alleviation and Development of China's Rural Areas (2001-2010). The Government follows the Millennium Development Goals (MDGs) to ensure environmental sustainability and aims to halve, by 2015, the proportion of rural people without sustainable access to safe drinking water and sanitation.
4. The relationship between access to safe water and sanitation, and poverty should be better understood by integrating improved analyses of community priorities and needs into policymaking and implementation, and by delivering increased access to water and sanitation to the poorest people. Access to water has significantly improved recently. However, this is not the same as access to safe water. By the end of 2003, the access to drinking water for 874 million people were improved to different extents, accounting for 92.7% of the total rural population (943 million people). Among them, the population with drinking water by piped water supply services was 58.18%. There is 37.9% of the rural population serviced with unsafe drinking water. Unsafe water sources may have high pathogen loads due to (i) fecal or other contamination; (ii) water with high levels of naturally occurring fluoride, arsenic, or salts; and (iii) growing industrial and agricultural chemical pollution. Some areas suffer seasonal water shortages.
5. Access to safe drinking water supply and sanitation facilities in the rural poor regions has been a serious issue in the social and economic development of these areas. The rural residents are used to obtaining their drinking water supply directly from surface water sources,





open wells, or distant sources due to the shortage of local water sources. Their latrines are primitive. These poor conditions of drinking water and sanitation have resulted in high human intake of contaminants and prevalence of water-related diseases, including high rates of diarrheal diseases and viral hepatitis, and lower, although problematic, incidence rates of cholera, dysentery, and typhoid, severely threatening the physical well-being of the rural population. These problems are manifested in It is a cause-and-effect phenomenon that unsafe drinking water and poor sanitation lead to diseases, diseases lead to poverty and poverty tolerates unsafe drinking water and poor sanitation. This is a vicious cycle which severely hampers the social and economic development of the rural poor regions in the PRC.

6. International experience has shown that for overall improvement in community health, provision of safe water must be integrated with latrine improvement, health education, and hygiene promotion. By the end of 2003, the prevalence rate of rural sanitary latrine has already reached 50.90%, representing a comparatively lower level in the world..Despite health education, behavior change has been slower to follow. Health messages must be made more effective and demonstrate clearly the relationship between hygienic behavior and improved health. A key area for enhancing future integrated RWSS projects should be hygiene promotion to realize behavioral change. Village schools provide a key focal point for such activities. Integration of the provision of safe water and sanitation requires cooperation between government ministries and agencies at various levels.

7. The Government recognizes the need to further strengthen national policy, strategy, and operational frameworks to develop the RWSS sector. National coordination of the sector is fragmented, involving a number of ministries with overlapping responsibilities. Local institutional capabilities are limited, especially in management and operations. Financial resources are limited, caused partly by poor cost recovery and inadequate operation and maintenance (O&M).

8. Providing safe RWSS services will help improve rural living standards and reduce incidence rates of water-related diseases and associated medical expenditures, thus reducing poverty. Increased access to convenient and safe drinking water for the rural poor will also translate into increased time for productive activities and long-term human development. Water collection has a particularly high opportunity cost for women and school-age children. For example, especially in mountainous areas, time devoted to water carrying limits opportunities for women (often responsible for household water use and sanitation) to earn income, and depresses children's (particularly girls') enrolment and active participation in schooling. Lack of access to safe water, and inadequate sanitation (e.g., use of common latrines) also disproportionately burden women and children with disease, while rising costs of health services are particularly problematic in poor localities.

9. Past efforts to develop the RWSS sector focused mainly on the construction of physical facilities. The Government is now giving more attention to strengthening sector policy, strategy and operational frameworks, and institutional capabilities, including in the poorest communities (often located in remote mountainous areas). Policies must reflect the PRC's regional diversity. Very active sector support from a number of international organizations, notably the United Nations Children's Fund and World Bank, in cooperation with the ministries of health and water resources, and Department of International Development of the United Kingdom have supported the sector. This has created a base of knowledge on which future projects can build and add value. The work of community-based organizations and the





All-China Women's Federation complement and strengthen this foundation. ADB has been active in water resource strategy planning and developing urban water supply and wastewater utilities in the PRC, from which lessons can be drawn and applied to the RWSS sector.

10. The ADTA will analyze key lessons from the experience and determine how these can be embedded in future RWSS policies and strategy. Lessons include the following:

- (i) Water supply and sanitation should be integrated.
- (ii) Drinking-water user groups should participate more, from scheme design to construction to operations, and ensure that decision-making on water and related issues involves a balanced mix of men and women in the villages.
- (iii) National procedures, such as manuals, design, and construction standards, should be harmonized.
- (iv) Operation and quality maintenance models tailored to local situations are needed for existing and new schemes.
- (v) National, provincial, and local capacity building should be ongoing.
- (vi) Short-term processes and long-term outcomes, and related targeted dissemination should be monitored and evaluated.
- (vii) Financing of sustainable RWSS in poor townships and remote villages need innovative, viable models that use participatory approaches to take into account cost recovery, water pricing, and willingness and ability to pay.

11. Towards this initiative, the PRC Government and ADB agree to conduct the Advisory Technical Assistance (ADTA), "Safe Drinking Water and Sanitation for the Rural Poor". The ADTA is timely as it will help formulate the 11th FYP by developing the medium-term (2006-2010) RWSS sector investment plan and an outline RWSS strategy to achieve related MDGs in the long-term (2006-2015). The full description of the ADTA requirements is enclosed in the Terms of Reference in [Appendix 1](#).

B Objectives, Scope and Output

12. The purpose of the Advisory Technical Assistance (ADTA) was to assist the PRC Government to prepare pro-poor RWSS policies, and a strategic investment framework for integrated RWSS Sector development, focused on defining viable models for financing sustainable pro-poor RWSS systems, and related institutional capacity building.

13. The scope of the ADTA focused on preparing a medium-term RWSS sector plan and investment strategy for 2006-2010, for inclusion in the 11th FYP, and, in the context of realizing the related MDGs, a longer-term outline strategy up to 2015. Strategy formulation will include (i) detailed desk and field reviews; (ii) national and provincial workshops to ensure stakeholder involvement, recognition, and understanding of perspectives; (iii) synthesis of lessons from local and international projects; and (iv) about three case studies to test selected critical issues, including an in-depth analysis of organizational models for water user groups (WUGs), pro-poor RWSS tariff setting, and community-based O&M models for existing RWSS schemes. The ADTA was nationwide but give particular attention to rural poor areas in the Western Region and central areas; decentralization initiatives; researching and promoting private sector participation; integrating water supply and sanitation; and enhancing participatory processes, including community consultations, women's involvement, and incorporation of children's needs, in the design and implementation of RWSS projects and





programs.

14. The Study area is shown in **Fig. 1**.

15. The principal outputs were (i) a RWSS sector profile, in accordance with ADB's format and standards; and (ii) a RWSS medium-term (2006-2010) sector development plan, for incorporation in the 11th FYP. The plan will contain recommended investment projects, a capacity-building program, a research and development program (if appropriate), and a RWSS sector road map; and (iii) in the context of realizing the MDGs, a RWSS long-term (2006-2015) outline strategy. The plan and the strategy will include recommendations for RWSS monitoring and evaluation systems and outline frameworks to disseminate information these generate. The outputs would provide the Government with a framework to guide and improve policymaking, coordination, investment, and implementation of RWSS.

C Structure of the Final Report

16. The purpose of this Final Report is to document the key progress of the ADTA and to present the findings of the Strategic Study.

17. This Final Report is structured into the following sections:

- (i) Section 1 - Introduction: describes the background, scope, and deliverables of this assignment. It also presents the scope and structure of this Final Report.
- (ii) Section 2 - ADTA Activities and Achievements: presents the logistics of the TA, list of reports submitted and main achievements that have been made.
- (iii) Section 3 - Current Status of Development in the PRC: summarizes the current status of development in various aspects.
- (iv) Section 4 - Current Profile and Constraints of RWSS Sector: outlines the existing status, profile and relevant constraints of the rural water supply and sanitation sector.
- (v) Section 5 - Case Studies: describes and discusses major tasks accomplished for the six Case Studies, including the background and objectives, current status with respect to the developments in the RWSS Sector, relevant analyses towards formulation of appropriate strategies, and the preliminary recommendations.
- (vi) Section 6 – Analysis of RWSS Sector Status and Constraints: presents the analysis of the existing status and relevant constraints of the rural water supply and sanitation sector.
- (vii) Section 7 - RWSS Sector Development Policies and Strategies in next Five Years (2006-2010): discusses and formulates the policies and strategies for the development in the RWSS Sector.
- (viii) Section 8 - Proposed RWSS Medium Term (2006-2010) Sector Development Plan for ADB: formulates the proposed medium term plan for ADB in line with the Sector Strategy.
- (ix) Section 9 - RWSS Sector Development Policies and Strategies in next Ten Years (2006-2015): outlines the longer term strategies as a continuation to the discussions in Section 8.
- (x) Section 10 - Roles of Asian Development Bank: discusses the role of ADB towards the development of the RWSS Sector.
- (xi) Section 11 – Conclusions.





D Acknowledgement

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II ADTA Activities and Achievements

A ADTA Strategic Study Start-up

19. The ADB appointed Metcalf & Eddy Ltd. (M&EL) in association with National Center for Rural Water Supply Technical Guidance, PRC (NCRWSTG) to undertake this ADTA No. 4215-PRC. Notice to proceed was issued to the Consultants on Jun 22, 2004 and the Consultants Team planned to mobilize on Jul 12, 2004. However due to various reasons, the actual commencement date was Aug 19, 2004. Upon mobilization of the Consultants Team, the Consultants Team Leader, David Lui, arrived at Beijing on Aug 19, 2004. Thereafter, the Consultants Team commenced very intense working activities for this ADTA.

B ADTA Consultants' Team

20. The Consultant has organized 2 international experts and 6 domestic experts to participate in this TA, In addition, supporting personnel are also provided. The full list of the members of the Consultants' Team is shown in Table 1.

Table 1 ADTA Consultants' Team

| Name | Initial | Status | Role |
|------------------|---------|---------------|---|
| David Lui | DML | International | Team Leader and Water Supply Expert |
| Techie Villareal | TV | International | Public Finance Specialist |
| Meng Shuchen | MSC | Domestic | Water Supply Development Specialist |
| Zhang Rong | ZR | Domestic | Sanitation Development Specialist |
| Fu Yanfen | FYF | Domestic | Health Education and Hygiene Promotion Specialist |
| Chen Xin | CX | Domestic | Community Participation Specialist |
| Zhang Lansheng | ZLS | Domestic | Economic and Financial Analysis Specialist |
| Xu Huan | XH | Domestic | Management Development Expert |
| Alex Kwan | KKF | International | Project Director of Metcalf & Eddy Ltd. |
| Tao Yong | TY | Domestic | Project Director of NCRWSTG |
| Wang Zhanshe | WZS | Domestic | Translator and Workshop Organizer |
| Fan Fucheng | FFC | Domestic | Technical Support |
| Stanley Chan | SCWC | International | Rural Water Supply and Sanitation Engineer |





C Logistic Arrangements

a. Office Facilities

21. Two rooms with 4 nos. writing desks were provided to the International Consultants as Project Office in Changping of Beijing throughout the entire period of the ADTA Study.

b. Computers and Associated Equipment

22. The office equipment (as shown in Table 2) was procured and installed under this ADTA Study.

Table 2 Office Equipment

| Item No. | Equipment | Item Description/Model/Specification |
|----------|---------------------|--------------------------------------|
| 1 | Notebook Computer | IBM ThinkPad T42 2373KC4 |
| 2 | Desktop Computer | Legend T6100 (P4 530 512120pB(W)) |
| 3 | Color Laser Printer | HP Color Laserjet 5550dn |
| 4 | Flash Disk | Aigo Flash Drive (256MB) (5 Sets) |
| 5 | Copier | Canon iR2010 |
| 6 | w/b Laser printer | HP Laserjet 2420n |
| 7 | Scanner | HP Scanjet 4670 |
| 8 | Fax Machine | Canon FAX-L388 |

c. Communication Facilities

23. Services of Telephone and Internet Access through broadband connection were also provided in the Project Office.

D ADTA – Progress and Major Achievements to Date

24. The following is a summary of the tasks accomplished from commencement to date:

- Mobilization
- Establishment of the ADTA office including all logistics
- Submitted monthly progress reports
- Attended Roundtable meetings with IDA
- Completed Part 1: Sector Review and Analysis during Inception Phase and submitted Inception Report
- Data collection
- Completed Part 2: Analysis of RWSS Sector Constraints and submitted RWSS Sector Profile
- Secured ADB's approval for Contract Variation No. 1 – one additional case study, one additional workshop, office equipment and translation
- Purchase of office equipment funded under the ADTA
- Attended meetings with ministries and IDA
- Completed two Tripartite Meetings
- Completed 4 Case Studies together with field visits
- Conducted Case Studies Workshop
- Secured ADB's approval for Contract Variation No. 2 – two additional case studies and additional Executive Summary for the ADTA
- Completed 2 Additional Case Studies together with field visits





- Completed Part 3: Sector Policies and Strategy, Investment Plan, Priority Programs and External Assistance and submitted RWSS Sector Strategy Report and Medium Term (2006 – 2010) Sector Development Plan
- Conducted Workshop for RWSS Sector Strategy Report and Medium Term (2006 – 2010) Sector Development Plan
- Submitted Draft Final Report
- Conducted Final Report Workshop
- Completed the 3rd Tripartite Meeting
- Incorporate comments received from Workshop and Tripartite Meeting and finalize the Final Report

25. The following is a summary of the tasks to be achieved after the submission of this Final Report:

- Prepare an Executive Summary for the ADTA and submit to EA
- Complete the ADTA Study

E Workshops and Meetings

26. Two national workshops have been organized (Table 3) and a third one is scheduled for Sep 2005.

Table 3 List of National Workshops

| Date & Time | Venue | Purpose of Workshop | Attendants |
|---------------|------------------------|--|---|
| 25-26/01/2005 | Beijing Henan Plaza | Case Studies Workshop | Government Ministries, International Donor Agencies, Representatives of Case Studies Hosts, Domestic Experts, MoH, ADB, Consultants' Team |
| 27/04/2005 | Beijing Henan Plaza | Workshop for the RWSS Sector Strategy and Medium Term (2006 – 2010) Sector Development Plan. | Government Ministries, International Donor Agencies, Domestic Experts, MoH, ADB, Consultants' Team |
| 16-17/12/2005 | Beijing Henan Plaza | Final Report Workshop | Government Ministries, Provincial Bureaus, International Donor Agencies, Representatives of Case Studies Hosts, Domestic Experts, MoH, ADB, Consultants' Team |





27. A full record of all meetings attended is listed in Table 4:

Table 4 Record of Meetings

| Date & Time | Venue | Purpose of Meeting | Attendants |
|------------------|------------------|--|---|
| 13/8/2004 9:00am | ADB Headquarters | Startup Meeting with ADB | Peter Wallum, Alex Kwan, DML |
| 20/8/04 9:00am | DFID | Meeting with Dept For International Development (DFID) | Jane Jamieson (DFID), Chris Spohr (ADB), DML |
| 20/8/04 2:30pm | NCRWSTG | 1 st Team Meeting | DML, MSC, ZR, FYF, CX, ZLS, WZS, FFC |
| 23/8/04 3:00pm | MoF | Meeting with Ministry of Finance | Dir. Huang Huiping (MoF), Zhao Daquan (MoF), Chris Spohr (ADB), DML, ZR |
| 24/8/04 2:00pm | NCRWSTG | 2 nd Team Meeting | DML, MSC, ZR, CX, ZLS, WZS, FFC |
| 25/8/04 9:00am | UNICEF | Meeting with UNICEF | Oluwafemi Odediran (UNICEF), Chris Spohr (ADB), DML, ZR |
| 30/8/04 2:00pm | NCRWSTG | 3 rd Team Meeting | DML, MSC, ZR, CX, ZLS, WZS, ZFB |
| 1/9/04 1:30pm | NCRWSTG | 4 th Team Meeting | DML, MSC, ZR, CX, ZLS, WZS, FFC |
| 3/9/04 2:30pm | NCRWSTG | Meeting with EA | Dir. Liu Jiayi (MoH), TY, DML, MSC, FYF, CX, ZLS, WZS, FFC, ZFB, Liu Baohua, Sun Boyin, Zhang Qi, Zhang Na, Yao Wei |
| 3/9/04 1:30pm | NCRWSTG | 5 th Team Meeting | DML, MSC, FYF, CX, ZLS, WZS, ZFB |
| 7/9/04 2:30pm | DFID | Roundtable Meeting of International Donor Agencies | Representatives from ADB, World Bank, DFID China, British Embassy, UNICEF, UNDP, WHO, Australian Agency for International Development, European Union Development and Co-operation, Japan Bank for International Cooperation, Kfw Bankengruppe German Development Cooperation |
| 8/9/04 1:30pm | NCRWSTG | 6 th Team Meeting | DML, MSC, ZR, XH, ZLS, WZS, ZFB |
| 15/9/04 1:30pm | NCRWSTG | 7 th Team Meeting | DML, TV, MSC, ZR, CX, XH, ZLS, WZS, FFC, ZFB |
| 22/9/04 2:30pm | NCRWSTG | 8 th Team Meeting | DML, MSC, ZR, FYF, CX, ZLS, WZS, FFC |
| 27/9/04 9:30am | NCRWSTG | 1st Tripartite Meeting (Day 1) | Peter Wallum (ADB), Dir. Liu Jiayi (MoH), Dir. Huang Huiping (MoF), KKF, TY, DML, TV, MSC, ZR, FYF, CX, XH, ZLS, WZS, FFC, ZFB, Liu Baohua, Sun Boyin, Zhang qi, Liang Lu, Wang Shu |
| 28/9/04 9:00am | NCRWSTG | 1st Tripartite Meeting (Day 2) | Peter Wallum (ADB), KKF, TY, DML, TV, MSC, ZR, FYF, CX, XH, ZLS, WZS, FFC, ZFB, Liu Baohua, Sun Boyin, Zhang qi, Liang Lu, Wang Shu |





| Date & Time | Venue | Purpose of Meeting | Attendants |
|-----------------|--|---|--|
| 28/9/04 3:00pm | Ministry of Water Resources (MWR) | Meeting with Ministry of Water Resources | Dep Dir. Li Yangbing (MWR), Dir. Li Ge (MWR), Dir. Zhao Leshi (MWR), Peter Wallum (ADB), DML, TV, MSC, ZR, FYF, CX, XH, ZLS, Liang Lu, Wang Shu |
| 13/10/04 1:30pm | NCRWSTG | 9 th Team Meeting | DML, MSC, ZR, CX, XH, ZLS |
| 15/10/04 2:30pm | MWR | Meeting with Ministry of Water Resources | Dir. Zhao Leshi (MWR), DML, MSC |
| 21/10/04 2:30pm | Water Resources Bureau in Chuxiong City | Start-up Workshop for Case Study 1 with local government officials of Chuxiong. | Dep. Major Chao and Representatives of Bureaux of Water Resources, Development & Reform, Finance, Poverty Alleviation, Health, Environmental Protection, Price Control; DML, MSC, ZR, FYF, CX, ZLS |
| 26/10/04 5:00pm | Water Resources Bureau in Chuxiong City | Feedback Workshop for Case Study 1 with local government officials of Chuxiong. | Representatives of Water Resources Bureau and Health Bureau; DML, MSC, ZR, FYF, CX, ZLS |
| 1/11/04 9:00am | Prefecture Government Office, Fenghuang County | Start-up Workshop for Case Study 2 with local government officials of Fenghuang. | Provincial WB RWSS Project Officer Wen Shikui, Representatives of Bureaux of Water Resources, Development & Reform, Finance, Poverty Alleviation, Health, Agriculture, Environmental Protection, Construction, Price Control, PHCCO, Foreign Investment; DML, MSC, ZR, FYF, CX |
| 3/11/04 9:30pm | Prefecture Government Office, Fenghuang County | Feedback Workshop for Case Study 2 with local government officials of Fenghuang. | Provincial WB RWSS Project Officer Wen Shikui, Administration Office of the Major, Representatives of Bureaux of Water Resources, Development & Reform, Finance, Poverty Alleviation, Health, Agriculture, Environmental Protection, Construction, Price Control, PHCCO, Foreign Investment; DML, MSC, ZR, FYF, CX |
| 8/11/04 10:00pm | National Development & Reform Commission | Meeting with National Development & Reform Commission | Dir. Guan Xifan, DML, MSC |
| 8/11/04 1:30pm | NCRWSTG | 10 th Team Meeting | DML, MSC, ZR, FYF, ZLS |
| 19/11/04 1:30pm | NCRWSTG | 11 th Team Meeting | DML, MSC, ZR, FYF, ZLS |
| 23/11/04 9:30am | Government Office, Tianshui City, Gansu | Start-up Workshop for Case Study 3 with local government officials of Tianshui City | Provincial Departments/Authorities, including Development and Reform Bureau, Finance Bureau, Water Resources Bureau, Health Bureau, Environmental Protection Bureau, |





| Date & Time | Venue | Purpose of Meeting | Attendants |
|----------------------|---|---|--|
| | | | Poverty Alleviation Office, Consumers Price Bureau, Construction Commission, Agriculture Bureau, etc. |
| 26/11/04 3:30pm | Government Office, Tianshui City, Gansu | Feedback Workshop for Case Study 3 with local government officials of Tianshui City | Provincial Departments/Authorities, including Development and Reform Bureau, Finance Bureau, Water Resources Bureau, Health Bureau, Environmental Protection Bureau, Poverty Alleviation Office, Consumers Price Bureau, Construction Commission, Agriculture Bureau, etc. |
| 29/11/04 2.30pm | Government Office, Tumotezuqi of Inner mongolia | Start-up Workshop for Case Study 4 with local government officials of Tumotezuqi | Provincial Departments/Authorities, including Development and Reform Bureau, Finance Bureau, Water Resources Bureau, Health Bureau, Environmental Protection Bureau, Poverty Alleviation Office, Consumers Price Bureau, Construction Commission, Agriculture Bureau, etc. |
| 3/12/04 2.30pm | Government Office, Tumotezuqi of Inner mongolia | Feedback Workshop for Case Study 4 with local government officials of Tumotezuqi | Provincial Departments/Authorities, including Development and Reform Bureau, Finance Bureau, Water Resources Bureau, Health Bureau, Environmental Protection Bureau, Poverty Alleviation Office, Consumers Price Bureau, Construction Commission, Agriculture Bureau, etc. |
| 8/12/04 1:30pm | NCRWSTG | 12 th Team Meeting | DML, MSC, ZR, FYF, XH, ZLS, FFC |
| 15/12/04 1:30pm | NCRWSTG | 13 th Team Meeting | DML, MSC, ZR, FYF, XH, CX, ZLS |
| 22/12/04 1:30pm | NCRWSTG | 14 th Team Meeting | DML, MSC, ZR, FYF |
| 28 & 29/12/04 1:30pm | NCRWSTG | 15 th Team Meeting | TY, MSC, ZR, FYF, ZLS, CX, XH, WZS, FFC |
| 05/01/05 1:30pm | NCRWSTG | 16 th Team Meeting | DML, MSC, ZR, FYF, ZLS, WZS, FFC, SCWC |
| 12/01/2005 1:30pm | NCRWSTG | 17 th Team Meeting | SCWC, MSC, ZR, FYF, ZLS, CX, XH, WZS, FFC |
| 19/01/2005 1:30pm | NCRWSTG | 18 th Team Meeting | SCWC, MSC, ZR, FYF, ZLS, XH, WZS, FFC |
| 27/01/2005 9:00am | MoF | ADB and MoF Meeting | MoF, ADB, Consultants' Team Leader |
| 27/01/2005 10:30am | MoF | Second Tripartite Meeting | MoF, MoH, ADB, Consultants' Team |
| 02/02/2005 1:30pm | NCRWSTG | 19 th Team Meeting | DML, MSC, ZR, FYF, ZLS, XH, WZS, FFC |
| 04/02/2005 1:30pm | NCRWSTG | 20 th Team Meeting | TY, MSC, ZR, FYF, WZS, FFC |
| 23/02/2005 9:00pm | NCRWSTG | 21 st Team Meeting | DML, MSC, ZR, FYF, ZLS, XH, WZS, FFC |





| Date & Time | Venue | Purpose of Meeting | Attendants |
|-------------------|---|---|---|
| 25/02/2005 9:00pm | NCRWSTG | 22 nd Team Meeting | DML, MSC, ZR, FYF, ZLS, XH, WZS, FFC |
| 28/02/2005 | Water Resources Bureau in Gaocheng City | Start-up Workshop for Case Study 5 with local government officials of Gaocheng | Dep. Major Chao and Representatives of Bureaux of Water Resources, Development & Reform, Finance, Poverty Alleviation, Health, Environmental Protection, Price Control; DML, MSC, ZR, FYF, CX, XH |
| 04/03/2005 | Water Resources Bureau in Gaocheng City | Feedback Workshop for Case Study 5 with local government officials of Gaocheng | Representatives of Water Resources Bureau and Health Bureau; DML, MSC, ZR, FYF, CX, XH |
| 15 -16/03/2005 | Haikou City of Hainan | International Workshop for Community Participation on Rural Water Supply Management | Government Ministries/Departments, International Donor Agencies, Consultants' Team Leader |
| 24/03/2005 9:00pm | NCRWSTG | 23 rd Team Meeting and Yuyao case study plan and ADTA Work plan | TY, DML, SCWC |
| 28/03/2005 | Construction Bureau in Yuyao City | Start-up Workshop for Case Study 6 with local government officials of Yuyao | Representatives of Bureaux of Construction, Water Resources, Finance, Development & Reform, Health, Environmental Protection; DML, MSC, ZR, FYF, SCWC |
| 31/03/2005 | Construction Bureau in Yuyao City | Feedback Workshop for Case Study 6 with local government officials of Yuyao | Representatives of Bureaux of Construction, Water Resources, Finance, Development & Reform, Health, Environmental Protection; DML, MSC, ZR, FYF, CX, SCWC |
| 04/04/2005 1:30pm | NCRWSTG | 24 th Team Meeting and preparation of Sector Strategy and Medium Term Plan | DML, MSC, ZR, FYF, CX, ZLS, WZS, FFC, SCWC |
| 05/04/2005 1:30pm | NCRWSTG | 25 th Team Meeting and preparation of Sector Strategy and Medium Term Plan | DML, MSC, ZR, FYF, CX, ZLS, WZS, FFC, SCWC |
| 06/04/2005 1:30pm | NCRWSTG | 26 th Team Meeting and preparation of Sector Strategy and Medium Term Plan | DML, MSC, ZR, FYF, CX, ZLS, WZS, FFC, SCWC |
| 28/04/2005 1:30pm | NCRWSTG | 27 th Team Meeting | DML, MSC, ZR, FYF, CX, ZLS, WZS, FFC, SCWC |





| Date & Time | Venue | Purpose of Meeting | Attendants |
|-------------------|---------|-------------------------------|--|
| 19/12/2005 9:30am | NCRWSTG | 28 th Team Meeting | TY, DML, MSC, ZR, FYF, CX, ZLS, WZS, FFC, SCWC |
| 19/12/2005 3:00pm | MoF | Third Tripartite Meeting | MoF, MoH, ADB, Consultants' Team |

F Deliverables Submission

28. The following deliverables (Table 5) were submitted.

Table 5 Record of Deliverables

| Deliverable | Date of Submission |
|---|--|
| Draft Inception Report | 3/9/2004 |
| Draft RWSS Sector Profile Report | 6/10/2004 |
| Draft Case Study 1 Work Plan (c/w Questionnaire) | 13/10/2004 (to Case Study Host) 22/10/2004 (to ADB) |
| Draft Case Study 2 Work Plan (c/w Questionnaire) | 18/10/2004 (to Case Study Host) |
| Draft Case Study 3 Work Plan (c/w Questionnaire) | 15/11/2004 (to Case Study Host) |
| Draft Case Study 4 Work Plan (c/w Questionnaire) | 15/11/2004 (to Case Study Host) |
| Response to comments on RWSS Sector Profile | 28/11/2004 |
| Recommendation for Quotations of Equipment for the ADTA | 7/12/2004 |
| Progress Report No. 1 | 20/12/2004 |
| Progress Report No. 2 | 20/12/2004 |
| Progress Report No. 3 | 20/12/2004 |
| Progress Report No. 4 | 20/12/2004 |
| Work Plan for Case Studies Workshop | 21/12/2004 |
| Preliminary Report for the Case Study of Chuxiong City in Yunnan Province (Draft) | 31/12/2004 |
| Preliminary Report for the Case Study of Fenghuang Prefecture in Xiangxi Area in Hunan Province (Draft) | 31/12/2004 |
| Preliminary Report for the Case Study of Tianshui City in Gansu Province (Draft) | 31/12/2004 |
| Preliminary Report for Case Study of Tumotezuqi in Inner Mongolia (Draft) | 31/12/2004 |
| RWSS Preliminary Sector Profile | 11/1/2005 |
| Interim Report | 14/1/2005 |
| Progress Report No. 5 | 21/1/2005 |
| Progress Report No. 6 | 22/2/2005 |
| Preliminary Sector Profile (Final) – Resubmission version | 28/2/2005 |
| Progress Report No. 7 | 24/3/2005 |
| RWSS Sector Strategy (Draft) | 13/4/2005 |
| Medium Term (2006 – 2010) Sector Development Plan (Draft) | 13/4/2005 |
| Progress Report No. 8 | 20/4/2005 |
| Preliminary Report for Case Study of Gaocheng City in Hebei Province | 23/5/2005 |



| Deliverable | Date of Submission |
|--|--------------------|
| Preliminary Report for Case Study of Yuyao City in Zhejiang Province | 23/5/2005 |
| Progress Report No. 9 | 30/5/2005 |
| Progress Report No. 10 | 29/6/2005 |
| Response to comments on RWSS Sector Strategy and Medium Term (2006-2010) Sector Development Plan | 8/7/2005 |
| Progress Report No. 11 | 5/8/2005 |
| Draft Case Study 5 Work Plan (c/w Questionnaire) | 5/8/2005 |
| Draft Case Study 6 Work Plan (c/w Questionnaire) | 5/8/2005 |
| Draft Final Report | 8/8/2005 |
| Progress Report No. 12 | 5/9/2005 |
| Work Plan for Final Report Workshop | 5/12/2005 |





III Current Status of Development in the PRC

A Population – Current Population and Estimation of Population Growth

29. The PRC is a developing country with the largest population in the world. Large population and relatively insufficient resources per capita are the general situation in the PRC. Population problem is closely related to the problems in economic and social development of the PRC and it is considered key constraints in the economic and social development.

30. For the past 10 years, the rate of population growth in the PRC has been effectively controlled. According to the Fifth National Census, the population in the PRC was 1.266 billion people on 1st November 2000. Comparing with the fourth census in 1990, the population increased by 132.15 million people. The average annual population increase was 12.79 million people and the average annual population growth rate was 10.7‰. Population growth pattern in the PRC is undergoing the transformation from high growth rate (resulting from high birth rate and low death rate) and low growth rate (resulting from low birth rate and low death rate). With the implementation of family planning for more than 30 years, the accumulated number of birth has been reduced by 300 million. This has alleviated the demand on resources and stress on the environment due to the population problem. This is also a beneficial factor in promoting the economic development and improving people’s living standard.

31. Entering into the new century, the PRC will still encounter many problems and challenges in population control and economic development. In the coming decades, the population will continue to increase with an annual net increase of about 10 million. It is estimated that the total population will reach its peak (about 1.557 billion people) ¹ in middle of this century in the year of around 2043, afterwards the total population will gradually decrease. There will be a growing conflict between the continuous increase in population, demand on the resources as well as threats to the environment, eventually posing a severe challenge on sustainable development. (See Table 6 for the results of population estimation by National Population and Family Planning Commission of the PRC in 2003.)

Table 6 Estimated Population in the PRC²

| Year | Estimated Population | |
|------|------------------------------|------------------------------|
| | Total Population 1 (Million) | Total Population 2 (Million) |
| 2005 | 1,319 | 1,324 |
| 2010 | 1,361 | 1,370 |
| 2015 | 1,403 | 1,419 |
| 2020 | 1,434 | 1,454 |

Note: Total Population 1 is based on Total Fertility Rate (TFR)=1.7; where Total Population 2 is based on Total Fertility Rate (TFR)=1.8.

Source: China Population Information and Research Center 1 – Website – 2004

¹ China Population Information and Research Center – Announcement 2004-06-23

² China Population Information and Research Center - Website





32. According to the 2000 Report of the National Bureau of Statistics, the relevant population distribution in the Western Regions of the PRC is shown in Table 7.

Table 7 Relevant Population Distribution in 2000 in the Western Regions of the PRC³

| | Province/City/ Autonomous Regions | Total Population (1000's) | Urban Population (1000's) | Rural Population (1000's) | Proportion of Rural Population (%) |
|----|---|---------------------------------|---------------------------------|---------------------------------|--|
| 1 | Xinjiang | 19,250.0 | 6,240.0 | 12,220.0 | 63.5 |
| 2 | Inner Mongolia | 23,755.4 | 10,138.8 | 13,616.6 | 57.3 |
| 3 | Gansu | 25,121.2 | 6,031.9 | 19,089.3 | 76.0 |
| 4 | Ningxia | 5,615.5 | 1,821.3 | 3,794.2 | 67.6 |
| 5 | Sha'anxi | 36,050.0 | 1,1630.0 | 24,420.0 | 67.7 |
| 6 | Tibet | 2,616.3 | 495.3 | 2,121.0 | 81.1 |
| 7 | Qinghai | 5,181.5 | 1,800.9 | 3,380.6 | 65.2 |
| 8 | Sichuan | 83,290.9 | 22,230.3 | 61,060.6 | 73.3 |
| 9 | Yunnan | 42,359.0 | 9,896.0 | 32,463.0 | 76.6 |
| 10 | Chongqing | 30,904.5 | 10,227.8 | 20,676.7 | 66.9 |
| 11 | Guizhou | 35,245.0 | 8,413.0 | 26,832.0 | 76.1 |
| 12 | Guangxi | 44,893.7 | 12,639.5 | 32,254.2 | 71.8 |
| 13 | Mainland China | 126,583 | 45,594 | 80,739 | 63.8 |

Note: Population includes mobile component from other provinces but excludes outbound residents. In Xinjiang, figure contains non-registered mobile portion of 790,000.

Source: National Bureau of Statistics of China, Provincial Annual Statistical Reports – 2000

33. According to the statistics of the China National Economic and Social Development Statistical Report 2003, by the end of 2003, the total population in the PRC is 1,292.27 million people, consisting of 523.76 million of urban population and 768.51 million of rural population. Owing to unbalanced development in various regions, the current low level of birth rate is still unstable and the implementation of family planning still faces a lot of difficulties. The pressure of excessive population increase mainly derives from the central and Western Regions.

B Status of Social and Economical Development

34. Since 1990's, the PRC has sustained remarkable social and economic development. The Government has steadfastly conducted major social and economic reforms, endorsed a scientific approach and promoted sustainable development strategy. In 2000, the Gross Domestic Product (GDP) broke \$ 1,000 billion level for the first time in history and reached RMB 8940.4 billion. The per-capita GDP increased from RMB 1,634 in 1990 to RMB 7,078 in 2000. The socialism market economies began to establish and the policy reforms in various sectors such as social security, education, medical and health have achieved major improvements.

35. According to the statistics of the China National Economic and Social Development Statistical Report 2003, by the end of 2003, the living standard of citizen continued to improve. The average national annual disposal personal income for each urban citizen was RMB

³ Data Source: National Bureau of Statistics of China, Provincial Annual Statistical Reports - 2000





8,472 and, exclusive of the factor of price inflation, the actual increase was 9.0%. The net income per rural citizen was RMB 2,622 and the actual increase was 4.3%. Engel's Index (i.e. the portion of household expenses spent on consumer goods out of the total household expenses) for urban families and rural families were 37.1% and 45.6% respectively. Both reduced by 0.6% as compared with 2002. The current state of social and economic developments in the PRC is impressive and the overall living standard of the Chinese people has reached a stage of "well-to-do" society.

36. The major problems for social and economic development are: slow increase of income in rural, heavy burden in employment and social security, tight supply and demand in power and transportation sector, relatively large investment in fixed asset, unplanned investment, repetitious construction of low grade infrastructure and facilities, excessive disparity in income for some social members, relative difficult living conditions for low income citizens, and increasing stress on resource and environment.

37. Based on the past experiences, the problems of supplying safe drinking water and the health condition of rural residents are relatively serious in rural areas. Improvement in physical facilities and health education can effectively improve the rural living standard and alleviate poverty condition. Therefore, safe drinking water and environment hygiene are always the mostly urgent and the mostly welcomed development project.

C Natural Conditions - Geography

38. China is located at the eastern part of Asian Continent along the western shore of Pacific Ocean occupying a land area of about 9.6 million square kilometers (sq. kms.). China is the third largest country after Russia and Canada. The topography of China is complicated and varied with high level in the west and low level in the east showing three-step terraces. The tallest step, known as "The Ridge of the World", is the Qingzang Highland. The average altitude is 4000 m above sea level. The second step includes areas of Yungui, Huangtu, the three Inner Mongolia Highlands, Talimu and the two Zhunga'er Basins of 1,000 – 2,000 metres (m) above sea level as well as Sichuan basin of 500m above sea level. The third step includes major river plains in areas of Northeast, Northern and the middle and downstream reaches of the Changjiang at below 200m above sea level as well as hilly regions of 1,000m above sea level in Southern China.

D Natural Conditions – Climate and Hydrology

39. With a board territory crossing over both the temperate and tropical climatic regions, the climate of China is extremely varied. It has the monsoon climate with dry winter and hot and wet summer in the east. The northwestern regions have continental climate with arid and semi-arid conditions. Rainfall is scarce. The Qingzang Highland has unique cold climate.

40. China has a wealth of river. There are more than 1,500 rivers with river basin coverage exceeding 1,000 sq. kms. Most of the famous rivers derive their sources from the Qingzang Highland. Ocean-bound rivers, including Changjiang, Huanghe, Zhujiang, Heilongjiang, Liaohe, Haihe, Huaihe, etc, flow towards east to the Pacific Ocean. Changjiang is the largest river in China. It has a total length of 6,300 kilometres (kms) and is very rich in water resources. Huanghe is the second largest river in China and has a total length of 5,464 kms. Yaluzangbujiang of Tibet flows eastwards and then southwards to discharge into the Indian





Ocean. Talimuhe of the Southern part of Xinjiang is the largest inland river in China with a total length of 2,179 kms.

41. As a result of topography and climate, the distribution of rivers in China is extremely uneven. Most rivers are found in the Eastern Regions with significant precipitation whereas the northwestern regions are inland arid areas with little rainfall. Rivers are scarce and there are vast areas without surface water bodies.

42. Total precipitation: in the 24 years from 1956-1979, the multiple year average annual precipitation is 6,200 billion cubic metres (m^3) translating to 648mm precipitation depth. This is lower than the global average by 20%. Again as a result of topography and climate, the distribution of rainfall is extremely uneven with most in the southeastern regions gradually decreasing towards the northwestern regions. The average annual rainfall depth in Taiwan is 2,535mm and that for Talimu and Chaidamu basins is less than 25mm. Runoff: The total surface runoff for the whole country is 2,700 billion m^3 . Component-wise, 678 billion m^3 or 27% emerges from ground water sources, 56 billion m^3 from thawing glacier sources and 17.2 billion m^3 from cross-border sources.





IV Current Profile and Constraints of RWSS Sector

43. Since the founding of the PRC half a century ago, the Communist Party of China and the Government of China have afforded great attention to RWSS sector work. Over the past twenty more years of economic reform, the government has clearly identified the RWSS work as a major component in its strategic poverty reduction plan for implementation. Since 1980s, the Chinese Government has participated in “International Drinking Water Supply and Sanitation Decade” campaign initiated by the United Nations. Since then, the PRC has commenced a large-scale campaign in the vast rural regions in planning and implementation of rural water supply and sanitary latrines projects for the rural residents. Some specific details are:

- (i) the Central Government has incorporated the rural water supply and sanitation and latrine improvement work into the National Social and Economic Development Plans and decreed clear targets, responsibilities and organizations for all levels of governments to implement;
- (ii) the Central Government established the National Patriotic Health Campaign Committee (NPHCC) and its hierarchy of lower levels Patriotic Health Campaign Committees (PHCCs) to be the coordinating bodies at respective level of governments. The bodies are responsible for co-ordinating government departments involved in the RWSS sector. The NPHCC and lower levels PHCCs set up cross-department cooperation mechanism, clarify the duties and responsibilities of various government agencies at respective levels aiming to achieve effective organization and management;
- (iii) government espouses the specific principles and policies of “Government advocates, departments co-ordinates cooperation; society supports, individual participates; state subsidizes, local people manage with funds raised from multiple channels; specific measures suiting local conditions coupled with scientific principles; self-constructed and self-maintained to safeguard water quality; consumption based water tariffs, reinvesting in water services”. These principles are well-founded specific directions and serve to guarantee the healthy development of RWSS;
- (iv) domestic and overseas experts were organized to compile relevant technical specifications, standards, codes of practices, manuals and atlas concerning the RWSS work. These technical documentation play positive and effective roles in guiding the implementation of RWSS work in scientific manner;
- (v) through substantial capital investments in rural poor areas, Government promotes the development of rural water supply, sanitation and latrine improvement work; and
- (vi) through international cooperation, Government actively brings in assistances from the international aid community finance RWSS in the PRC, successfully promotes the development in the RWSS work.

44. The major challenges for rural water supply and sanitation work in the PRC are: the mere extent of the burden, the severe shortage of funds and construction and post construction management. Currently, over 300 million rural residents do not have access to safe drinking water, among whom, the drinking water conditions of nearly 70 million have never ever been improved. For those rural residents with open wells and rainwater storage water cellars, they enjoy only very basic improvement in terms of access to drinking water. The water quality issues still require desperate improvements, particularly in areas with arsenic, fluoride and other kinds of contamination. For the water treatment plants constructed during early 1980s, their treatment technologies are out-dated, water purification facilities are basic and water





transmission and distribution systems are aging. Upgrading and further improvement are needed. Furthermore, close to 122 million rural households will require sanitary latrines to be constructed. All the above-mentioned demands mainly locate in the rural poor areas in the PRC. In the following sections, the current profile and constraints of RWSS Sector are presented.

A Rural Water Supply in the PRC

a. Water Resources and Distribution

45. According to the “Study Report of Sustainable Development in the PRC On Water Resources” (March 2001), the water resources quantitative assessment for a total of 24 years, from 1956 to 1979, reveals that the multiple year average annual water resources in the PRC is 2,810 billion m³. From geographical perspective of river basins, the southern side (Changjiang and south of Changjiang) occupies 80.4% of the total; the northern side (north of Changjiang, excluding the inland river side) has 14.7% of the total and the inland rivers take the remaining 4.9%.

Table 8 Multiple Year Average Annual Water Resources in 12 Western Provinces (1956-1979)

| Item | Province | Surface Water Resources (Billion m ³) | Ground Water Resources (Billion m ³) | Total Water Resources (Billion m ³) |
|------|----------------|---|--|---|
| 1 | Inner Mongolia | 37.1 | 24.83 | 50.67 |
| 2 | Guangxi | 188.0 | 39.77 | 188.0 |
| 3 | Sichuan | 313.1 | 80.15 | 313.38 |
| 4 | Guizhou | 103.5 | 25.89 | 103.5 |
| 5 | Yunnan | 222.1 | 73.8 | 222.1 |
| 6 | Tibet | 448.2 | 109.43 | 448.2 |
| 7 | Sha'anxi | 42.0 | 16.51 | 44.19 |
| 8 | Gansu | 27.3 | 13.27 | 27.43 |
| 9 | Qinghai | 62.3 | 25.81 | 62.62 |
| 10 | Ningxia | 0.85 | 1.62 | 0.99 |
| 11 | Xinjiang | 79.3 | 57.95 | 88.28 |
| 12 | National Total | 2,711.52 | 828.77 | 2,812.4 |

Note: Data only represents provincial water resources, excluding cross-provincial inflows. Data of Sichuan contains Chongqing data. Some portions are counted twice towards both surface and ground water resources.

46. According to the published information of water resources in the PRC, the total water resources, the total water supply and the average water consumption in the PRC in 2002 are as follows:

- (i) the total quantity of water resources is 2,825.5 billion m³. The surface water resources are 2,724.3 billion m³ and the ground water resources are 101.2 billion m³ without double counting with the surface water.
- (ii) the total quantity of water supply is 597.4 billion m³, which is 19.5% of the total water resources in that year. The water supply from surface water is 80.1%, the water supply from ground water is 19.5%, the supply from other water resources (reuse of treated effluent and collection of rain water) is 0.4%. Amongst the total water





consumption, the urban domestic water consumption is 5.8%, the rural domestic water consumption (including residential and domestic animals consumption) is 5.4%, industrial consumption is 20.8%, the farmland irrigation is 61.4% and the husbandry fishing is 6.6%.

- (iii) the average annual comprehensive consumption per capita is 428 m³. The peoples' average per capita daily consumption in urban areas is 219L/head*day. The peoples' average per capita daily consumption in rural areas is 94L/head*day.

b. Rural Water Supply Coverage Rate and Consumption Status

47. By the end of 2003, the access to drinking water for 874 million people were improved to different extents, accounting for 92.7% of the total rural population (943 million people)⁴. Among them, the population with drinking water by piped water supply services was 549 million people, accounting for 58.18%. The population with drinking water by hand pump well was 208 million people, by rainwater collection-storage was 13 million people and by stream course extraction and mechanical pump well was 105 million people. These are beneficiary coverage rates of 22.08%, 1.34% and 11.12% of total rural population respectively.

48. Amongst the total 31 provinces, cities and autonomous regions in the PRC, there are 16 provinces for which the rural piped water supply coverage rate is below the country average of 58.18%. Half of these, i.e. 8 out of the 16, are among the 12 western provinces.

c. Quality of Drinking Water the Rural Areas

49. According to the information from rural sampling monitoring programme of environmental hygiene study unit in the PRC in 1990's, and with reference to "Specification for Application of the "National Drinking Water Standards" in Rural Conditions", 37.9% of the rural population are serviced with unsafe drinking water, 62.1% of the rural population are serviced with safe or basically safe drinking water. The reasons are due to the exceedance of the following parameters: total E.Coli, total bacteria, fluoride, chromaticity, organic contaminants, nitrate nitrogen, iron, manganese, fluorine, arsenic etc.

50. The causes for unsafe drinking water in rural area are mainly related to the environment. Firstly, the natural water resources in some areas have mineral contents which cause exceedance of the drinking standard and harms to human health, for example, iron, manganese, nitrate, sulfate, oxides etc. Some of them are also toxic to human body, such as fluorine and arsenic. Secondly, many rural residents extract water direct from surface sources (rivers, lakes, ponds, water cellars) and wells shallow stratum ground water. These sources are vulnerable to contamination by human activities, such as latrines, domestic animal farms, solid, liquid and gaseous wastes from rural enterprises, and rural domestic wastewater. Thirdly, the water supply systems to rural areas are primitive. Currently, about 40% of the rural areas are serviced with piped water supplies, most of these supply systems are directly taped to households for convenient use, however about half of these "piped water" are without treatment and disinfecting process. Fourthly, the rural population is large, yet widely scattered in various areas, these people are poor and do not enjoy the benefit of safe drinking water supply. Furthermore there is inadequate knowledge of the importance of safe drinking water and absence of essential hygiene habits.

⁴ 943 million contains township population, 807 million in Table 2-2 refers to rural population in villages.





d. Centralized Water Supply

51. According to the statistic from NPHCC in 2003, there were 630,900 water treatment plants (stations) in the PRC. Amongst which, 10,000 are large plants with treatment capacity greater than 1000 m³/day, accounting for less than 2% of the total. Majority of the water treatment plants (stations) are small plants with the daily treatment capacities from several to few hundred cubic metres.

52. In general, large treatment plants are planned, designed and constructed by organized project office with better design and construction quality. Operation and maintenance, plant management and water tariff collection works are also better organized. For those small scale works organized by local societies, the design, construction and operation are relatively less satisfactory.

e. Decentralized Water Supply

53. Nearly 400 million rural people in the PRC are depend on decentralized water supply facilities. These facilities include conventional wells, hand pump wells, rainwater collection-storage water cellars, direct extraction from stream course and mechanical pump wells. According to the statistic from NPHCC in 2003, currently, there are totally 5.6 millions of manual operated pump wells, 1.76 million rainwater collection-storage water cellars. The sources for decentralized water supply facilities are mainly coming from ground water, rainwater and stream courses. For those rural populations with decentralized water supply facilities, safe drinking water with respect to the water availability and quality cannot be guaranteed.

B Rural Sanitation

a. Rural Sanitation – an Overview

54. About 72.5% of Chinese population live in the rural area. Up to 2002, the prevalence rate of rural sanitary latrine for 247.88 million rural households was 48.66%, represents a comparatively lower level in the world. In rural poor area in the PRC, the harmless treatment⁵ of human excreta remains inadequate. Pigsties are still connected to domestic dwellings in close proximity to latrines and drinking water wells (sometime within 10m separation). Owing to the lack of necessary hygiene common sense and inadequacy of sanitary latrine facilities, it is still very hard to effectively control the spreading of infectious diseases.

b. Prevalence Rate of Rural Sanitary Latrines

55. A background survey on the rural latrine and the waste disposal was carried out in 1993 covering 780,000 rural households in 470 counties (cities) in 29 provinces. The result indicated that the prevalence rate for rural households equipped with latrines was 85.9%, the prevalence rate of rural sanitary latrine was 7.5%. The rate for harmless treatment of latrine waste was 13.5%. Since the national rural latrine improvement workshop in 1999, the development on improvement of latrine at rural area achieved good progress. In 2000, NPHCC convened a technical discussion workshop on modification of latrine at rural area.

⁵ "Harmless treatment" of latrine waste is based on the "China Rural Sanitary Latrine Technology Guidelines" jointly published by UNICEF and NPHCC in 2001. It is a collective term meaning the employment of biological, physical and chemical means to destroy and eliminate pathogens, harmful micro-organisms and parasite ova in latrine wastes to achieve the objectives of diseases control, flies control, odour control and pollution control.





Under its direction, modification of latrine in the rural area was conducted orderly in a scientific, regulated and standardized manner. By the end of 2000, the prevalence rate of rural sanitary latrine increased to 44.85% with harmless treatment of latrine waste attaining 31.2%. Thus the goal of 40% stated in the 9th Five-Year Plan was accomplished. At the end of 2003, the prevalence rate of rural sanitary latrine has already reached 50.90%.

56. It can be seen that, with unrelenting efforts in the last two decades, the prevalence rate of rural sanitary latrine in the PRC increased from 7.5% in 1993, 44.85% in 2000 and then to 50.90% in 2003. The harmless treatment of latrine waste increased from 13.5% in 1993 to 31.2% in 2000. The expansion of prevalence of sanitary latrine in rural area not only greatly improves the environmental hygiene condition, but also plays an extremely positive role in protection of drinking water sources, control of rural intestinal tract infectious disease and promotion of good health and hygiene behaviour.

c. Types and Technical Standards of Rural Sanitary Latrines

57. With decades' experience in modification of latrine, National Patriotic Health Campaign Committee Office (NPHCCO) has developed new standards on the existing rural latrine aiming to improve the hygienic standards of living of the rural household. The rural latrines should be comfortable, convenient and odourless.

58. Major sanitation latrine type and their distribution:

- (i) Triple Compartment Septic Tank: Mainly in is provinces and cities of Guangdong, Zhejiang, Jiangsu, Fujian, Shanghai, Anhui;
- (ii) Double Barrel Funnel Type : Mainly in provinces and areas of Henan, Shandong, Jiangxi, Shaanxi, Xinjiang;
- (iii) Methane Generation Digester Type: Mainly in provinces and area of Sichuan, Guangxi, Chongqing, Yunnan, Hunan;
- (iv) Separate Faeces and Urine Collector: Some 18 provinces and areas have promoted this type of latrine which was implemented in China in 1950's. The most completed installations are in Guangxi;
- (v) Sewer Systems: Mainly in Hubei, Henan; and
- (vi) Others: various forms and designs which may not fully meet the sanitary requirements.

Table 9 The Types of Sanitary Latrines in Use in Rural Areas in the PRC in 2002

| Total No. of Rural Households (Thousand) | Cumulative Total. No. with Sanitary Latrines (Thousand) | Prevalence Rate (%) | Cumulative No. of Sanitary (Thousand) | | | | | |
|--|---|---------------------|---------------------------------------|---------------------------|-----------------------------|-------------------------------------|---------------|----------|
| | | | Treble Compartment Septic Tank | Double Barrel Funnel Type | Methane Generation Digester | Separate Faeces and Urine Collector | Sewer Systems | Others |
| 247,889 | 120,616.8 | 48.66 | 31,790.2 | 11,872.1 | 9,133.9 | 1,097.8 | 7,481.9 | 59,241.2 |
| | | Relative Weight | 26.36% | 9.84% | 7.57% | 0.91% | 6.20% | 49.12% |

Source: NPHCCO Annual Report of Rural Water Supply and Sanitary Latrine Improvement

59. Through the following case study, it is clear that rural water supply and sanitation improvements produce significant benefits towards the health of the rural population:





Case Study – Study on Beneficial Effects of RWSS on Health

In Changge City in Hunan Province, the City Centre for Disease Control conducted a detailed survey in 1990's to monitor the effects of rural water supply and sanitation improvement on the health of the population. The incidences of (1) flies, (2) diarrhea and (3) tapeworm cases in primary students were surveyed for villages with RWSS improvements (Experiment Sample) and measured against villages without RWSS (Control Sample). The relevant findings were:

- In the first and tenth year, the flies' densities were reduced by 52.11% and 68.19%.
- With respect to diarrhea, the incidence rate was reduced by 41.25% upon rural water improvement; and further reduced by 60.91% upon subsequent sanitation improvement. In the first, third and tenth year after both improvements, the reductions were 39.35%, 69.52% and 44.71%.
- In case of tapeworm cases in primary students, the rate reductions prior to medical treatment and after treatment in the third year were 12.71% and 33.61%. The reductions in the tenth year were 41.16% and 55.09%.

In conclusion, the beneficial effects of RWSS improvements in terms of flies density, diarrhea incidences and tapeworms' cases in primary students were prominent, long-term and reliable.

More examples can be found in [Appendix 4](#).

C Rural Sanitation Improvement and Health Education Aspect

a. National Patriotic Health Campaign

60. Upon the foundation of PRC in 1950's, the Government placed importance focus on the mass participation in the health campaign aiming for the prevention and reduction of diseases and protection of people's health condition. The NPHCC is established at the central government level with respective provincial, municipal and county counterparts. The NPHCC, supported by NPHCCO and the hierarchy of sub-ordinate offices, is given the responsibility for co-ordinating the health and sanitary functions of various ministries, committees, functional departments and local implementation agencies. The objectives of the campaign include the promotion of national health and public hygiene; diseases prevention, reduction and treatment; and contribution to the overall social development of the PRC.

b. Rural Sanitation Improvement and Health Education

61. The Government of PRC has placed particular emphasis on health education to improve the quality of health of rural people. In the "Preliminary Sanitation and Health Education Directives for the Rural Areas (2001-2010)" it has promulgated the need for strengthening the efforts in RWSS, increasing the coverage rates of piped water supply and sanitary latrines, building hygienic communities and improving the working and living environments. It actively promotes the mass movement of "Health Education for the Rural People".

62. Health education can intervene and change people's improper hygienic habits. It helps to prevent and control infectious diseases and spontaneous public health incidents. In the long run, it helps to reduce the medical costs. People through health education could benefit by healthy living and quality living. Even the not as poor, better off rural population would benefit from health education. The increase in knowledge would eventual help the people build a healthy living.





c. 3-in-1 Concept Rural in Water Supply, Rural Sanitation and Health Education

63. Previous efforts to develop the RWSS sector focused mainly on the construction of physical facilities in rural water supply and sanitation. The Government is now giving more attention to strengthening sector policy, strategy and operational frameworks, and institutional capabilities, and health education. This strengthened 3-in-1 concept with components of rural water supply, rural sanitation and health education/hygiene promotion emphasizes the integrated approach for the comprehensive developments in these three areas in the RWSS sector. It is therefore beneficial to promote the 3-in-1 concept so that resources for IEC would be appropriately funded through the “Safe Drinking Water” project items.

d. Issues on Rural Sanitation Promotion and Health Education

64. There are still a lot to do in the front of sanitation promotion and health education for the rural population. At present, there are many issues to wrestle with:

- (i) there are few channels for the rural population to obtain the health knowledge, especially for those in the Western Regions. People have very limited knowledge in modification of sanitary latrine and lack of basic concept on safe drinking water quality and sanitation latrine. To certain extent, these will slow down the development of the modification of latrine work in rural area;
- (ii) despite sizeable resources are allocated at the national/central government level, the establishments at the local level (prefectures, counties, towns and villages) do not receive sufficient resources. This was the case in the past and is still the case at present;
- (iii) some government offices do not have sufficient understanding in the this issue, some of them pay attention to the high productivity economic activities and tend overlook the importance on the improvement of general health education;
- (iv) the quality of some dissemination material is not effective to deliver the right message to the people they targeted; The delivery channel is monotonous and the message for the three concepts is not integrated well enough;
- (v) inadequate fund for rural populations’ health education;
- (vi) lack of effective planning and design framework;
- (vii) lack of effective project management skills;
- (viii) insufficient specialist skills in the RWSS sector; In Western Regions this is more acute; and
- (ix) inadequate co-ordination of efforts such as information sharing, experience exchange, project co-ordination and cooperation among various government departments and among other donor organizations.

D Legal, Policy and Institutional Framework

a. Laws and Policies

a(i) Laws

65. The major laws relevant to the RWSS are:

- (a) Water Law of the People’s Republic of China;
- (b) Water Pollution Prevention and Treatment Law of the People’s Republic of China;
- (c) Environmental Protection Law of the People’s Republic of China;
- (d) Infectious Disease Prevention and Treatment Law of the People’s Republic of China; and
- (e) Water and Soil Conservation Law of the People’s Republic of China.

In these laws there are provisions relating to the rural water supply and sanitation matters.





a(ii) Regulations, Standards and Specifications relating to Rural Water Supply

66. These include:

- (a) National Standards for Drinking Water;
- (b) Regulations for Implementation of “National Standards for Drinking Water” in Rural Areas;
- (c) Standards for Domestic Water in Rural Areas;
- (d) Technical Standards for Rural Water Supply;
- (e) Standard Methods for the Monitoring of Quality of Drinking Water;
- (f) Water Quality Standards for Surface Water Sources; and
- (g) Specifications for Evaluation of Safe Use of Chemicals in Drinking Water Supply.

At the same time, various local authorities formulate codes of practices for RWSS works with due recognition of local conditions. With these laws, regulations, standards and specifications, the RWS works are adequately governed, regulated and standardized.

a(iii) Regulations, Standards and Specifications relating to Rural Sanitation

67. These include:

- (a) National Standards for Sanitary Cities, National Standards for Sanitary Districts, National Standards for Sanitary Townships;
- (b) Standards for Rural Sanitary Latrine Construction – Method of Assessment for Pioneer Counties and Common Counties;
- (c) Standards for Harmless Treatment of Latrine Waste; and
- (d) Planning Standards for Sanitation for Townships.

68. In particular, the Standards for Harmless Treatment of Latrine Waste specifies the quality parameters for different treatment methods and provides a guidance on enhancement of the sanitation management on human excreta in rural areas and assessment of the corresponding effectiveness. This standard provides a legal basis for the construction of sanitary latrines in rural areas. It has been well proven that the harmless treatment of human excrete in latrine waste is an important step to improve the rural health situation in the PRC. It is also an effective way to lower the number of intestinal infectious diseases and parasitic disease. With these laws, regulations, standards and specifications, the rural sanitation works are adequately governed, regulated and standardized.

b. Establishment and Institutions

69. Fig. 2 shows the inter-relationship and interaction of major government institutions with RWSS functions.

b(i) Central Government

70. The National Development and Reform Commission (NDRC) is responsible for the examination and approval of development plans for incorporation into the social and economic development framework. It also manages the examination and approval for project initiation for investment programmes of the Central Government as well as programmes funded by international agencies and foreign investments. The Ministry of Finance is responsible for the management and administration of national finances and the external liaison work with international funding agencies. It is noted that officially the National Patriotic Health Campaign Committee (NPHCC) is responsible for coordination of government departments in the integrated management of the RWSS sector. While the Ministry of Water Resources (MWR) is the ministry responsible for the rural water supply and the Ministry of Health (MoH) is responsible for environmental hygiene and health promotion/education, the NPHCCO and various levels of PHCCO are offices established within the MoH hierarchy.





71. The Ministry of Water Resources centrally manages the water resources (including Water in Atmosphere, Surface Water, Groundwater and thermos), and is responsible for directing the rural water supply works, organize and co-ordinate the rural water supply infrastructures, rural water and electricity and village and town water supply works.

72. The Ministry of Health in accordance with the national social development plan and health activities is responsible for the works of rural water supply and sanitation; sets out the planning, evaluation and monitoring the water quality of the domestic water and takes up the daily duties of the National Patriotic Health Campaign Committee. The Technical Center for Rural Water Supply for the Department of Disease Control, Ministry of Health, PRC is responsible for providing technical support for the rural water supply and sanitation works. In addition, the Health Education Center is also established for rural water supply and sanitation information, education and communication.

73. The Ministry of Agriculture is responsible for managing the Agriculture and Rural economic development. Prior to February 2002, it also performed the daily duties for the State Council Leading Group for Poverty Alleviation and Development. This office is now an independent unit.

74. The Ministry of Construction is responsible for directing the planning of the villages and towns for the whole nation; directing the housing development and construction of the villages and towns; directing the infrastructures construction of villages and towns and the management of the landscaping works of the villages. The Ministry of Land and Resources is responsible for supervision and managing the geological environment and underground water resources.

b(ii) Provincial, Municipal and Local Governments

75. The top levels of the regional governments in the whole country are the regional governments of the 31 provinces, autonomous regions, direct-administration cities. The second tier are governments of the autonomous prefectures and the cities. The third tier of the government are counties, autonomous counties and districts. The fourth tier of the government are villages, ethnic minorities villages, towns, autonomous districts, autonomous prefectures, autonomous counties of the minority ethnic groups. Each level of government has set up its corresponding water supply, health, agriculture and land managing departments. Urban and rural residents could voluntarily set up their individual residents' committees to manage the local affairs.

76. To a certain extent, the Ministry of Water Resources together with its subordinate Water Resources departments is responsible for rural water supply functions; the Ministry of Health together with its subordinate Health departments is responsible for rural sanitation and health education functions. The two streams of administrative department should co-operate and co-ordinate their planning, funding and implementation of projects in the RWSS sector to put the concept of "3-in-1" into actual application.

b(iii) Non-Government Organizations (NGO)

77. In the PRC, through the advocacy and support from the government, there are numerous non-government organizations actively involved in the works of rural water supply and sanitation. These NGOs can roughly be divided into three types, namely, social





organizations, funds agencies and community-based non-commercial organizations.

78. Under the leadership of the All-China Women's Association, through the mobilization of each level of women networks and the active involvement of the mass media, the support from every social sector was solicited for the RWSS works. By the end of 2000, China Women's Development Foundation raised funds for "Water Cellar for Mothers" project. Also from February 2001, the foundation regularly provided financial support to RWSS works in Western Regions. In these 3 years it has invested RMB 130 millions in western 15 provinces and about 90,000 water cellars and 1070 small-scale water plant projects have been constructed. It helps 900,000 people in solving the difficulties of drinking water supply.

79. The Chinese Poverty Reduction Fund has established specific project items to help with the social development and basic infrastructure for the rural poor areas. In RWSS works, the Fund implemented 5 phases of RWS works from 1998 to 2003 in the provinces of Gansu, Shaanxi, Hebei, Guizhou and the autonomous region of Ningxia with an investment of RMB 5.359 millions. The project covered water storage and intake works at 16 locations with 2,237 water cellars and solved the drinking water supply problems for about 16,400 rural population and 4,000 no. of cattle.

80. In addition, academic societies such as the Chinese Hydraulic Engineering Society, Chinese Medical Society on Disease Prevention devote great effort in scientific research and development in the RWSS sector. At present, the related professional members are planning to establish a RWSS Sector Subcommittee in the Chinese Medical Society on Disease Prevention.

E Current Situation of Capacity Building

a. National Policy

81. The Central Government has afforded great attention to RWSS works. While it strongly promotes the functions of NPHCC, it strong advocates the further strengthening of the rural water supply, rural sanitation and health education in the rural areas. The Central Government endorsed the Agenda 21 with main theme on "Sustainable Development". The government assigns top priority to the protection of water resources; management and rectification of water pollution; rural water supply and sanitation. The PRC also promulgates the "Poverty Alleviation and Development Directives for the Rural Poor in the PRC (2001-2010)". One key directive is to improve the living condition of the people in the rural villages and resolve the human and cattle drinking water problem.

82. In the implementation of the "Tenth Five-Year Plan", government treated RWSS works as top priority and arranged the national bonds to finance the RWSS works. Officials at all levels of government participated actively and the beneficiaries would be actively involved.

b. Issues relating to Capability Building in RWSS Sector

83. There are still a lot of issues relating to capacity building in the RWSS sector, namely:

- (i) inadequate skilled personnel, skill sets too narrow. There is a necessity to establish a qualified professional team with talents in rural water supply, sanitation, health education, economics, management, and legal fields;
- (ii) issues such as late availability of financial resources; funding from central level failing to reach the local levels, matching funding non-available could affect the progress of





- RWSS construction works. The local beneficiary and local organization may need to put in funds upfront, provide labour in kind or request the construction contractor to bear the costs;
- (iii) the water tariff policy fails to manage the demand of water supply and affects the financial sustainability. In consideration of the ability to pay and willingness to pay, the water tariff is set lower. The inadequate cost recovery could only cover the cost for operation and maintenance. In some cases, the tariff is set reasonably, however water users reduce water usage to sub-optimal level; and
 - (iv) the reliability of continuous water supply and ability to meet water quality criteria are still not satisfactory for some RWSS systems. It is estimated that the average per capita consumption level would only reach 100 L/day in normal areas and 50 L/day in arid areas by 2010⁶.

F Economic and Financial Aspects

a. Present Situation on Economic and Financial Management

84. In order to improve the overall effectiveness of investments, it is necessary to carry out financial assessment and economical assessment.

- (i) economical analysis consists of assessment of the economical and social effectiveness from the national economy's point of view. To determine the effectiveness on national economy, the use of shadow tariff, shadow salary and shadow rate of currency exchange is necessary for the assessment the feasibility of the RWSS projects; and
- (ii) financial analysis is conducted to examine the cost effectiveness from an enterprising point of view. The analysis is based on a number of financial parameters, such as return on investment, debt-repayment ability, foreign exchange risk tolerance etc. to assess the financial viability of the project. The major parameters of financial analysis are the internal rate of return, breakeven period and net present value. Financial analysis can help determine a reasonable water tariff and an appropriate investment plan, and predict the financial situation of project implementation. It also enables the optimization of the capital and operation costs. Currently, the expenditure of water tariff in rural water supply is regulated to not more than 5% of net annual income.

85. The World Bank adopts the willingness-to-pay method in the loan projects in the PRC. Analysis on water supply investment, including the calculation of net present value due to public hygiene, social welfare and other factors, should be carried out in the selection of project locations. The rural village with the largest net present value in the investment plan should be selected.

86. In reality, investments on different RWSS projects produce different net present values, which are depended on factors such as willingness to pay, public hygiene, social welfare and capital cost of the systems. Owing to the lack of market in rural poor areas, it is difficult to determine the water tariff. Therefore, investment on water supply system should adopt the arrangement of financial agreement. A basic rate of return should be determined. The water tariff should be sufficient to cover the cost of operation, maintenance and depreciation, or the repayment of debt, whichever is greater. It is calculated that the rate of return should be at

⁶ Ministry of Water Resources, Research & Development Center "Rural Water Supply Strategic Study Report"





least 3% in order to meet the requirement of financial agreement and obtain a positive net present value in investment.

b. Status of Funding in RWSS Sector

87. According statistics of NPHCC, the cumulated total investment of the PRC from 1981 to 2002 in rural water supply reached RMB 70.57 billion (\$8.53 billion), and that in rural sanitation and latrine improvement from 1996 to 2002 reached RMB 20.21 billion (\$2.44 billion). For the period of 1996 to 2002, the total investment in RWSS sector is RMB 62.17 billion (\$7.51 billion). (See Table 10 and Table 11 below.)

Table 10 Nationwide Rural Water Supply Investments (1981-2002)

| Time | Total Invesmt. (Million RMB) | Government at all Levels | | Rural Collectives | | Rural Households | | Others | |
|--|------------------------------|--------------------------|-------|-------------------|-------|------------------|-------|----------|------|
| | | Invesmt. | % | Invesmt. | % | Invesmt. | % | Invesmt. | % |
| 1981-1985 6 th FY Period | 3919.23 | 910.11 | 23.22 | 1220.91 | 31.15 | 1658.83 | 42.33 | 129.38 | 3.3 |
| 1986-1990 7 th FY Period | 9434.08 | 1937.34 | 20.5 | 2630.43 | 27.90 | 4469.23 | 47.40 | 397.08 | 4.2 |
| 1991-1995 8 th FY Period | 15263.52 | 3656.36 | 23.95 | 4002.46 | 26.22 | 6530.28 | 42.78 | 1074.42 | 7.04 |
| 1996-2000 9 th FY Period | 26343.94 | 5993.65 | 22.75 | 7310.03 | 27.75 | 11771.25 | 44.68 | 1269.01 | 4.82 |
| 2001-2002 | 15614.17 | 5672.57 | 36.33 | 3792.25 | 24.29 | 5590.72 | 35.80 | 558.63 | 3.58 |
| Total | 70574.94 | 18170.03 | 25.75 | 18956.08 | 26.86 | 30020.31 | 42.53 | 3428.52 | 4.86 |

Notes: The investments in "Others" column are: loans, donations and grants

Table 11 Nationwide Rural Sanitary Latrine Investments (1996-2002)

| Time | Total Invesmt. (Million RMB) | Fund Sources | | | | | | | |
|--|------------------------------|--------------------------|-------|-------------------|-------|------------------|-------|----------|------|
| | | Government at all Levels | | Rural Collectives | | Rural Households | | Others | |
| | | Invesmt. | % | Invesmt. | % | Invesmt. | % | Invesmt. | % |
| 1996-2000 9 th FY Period | 13591.24 | 1849.49 | 13.61 | 2191.00 | 16.12 | 9341.63 | 68.73 | 209.12 | 1.54 |
| 2001-2002 | 6620.13 | 990.68 | 14.96 | 1269.44 | 19.18 | 4279.76 | 64.65 | 80.25 | 1.21 |
| Total | 20211.37 | 2840.17 | 14.05 | 3460.44 | 17.12 | 13621.39 | 67.40 | 289.37 | 1.43 |

Notes: The investments in "Others" column are: loans, donations and grants





88. The investments in RWSS increased progressively with more significant increments 1990's. The characteristics of RWSS investments are:

- (i) domestic funds comprised major portion supplemented by minor portion of foreign funds. From 1981 to 2002, the total investment on RWS from 1981 to 2002 was RMB 70,575 million. The total investment on sanitary latrines from 1996 to 2002 was RMB 20,211 million. The funds from the World Bank were minor;
- (ii) collective funds from rural villages and beneficiaries are major sources for the domestic funding, with government funds in subsidiary roles;
- (iii) government funds include finances from Ministry of Finance and respective Departments of Finance. Matching funding comes from local government and local department funding sources;
- (iv) the share of community investments is high (approximately 60%) in more economically developed regions such as Guangdong, Beijing, Shanghai, Tianjin and Jiangsu. In contrast, government investment reaches 60% in those poor areas such as Qinghai, Xinjiang, Guizhou, Gansu and Ningxia;
- (v) there is an increasing trend of individual investments on water supply systems. Investors have actively participated in RWSS projects;
- (vi) provincial government co-ordinates funds from more developed areas to support the less developed areas within the province;
- (vii) specific support was provided to the poor areas and ethnic minorities. Capital investment by the government was increased to 80% for Nanjiang Hetian, Keshi, Kezhou Sandizhou and other poor areas;
- (viii) the utilization of foreign investment is low. Except loans from the World Bank, other international funding sources are limited;
- (ix) donation from the society, such as the "Water Cellar for Mothers" project championed by the China Women's Development Foundation, was one of the funding sources; and
- (x) some provinces and cities have explored multiple funding sources including share capital, domestic/foreign investment, domestic and foreign loans, cooperation between agricultural and enterprising bodies, merging of town and rural areas, and various forms of privatization.

c. Water Tariff and Operation and Maintenance Costs

89. It is estimated that about one third commissioned water supply systems in the PRC are levying water tariffs which are unable to recover the costs. Insufficient or even no water tariff is being levied in some poor managed water supply systems. Since careful considerations have not been made during the determination of the water tariff, water supply bodies can hardly recover the costs from water tariffs, resulting in low rates of return (FIRR referred) and even losses. Hence, the effectiveness and development of water supply in those areas are adversely impacted.

90. The water tariff should be set at a level that can be beneficial to the development of water supply industry, enable recovery of water supply costs, encourage saving water and control of pollutions. The social acceptability (willingness to pay and ability to pay) should also be taken into account in the determination of water tariff. Water tariff should be adjusted for different types of usages. The profit for domestic water supply should be marginal. Tariff for manufacturing and commercial water consumptions should be set at a reasonable level; whereas tariff for profitable business water users should be relatively higher.





91. There are two major types of tariff structures. In the progressive stepwise structure, water rates increase stepwise with consumption, hence encouraging water saving practice. In the two-block structure, a fixed charge is levied for water consumption up to a pre-determined level, beyond which water tariff on consumption basis is charged. The merit is a guarantee of a base income in cost recovery.

92. The cost for rural water supply is depended on the following factors: (1) the distance between the water source and the users; (2) the water quality; and (3) mode of water supply. The cost can be fluctuated due to such factors as provision of public standpipes, connection of the supply system into each household and provision of continuous/intermittent supply. Therefore, the water tariff should be levied based on either the number of family members, or the metered consumption quantities.

G Current Status of External Aid

93. Since the commencement of economic reform, the International Donor Agencies have been very active in providing assistance to the PRC in the RWSS sector. These include the World Bank, United Nations Development and Program, World Health Organization, financial institutions and certain bilateral counterpart agencies of foreign governments. Table 12 shows a summary of the RWSS projects implemented by these external agencies.

Table 12 Major RWSS Projects Implemented by International Donor Agencies

| | Project Title | Project Content |
|---|--|---|
| 1 | World Bank RWS and RWSS Projects | <p>This project has been executed by 4 stages since 1985. In Phase I, the only component was rural water supply. From Phase II onwards, sanitary latrine and health education were added.</p> <p>Periods of Execution: Phase I 1985.11.13—1991.6.30 Phase II 1992.7.23—1998.12.31 Phase III 1991.11.12—2003.12.31 Phase IV 1999.11.21—2004.12.31</p> <p>For all 4 phases together, the projects encompassed 178 counties in 18 provinces, 6042 concentrated water supply systems, 65772 distributed water supply systems, sanitary public latrines 64500 and 15 million people benefited from health education programme. The total investment for all 4 phases is US\$686.286 million of which the loan of World Bank is US\$330.6 million, about 50%.</p> |
| 2 | China / UNICEF Programme of Co-operation | <p>Water and Environmental Sanitation (WES) (1996-2000) – construction of 110,000 latrines and health education for 47430 people;</p> <p>Child's Environmental and Sanitation (CES) (2001-2005) – (1) Environment, Sanitation and Hygiene; (2) Safe Drinking Water in Rural Areas</p> |
| 3 | World Food Program (WFP)-China RWS food assistance project | <p>Correlated with World Bank loan projects in RWSS, WFP provided food assistance for workers working on 10 RWSS projects in Liaoning and Shanxi. The labour in kind was counted towards matching local funding.</p> |





| | Project Title | Project Content |
|---|--|---|
| 4 | United Nations Development and Program – RWSS Projects | United Nations Development and Program contributed total US\$2.8 million grant for World Bank Phase I RWSS project. |
| 5 | World Health Organization Project | WHO provided teaching and financial resources for training of rural water quality monitoring, rural sanitation management, role and effect of women in rural water supply, etc. |
| 6 | Other International projects for RWSS | These assistance projects were mainly from government of Japan, Germany, Britain and Europe Union |

94. In the implementation of the 4 phases of World Bank project in the RWSS section, the integrated approach of the 3-in-1 concept in rural water supply, sanitation and hygiene education is adopted. With the cooperation of respective level governments and ministries in assigning competent staff to the project management offices, the integrated development in the RWSS sector has been satisfactory.

95. The external funding agencies as listed in the above section have been instrumental in promoting the development in the RWSS sector. The seeding effect and the demonstrative effect are very prominent. The key impacts are:

- (i) promoting the RWSS development in the rural parts of the PRC;
- (ii) management aspects and capacity aspects in the rural water supply, sanitation, and health education & hygiene promotion;
- (iii) appropriate technology in rural water supply systems and sanitary latrine construction; and
- (iv) rural water supply, sanitation and hygiene education are the 3-in-1 integrated components in this sector.

H Poverty, Social and Gender Aspects

96. The PRC has achieved remarkable results in pro-poverty works. Since the commencement of economic reform in early 1980's, the Government of PRC has made a great achievement in social and economic development. The result in alleviating poverty is particularly prominent. The rural population below the poverty line (i.e. net annual income less than RMB 637 or \$77) decreased from 250 million (i.e. 30.7% of the total rural population) in 1978 to 80 million in 1992 and further to 30 million (i.e. 3% of the total rural population) in 2000. At the end of the last century, the objective of resolving the problem of population without basic provisions in life was basically achieved. According to the statistics of the China National Economic and Social Development Statistical Report 2003, by the end of 2003, the poor rural population was 29 million. According to the extreme poverty index of the WB (i.e. daily expenditure of less than USD 1), by 2002, there are still 88 million of poor population throughout the country. Irrespective of the definitions adopted by PRC or WB, the alleviation of poverty for these people presents a great challenge. Most of this under-privileged group live in Central and Western Regions of the PRC.

97. In the new century, the Central Government formulated a new 10 Year pro-poverty investment policy embodied in the "Poverty Alleviation and Development Directives for the Rural Poor in China (2001-2010)". The basic directive emphasizes to: "strengthen the





infrastructure facilities for water resources, transport, power supply, communication, etc, focus in the development of science, education, hygiene and culture, improve the social environment, elevate the living standard, promote the harmonic and comprehensive social and economic development and improvement.” The guidelines for poor alleviation objectives, target and scope have recently been changed: (i) from resource orientated to capacity development. (ii) from township to village and (iii) not only includes the poor population, but also covers the low income class.

98. The pace of resolving the problem of population without well-being life is evidently slowed down. During the period of “Pro-poverty Scheme 1987”, the problems of lack of well-being life of about 6 million of rural poor population were resolved annually. For the first 2 years after entering into the new era, the figure reduced to 2 million. The figure even bounced back and showed an increase last year. The situation was worsened by natural disasters in the provinces of Henan, Anhui, Shanxi, Heilongjiang, etc. More than 2 million of population returned back to poverty in these four provinces. This was the first time in the pro-poverty history since the economic reform⁷.

99. Moreover, from the macroscopic level, there were also serious problems existed in the development of social and economic in the PRC in the past 20 years. One of the problems was the unbalanced social and economic development. This was reflected in the widening of the gap between rural and urban income as well as the difference between rich and poor. According to detailed investigation of the situation of the income distribution for the years of 1988 and 1995 conducted by the Research Group of Income Distribution Study of the Chinese Academy of Social Science, the Gini index of the PRC increased from 0.382 in 1988 to 0.445 in 1995 and reached 0.459⁸ in 2001, which has already exceeded those of some developed countries and also exceeded the widely recognized alarm level. It showed an increasing trend towards to end of the 90s. WB published a report in 1997 stated that the Gini index, which reflects the income of residents, was 0.28 in the early 80s and raised to 0.38 in 1995. This information reflects that the difference between rich and poor is even bigger than that of developed countries, other Asian countries and the former USSR.

100. In the aspect of disparity in income, the most apparent problem is the difference in income between urban and rural areas. The difference in income between urban and rural areas also basically reflects the key point of pro-poverty works and has a profound influence in the sustainability development of social and economic of the PRC. The difference in income between the poor population and other rural population increased. In 2003, the upper limit for personal net income of population without well-being life was RMB 637, while that for the average personal net income of the rural population in the country was RMB 2622. The ratio was 1:4.12 compared with 1:2.45 in 1992 indicating a further increase in the difference. This highlighted that the poor population was in an under privileged situation during the course of development.

⁷ Dazhong Ribao 2004-9-14 “Eliminate Fragility in Poverty Alleviation”

⁸ Economic Daily 2002-8-30 “Disparity of Income Widening”



Table 13 Urban and Rural Income Comparison and Engel's Index⁹ (1991-2001)

| Year | Net Income per Capita in Rural Households (RMB) | Net Income per Capita in Urban Households (RMB) | Engel's Index of Rural Households (%) | Engel's Index of Urban Households (%) |
|------|---|---|---------------------------------------|---------------------------------------|
| 1991 | 708.6 | 1700.6 | 57.6 | 53.8 |
| 1992 | 784.0 | 2026.6 | 57.6 | 52.9 |
| 1993 | 921.6 | 2577.4 | 58.1 | 50.1 |
| 1994 | 1221.0 | 3496.2 | 58.9 | 49.9 |
| 1995 | 1577.7 | 4283.0 | 58.6 | 49.9 |
| 1996 | 1926.1 | 4838.9 | 56.3 | 48.6 |
| 1997 | 2090.1 | 5160.3 | 55.1 | 46.4 |
| 1998 | 2162.0 | 5425.1 | 53.4 | 44.5 |
| 1999 | 2210.3 | 5854.0 | 52.6 | 41.9 |
| 2000 | 2253.4 | 6280.0 | 49.1 | 39.2 |
| 2001 | 2366.4 | 6859.6 | 47.7 | 37.9 |

101. The difference in income is related to poverty problems, which can also be reflected in the difference in regions. The difference in development between the western and eastern provinces is more conspicuous. The major economic and social development indicators for the 12 provinces in the Western Regions as compared with the national averages in 2001 are shown in Table 14.

Table 14 Major Economic and Social Development Indicators for the 12 Provinces in the Western Regions (2001)¹⁰

| Indicators | Unit | National Level | 12 Western Provinces | Relative Proportion of 12 Western Provinces (%) |
|---|-------------|----------------|----------------------|---|
| Area (Thousand Sq. Km) | | About 9,600 | 6,867 | 71.5 |
| Population by end of year | Thousand | 1,276,270 | 364,470 | 28.7 |
| Employment Population by end of year | Thousand | 730,250 | 182,860 | 29.0 |
| National Domestic Product | Billion RMB | 9,593.33 | 1,824.84 | 17.1 |
| Primary Production | Billion RMB | 1,460.99 | 383.31 | 24.7 |
| Secondary Production | Billion RMB | 4,906.91 | 743.06 | 14.9 |
| Industrial Production | Billion RMB | 4,260.71 | 581.32 | 13.6 |
| Tertiary Production | Billion RMB | 3,225.43 | 698.48 | 16.9 |
| Retail Value of Social and Consumer Goods | Billion RMB | 3,759.52 | 659.14 | 16.8 |
| Net Income of Rural Resident | RMB | 2366.40 | 1755.10 | |

⁹ Source: National Bureau of Statistics of China

¹⁰ Source: National Bureau of Statistics of China





102. In order to strengthen the capability of the PRC's sustainable development in social and economic aspects, to enhance comprehensive establishment of a well-to-do society through harmonic development in social and economic and to reduce the adverse impact of market economics reform to the disparity in income, the PRC Government formally proposes the "Five Planning Balancing Strategies":

- (i) balancing urban and rural development: the development of rural agriculture is slow and the increase in farmer's income is low. In order to achieve well-to-do middle class society, the key issue is on farmers;
- (ii) balancing regional development: requires governments to strengthen the harmonize regional development among Eastern, Central and Western Regions;
- (iii) balancing social and economic development: requires balanced efforts in social and economic development with emphasize on the balance of the quality of economic development and the quality of living;
- (iv) balancing the harmony between development of human kind and nature: Protect the environment and natural ecology; and
- (v) balancing domestic development and international cooperation, fully commit to the cooperation with international financing agencies.

103. In the development strategy of the new era, the PRC Government clearly states the objective of "human capital" in social and economic development. It further emphasizes the importance of social development. The meaning of social development in the aspect of pro-poverty works is to change the narrow concept of simply economic growth and to take into account of the education, hygiene, and environmental aspects in rural areas. Through development in social aspects, the living standard of the poor areas can be improved and the sustainable development of social and economic can also be facilitated.

104. In rural poor areas, women and children still expend labour and time to fetch water. On one hand it is a waste of economic resources, on the other it deprives the children the opportunity to receive education. Women are also the primary care-givers in families especially in times when family members fall sick. As illustrated in the case studies conducted in Nov and Dec 2004 (please refer to the Case Studies Reports), the burden of carrying water lies heavily and most of the times solely on the female gender. Although the status of women in rural areas is improving, the motivation of women to participate in social community based development is still thin. Women's self image remains subservient to the male counterpart.

105. In the social development of women and children, the PRC Government formulates the "Directives for Social Development of Women in China (2001-2010)" and "Directives of Social Development of Children in China (2001-2010)". These two documents demonstrate the potential development of women and children in the aspects of economic, politics, education, health care, legal protection and environment and achieved the sustainable development of women and children. Previous study demonstrates that women when given the opportunity are able and willing to participate in social development projects.





I Issues of Community Based Participation

a. Government Led Community Based Participation in Poverty Alleviation

106. The efforts in poverty alleviation and development in the PRC is a government led community participated effort. The participation of community in RWSS projects is essential in ensuring that conflicting interests are harmonized, that inequities are removed and that the benefits are enjoyed by the community members.

107. Based on the past experience, a clear set of procedures and methods is essential to facilitate effective participation of local community. Since 1990's, the traditional principle guiding the community participation is "total involvement with the people". The international experience such as the World Bank projects also enriches concept and method of community-based organization. As present, there are about 200 major poverty alleviation projects being planned with active community participation for the next 3 to 5 years at the village level. Many of these works are already implemented.

b. Issues Relating to the Community Participation

108. The integration of the traditional "people based strategy" in the PRC and emphasis on "community participation" promoted by the international aid agencies results in a clear policy of community based participation in the RWSS project works. However, there are issues and deficiencies to be resolved:

- (i) inadequate implementation procedures to ensure clear understanding of community participation and elimination of deficiencies and arbitrary elements;
- (ii) inadequate appreciation of the full meaning of community participation. Some consider government administration with community support as community participation;
- (iii) some officials fail to appreciate the empowerment of community participation, putting community in a subordinate position in a "Government lead, people follow" model;
- (iv) at the other extreme, community participation perpetuates the mistrust and alienation of government and bypass of established procedures;
- (v) in some cases, only lip service is paid to the participation; and
- (vi) in some cases, the costs of involvement of external "experts" become a disproportionate burden.

109. The beneficiaries and communities are important resources to be mobilized. It is essential for government to mobilize, organize and guide the efforts of community participation and its integration with external factors to ensure success of RWSS projects.

J Environmental Aspects

110. Improvements in sanitary facilities and environmental hygiene of villages and townships are one of the major and high-priority tasks of the government¹¹. By implementing this task, the authority aims to control pollution and protect the environment of villages. Moreover, protection of villages' water resources and reduction of water-borne diseases can also be achieved. By "water-borne" we refer to diseases communicable through the water media.

¹¹ NPHCCO "National Standards for Sanitary Townships"





111. The problem of “solid waste hills surrounding cities scenario” is currently very serious in many cities in the PRC. The one-layer non-permeable membrane could not effectively contain the leachate. Ground water resources in cities in the PRC have undergone different degrees of contamination, ranging from 33% in moderately polluted cities to 64% in heavily polluted cities. Owing to the exfiltration problem in landfill sites, there is a trend to dump municipal wastes further and further away from urban centers.

K Monitoring, Evaluation and Dissemination Aspects

a. Monitoring

112. With the aim for effective management of the water quality of rural water supply and prompt identification and action on incidences of unsafe water quality issues, the NPHCCO formulated a “National Monitoring System for Water Quality Rural Drinking Water Supply” in 1991 and commissioned monitoring networks in 1992. The programme has since provided effective continuous monitoring of drinking water quality in rural areas. It enables early alert for water-borne diseases, safeguard of drinking water hygiene and support data for improvement efforts in rural water supply. After ten years of work, the monitoring network of drinking water quality in rural area in the PRC is basically established.

113. At present, 17 water quality parameters are monitored. From 2004 onwards, arsenic monitoring will be added. In 2003, UNICEF sponsored a study on the issue of arsenic monitoring and successfully incorporate the arsenic into the monitoring systems in 11 provinces. By 2004, a total of 14 provinces have implemented arsenic monitoring.

114. Based on the experience of executing World Bank funded RWSS projects, an effective model of monitoring system is now available. The short term and long-term health indicators are particularly relevant in assess the interaction of RWSS works with poverty, women, children and vulnerable groups. Details of indicators with respect to rural water supply, rural sanitary standard and health education are listed in [Appendix 2](#). The list of indicators is derived from the WB experience. In WB’s RWSS III projects, there were a pre-implementation baseline survey and a post-implementation follow-up survey in which these indicators were monitored. In RWSS IV, the baseline survey has been completed while the follow-up survey is not in progress.

b. Evaluation

115. In establishing an effective monitoring system to collect various monitoring data, it is also necessary to establish scientific evaluation methods to assess the transparency, impact, and sustainability of the Project. As a way forward for RWSS projects, some of the methods are listed below:

- (i) initialization Evaluation: understand the characteristics of the target groups and their views on RWSS work, devise public health education messages and survey questionnaires;
- (ii) process Evaluation: Assess the implementation of the plans; assess the working conditions of monitoring staff; assess project pre-experiments, education materials, propaganda material and survey questionnaires;
- (iii) impacts Evaluation: Assess the short and medium term Knowledge-Action-Practice (KAP) difference of the target groups, change of viewpoints of key stakeholders;
- (iv) results Evaluation: Assess the long term KAP observation to evaluate the





- achievement of ultimate objectives of the health promotion programme. Effects of RWSS works in improving the health condition of the target group and benefits of RWSS in improving the living standards of target groups in terms of long term social, economic, environment and health benefits; and
- (v) overall Evaluation: Assess the overall effectiveness of RWSS works by summarizing all relevant evaluation data, objective achievement, completion status, experience sharing, lessons learned and considerations for future planning.

c. Dissemination

116. The information of monitoring and evaluations should be transparent; the data and interpretation analysis should be published through the communication channels to ensure the public is able to make reference to.





V Case Studies

A Background of Case Studies

a. Case Studies as Key Elements of the ADTA

117. The Case Studies constitute essential elements in the entire ADTA. Given the vastness and great disparities of the PRC, a generalized perspective for the RWSS Sector as discussed in Section IV will need to be supplemented by specific perspective for critical sectoral issues arising from local-specific conditions. Specific locations with their own characteristics in social, economical, demographic & ethnical, geographical, hydro-geological, technological, institutional, management aspects would be best analyzed by a Case Study approach. The Terms of Reference ([Appendix 1](#)) stipulates that the strategy formulation will include case studies to test selected critical issues, including an in-depth analysis of organizational models for water user groups, pro-poor RWSS tariff setting, and community-based O&M models for existing RWSS schemes. The ADTA is required to carry out an analysis of the constraints and identified critical sectoral issues for selected case studies.

b. Selection of the Case Study Location

118. The Consultants' Team has selected a total of six Case Studies as the major investigation works with appropriate liaison with ongoing RWSS projects. The case studies would be based on the existing primarily and secondary information and supplemented with the information obtained in the field visit to investigate the major and the most difficult aspects of the project. Representing different development characteristics amongst the Western, Central and Eastern Region of the PRC, the six locations are:

- (i) Chuxiong City in Yunnan Province;
- (ii) Fenghuang Prefecture in Xiangxi Area in Hunan Province;
- (iii) Tianshui City in Gansu Province;
- (iv) Tumotezuqi in Inner Mongolia Autonomous Region;
- (v) Gaocheng City in Hebei Province; and
- (vi) Yuyao City in Zhejiang Province.

119. Chuxiong City is located within the Chuxiong Yi Zu Autonomous Prefecture in Yunnan Province, which is classified as the National Poverty Prefecture. During the years between 1992 and 1998, the City implemented Phase 2 of "Rural Water Supply and Sanitation Project" funded by the World Bank. The Project Management Office was responsible for the management of the implementation of the World Bank Phase 2 project. Upon the completion of the project, municipal government strengthens the operation and management works for the water supply and sanitary works. Being selected as one of the case studies, Chuxiong City is representative of the southwestern region in the PRC. The required basic information is abundant and readily available. It provides good value for strategic study. Therefore, it fulfills the basic requirements for the case study. Please refer to [Appendix 2-1](#) for the Work Plan for the Case Study of Chuxiong City in Yunnan Province.

120. The subject of the case study, Fenghuang Prefecture is located at the western end of Hunan Province along the Tuojiang River. To the east is the Loxi County of Xiangxi while to the south is Mayang County. Being selected as one of the case studies, Fenghuang Prefecture is representative of poverty areas inhabited by ethnic minority races locating in inland mountainous regions. The required basic information is abundant and readily available.





It provides good value for strategic study. Therefore, it fulfills the basic requirements for the case study. Please refer to [Appendix 2-1](#) for the Work Plan for the Case Study of Fenghuang, Xiangxi in Hunan Province.

121. During the years between 1992 and 2003, Tianshui City implemented Phase 2 and 3 of “Rural Water Supply and Sanitation Project” funded by the World Bank in Beidao District and Quicheng District. During the course of the project, the Project Management Offices (PMOs) strengthened the operation and management works for the water supply and sanitary works. Upon completion of the project, the PMOs are retained to cooperate with the Water Resources Bureau for operation and management of the RWSS project works for the whole city, including supervision and technical assistance in water quality monitoring, supervision and control for safe drinking water supply and co-operation with the relevant departments for the proper execution of the loan repayment. Being selected as one of the case studies, Tianshui City can represent the water storage and remote poverty inland region in China. The required basic information is abundant and readily available. It provides good value for strategic study. Therefore, it fulfills the basic requirements for the case study. Please refer to [Appendix 2-1](#) for the Work Plan for the Case Study of Tianshui City in Gansu Province.

122. Tumotezuqi has the problems of fluorine and arsenic exceeding the permissible limit in drinking water. The case studies would base on the existing information and supplement with the information obtained in the field visit to investigate the major and the most difficult aspects of the project. Being selected as one of the case studies, Tumotezuqi is representative of the minority races at inland region. Please refer to [Appendix 2-1](#) for the Work Plan for the Case Study of Tumotezuqi in Inner Mongolia.

123. Being selected as one of the case studies, Gaocheng City is representative of the Central Region in the PRC. Since 1980, Gaocheng City has started its rural water supply projects with village and township as project units according to the local geographic conditions and level of economic development. Gaocheng City is located at plain areas with high density of population, medium level economic development, where the basis needs for food and shelter have been solved and there is a strong desire for sanitation improvement. Please refer to [Appendix 2-1](#) for the Work Plan for the Case Study of Gaocheng City in Hebei Province.

124. Yuyao City belongs to the jurisdiction of Ningbo city in Zhejiang Province. Since 1985, the city has started the implementation of the first Rural Water Supply project financed by the World Bank, and currently the piped water systems cover the whole city. During the project implementation, the Executive Agency was fully organized with standardized management and well preserved documentations. After project completion, the city government strengthened the operation and management of the water supply project, and the former project offices have been transferred to be responsible for the overall direction and supervision of operation, management and water supply systems. Being selected as one of the case studies, Yuyao City is representative of the Eastern Region in the PRC. The required basic information is abundant and readily available. With high density of population and better economic level, the rural residents are eager to improve their water supply and sanitation, which fulfills the basic requirements for the case study. Please refer to [Appendix 2-1](#) for the Work Plan for the Case Study of Yuyao City in Zhejiang Province.





B Scope and Objectives of the Case Studies

a. Common Topics of the Case Studies

125. The Case Studies have been devised aiming for an in-depth investigation on the following topics which are common for the six locations:

- (i) Construction, operation and maintenance of the rural water supply facilities;
- (ii) Construction, usage and benefits of the sanitary latrines;
- (iii) Availability, quality, application and practical usage of locally manufactured goods and construction materials;
- (iv) Protection and utilization of water resources.

b. Specific Topics of the Case Studies

126. The topics specific to the particular locations are:

| | |
|-------------|---|
| Chuxiong: | comprehensive aspects for World Bank RWSS projects; |
| Fenghuang: | ethnic minority races in remote, poor and hilly regions; |
| Tianshui: | arid regions with severe shortage of water and “Water Cellars for Mothers”; |
| Tumotezuqi: | high Arsenic and Fluorine content regions. |
| Gaocheng: | Central Region of the PRC, plain area with high density of population, medium level economic development, |
| Yuyao: | Eastern Region of the PRC with high density of population and better economic level and rural residents are eager to improve their water supply and sanitation. |

c. Objectives

127. The objectives of the Case Studies are:

- (i) Evaluate the appropriateness of the existing water supply and sanitary facilities;
- (ii) Evaluate the procurement and quality of materials, equipment and workmanship;
- (iii) Evaluate the reasonable utilization of water resources;
- (iv) Evaluate the sustainability of development.

d. Methods

128. The methodology of this Case Studies mainly involves the following tasks:

- (i) Collect and analyze the reference books and materials, then prepare the proposals for the case study, include liaising with the case study team members and the reception units, arranging for accommodation and transportation, preparing checklists for all required information and the relevant questionnaires;
- (ii) Conduct a seminar with the reception unit and local government departments with relevant responsibilities in the rural water supply and sanitary sector, and review the relevant information;
- (iii) Conduct field visits and surveys, including questionnaire surveys, open discussion, observations and records, home visits and interviews, discussion forums and seminars etc;
- (iv) Analyze the collected information, conduct group discussion, investigation, assessment, conclusion and recommendation;
- (v) Prepare and compile Case Study Report.

e. Questionnaires and Survey Sheets

129. 5 Survey Forms and Questionnaire have been devised for the field visits, sample questionnaires and survey sheets are enclosed in [Appendix 2-2](#).





- (i) Information provided by Officers of County/ Village of Local Government;
- (ii) Questionnaire for Local Government relevant to RWSS;
- (iii) Summary Data of Existing centralized water supply facilities (water treatment plant);
- (iv) Survey Sheet for Centralized Water Supply Facilities;
- (v) Village Household Survey Questionnaire.

C Case Studies - Social and Economic Development Current Status

General information with respect to the status of social and economic development of the six Case Studies locations are listed in

130. Table 15 below:

Table 15 Status of Social and Economic Development

| Region in PRC | Western | | | | Central | Eastern |
|---|-----------------------------------|--------------------------------|--------------------------------|-------------------------------------|---|------------------------------|
| Location | Chuxiong | Fenghuang | Tianshui | Tumotezuqi | Gaocheng | Yuyao |
| Province | Yunnan | Hunan | Gansu | Inner Mongolia Autonomous Region | Hebei | Zhejiang |
| Area (km ²) | 4,433 | 15,468 | 14,319 | 2,700 | 836 | - |
| Ethnic Minority | Yi, Miao, Bai, Hui, Hani and Susu | Miao, Han, Tujia and Hui Zu | - | Han and Mongolia | Han | Han |
| Major Agricultural Activities | Cultivation (Tobacco) | Cultivation (Varyity of crops) | Cultivation (Varyity of crops) | Cultivation (Corn) & Animal Rearing | Private Enterprise, Animal Rearing and Forestry | Cultivation & Animal Rearing |
| Per capita Income (¥) | 2,067 | 1,300 | 1,058 | 3,000 | 4,621 | 6,960 |
| Geography | Highland | Mountainous | Mountainous | Plain | Plain | Plain |
| Climate | Sub-tropical | Sub-tropical Continental | Continental | Continental | Subtropical monsoon | Subtropical monsoon |
| Annual Precipitation (million m ³) | 3,886 | 1,624 | 3,249 | - | 12 | 3,886 |
| Surface Water Resources (million m ³) | 633 | 1,312 | 2,970 | - | - | 1,101 |
| Ground Water Resources (million m ³) | 266 | 312 | 842 | - | 288 | 112 |

131. Refer to Fig. 3 to Fig. 8 for the Maps of Chuxiong, Fenghuang, Tianshui, Tumotezuqi, Gaocheng and Yuyao.



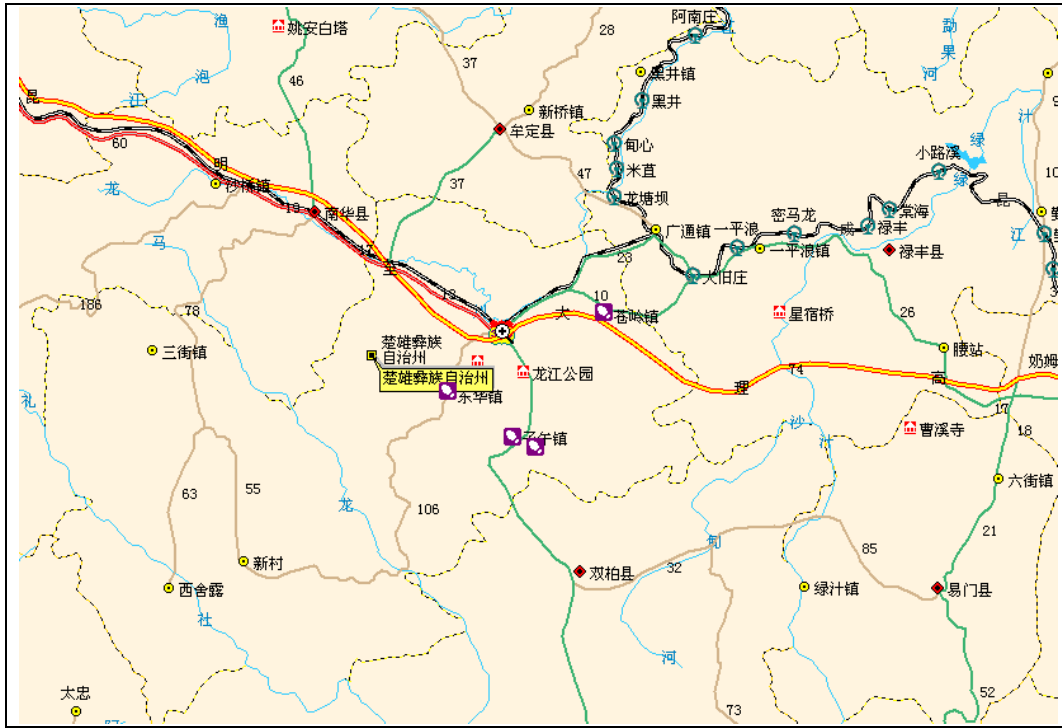


Fig. 3 Map of Chuxiong in Yunnan Province



Fig. 4 Map of Fenghuang, Xiangxi in Hunan Province





Fig. 5 Map of Tianshui in Gansu Province



Fig. 6 Map of Tumotezuqi in Inner Mongolia Autonomous Region





Fig. 7 Map of Gaocheng in Hebei Province



Fig. 8 Map of Yuyao in Zhejiang Province





D Case Studies - Rural Water Supply Current Status

a. Survey Work for the Rural Water Supply

132. In Chuxiong, despite the abundance of water resources, there is water shortage of engineering nature (i.e. water flowing down the valleys require engineering works to lift to communities). This shortage is more prominent in areas prior to RWS projects or not yet benefited by RWS projects. In these areas, inhabitants extract untreated water from distributed surface sources such as wells, rivers, ponds, streams and springs etc. Based on the team's observation, there are significant risks for safe drinking water in terms of water quantity and water quality, e.g. contamination by upstream sources or water shortage in dry seasons. It is recognized that these safe drinking water problems are closely related to the state of social development, awareness of environmental hygiene and public health as well as poverty issues in the local communities. The team visited 4 RWS water treatment plants (Ziwu, Donghua, Yunlong and Cangling) and associated existing rural water supply facilities as listed in Table 16:

Table 16 Summary of Information of the Existing Rural Centralized Water Supply Facilities in Chuxiong City

| Project Title | Water Source | Total Engineering Investment (¥ thousands) | Design Water Supply Capacity (m ³ /day) | Beneficial population (thousands people) | | Existing Daily Water Consumption (L/person •day) | Average Daily Water Supply (%) | Water price (¥/T) | Management Staff (person) | Operation Period (Year) |
|----------------|--------------|--|--|--|----------|--|----------------------------------|---------------------|-----------------------------|---------------------------|
| | | | | Design | Existing | | | | | |
| Donghua WTP | Reservoir | 5759.5 | 1200 | 16.0 | 13.4 | 58 | 93 | 1.5-2.5 | 13 | 11 |
| Yunlong WTP | Spring | 712.1 | 300 | 04.0 | 03.4 | 55 | 94 | 1.5-2.0 | 4 | 8 |
| Ziwu WTP | Reservoir | 4830.0 | 1200 | 15.8 | 11.0 | 52 | 64 | 1.5-3.0 | 9 | 8 |
| Cangling WTP | Reservoir | 1898.0 | 918 | 15.5 | 13.0 | 39 | 94 | 1.5-2.0 | 9 | 8 |
| Shangsan WTP | Reservoir | 41.8 | 30 | 0.38 | 0.32 | 63 | 67 | 1.2 | 1 | 11 |
| Zhoujiacun WTP | Spring | 33.4 | 12 | 0.16 | 0.13 | 69 | 75 | 1.0 | 1 | 11 |
| Liujiacun WTP | Stream | 130.8 | 24 | 0.32 | 0.27 | 63 | 71 | 1.0 | 1 | 8 |
| Liujiatun WTP | Reservoir | 187.1 | 200 | 2.6 | 2.2 | 59 | 65 | 1.0 | 1 | 10 |

Note: The first 4 WTPs adopt different water tariffs for different consumer categories.





133. With the assistance of the Fenghuang municipal government (including World Bank PMO, Health Bureau & PHCCO, Water Resources Bureau, Development and Reform Bureau, Finance Bureau, Poverty Alleviation Office), the team conducted seminars, data collection, field visits and interviews. The team studied the implementation, operation and maintenance of RWSS projects. The team visited 4 RWSS water treatment plants (Ala, Jixin, Xinchang, Liubao) and associated existing rural water supply facilities as listed in Table 17:

Table 17 Summary of Information of the Existing Rural Centralized Water Supply Facilities in Fenghuang Prefecture

| Project Title | Water Source | Total Engineering Investment (¥ thousands) | Design Water Supply Capacity (m ³ /day) | Beneficial population (thousands people) | | Existing Daily Water Consumption (L/person •day) | Average Daily Water Supply (%) | Water price (¥/T) | Management Staff (person) | Operation Period (Year) |
|----------------|--------------|--|--|--|----------|--|----------------------------------|---------------------|-----------------------------|---------------------------|
| | | | | Design | Existing | | | | | |
| Liubao WTP | Reservoir | 519.7 | 300 | 7 | 5 | 40 | 67 | 0.5 | 2 | 2 |
| Ala WTP | Reservoir | 3579 | 1500 | 8.5 | 12 | 56 | 45 | 1.36-4.0 | 28 | 10 |
| Jixin WTP | Reservoir | 2200 | 700 | 4 | 9 | 72 | 92 | 0.6 | 8 | 19 |
| Xinchang WTP | Ground Water | 1039 | 500 | 5 | 5 | 53 | 53 | 1.5 | 2 | 7 |
| Na'ershan WTP | Spring | 822 | 650 | 6.5 | 6.5 | 31 | 31 | 2.0 | 5 | 10 |
| Datianlong WTP | Spring | 240 | 50 | 1 | 1 | 30 | 60 | 1.0 | 1 | 1 |
| Shiyan WTP | Ground Water | 687 | 500 | 4 | 4 | 50 | 40 | 1.2 | 2 | 7 |
| Chatian WTP | Ground Water | 675 | 650 | 5 | 5 | 40 | 31 | 1.5 | 2 | 7 |

Note: Ala WTP adopts different water tariffs for different consumer categories.

134. Wei River basin of Tianshui is short of water due to lack of water resources and engineering infrastructure, such as water storage facility, within the basin. Owing to its mountainous topography, the water quality is found to be poor. The soil characteristic is mainly alkaline yellowish soil and chestnut colour calcium rich soil. It is a weak alkaline to alkaline oxidized chemical environment in terms of hydrological geology. The area is classified as high fluorine affected area. Besides, because of the low rainfall and high evaporation rate, the seepage of saline and alkaline materials imparts bitter and salty tastes in water in the North Wei District. In addition, the discharge of the untreated domestic and industrial wastewater results in water pollution in some areas. Moreover, the natural conditions of villages located at the arid area are poor. Villagers have to collect the poor quality water from streams far away. It is recognized that there are problems of safe drinking water in terms of water quantity and water quality. These problems are closely related to the state of social development, awareness of environmental hygiene and public health as well as poverty issues in the local communities. The team visited 5 RWSS water treatment plants (Taijing, Niangniangba, Chengjicun, Maiji and Zhongshi) and associated existing rural water supply facilities as listed in Table 18:





Table 18 Summary of Information of the Existing Rural Water Supply Facilities in Tianshui City

| Project Title | Water Source | Total Engineering Investment (¥ thousands) | Design Water Supply Capacity (m ³ /day) | Beneficiary population (thousands people) | | Existing Daily Water Consumption (L/person •day) | Average Daily Water Supply (%) | Water price (¥/T) | Management Staff (person) | Operation Period (Year) |
|---------------|--------------|--|--|---|----------|--|----------------------------------|---------------------|-----------------------------|---------------------------|
| | | | | Design | Existing | | | | | |
| Taijing | Groundwater | 1150 | 629 | 12.5 | 3.2 | 27 | 13 | 0.8-2.5 | 1 | 10 |
| Niangniangba | Groundwater | 590 | 80 | 2.0 | 1.6 | 10 | 19 | 1.84 | 1 | 0.3 |
| Sangrias | Groundwater | 474.8 | 76.8 | 1.8 | 1.6 | 25 | 52 | 1.3 | 6 | 2 |
| Duojiazhuang | Groundwater | 187 | 67.55 | 1.4 | 1.2 | 23 | 40 | 1.46 | 2 | 10 |
| Yangjiayao | Spring | 115.4 | 24.4 | 1.1 | 1.0 | 24 | 98 | 0.52 | 1 | 9 |
| Chengjiacun | Groundwater | 251.1 | 84 | 2.0 | 1.6 | 32 | 60 | 1.20 | 3 | 10 |
| Dongcha | Spring | 144.5 | 41 | 1.0 | 0.5 | 63 | 69 | 1.00 | 2 | 8 |
| Zhangyuan | Spring | 71.8 | 60 | 1.7 | 1.6 | 31 | 81 | 0.80 | 2 | 7 |
| Weixi | Groundwater | 292.2 | 148 | 2.9 | 2.8 | 50 | 92 | 1.00 | 3 | 10 |
| Maiji | Groundwater | 8610 | 2297 | 42.2 | 37.1 | 30 | 48 | 2.00 | 6 | 1 |
| Zhongshi | Groundwater | 11288.6 | 3318 | 40.9 | 16.0 | 41 | 20 | 1.21 | 5 | 1 |

135. With the assistance of the Tumotezuqi municipal government (including Development and Reform Bureau, Finance Bureau, Water Resources Bureau, Health Bureau and PHCCO, Poverty Alleviation Office), the team conducted seminars, data collection, field visits and interviews. The team studied the implementation, operation and maintenance of RWSS projects. The team visited 4 RWSS water treatment plants (Shandai, Heihe Village, Yunshebao and Combat Arsenic & Fluorine WTP) and associated existing rural water supply facilities as listed in Table 19:



Table 19 Summary of Information of the Existing Rural Centralized Water Supply Facilities in Tumotezuoji

| Project Title | Water supply resource | Investment of construction (¥M) | Design water supply capacity (m ³ /d) | Beneficial population (10 thousands person) | | Existing average daily water demand (L/person •day) | Average daily water supply percentage (%) | Water charge (¥/T) | Management staff (person) | Operation period (year) |
|-------------------------------|-----------------------|---------------------------------|--|---|----------|---|---|--|---------------------------|-------------------------|
| | | | | design | existing | | | | | |
| Shandai WTP | Ground water | 13.59 | 6800 | 6.80 | 5.9 | 31 | 26 | 1.3 | 13 | 6 |
| Heihe Village WTP | Ground water | 0.323 | 114 | 0.20 | 0.17 | 68 | 100 | person : 5¥/yr animal : 10¥/yr | 1 | 10 |
| Tabusai WTP | Ground water | 5.362 | 274 | 0.28 | 0.23 | 73 | 68 | 1.30 | 2 | 7 |
| Beiyuansi WTP | Ground water | 0.2274 | 105 | 0.12 | 0.10 | 49 | 47 | 1.30 | 2 | 6 |
| Donghe WTP | Ground water | 0.2148 | 105 | 0.11 | 0.09 | 52 | 44 | 1.30 | 2 | 6 |
| Bingzhouhe WTP | Ground water | 143.93 | 471 | 0.50 | 0.42 | 50 | 45 | 1.30 | 4 | 1 |
| Yunshobao WTP | Ground water | 0.557 | 179 | 0.19 | 0.16 | 50 | 45 | person :¥1/mt h animal :¥2/mt h | 2 | 3 months |
| Shayizhan WTP | Ground water | 0.9496 | 516 | 0.52 | 0.41 | 50 | 40 | 1.30 | 2 | 2 months |
| Combat Arsenic & Fluorine WTP | Ground water | 12.88 | 4580 | 3.4 | 2.7 | 6 | 4 | retail: 1.30 | 8 | 2 |
| Shibugeng WTP | Ground water | 0.6908 | 222 | 0.29 | 0.2 | 50 | 45 | 1.30 | 2 | 2 |

136. In Geocheng, the major source of drinking water is groundwater. Due to the diminishing of groundwater level and contamination of shallow groundwater, some villages have started planning the extraction of deep groundwater for drinking purpose to safeguard the quantity and quality of water delivered. Some villages even start considering the construction of water plants with sizeable capacities. With the social and economic development of the city, Gaocheng municipal government has started the planning of township water supply system construction to serve the needs of adjacent villages. The team visited 4 RWS water treatment plants, among which, the water plants in Gaocheng New Economic Development Zone (EDZ) are township water systems which also serve the adjacent rural villages, while the water plants in Gangshang and Taixi villages are village level water schemes. Relevant information is shown in Table 20 below:





Table 20 Summary of Information of the Rural Water Supply Facilities in Gaocheng

| Project Title | Water Source | Capacity (m ³ /d) | Beneficial population (thousands people) | Per Capita Water Consumption (L/person•day) | Water price (RMB) | Management Staff (person) | Years of Operation |
|---------------|--------------|------------------------------|--|---|-----------------------|---------------------------|--------------------|
| Gangshang | groundwater | 200 | 0.24 | 83 | 5 per year per person | 2 | 25 |
| Taixi | groundwater | 100 | 0.12 | 81 | 8 per year per capita | 1 | 19 |
| EDZ | groundwater | (Total)42900 (Rural) 120 | 0.12 | 100 | 1.10 / ton | 46 | 10 |
| New Zone | groundwater | (Total) 50000 (Rural) 2000 | 2.0 | | | | Under construction |

137. Abundant in underground water, Yuyao City still faces the problem of water shortage in engineering sense and needs capital input. The main water source is surface water. The water plants visited have lasted for nearly 20 years, some are now under the technical renovation or expansion to meet the demands of economic development. The team has known that, due to different levels of social development and coverage of piped water supply, attention is required to be paid to sanitation concepts, health awareness and other related issues. The team visited 4 RWS water treatment plants (Simen, Mazhu, Sanqishi and Zhangting WTPs) and two water supply stations (Xiaodong and Shibu), Table 21 below refers:

Table 21 Summary of Information of the Existing Rural Centralized Water Supply Facilities in Yuyao City

| Project Title | Water Source | Total Engineering Investment (RMB thousands) | Design Water Supply Capacity (m ³ /day) | Beneficial population (thousands people) | | Existing Daily Water Consumption (L/person•day) | Average Daily Water Supply (%) | Water price (RMB/m ³) | Management Staff (person) | Operation Period (Year) |
|---------------|-----------------|--|--|--|----------|---|--------------------------------|-----------------------------------|---------------------------|-------------------------|
| | | | | Design | Existing | | | | | |
| Simen | Lake | 3500 | 8000 | 12 | 11 | 300 | 50 | 1.4-1.8 | 50 | 24 |
| Mazhu | River Reservoir | 33000 | 12000 | 50 | 50 | 35 | 67 | 1.6-2.3 | 150 | 9 |
| Sanqishi | Reservoir | 450 | 7000 | 3 | 3 | 35 | 129 | 1.3-1.8 | 12 | 25 |
| Zhangting | Reservoir | 1200 | 12000 | 5.8 | 4.8 | 55 | 83 | 1.2-1.8 | 25 | 21 |
| Xiaodong | Reservoir | 120 | 4000 | 1 | 1 | 60 | 100 | 1.2-1.3 | 11 | 23 |
| Shibu | Spring | 100 | 300 | 0.3 | 0.2 | 60 | 62 | 1.0 | 1 | 1.5 |

Note: The first 4 WTPs adopt different water tariffs for different consumer categories.

b. The Construction and Operation of the Rural Water Supply Systems

Project Planning:

138. With due regards to the water resources, topography, geography, location of the villages and the conditions of social and economic development, the planning of RWS projects has been carried out following a unified approach with appropriate emphasis placed on systematic production and efficiency.



139. General information with respect to the water supply system of the six Case Studies locations are listed in Table 22 below:

Table 22 Status of Water Supply System

| Region in PRC | Western | | | | Central | Eastern |
|------------------------------------|---|---|---|---|---|---|
| Location | Chuxiong | Fenghuang | Tianshui | Tumotezuqi | Gaocheng | Yuyao |
| Water Resources | Surface Water | Ground water | Groundwater and spring water | Ground water | Ground water | Ground water |
| Treatment Process | Typical train (flocculation, clarifier, filtration &, disinfection) | Typical train (flocculation, clarifier, filtration &, disinfection) | No water treatment structure, bleaching powder, chlorine dioxide or sodium hypochlorite used for disinfection | direct pumping, bleaching powder or Chlorine Dioxide used for disinfection | direct pumping | matured water purifying processes incl. mixing, sedimentation, filtration, disinfection |
| Supply System | Distribution by gravity | Distribution by gravity | Distribution by gravity | Distribution by gravity | Distribution by gravity | Distribution by pumping and gravity |
| Designed per capita (L/person-day) | 59-76 | 30-72 | 23-50 | 57-100 | - | 66-400 |
| Actual Consumption (L/person-day) | 39-58 | 39-58 | 22.5-49.5 | 6-68 | 81-100 | 35-300 |
| Design Life (in operation) | 15 years | (19 years) | 15 years | 15 years | (25 years) | (25 years) |
| Quality of Construction | Constructed in reasonable quality and pipe networks are properly functioning. | Constructed in reasonable quality but distribution networks suffer from serious leakage | Constructed in reasonable quality, facilities and pipe networks are properly functioning. | Constructed in reasonable quality, facilities and pipe networks are properly functioning. | Construction of township water plants followed technical specifications and standards | constructed in reasonable quality and all the facilities and pipe networks are properly functioning |

Operation and Maintenance Management

140. Organization of RWS O&M: The main departments responsible for RWS are Water Resources Bureau and PHCCO. The key duties include (i) overall management of planning, design and construction of RWS projects (both WB funded or domestically funded); (ii) organization of the planning, design, construction and acceptance testing of RWS projects; (iii) organization of material and equipment procurement; (iv) provision of professional direction, technical guidance and operational training in the O&M management of RWS projects.

141. In Chuxiong, due recognition of the spare capacity and potential of system improvement to expand the system coverage and increase the beneficiary. The current supply rate of 64%-94% is healthy with pronounced social and economic benefits. In Fenghuang, the cost is based on O&M costs with water tariffs collection rate exceeding 90%. However, the water tariffs collected are barely sufficient to cover the O&M costs leave no surplus fund for the loan repayment. The rate of supply of WTPs is 31%-92%. In Tianshui, the





conditions of natural environment are poor and the rainfall in recent years was low. The spring, which is located 2.5km away from the villages, is short in supply and of poor water quality. Therefore the construction of water cellars could improve the community's living standard and enhance the economic development. While in Tumotezuqi, the WTPs in the villages have higher water supply efficiency that can achieve about 40% - 100%. The social and economic benefit is obvious. In Gaocheng, the water tariff rates are authorized by the municipal Consumers Price Bureau, adopting differential pricing standards, collecting tariff by meterage, and the collection rate exceeds 95%. The water prices for domestic purposes, administrative institutions, industry/commerce, catering services and bathing industry are RMB 1.10, RMB 1.50, RMB 1.60, RMB 2.10, and RMB 6.0 per ton respectively. In Yuyao, the main departments responsible for RWS are Water Resources Bureau and Construction Bureau. The establishment strength of the WTP labour force is reasonable. The operators commence duties only after completion of training to guarantee reasonable quality of performance. The financial management is well regulated with good emphasis on cost control; the rate of collection of water tariffs achieves 90-100%.

c. Decentralized Water Supply

142. In Chuxiong and Fenghuang, for the decentralized water supply modes both shallow large diameter wells and hand pump wells extract groundwater from shallow stratum but the cost of these wells varies from a few hundred to a few thousand RMB.

143. In Tianshui, the team visited the "Water Cellar for Mothers" project in Qincheng District. The Qincheng District Women's Association made use of RMB 400,000 raised from China Women Development Foundation for the construction of water cellars in 6 villages of Jiekou and Tielu townships which suffered from serious problem of water shortage.

144. In Tumotezuqi, there are two main types of rural decentralized water supply engineering facilities, i.e. the brick/stone type large well and manual pumped well. The cost of the decentralized water supply facilities is ranged from few hundreds to few thousands. For this decentralized type of water supply system, as it would be affected by the underground condition, at some locations, the concentration of fluorine and arsenic may exceed the permissible limit, the water quality and quantity could not be guaranteed.

145. Water plants in Gaocheng New Development Area and Economic Development Zone (EDZ) projects have been carried out following a unified approach with the main purpose of serving township and industries, while the water plants in Gangshang and Taixi villages are village level water schemes, mainly serving the needs of human consumption. The sources for township WTPs groundwater in confined aquifer 160-200 meters, abundant and with high quality; while sources for village level are groundwater in confined aquifer 60-80 meters deep. The production can meet the needs for village water supply and the quality of raw water can meet the requirements of the National Standards for Drinking Water.

146. In Yuyao, with due regard to the water resources, topography, geography, location of the villages and the conditions of social and economic development, the planning of RWS projects has been carried out following a unified approach. The large-scale trends of rural water supply service has produced certain social and economic benefits, the improvement of water supply has promoted the economic development with the village as a unit. With the economic development and rising demands of rural residents for better water quality, the local government has made some improvements and expansion over the original techniques,





although the water supply technology, water purifying structures and regulatory structures and water transmission and distributing are appropriately designed;

d. Need Assessment for Safe Drinking Water in Rural Areas

147. The tasks for providing safe drinking water for the rural population are arduous. The desire expressed by the local government, the rural populace is strong. At present, the major constraint is the lack of financial resources.

148. The Tumotezuqi regions with high fluorine content in drinking water are mainly distributed in an outwash plain with area of 1800 km² south of the Beijing – Baotou Railway. According the investigation, about 150,000 people are drinking high fluorine and arsenic content water. The maximum concentration of fluorine and arsenic are 7.2mg/L and 2.0mg/L.

149. In Geocheng, due to dry climate and excessive extraction of water in recent years, the buried depth of groundwater level has been lowered by 27 meters, and it is dropping continuously at an annual rate of 1 meter. Due to the solid, liquid and gaseous industrial wastes, the excessive use of fertilizers, pesticides and contamination from domestic wastewater, groundwater in free aquifers 40 meters higher are contaminated and cannot be used as drinking water. The groundwater in the confined aquifer of 60 to 80 meters deep along Hutuo river basin and near the Gaocheng outskirts has been contaminated. Due to the continuous descending of groundwater table, some villages have started re-drilling tube wells to extract water from the confined aquifers buried down to 160 to 200 meters deep.

150. The following Table 23 summarizes the population figures in respect to Safe Drinking Water of the six case studies locations.

Table 23 Summary on Need Assessment for Safe Drinking Water

| Region in PRC | Western | | | | Central | Eastern |
|--|----------|-----------|-----------|------------|----------|---------|
| Location | Chuxiong | Fenghuang | Tianshui | Tumotezuqi | Gaocheng | Yuyao |
| Total Population | 349,500 | 338,000 | 2,990,900 | 284,000 | 746,000 | 850,000 |
| Population benefited by piped water supply | 205,300 | 149,700 | 700,900 | 134,300 | 746,000 | 700,000 |
| Population without piped water supply | 144,200 | 188,300 | - | - | - | 150,000 |
| Population without water supply | 14,800 | 10,800 | 200,000 | - | - | - |
| Population suffering from contaminated water | - | - | 1,287,000 | 154,600 | - | - |

Note: High fluorine, and bitter & saline water in Tianshui. High fluorine, high arsenic and salty water in Tumotezuqi

e. Organization in Rural Water Supply

151. For many years the Water Resources Bureau and the PHCCO have been undertaking the RWS projects as well as O&M of RWS facilities. In the course of World Bank's RWS projects, the PMO coordinated works with Water Resources Bureau and the PHCCO and successfully accomplished the project implementation. The technical and management expertise and experience gained by various department and officials are good assets. This





team of personnel represents strong capability to undertake future RWS projects. In addition, there are qualified professional design institutes and approved construction companies available in Chuxiong, Gaocheng and Yuyao for the design and construction works for the RWS projects.

f. Water Resources and Water Quality Monitoring

152. The water resources for the six case studies locations have been summarized in Table 22 of the previous section.

153. There is a strong sense in the protection of water resources. Measures are in place to protect the water sources. The quality of raw water was regularly monitored. In the monitoring of the water quality of the treated water, the City Disease Control Centre conducts monthly monitoring of turbidity, pH, residual chlorine, total bacteria counts and total coliform counts for the treated water.

154. In Tumotezuqi, particular concerns are focused on the measuring of fluorine and arsenic concentrations during the water quality monitoring.

g. Procurement and Local Construction Material Supply

155. During the implementation of the World Bank RWSS project, the structural steel, metal pipes, plastic pipes, electrical instrument, pumps, office equipment, audio-visual equipment and transportation vehicles were procured by International Competitive Bidding. Local construction materials, water meters, taps, etc, were procured by the City's PMO. The quality of purchased materials was generally satisfactory. During the execution of national projects, the materials were mainly procured by quotation.

156. There are adequate supplies of good quality cement, timber, bricks, sand and aggregates to meet the needs of RWS projects.

E Case Studies - Rural Sanitation Current Status

a. Types, Usage, Operation and Maintenance of Sanitary Latrines

157. In Chuxiong, the latrines in rural households are mainly single pits type. There are also methane generation types and triple compartment septic tank types. The prevalence rates are low. There are public sanitation latrines, but villagers still prefer the traditional primitive latrines, because of convenience and the need of faeces as fertilizers. Public sanitation latrines are not very popular. Public sanitation latrines are not suitable to be adopted in the villages. For towns, schools and villages with a large mobile population, public latrine can be considered. The implementation of sanitary latrines needs to be strengthened.

158. In Fenghuang, there are 100 triple compartment septic tank latrines, 700 water flush latrines which altogether represent a prevalence rate of 2.4%. Visits to households reveal all 18 families are using single pit latrines which do not meet the "harmless" sanitary standards. The respondents are not aware of sanitary latrines. The tasks to improve the environmental hygiene are extremely difficult. Progress is slow owing to economic, environmental and living habit constraints. Fenghuang is a poor prefecture. Villages unable to afford chemical fertilizers mainly rely on human and pig's faeces for fertilizers. They cannot see the benefits arising from RWSS project and not willing to pay for the sanitary latrine.





159. In Tianshui, The latrines in rural households are mainly double-barrel type, which is suitable for the conditions. However, some of them still use the traditional primitive single pit latrines because of convenience and the need of faeces as fertilizers. The prevalence rates are low. People using sanitary latrines are satisfied with the sanitary conditions, a cleaner environment, fewer flies, less odour, richer faecal fertilizers and reduced incidences of diseases. The villagers' sense of hygiene has heightened. A few people are still lack of sanitary sense by the irresponsible behaviour of dumping garbage. It shows that the improved sanitary conditions help to foster the correct attitude and behaviour towards public sanitation. The implementation of sanitary latrines needs to be strengthened.

160. In Tumotezuqi, except for government subsidized model latrines, one third of the rural households do not have sanitary latrine. Two thirds of the households have simple latrines, which are constructed by 1-m-high fencing wall. Some of these simple latrines are single pit and some without pit. The lower part of latrine constructed by the rural households is covered trench. The villagers consider that faeces are the excellent fertilizers. It is noted that the villagers have no concept on sanitary latrine and would not prepare for upgrading the sanitary facilities in their families.

161. In Gaocheng, the municipal party committee and government of Shijiazhuang in Hebei province issued the "Shijiazhuang Rural Sanitary Latrine Renovation Program 2004~2006" and developed corresponding implementation plans, stipulating the sanitary latrines suitable for local conditions include: pre-fabricated triple compartment septic tanks, methane generation type latrines, water flushing toilets and self-made triple compartment latrines. In all the villages visited, every household latrine is separated for male and female gender respectively, adopting excreta sliding slots in most cases. The exterior of the latrines walls are decorated with ceramic tiles and the internal kept clean. The most commonly adopted latrine is the single-pit latrine, some also use traditional latrine with latrine and livestock sty combined, or use open pit latrine renovated from the former one, and the pit is filled with domestic garbage and excreta. Although there are domestic waste and sewage collection systems in the villages visited, there still need for technical guidance, preventing the simple treatment methods and storage from contaminating the ground water sources. With regard to sanitary latrines, monitoring work of "harmless and sanitary treatment" of excreta should also be carried out to find out the effects of treatment of different types of latrines.

162. The economic condition in Yuyao, representing the Eastern Region of the PRC, is relatively better than the Western Region. The coverage rate of rural piped water has reached 100% in the townships the team visited. The rural residents generally build traditional triple compartment sanitary latrines with their own funds, averaging at RMB1000 each. The main type of sanitary latrine adopted here is this type, in which the first two compartments are confined structures with interconnecting pipes, yet the third compartment is not sealed. The septic liquid in the third compartment will seep into earth. The night soil can ferment naturally. The three compartments are built under the latrine structure. With little or no risk of blockage or explosion, this type of latrine is one of the most widely used type. In local latrines, there are usually 2 flush toilets bowls that lead to the increase of water consumption. The residence of all households has an open channel around the house to convey domestic wastewater to the open trench/pond right outside the village. But the wastewater collected in the open channel is basically stagnant. There are many plastic bags randomly littered. It is worthwhile to note that during summer season or high air temperature periods, the open channel will become





the breeding site of mosquitoes and sources of obnoxious odour.

F Case Studies - Sanitation Promotion and Health Education Current Status

a. The Organization at Local Level for Sanitary Promotion and Health Education

163. In Chuxiong, the organizations at the local levels for sanitary promoting and health education are fairly well established. However funding is insufficient. The rural population generally lack the necessary knowledge in environmental sanitation and personal hygiene.

164. In Fenghuang, sanitary promoting and health education are carried out by the villager committees.

165. In Tianshui and Tumotezuqi, CPHCCO is responsible for the planning, coordination and technical assistance on the water and sanitary improvement of villages. In Tianshui, owing to the high investment for the RWSS project, there are insufficient financial sources and there is lack of funds in recent years. There is little progress. The village committees are well organized and there are village representatives who are responsible for the sanitation works of the village. There are also female committee members responsible for the hygiene and health care of the women.

166. In Gaocheng, the organization of village committee is comprehensive. Each village has designated place for village committee activities including village planning development, guidelines and regulations display boards and village financial report columns. Village officials are responsible for promotion of hygienic works. Female official is also responsible for promotion of women's health and related health knowledge. Some villages have also employed cleaning personnel who would be responsible for handling the refuse from the villages. In some villages, collection of refuse would also be managed on district basis.

167. In Yuyao, village committees are well organized. Some village committee even invite professional planning departments to make long-term plan for them, including sanitation, water supply and ecological/environmental protection, etc. Every village has a communal place for activities. Since there are many migrant workers, every village organizes a cleaning team, responsible for the cleaning and transportation of the garbage in the villages. The villages charge every resident (both local and non-local) RMB1 per month for the services provided. A female village committee member responsible for women's matters is in charge of sanitation and women's health, organizing women's participation in health examinations, and coordinating the publicity and renovation of sanitary latrines.

b. Status of Sanitary Promotion and Health Education in the Villages

168. In Chuxiong, majority of the rural population have the habit of boiling water for drinking, quoting tastefulness instead of hygiene as the reason. Still some people drink unboiled water directly. Drinking unboiled water from shallow wells could easily cause diarrhea and other intestinal infectious diseases. These people fail to see the linkage between unclean water and diarrhea.

169. Habits of washing hand are not strong in Fenghuang. Basically washing hands after toilet is not widely practiced. People do wash hands before meals. Even so, few use soap. Most families are equipped with television sets and viewing interests mainly in news and





agriculture channels. Some sanitation messages are learned via television. In the village primary schools, there are no lessons on health education. Relevant materials are posted on notice boards. Two times in each semester there are talks on personal hygiene such as washing hands.

170. In Tianshui, the villagers are aware of the advantages of sanitary latrine and they are willing to construct and use the latrine themselves without the need of government's promotion and subsidy. It is noted that the traditional single-pit latrines have largely been replaced and the people's living condition is improved. There is a sanitary latrine in a village primary school. Although it is reasonably designed and clean, there is no sink or hand washing facilities and health promotion material. It is considered that the demonstration purpose of the latrine is very limited.

171. In Tumotezuqi, the villagers do not have enough understanding on toilets and have no incentive to build one out of their own funds. No short-term benefits on health education promotion could be realized. Due to the shortage of funds, construction of hygienic toilets would face more difficulty. At present, demonstration villages are constructed only in areas with better economic conditions. Since village hygiene activities require a large amount of funds, it is difficult to start up work in this area.

172. Representing the Central Region in PRC, Gaocheng has used piped water in villages for more than 20 years, villagers have already had the habits of washing hands before meals and after toilet and boiling water for drinking. However, due to the support of the collective economy in the village, except for some villagers living in and at the fringe of urban area, most of the villagers do not endorse the concept of portable water being a commodity at a price. They consider portable water as social benefits. It is found that some villagers continuously leave the water dripping and do not feel compelled to repair broken water taps. Most of the villagers still adopt the simple toilet. As they are constrained by their living conditions, they have no intention to modify their existing toilets and they are not aware of relevant technology. People wish that the government can provide subsidies and technology to help them in the construction of sanitary latrines. Few people hear other types of sanitary latrines such as triple compartment septic tank and double barrel funnel type latrines etc.

173. Yuyao belongs to the eastern economically developed region. There are more enterprises with better sanitation facilities. Meanwhile, the enterprises cause more contaminations. The increase of migrant workers also lead to environmental deterioration. The overall observations are as follows:

- (i) The rural villagers have formed good habits of drinking boiled pipe water, consuming more water and showing more concern on water quality.
- (ii) The rural villagers have a good sense of sanitation, have formed the habit of using flushing toilets, and have some understanding of garbage treatment and wastewater discharge.
- (iii) Local schools have sets of procedures and regulations concerning physical health building, sanitary behavior and cultivation of personal hygiene. The schools regularly conduct training on health and disease prevention in cooperation with the local health departments. The teachers proactively collect and disseminate materials on the treatment and prevention of infectious diseases that are incidental to students and their parents.
- (iv) The village clinics are active in cooperation with health departments at upper levels on





activities of health education and hygiene promotion. Despite the reduction in subsidy, they conduct their duties with a strong sense of responsibility.

G Case Studies - Financial Management Current Status

a. Financial Resources and Financial Management

174. Amongst the six Case Studies locations, there are World Bank funded projects. The repayment terms for these projects are summarized in Table 24.

Table 24 Repayment Terms of World Banks RWSS Projects

| Region in PRC | Western | | | | | Central | Eastern |
|-------------------------|----------|-----------|---------------|----------------|------------|----------|---------|
| Location | Chuxiong | Fenghuang | Tianshui (II) | Tianshui (III) | Tumotezuqi | Gaocheng | Yuyao |
| Repayment Period (year) | 15 | 20 | 10 | 10 | 15 | - | 25 |
| Grace Period (year) | 5 | 5 | 6 | 2 | 5 | - | 5 |
| Interest Rate (%) | 4 | 4 | 4 | 3 | 4 | - | 4 |

Note: All repayment amounts include the principal as well as the commitment fees

175. The Finance Bureau of Chuxiong City is responsible for the repayment of the World Bank loans. Water tariffs are the main source of income for the loan repayment. In case of shortfalls, the repayment would be temporarily paid by rural township. Currently, all WTPs under the World Bank RWSS projects manage to follow the repayment schedule.

176. The Finance Bureau of Fenghuang is responsible for the repayment of the World Bank loans. Water tariffs are the main source of income for the loan repayment. Currently, all WTPs under the World Bank RWSS projects manage to observe the repayment schedule.

177. The Financial Bureau of Tianshui is responsible for the repayment of loan to the World Bank. The water tariffs are the major source of income for the loan repayment. In case of shortfalls, the repayment would be temporary paid by rural township. Currently, all the WTPs could manage to follow the repayment plans and the repayment status is considered to be satisfactory.

178. In Tumotezuqi, the City Finance Bureau is responsible for repaying the loan on schedule and the overall repayment condition is satisfactory.

179. The financial sources of Gaocheng on the municipal and counties' water supply facilities mainly come from provincial and municipal fund allocations, national bonds, commercial loans of national commercial banks and funds from Ministry of Water Resources system. Financial source on village type water supply facilities comes from collective fund of village communities and individual households.

180. The Finance Bureau of Yuyao is responsible for the repayment of the World Bank loans. The repayment amount includes the principal as well as the commitment fees. Water tariffs are the main source of income for the loan repayment. In case of shortfalls, the unmet





repayment obligation would be temporarily borne by rural township. Currently, all WTPs under the World Bank RWSS projects manage to follow the repayment schedule.

181. It is the general observation that although the loans from the World Bank contribute towards the improvements in RWSS sector, it also creates a heavy burden in loan repayment. In Yuyao which represents the relative well economic development area of Eastern Region, the loans from the World Bank account for 50% of the investment cost, while the counterpart funding from provincial/municipal governments and beneficiary communities account for 25% respectively. However, in some WTP upgrading works, the portion of counterpart funding of the beneficiary community could reach 43.6%.

b. Setting and Collection of Water Tariffs

182. In Chuxiong, each WTP carries out monthly and yearly audits. The water tariff is set at RMB0.50/m³ in the commissioning stage of the WTP. Upon completion of World Bank financed projects in 1999, the PMO set up joint committee to deal with the requests from the township governments on tariff adjustment. Water tariffs are mainly calculated in accordance with the quantity measured by water meter, whereas some of the tariffs are collected on household basis.

183. The water tariff is set in accordance with actual operation cost in Fenghuang. The cost for Xinchang WTP is RMB 0.4/m³ while that of Jixin is RMB 1.60/m³. The water tariff prior to 2003 was relatively low, ranging from RMB 0.5/m³ to RMB 0.6/m³. From 2004 onward with the approval of the township governments, water tariff is RMB 1.5/m³ and RMB 1.6/m³ for Jixin.

184. In Tianshui, the water tariff is set between RMB 0.52 to 2.00/m³ by the County (District) Price Bureau. The collection rates range from 90% to 100%. The water tariffs for large scale Maiji and Zhongshi WTPs are approved by the City Price Bureau. The tariff for Maiji WTP was temporary set at RMB 2.00/m³; while that for Zhongshi WTP is RMB 1.21/m³. The tariffs are on trial for one year and subject to adjustment afterward. The tariff setting and collection for water supply works is found to be on track.

185. The treatment processes were simple in Tumotezuoqi and the treatment cost is about RMB 1.25/m³. Therefore tariff of most water treatment plants is set at RMB 1.30/m³. With reference to the financial situation of the local consumers, Heigou Village WTP has set the standard water tariff. For people, it is at RMB 5.0/person/year. For animal, it is RMB 2.0/person /month.

186. Water Tariff in Gaocheng is set by the municipal's Consumers Price Bureau. Basically, the water tariff is based on differential structure according to the type of usage. The collection rate is more than 95%. The standard water tariffs are: RMB1.10/m³ for domestic use, RMB1.50/m³ for administrative sector use, RMB1.60/m³ for commercial and industrial use. For village type water supply facilities, water tariff is determined by village community. In general, it based on RMB 5-8 per capita per year. The collection rate is more than 90%.

187. In Yuyao, each WTP at township level or for regional services carries out financial audits. The municipal government will hold hearings according to the request of water tariffs readjustment by the local government and water plants. Having considered the financial situation of the WTPs and the community's affordability, the Consumer Price Bureau will set a proper water price. A categorized water tariff system has been established as well. For the





village level water plants, the village committee can set water tariff on their own, often ranging from RMB 0.5-1.0/m³. The Consumer Price Bureau has regulated the water tariffs for four large-scale WTPs namely Simen, Mazhu, Sanqishi and Zhangting with a production cost of about RMB 1.45 /m³. These tariffs are set in accordance with the State Council's pricing policies.

H Case Studies - Organization and Capacity Building Current Status

188. The Water Resources Bureau and the Health Bureau (PHCCO) in Chuxiong are two municipal government departments responsible for the RWSS sector. The Municipal PHCCO is responsible for planning, co-ordination and technical guidance for the RWSS projects while Centre for Disease Control (CDC) is responsible for technical assistance in rural sanitary works. Owing to the insufficient funding to meet the hefty financial needs, the progress of rural sanitation projects is not satisfactory.

189. In Fenghuang, the Project Management Office (PMO), Water Resources Bureau and the Health Bureau (PHCCO) are major departments responsible for the RWSS sector. In addition, there are qualified professional design institutes and approved construction companies available in Fenghuang to undertake the design and construction works for the RWSS projects.

190. The government of Tianshui City concerns very much on the issues of RWSS and health education. The PHCCO is responsible for the coordination works, while different government departments/authorities, including Development and Reform Bureau, Poverty Alleviation Office, Finance Bureau, Water Resources Bureau, Health Bureau and Women's Association, all perform their duties in the rural water supply, sanitation and health education works.

191. The Water Supply Bureau in Tumotezuqi has been established since March 2001 according to the actual situation of water management. This centralized the administration and management of water supply services which were originally run by various different parties. The Water Supply Bureau is assigned to manage the Shandai Water Treatment Plant. Besides, the Water Supply Management Committee is established. The committee members comprised of the leaders from all beneficiary townships and administration villages and water management personnel from all villages.

192. In Gaocheng, the municipal PHCCO is managed by the Construction Bureau and is responsible for planning and coordination works in RWSS. Water Resource Bureau is responsible for construction of water supply facilities. The Health Bureau has the duty in water quality monitoring, hygienic knowledge dissemination and sanitary latrine promotion. Agriculture Bureau has a major role on for construction of methane generation latrine. The Environmental Protection Bureau is responsible for management and control of pollutions. Women's Association also participates in promotion including the promotion of "Ten Stars Civilized Household". Construction of Ecological and Sanitation Demonstration Village is organized by Propaganda Department with the participation of relevant Bureaus.

193. The Construction Bureau is responsible for rural water supply in the whole city, and the Health Bureau (PHCCO) is responsible for the rural sanitation and health education. In





recent years, combining with environmental protection, a great deal of work has been done in sanitation and health education with an investment of about RMB 20 million annually. The work has played an active role in improving sanitation and advocating appropriate sanitary behavior. Health education work in Yuyao is mainly the responsibility of the Municipal PHCCO, with the Disease Control and Prevention Center in the city providing publicity on treatment and prevention of infectious diseases and conducting community mobilization, making and distributing materials on it in cooperation with the health education institutions, providing training and conducting supervision.

I Case Studies - Poverty, Social Development, Gender Aspects and Community Based Participation - Current Status

a. Poverty Aspect

194. According to the experience in Chuxiong and Tianshui, the per capita annual income of RMB 1,000 is the approximate criterion. With due recognition of this limit, it would be difficult to satisfy the objective of poverty alleviation and at the same time respecting the loan repayment ability. In Chuxiong's case, beneficiary communities of poor economic status are bundled with communities of stronger economies. In addition, the poverty problem is not merely reflected by the economic incomes. At the same income level, the improvement of living standard could also be an important index of poverty alleviation.

195. Fenghuang Prefecture is one of the designated poverty areas in the Western Region of China. The prefecture faces great difficulties in providing counterpart finances and in guaranteeing loan repayment for the loans offered by World Bank and other international donor agencies in financing RWSS projects. The total outstanding loan from international agencies is over \$2 million. At the peak of loan repayment, the Finance Bureau of Fenghuang has to set aside sums of money to cover the shortfall in recovering the repayment amounts from the WTPs. Often the prefecture shoulders major portions of the repayment. This burden is sometimes over RMB 1million annually for a period of 20 years.

196. The major sources of incomes of the visited villages in Tumotezuqi are from animal rearing and one-quarter-per-year agricultural activities, which could easily be affected by the natural elements. Amongst the visited villages, Zhijiliang Village is situated in the lowland. It is more susceptible to flooding and, thus, the income is relatively lower.

197. The rural villages of Gaocheng belong to relative high economic development district in Central Region of the PRC. Except for those poor people in extreme difficulty, villagers do not have the "low income" problem. Individual low income families would receive subsidies from village committee. Comparing to other places, water tariff in Gaocheng is relatively low, especially the village owned water supply facilities. Water is construed as a kind of "social benefit". Operation cost of the water supply facilities is subsidized by village committee. Intention on collection of water tariff from households is low. Under this circumstance, the water saving concept amongst the villagers is very weak and water saving technology is not promoted. Due to the consideration on water quality and single available source of water supply system, ground water extracted from deep well has not only been used for drinking purpose, but also for general cleansing and other usage. This arrangement would lead to have a high water production cost and waste of water resource.

198. In Yuyao, the per capita annual income has reached RMB 7,000, yet a lot of rural





households in mountainous areas in North of Yuyao do not have access to pipe water. To solve the problem of poverty in mountainous areas, the local government has made a plan for gradual migration by stages. The rural villagers will be resettled down the hills in 3 to 5 years to solve the poverty and safe drinking water issues. The major poverty issues in rural area of Yuyao lie with the migrant workers. These workers mainly work for the village collective enterprises, private enterprises and family economy, or engage in catering industry or services in the region. The majority of them cannot enjoy the achievements of rural economic and social development. They often earn a low salary, having bad working conditions, having no basic social security. They do not participate in local rural social and public affairs; and they often live in the old and shabby houses. The conditions of using water and sanitation for them are obviously worse than local residents.

b. Gender Aspect

199. Female's participation in local community matters, family issues and major decision-making is still inferior to the male's. This is both the current organizational set up as well as the traditional values. The female gender, even if they were given the authority, would formulate their decision from the family perspective. Consensus decisions upon internal consultation would still be delivered by the male heads of the family.

200. RWSS projects have generated benefits in improvement in environmental hygiene and economic development in communities. There are still some concerns in the gender aspects in community development, namely, (1) to further develop economic activities at household level and at community level to fully utilize the available rural water supply; and (2) to incorporate sanitation promotion and hygiene education for women in RWSS projects.

201. Similar to the situation in Central and Western Region, in Yuyao, female's participation in local community matters, family issues and major decision-making is still inferior to the male's. The social status of female gender is also not really equal to male. The female gender plays a significant role in domestic water sanitation, saving water, discharge of household wastewater and dumping of garbage. The fact that the villages do not pay enough emphasis on the role of women, has forsaken an effective force in making a strong contributing to rural water supply, saving water, wastewater discharge, sanitation and garbage collection issues.

c. Community Based Participation

202. The format of community based participation in the RWSS project villages are basically the same. The Executing Agencies (mainly government and foreign collaboration agencies) communicate the project scopes and objectives to the rural households via an effective administrative system. The projects are implemented with due regards to the views and comments solicited from the rural households. The RWSS project works with leadership by the government and support by the community groups normally achieve good success and effectiveness. However, local households are somewhat passive. As the need for safe drinking water is pressing, mostly the communication channels are top-down aiming to solicit the agreement and cooperation of the communities. It is suggested that community based participation could be promoted and strengthened in future RWSS projects.

203. The rural economic conditions in Yuyao are relatively better than other regions of the RPC, and most of the village collective economies have considerable financial strength, laid a sound basis for villages participating in RWSS projects led by local governments. There is no problem in raising counterpart funds for all projects at the village level. It should be easier to





organize and implement projects than in poorer areas. Since less emphasis has been paid to villagers' direct participation. The villagers rely heavily on village organizations and local governments.

J Case Studies - Opinions Expressed by Local Community

a. Local Experiences, Recommendations and Needs in RWSS Expressed by Local Community

204. Common views expressed by municipal government and relevant departments are:

- (i) The municipal government welcomes international aids, loans and investments for RWSS projects. With economic development below the national average, the municipal government prefers to see a higher proportion of counterpart funding to be borne by the Central and Provincial governments for RWSS projects. A longer loan repayment period, say over 20 years, is also preferable. Subsidies from various levels of government to bear the loan interests is desirable.
- (ii) From the experience in the World Bank RWSS projects, the International Competitive Bidding procurement cycles are too long. Some of the procured materials unfortunately become useless owing to the changes of project requirements. It is suggested that the procurement arrangement in the future RWSS projects should be organized by the provincial or county governments via national competitive bids or by quotation invitation.

Specific view from Fenghuang:

205. Fenghuang prefecture is a major agricultural county and the demand for improvement in sanitation and health education is not keen. However, through RWSS projects financed by international funds, sanitation and health education programme could be implemented. It is expected that the desire would grow upon economic growth and rise in living standards.

Specific view from Tianshui:

206. The government recommended that the water supply works should mainly be focused on the construction of reasonably larger scale facilities. For example, the facilities should be constructed in the townships with expansion of water supply to the surrounding peripheral areas, or the facilities should be built at more densely populated centres. Separate water supply system should be provided in the less densely areas, while water storage facilities should be constructed in the locations without water sources. The works should be planned in accordance with specific geographical conditions in order to maximize the economical and social effectiveness.

Specific view from Tumotezuqi:

207. Financial status of Tumotezuqi is poor. The municipal government prefers to have a higher portion of investment from Central and Provincial governments for financing the rural water supply and sanitation works.

Specific view from Gaocheng:

208. With respect to construction of sanitary latrine and promotion of health education, villagers are not willing to take out loans as they consider that the sanitary latrines and health education could not generate economic benefit, especially health education. Except for paying home visits to households, other measures for promotion of health education are televisions, broadcastings, booklets and dissemination boards. Without specific targeted





recipients, it is difficult to convince the villagers to make investment on health education. People also are afraid that they might not be able to make repayment on the loan and that would also cause a financial burden to their families. It would be appropriate to seek International grants or government subsidies for health education promotion. They believe this is the only way that would not add extra financial burden to their households.

Specific view from Yuyao:

209. The construction of local RWS projects and sanitation facilities would require financial assistance from international donor agencies. The projects also require the knowledge and application of advanced management know-how. In terms of rural water supply engineering, the major work can be divided into two parts, water supply and wastewater collection, the estimated budget is RMB 970 million.

b. Views Expressed by Village Committee Leaders and Rural Population

210. There are strong desires for new RWSS projects from the rural population. The needs are pressing now that the rural population develop reasonable appreciation of the importance of environmental sanitation. They are enthusiastic in obtaining international and national financial assistance, and they are also willing to bear the counterpart finances by payment or by provision of labour services in kind.

211. In the case of Fenghuang with ethnic minority races living in the hilly remote areas, the centralized water supply systems require more capital investments.

212. In the case of Tumotezuqi, a negotiation mechanism can be formed between village type organization and the project's implementing agent, but the project's implementing agent often possesses a greater bargaining power.

213. In Yuyao, there were strong desires for new RWSS projects from the rural population. The needs are pressing now that the rural population develops reasonable appreciation of the importance of environmental sanitation. They are enthusiastic in obtaining international and national financial assistance, and they are also willing to bear the counterpart finances by payment or by provision of labor services in kind.





K Summary of Results of the Survey Questionnaire for Village Households

214. The field visit team visited natural villages and interviewed households for the six Case Studies locations.

Table 25 Number of Respondents in Survey Questionnaire for Village Households

| Region in PRC | Location | Sample Size | Mean Age |
|---------------|---------------------|-------------|----------|
| Western | Chuxiong, Yunnan | 83 | 43.22 |
| | Fenghuang, Hunan | 52 | 44.87 |
| | Tianshui, Gansu | 71 | 44.10 |
| | Tumotezuqi, Neimeng | 71 | 46.90 |
| Central | Gaocheng, Hebei | 46 | 46.70 |
| Eastern | Yuyao, Zhejiang | 21 | 46.30 |
| | Total | 344 | 45.35 |

Note: Neimeng is Inner Mongolia.

215. The summary of results and descriptive analyses are enclosed in [Appendix 2-3](#). Site photos are for respective case studies are enclosed in [Appendix 2-4](#).

L Key Issues in RWSS as Evidenced in the Case Studies

216. In summary, the Consultants' Team takes note of the following key issues to be further assessed in the formulation of the RWSS sector strategy. These observations are evidenced after discrete analyses of the Case Studies:

- (i) There is an intrinsic difficulty in implementing a RWSS project in the poor rural area in Western China. The objectives of poverty alleviation and the affordability to repay loan are at loggerheads;
- (ii) The financing mix for international loan should contain the grant, low interest loans etc. to “soften” the loan;
- (iii) The concept of “property ownership” for RWSS facilities is non-existent or very slight;
- (iv) There is room for improvement in capability building for personnel and organization in RWSS projects;
- (v) The management of implementation of the RWSS projects could model the successful experience of World Bank’s previous RWSS projects;
- (vi) The management of O&M of rural water supply facilities should be further strengthened.

217. The rural villages of Gaocheng belong to relative high economic development district in Central Region of the PRC. Except for those poor people in extreme difficulty, villagers do not have the “low income” problem. Individual low income families would receive subsidies from village committee.

218. Following the local economic development and the increase in household’s income, water consumption rate in villages of Gaocheng has being increased. The rural areas are





now at a stage facing growing demand in water supply. The water demand per capita will increase significantly. Due to over 20 years of over exploitation, the ground water level in Gaocheng has been lowering at an average rate of 0.72m annually. The lowering rate has a tendency to increase. In the next 3 to 5 years, it is expected that about one-third to half of the total villages would require to drill new water wells with depth from 160m to 200m in order to replace the existing wells. Groundwater within 100m below ground has been contaminated and is not suitable for drinking. Although some planned villages have already had the wastewater disposal systems, the systems are rather primitive, wastewater is being discharged to the ponds and rivers nearby. Intermittent flows of some rivers due to reduction in surface runoff also aggravate the contamination of local water sources. Under these circumstances, following the imminent completion of large scale water supply facilities, deep water wells and untreated wastewater disposal, it can be foreseen that the situations of diminishing water resources, contaminating the water sources and polluting the environment are serious and growing concerns.

219. Domestic solid waste is another adverse impact on water sources, environment and sanitation. Most of the villages have refuse collection systems, yet the facilities are rather inadequate, especially the treatment method of the solid waste after transferred from villages is very simple. It causes an adverse impact on the environment

220. In coastal areas of Eastern Region, the economy has been well developed, particularly in the Yangtze Delta region within 1,000 km radius. Yuyao is one of the townships commencing the urbanization process early on. Based on a related survey, we have learned that water supply has achieved its goal in providing water from water plants to townships, from township to villages, and from villages to households. The process of using piped water has encouraged the increase of per capita water consumption. The per capita water consumption in Yuyao has reached 100 liters per day, up to 300 liters per day in some areas. The shortfall of water resources still remains a common issue of Yuyao and adjacent areas. With the construction of large scale WTPs, input of water production cost and the increase of water consumption, saving water has become a top concern in the region. In addition, investigation shows that the absence of proper domestic wastewater collection system in the villages has led to pollution to water sources. In terms of the economic strength, Yuyao has the capacity to pilot the “comprehensive management of water supply, saving water and wastewater drainage” to safeguard the objectives of the sustainable development of rural urbanization. There will be a lot of work ahead.

221. The major obstacles to realize the development and management of safely using water with comprehensive model of water supply, water saving and wastewater discharge combination in the region is not only the funding shortfalls, but rather people’s awareness and concepts, community management organization and capacity building as well as rural ways of life.

- (i) Firstly, the local villagers have not paid enough emphasis on saving water. Located in the Yangtze Delta region, the local government, enterprise and residents like do not think scarcity of water resource a problem. The inquiries with the local government officials and project manager of local RWS projects all show the same results: there is plenty of water, and water can also be diverted from other places to meet the needs of capacity expansion; the field survey of the local household also shows that the local residents have a better affordability to pay the tariff, having little or no sense of saving water. They fail to realize the reality of water shortage in the region.





- (ii) Water supply, saving water, wastewater discharge, sanitation, resources management, township building and rural community building, all these fields that should be planned and developed in a co-ordinated manner are under the administration of different government departments. The lack of concerted coordination, and the counterpart funds for construction are not sufficient. The responsibilities, powers and benefits among different departments are not in harmony with one another, sometimes even contradictory. For example, under market economy system, effective measures for saving water are not proactively taken into consideration, and there is little interest developed specially for saving water. Even some cheap, highly efficient and matured water-saving technologies and measures are not applied and promoted. There are also a lot of problems in planning, construction, management and sustainable operation issues of domestic wastewater and garbage collection and treatment systems.
- (iii) Although the economy in rural Yuyao is quite well developed, and the per capita income is 10 times or more of that of poverty stricken areas, but the public management and public production provision lag behind. Since the introduction of responsibility production systems, the so-called people's commune has been disintegrated. The public management and public affairs do not develop hand in hand with the economic development, particularly in public health and other programs with indirect economic benefits. The actual status is not too different from that of the poverty-stricken areas in less developed regions. The increase of economic income has not enhanced the sense of public interest and collective well-being among the residents in the region. On the contrary it enhances individualist behaviour among the households. In terms of improved living standards, the cleanliness, free of wastewater and garbage can only be observed inside luxurious houses and courtyards, whereas strong contrast can be seen immediately outside.

M Case Studies Recommendations - Rural Water Supply

222. Upon the field visits and case study with respect to the six case studies locations, the team makes the following suggestions in the aspects of rural water supply, rural sanitation and health education for reference:

a. Recommendations common to All Case Studies

- (i) Conduct thorough planning works for the RWSS projects - Under the direction of municipal government, relevant departments should co-operatively prepare a thorough plan for RWSS projects with specific details to the project items. The planning should be consolidated irrespective of the intended financing model;
- (ii) For those rural villages at the peripheral fringes of more major township centres, rural water supply projects could be integrated into the township's development plan with staged implementation. The larger scale of development would be more amenable for more proper and systematic management and better financial performance. In view of the shortage of funds at the local level, international financial assistance would be appropriate;
- (iii) Emphasize the community participation in RWSS project planning and post construction O&M management, to ensure the sustainability of the WTPs;
- (iv) Further regulate the daily operation and water quality monitoring procedures, improve the organization and filing of financial and operational data.
- (v) Considering the rural economic status, rural residents can contribute in-kind labor





instead of funds. Apart from the service connection parts which should be shouldered by rural households themselves, raising money from rural residents is not advocated. The PMOs are temporary institutions, post-construction management and ownership should also be taken into consideration, as exists to different extent in all regions of the PRC.

b. Recommendations Specific for the Case Studies

Chuxiong:

- (i) For rural population living in the remote hilly areas, the rural water supply would be smaller in scale and for the sole purpose of domestic use, it would be appropriate to seek the central government funds and other departments' special finances. The design capacity should be determined with reference to the operating conditions of similar facilities;
- (ii) In some WTPs, the flocculating chemical dosing system should be improved. Mixing the flocculants within the inflow pipe or changing the dosing administration point would ensure the complete rapid mixing of the flocculants, so as to enhance the performance of the WTP.

Fenghuang:

- (i) As soon as practical, leakage detection and pipework repairs should be carried out to rectify the serious leakage problems;
- (ii) Organize training programmes in O&M aspects and management aspects of WTPs to improve the capability of the plant operators. The objectives would be the improvement in O&M and financial management of the WTPs.

Tianshui:

- (i) During the construction of water supply works, attention should be paid to the allowable working pressure of water supply equipment and the plastic pipeline. Wherever the topographical condition is suitable, gravity type high level water tank should be the constructed for water distribution purpose.

Tumotezuqi:

- (i) Tumotezuqi lies in the plain region between the mountains and the Huangtu highlands. In this region, the hydrogeological conditions are fairly complex. The areas with evidence of high fluorine, high arsenic and high content in groundwater. On the other hand, the rural population is concentrated in scattered residential developments. It is therefore appropriate to select alternative groundwater sources for existing centralized water treatment and supply systems suffering from high arsenic, fluorine or saline content. Before determination on the scale of water supply system, it should take the previous learnt lessons in to consideration, to integrate the social economy development plan and with the existing actual water supply condition. To make reasonable judgement and avoid unnecessary expansion;
- (ii) The Shandai WTP and Combat Arsenic & Fluorine WTP should still have spare water production capacity. Apart from completing the construction of the planned expansion of the distribution network to cover designated villages, it should also consider further extending the coverage to other areas in order to fully utilize the supply capacity of the water treatment plants for increasing the social and economical efficiency;
- (iii) The design capacity of WTP and Combat Arsenic & Fluorine WTP can meet the demand of 102,000 people. Currently, the water supply networks have covered a





population of 86,000. The two water treatment plants have significant effect on the whole town for removal of fluorine, arsenic and saline water. It is recommended that the municipal government and managerial departments should take due considerations on extension of the coverage of these two water treatment plants.

Gaocheng:

- (i) In 80's of last century, water supply in Gaocheng was developed on village basis. Centralized water supply facilities were constructed based on integrated village economy and collective funds from village households. The piped water supply systems were eventually implemented and the villagers' safe drinking water problem was resolved. However, due to the rapid economic development, human resources on this aspect become inadequate. The organizational management and technologies on rural water supply are constrained. The water supply facilities appear to be insufficient, the management skills are relatively inadequate. Works on water quality monitoring and auditing could not be carried out.
- (ii) Due to the lowering of ground water level, aged water supply facilities and contamination of underground water resources, some villages have commenced the replacement works for the water supply facilities.
- (iii) One of the important measures in RWS works for Gaocheng is to integrate the water supply facilities in the rural areas around the fringe of towns. In the future, the mode of rural water supply development will be using the town as the core to develop appropriate scale of water supply facilities to serve the surrounding rural villages.

Yuyao:

- (i) Over the past 20 years, the rural economy in Yuyao has witnessed a rapid growth. A large scale of renovation has been made in parts of the original rural water supply systems by capacity expansion to meet the needs of economic development. Due to funding shortfalls, the upgrading of old water distribution networks has not been conducted along with the renovation of WTP, leading to great loss and leakage and impacting the water quality served to rural residents.
- (ii) With the further development of rural economy and the great increase of water consumption as well as the organization and implementation of overall development planning in rural areas and the needs for safe drinking water, it is a tendency for Yuyao to conduct regional rural water supply systems and establish wastewater treatment systems.
- (iii) Yuyao should enthusiastically conduct training on saving water and take necessary measures to save water. Water has been recognized in recent years as a kind of non-renewable resources. On how to save water, mere publicity is far from enough. Emphasis should be paid to water-saving techniques to increase the utility rate and rate of repeated utilization, and on the other hand, to increase water price and reduce wastewater by price incentives to meet the environmental protection requirements. The economic conditions in Yuyao fairs relatively better economically. The current problems faced by Yuyao might become the ones for poorer regions some years later.
- (iv) Learning from the experience of developed countries, water consumption cannot be increased unboundedly, and will decrease when reaching a certain degree due to changes in industrial structure and demographics. Thus how to determine the final construction capacity is also very significant. To avoid future severe surplus of capacity, further investigation should be done to make to proper water consumption index and take all measures to identify the clear cut final capacity.





N Case Studies Recommendations - Rural Sanitation

a. Recommendations common to All Case Studies

- (i) Co-relate the sanitation and the prevention of intestinal tract infectious diseases. Promote the participation of the rural community and village people in environmental sanitation improvement activity. Formulate village environmental sanitation management joint pledge or the villagers joint pledge;
- (ii) Launch patriotic health campaign in conjunction with the integrate civilized ecological development, improve the overall environmental sanitation characteristics by rural water supply, rural latrines, improved pigsty, nuisances removal and concrete road pavement. Through government subsidies, operate village bathrooms, install solar-powered water heater, improve villagers' health issues and set up refuse collection points;
- (iii) On the basis of common senses of intestinal infectious disease, formulate guidelines for the storage of drinking water in rural households; the objective is to avoid secondary contamination;
- (iv) Consider the conditions of local economy, culture, geology and resource, determine and select appropriate sanitation technologies and that can be accepted and sustainable used by the local people.

b. Recommendations Specific for the Case Studies

Chuxiong:

- (i) Improve the existing latrines which are primitive and do not achieve "harmless" treatment standards;
- (ii) The World Bank's experience in integration of rural water supply, sanitation and health education in model village should be promoted. Conduct further trials and investigation on the feasibility in implementation for other villages;
- (iii) Make use of Activity Room in the villages to promote sanitary latrines, their usage and upkeeping as well as the linkage of intestinal infectious disease to sanitation. Promote the participation of the rural community and village peoples' in environmental sanitation improvement activity.

Fenghuang:

- (i) Start the inter-departmental co-operation with the unified leading and co-ordination, fully utilize the existing resources for disease prevention and control in particular for the drinking water quality monitoring, rural sanitary works and health education. However, during the participation, the roles are different from each other. Women are the main care-givers in families. They has to cook, take care of the elderly and children etc. Hence, they play a special role in improving personal hygienic habits in the families. Moreover, women are more caring about privacy, safety and convenient from good latrine. Similarly, regarding the children, they are the next generation, they should be taught with the knowledge of water, latrine, hygienic habits and health so that they can possess sanitary knowledge and foster hygienic habits;
- (ii) In accordance with the national and local law and regulations, set up suitable preservation facilities for drinking water resources. In consideration of the local geology, strengthen the quality monitoring of the drinking water resources such as manganese and mercury concentration monitoring;
- (iii) From the basis of the RWSS project, strengthen the wastewater effluent works and





refuse treatment works; in respect of disease prevention, strengthen the works on health education of good hygienic habits for children and women. In addition, incorporate the works which focusing on personal hygiene for women and health education.

Tianshui:

- (i) For the larger scale villages, treated water quality and safety monitoring works should be set up, in particular the monitoring of microorganisms in drinking water. Formulate appropriate protective measures should be established to protect the water resources in accordance with national regulation or local legal requirements. Local geographical constraints should be considered for the monitoring of quality in raw and treated water;
- (ii) The methane generation type, separate excreta and urine collection type and triple compartment septic tank type latrines, which are favoured by the villagers, should be promoted. The information on health promotion and management of sanitary latrines should be disseminated.

Tumotezuqi:

- (i) Based on the surveys, the households wish to have triple compartment type and excreta urine separation type sanitation latrines. From the arid climatic conditions, the excreta urine separation type sanitation latrine would be more appropriate to be used. However, it is premature to make decision on the type of sanitation latrine to be used in specific villages, it would be more appropriate for the village people to choose via the "Apply Hygienic Steps" method, and then determine which type should be adopted. It should focus on the design technology with low capital cost. Therefore, to meet the different demands from households, it is required conduct necessary and comprehensive investigation on the expectation and economic capability of the households within the whole town before the works being carried out;
- (ii) Formulate appropriate measures to protect the water resources in accordance with national regulation and local legal requirements. Consider the local constraints and local geological conditions, provide appropriate protection measures on water resources. Regarding the fluorine and arsenic content of the local water source, long term monitoring is required to find out any abnormal content of fluorine and arsenic in drinking water to ensure the quality of the safe drinking water;
- (iii) As in the projects of rural water supply, sanitation and health education, the environmental sanitation and the health education are relative lagging behind. It is necessary to understand the way to incorporate the health education into villages' and towns' rural water supply and health management committee or in group. The main objective is to maximize the comprehensive benefit of the project.

Gaocheng:

- (i) Gaocheng has developed the 2004-2006 Sanitation Plan. However, the capital investment is mainly on household's sanitary latrines, the investment on health education promotion is relatively small. As the villagers' hygienic habit should take a longer time to develop, the investment on this aspect should be increased.
- (ii) Suspension of water supply would happen in local villages (several hours a day), villagers would use water container and buckets for water storage. To avoid secondary contamination, it should promote the preventive measures intestinal infectious disease and formulate safe water storage guideline for the households.





- (iii) Conduct “harmless” treatment and sanitation monitoring works for rural sanitary latrines. Select target population to promote appropriate sanitary latrines with due considerations on local economy, culture, geographical and resources. Conduct monitoring works on water quality for groundwater with regard to the refuse and waste water storage and disposal, identify possible contamination sources to groundwater and propose mitigation measures.

Yuyao:

- (i) According to the survey, the rural economy is quite well developed, and there is strong desire to improve drinking water quality. If emphasis has been given to sanitation and health education when implementing rural water supply projects, the present outlook of the villages should be a lot better.
- (ii) Yuyao should continue to strengthen monitoring of drinking water sources and quality, and establish suitable underground water sources protection measurements.

O Case Studies Recommendations - Sanitation Promotion and Health Education

a. Recommendations common to All Case Studies

223. With due respect to the major health issues, employ mass media propaganda as well as personal level interaction to promote the basic sanitary hygiene and health education. The objectives are to enhance the rural population’s own ability to lead a scientific, civilized and healthy way of life:

- (i) With the integration of RWSS, establish demonstration sanitary latrines and promote the proper behaviour and attitude towards RWSS;
- (ii) Co-ordinate among various departments relevant to RWSS for better synergy in the RWSS sector;
- (iii) Mobilize mass media in society to promote sanitary and health messages in RWSS, such as television and radio broadcast. Display posters, banners, slogans in propaganda columns and blackboards. Disseminate relevant leaflets to households and organize seminars;
- (iv) Mobilize key figures in the villages to assist in the health promotion, including village committees, village chief, women's representatives, teachers, doctors, local businessmen, religious leaders etc.;
- (v) Promulgate policies and pledges such as "the village environmental sanitation policing methods", "the villagers health behavior standards", "the civilized & healthy family competition" etc to promote the public health awareness;
- (vi) Promote competitions on rural sanitation and health education and publicize the winning models;
- (vii) Use educational department’s advantages to develop "school links village, student links household, small sector links large sector" chain-type knowledge dissemination. The students are the most effective human resources on family knowledge dissemination. Teach the students health education via school to disseminate the message to their parents in order to monitoring the improvement on family hygiene condition, and bring the overall health level enhancement in rural areas;
- (viii) Launch patriotic health campaign in conjunction with the integrate civilized ecological development, improve the overall environmental sanitation characteristics by rural water supply, rural latrines, improved pigsty, nuisances removal and concrete road pavement. Through government subsidies, operate village bathrooms, install





solar-powered water heater, improve villagers' health issues and set up refuse collection points.

b. Recommendations Specific for the Case Studies

Chuxiong:

- (i) Adopt the languages and customs of the ethnic minorities races to promote the health education messages in their mother-tongue.

Fenghuang:

- (i) Adopt the languages and customs of the ethnic minorities races to promote the health education messages in their mother-tongue.

Tianshui:

- (i) At the national level, CCTV Channels 1 (news channel) and 7 (agricultural channel) can help to promote the sanitation technology and knowledge;
- (ii) Integrate the government departments' management functions, provide reasonable design, planning and approval on the sanitary latrine in the proposed and planned villages. By construction of demonstration sanitation latrines, encourage proper hygienic habits in rural households.

Tumotezuqi:

- (i) At the national level, CCTV Channels 1 (news channel) and 7 (agricultural channel) can help to promote the sanitation technology and knowledge;
- (ii) Coordinate with relevant departments, share the resources, use different technologies amongst the departments and also administer resources to implement the work plans together such that numerous projects can become integrated activity and maximize the effect of the effort provided. To ensure the water quality, provide low water tariff and encourage wider use of water in rural households. Strengthen the local disease prevention network and guarantee the capital is expended in a proper way. Corporate with schools to produce an environment on promotion health education and using sanitation latrine.

Gaocheng:

- (i). Since there are relatively comprehensive dissemination facility, high prevalence rate of TV set in household and higher level of education in Gaocheng, the inadequacy in knowledge of saving water measures and sanitary latrine construction could be made up by dissemination of saving water, application of water meter for water tariff collection and promotion of water conservation technology. Promote construction techniques for sanitary latrine, proper use of water saving toilets. Integrate the activities on RWS and hygiene promotion seamlessly. Establish demonstrative sanitary latrine household and role models. Conduct propaganda on promotion of the knowledge, habits and behaviors in relation to drinking water and hygienic environment.
- (ii). The relevant government bureaus should be coordinated to share common resources. Utilize the technologies and administrative resources amongst each bureau for distribution of the works and project implementation in order to organize different projects in a well managed manner for increasing the effectiveness.





Yuyao:

- (i) Strengthen the health education for migrant workers, increase their awareness of sanitation. The migrant workers usually have worse economic conditions, lower sanitation awareness, more vulnerable of water and sanitation related diseases and hence more prone to the prevalence of infectious diseases in the villages. It is especially necessary to promote their sanitation awareness and improve the sanitation conditions. When first moving into the villages, they should receive the knowledge on sanitation and disease prevention. Simple identification and report of infectious diseases, sanitation laws and regulations organized by local governmental health personnel, and regular checking, instruction and assessment of their living environment will also be conducted accordingly.
- (ii) With regard to private enterprises, with the cooperation of the managers, training by health professionals or putting up health education posters and pictures can be adopted to ensure the physical health of the employees and promote and sanitation in the factories. Through these activates, the workers have not only learned the knowledge, they can also pass on these messages back to their hometown, which may generate more substantial health benefit.

P Case Studies Recommendations - Financial Management

a. Recommendations common to All Case Studies

- (i) In the current RWSS projects, the mix in assembling the finances is restricted to one model. The repayment period for World Bank's loan is short creating a heavy burden of loan repayment. Also water tariffs cannot be set too high with due consideration of the affordability of the rural households. The commercial activities in the villages are not well developed and could not contribute to improve the village finances. The rural economies still vary a great deal, there are possibilities for ownership by share holding and out-sourcing of O&M services of the WTP;
- (ii) The needs for improvement in RWSS for the rural population are very pressing and well found. The central government has been very vocal in emphasizing the development of the Western Regions. Appropriate concessions towards the Western Regions are a national policy. In this regard, the sources of funding could be expanded to include international loans as well as domestic loans and concessions could be negotiated for more favourable interest rates and repayment periods;
- (iii) For those WTP with no outstanding loans, asset depreciation should be effected in the accounts to ensure the long-term financial well-being of the WTPs.

b. Recommendations Specific for the Case Studies Location

Chuxiong:

- (i) Since rural water supply is a public utility of beneficiary nature, the current policy of levying business tax and capital gain tax should be reviewed; and relaxed.

Fenghuang:

- (i) The Finance Bureau of the prefecture shoulder the major responsibility for loan repayment, yet the bureau does not participate in the management of the WTPs. WTPs are run by Water Resources Bureau. The water tariffs collected are inadequate to cover the repayment. Also water tariffs cannot be set too high with due consideration of the affordability of the rural households;
- (ii) Since rural water supply is a public utility of beneficiary nature, the current policy of





levying business tax and capital gain tax should be reviewed and relaxed. For those WTPs with all loans completely paid down, such concessions could be used for plant upgrade and preventive maintenance.

Tianshui:

- (i) For those completed water supply projects, the massive investment by the government has guaranteed the project completed smoothly. Therefore, the government's special fund supporting the rural water supply construction work is the most important guarantee;
- (ii) The investment on health education should be increased;
- (iii) Financial reports and cost audits should be prepared by the WTPs.

Tumotezuqi:

- (i) Tumotezuqi features the characteristics of ethnic minority races, animals rearing area, arid region, groundwater with high content of arsenic and fluorine. It is recommended that each level of government departments should fully understand the local social and economic conditions, sustainable development, image of government so as to ensure satisfactory achievement of the RWSS works;
- (ii) It should continue enforce the "science and technology is the productivity". Proactively develop, introduce, and promote some appropriate technologies. For example, the quick detecting method on high content of arsenic and fluorine in water source and water quality monitoring. Use standardized technology in the sanitation latrine design and construction.

Gaocheng:

- (i) Municipal government and relevant bureaus should proactively promote to the public that water is a "commercial product" and collection of water tariff is a necessary means to maintain the operation of the water supply facilities. Set reasonable water tariff, promote water meter installation and water tariff collection system for village type water supply facilities.

Yuyao:

- (i) There is a big demand for investment in rural water supply renovation, system expansion and wastewater collection and treatment engineering in Yuyao. Although the local economy is prosperous, it cannot shoulder the vast demand on financial resources. Actively introducing loans from international financing organizations is a good channel for fund-raising apart from expanding domestic channels.
- (ii) Financial management in village water supply systems should be strengthened. Setting proper water price according to the cost accounting will bring more economic revenues, guaranteeing the renovation and maintenance of WTPs.

Q Case Studies Recommendations - Organization and Capacity Building

a. Recommendations common to All Case Studies

- (i) The municipal government should co-ordinate the human and financial resources of relevant departments for integrated planning, implementation and O&M management of the RWSS projects;
- (ii) Encourage people's participation: The local people are the targeted beneficiary





population for rural water supply, sanitation latrine and health education. Their participation is the most important.

- (iii) Enhance the self-regulating capability in the management of the WTPs;
- (iv) Strengthen the training and professional development of the WTP operation staff, in particular in the aspects of water quality monitoring and in financial accounting management.

b. Recommendations Specific for the Case Studies

Chuxiong:

- (i) The municipal government should co-ordinate the human and financial resources of relevant departments for integrated planning, implementation and O&M management of the RWSS projects;
- (ii) The Health Bureau should secure funding and technical capability in the monitoring of quality of drinking water supply. It should also develop the capability of the CTHs in the promotion of health education as an important component of rural sanitation works.

Fenghuang:

- (i) There are funds available from specific departments for specific purposes (e.g. funds from Development and Reform Bureau to pay for labour services, rural water supply funds by Water Resources Bureau, funds from Poverty Alleviation Office, funds for environmental protect from Forestry Bureau, medical funds from Health Bureau, etc). At present, these funds are administered by respective departments independently. There is little coordination and integration across departmental lines. The prefecture government and higher levels of government could strengthen the coordination and integration of these funds to support integrated RWSS projects to achieve the most pronounced results;
- (ii) The sense of participation can be increased by the following ways: (1) Fully utilize the mass media to promote hygienic knowledge, environmental protection knowledge and other scientific knowledge in order to enhance their health awareness. Investigations show that people will watch television for more than 5 hours a day, especially the programme in CCTV channels; (2) Increase labor force, pay the people salary for construction of rural water supply and sanitation latrine. This can increase their incomes and also get the works start; (3) Conduct environmental protection, recommend landscape planting in residential districts for enhancement of the environment, provide rural water supply, construct methane generation type latrine and promote rain water collection system to resolve the drinking problem from human and animals.

Tumotezuoji:

- (i) It is recommended to make reference to "The Huhehaote Agriculture Science and Technology Development in the 10th Five Year Plan Implementation Plan" for rural water supply works, to provide training with objectives, measures and step by step, on specialists for rural water supply, sanitation latrine and health education in Tumotezuoji. To develop a methodology on position setup, responsibility designation and examination on working people for on water supply, sanitation provision and healthy education in order to enhance the their performance;
- (ii) In view of the ethnic minority races' culture, translate and edit the existing Chinese health education material to minority nations' language. Develop the technology to





select agricultural species that can adapt to the arsenic and fluorine content in groundwater, etc.

Yuyao:

- (i) The Health Bureau should secure funding and technical capability in the monitoring of quality of drinking water supply. It should also develop the capability of the county and township hospital in the promotion of health education as an important part of rural sanitation works.

R Case Studies Recommendations - Poverty, Gender Aspects and Community Based Participation

224. Some suggestions of different financing models with due regards to the poverty aspects are:

- (i) Safe drinking water supply projects in rural poor areas in the remote hilly regions should be led by governments. Beneficiary counterpart funding would mainly be labour services in kind;
- (ii) In remote and extreme poverty areas, government funding and grants by other agencies would be more appropriate. RWSS projects funded by loans should be planned for larger townships to sustain a reasonable scale. This could expand to cover the peripheral villages in due course;
- (iii) Secure loans from domestic banks with policies of interest subsidies by central government. These loans could be bundled with international loans.

Fenghuang:

- (i) Governments above the prefecture level should bear 80% of the funds whereas beneficiary counterpart funding would mainly be labour services in kind;
- (ii) The international loans when administered to the rural poor areas, the interest rates should not exceed 2% and repayment period not less than 25 years. The gaps in the terms and conditions should be borne by governments above the prefecture level.

Tumotezuogji:

- (i) For the poverty areas, establish the central government's interest rate subsidy policy for domestic bank loans. The international loan may combine with the domestic loan to constitute an overall loan. The funds provided by provincial and municipal government's should be 80% of the total cost. Counterpart funding of beneficiary would be in the form of manual labor services in kind;
- (ii) The interest rate of international loan after eventually arriving at the local government or the local community level should not exceed 2%, the repayment period should not be shorter than 25 years, the gaps between these terms and the loan agency's terms should be borne by the provincial or higher level of government;
- (iii) Fully use the functionality of local Community Based Organization, to adopt "Participation Type Personal Hygiene and Sanitation Training (PHAST)" or "Participation Type Health Propaganda and Education" method to promote the 3-in-1 rural water supply, sanitation and the health education. Make use of local people's participation and proactive attitude.

Gaocheng:

- (i) For those villages which have received the qualification of "civilized village", there are





waste-water disposal systems, refuse collection systems and street cleansing systems, and thus all the streets, front yards and toilets are clean and tidy. However, the way of handling and treatment of the refuse after transferred from villages raise concerns. In some extensive community areas, appropriate treatments on wastewater and refuse have not been provided. Relevant government bureaus should strength the control and management on treatment of wastewater and collection of refuse.

Yuyao:

- (i) One of the poverty issues in the region mainly is the issue of migrant population. The urbanization in the regions is not just the process of the local rural residents becoming urban dwellers, there are still great numbers of migrant workers living there, accounting from 20-30% of local population, who are the major composition of poverty stricken population in the region. The future plan for water supply and sanitation projects should take this part of population into account, in addition to the permanent resident population.
- (ii) Increase the role of female gender in household water supply, sanitation, saving water, wastewater discharge and dumping of garbage. Emphasis should be given to this to promote the community-wide participation and to improve the status of women in community building.





VI Analysis of RWSS Sector Status and Constraints

A Summary - Current Status of RWSS Sector and Constraints

225. On the basis of the review and analysis discussed in the Sector Profile (Section IV) as well as in the six Case Studies (Section V), the key issues and the constraints faced in the RWSS Sector are summarized in the following:

- (i) There are great difficulties in the rural water supply development in the rural poor areas of the PRC. Key issues include low beneficiaries coverage rate for piped water supply, contamination of water resources, fluoride and arsenic issues, and inadequate water supply facilities. The task is arduous by measure of the volume of work i.e. over 300 million rural people remain deprived of access to safe drinking water.
- (ii) For small-scale rural water supply systems organized by local communities, the planning, design, operation & maintenance and management aspects are not satisfactory. The reliability of supply and compliance with water quality standards need improvement.
- (iii) The low prevalence rate of rural sanitary latrines is still a cause for epidemic disease and environmental contamination. About 122 million rural households remain in need of sanitary latrines.
- (iv) The development of health promotion and health education is imbalanced amongst Western, Central and Eastern Regions. The rate of "Knowledge of Core Sanitary and Health Information" and the rate of "Formation of Hygiene Behavior" are low. Professional health education organizations and networks in township and villages are not sufficient. Financial resources are limited.
- (v) The financial resources in the rural communities are inadequate, funding for RWSS projects is still a major constraint.
- (vi) Capacity building and management capability still need further improvement.
- (vii) Some RWS systems are suffering financial losses because of problems in the water tariff policy, water tariff collection, and operation efficiency.
- (viii) RWS projects cover a vast area with unbalanced development. Issues of inadequate emphasis on management, weak institutions, lack of operation and maintenance, and competence of management personnel affect the overall effectiveness of RWS projects.
- (ix) The rural poor population still represents a significant proportion, especially in the Western and Central Regions. Poverty reduction works are still arduous.
- (x) The recognition and implementation of community-based participation still need improvement. Women's participation in management and decision-making in RWSS projects is still weak.

B Three Phases of Development of RWSS in PRC

226. Since the founding of the PRC and along with the development of rural economy, the development of the rural water supply can be broadly divided into three major stages:

- (i) Initial Stage: mainly Decentralized Water Supply Systems:
From the founding of the PRC to the end of 1980's, the rural water supply facilities were co-ordinated through the National Patriotic Health Campaign Committee. Works mainly involved "Separation of drinking water for human and animals consumption", enhancement of capacity of open wells and provision of well covers, construction of hand pump wells, conduction of simple water resources intake and transmission





works, provision of irrigation systems in a form of storage, conveyance and uplifting etc.

- (ii) **Development Stage: mainly Centralized Water Supply Systems:**
 From 1980's to early 2000's, with the participation of "Ten-Year International Drinking Water and Sanitation" campaign, the PRC Government promoted the development of centralized water supply systems comprehensively in the rural regions. Measures consisted of incorporation the rural water supply objectives into the Five-Year Plans (FYs), the country's national social and economical development plan, establishment of rural water supply policies, increasing government's funding in this sector, commencement of projects on "Drinking Water for Humans and Animals", introduction of International Donor Agencies' projects, establishment "Regulations for Implementation of "National Standards for Drinking Water" in Rural Areas", publishing "Technical Standards for Rural Water Supply" and compilation of relevant technical handbooks. In the past twenty years, the successful execution of International Donor Agencies' RWS cooperative projects not only implemented the centralized water supply works, it also introduced scientific and regulated management practices in the project planning, design, implementation and commissioning of the RWS projects. The works help to lay a good foundation for comprehensive promotion of safe drinking water concept and the sustainable development of RWS projects.
- (iii) **Sustainable Development Stage: Safe Drinking Water:**
 Since 2000's, the RWSS Sector in the PRC has reached a new era of safe drinking water and sustainable development. Based on the directives issued by NDRC for the drafting of the 11th FYP for the RWSS Sector which confirms the preamble in the "Rural Safe Drinking Water Supply 2005-2006 Implementation Plan" prepared jointly by NDRC, MWR and MOH, the PRC has elevated from quantity to quality focus for drinking water. In addition to merely satisfying the need for drinking water, increased concern is placed on good quality, safe to consume drinking water. The "Village Water Supply Technical Specifications", "Village Water Supply Station Staff Organization Standards", "Qualifications Requirements for Village Water Supply Stations" published by MWR as well as the "Safe Drinking Water Standards and Monitoring and Evaluation Parameters for Rural Water Supply Systems" jointly published by MWR and MOH have laid a sound and reliable foundation for sustainable development of RWS.

227. **Sanitation and Health Education:** The development of rural sanitation in the PRC commenced in 1950's. The NPHCCO directed the National Patriotic Health Campaign in the whole country to promote sanitary latrines in rural areas. Following the social and economic development, different types of sanitary latrines have now been researched and developed for applications in various regions of the country with vastly different geographical, environmental and climatic conditions. Some examples include (1) 3-Way Connection Digester with Methane Generation Latrine for energy conservation purpose and (2) Separate Faeces and Urine Collector Latrine for the purpose water conservation for arid regions. The improvement in household and public sanitary latrines not only reduces the water and soil contamination arising from human waste and animal waste, but also enhances the environment hygiene and neat appearance of the villages.

C Regional Disparity in Economic Development in PRC

228. The PRC is a vast country with great variability in the natural conditions as well as





economic conditions with broad classification into the Western, Central and Eastern Regions¹². Even within a single region, there are also differences in the state of economic development. There are a total of 2862 counties the whole country, most of the better developed economies are located in the coastal area enjoying geographical advantages, well developed transportation networks, good communication systems, highly educated societies, advance technologies, densely populated centers and high average personal income. On the contrary in the poverty areas, average personal income is low, economic production factors are poor, and the level of education is low. For delineation of Eastern, Central and Western Regions of the PRC, please refer to Fig. 9.

229. Owing to the relatively weak economic development, the private sector in the Western Region is small and weak. In 1999, the total number of private enterprises was 3.222 million, Western Region only accounted for 16.61%, while Central and Eastern Regions accounted for 20.3% and 61.9 respectively.

230. The disparity among the regions can be reflected in terms of counter-part funding ability, affordability of water tariff, water consumption behavior and water consumption rate. There are a significant differences between different regions. The monthly water consumption in wealthy region could reach 10m³/person while in poor region, it is only 1m³/person.

D RWSS – Funding Sources and Financial Models

a. Multiple Funding Sources and Financial Mixes

231. Following the tremendous economic development, open and market oriented policies and institutional reforms, there are now multiple funding sources and financial mixes available to finance the RWSS Sector development.

232. Likely funding sources to finance the RWSS Sector are:

- Central Government finances, Special designated funds
- Government Bond proceeds
- Provincial and Local Government finances
- Poverty Alleviation Funds: including Central Government Poverty Alleviation Fund, Non-government Poverty Alleviation Fund
- Grant Assistance from International Donor Agencies: including grants from Inter-Government Agencies, Foreign Government Agencies, Foreign Non-government Agencies
- Loan Assistance from International Financial Institutions: including loans from World Bank (IDA, IBRD) ABD and other institutions
- Foreign Government Loan
- Loan from Domestic Development Bank: with and without government subsidies on interest
- Loan from Domestic Commercial Bank: Commercial Loan
- Domestic Private Sector (Non-government) Capital

¹² In 2001, the average net income of the rural population was RMB 2366.40. However, 444 million peasants earned a net income below RMB 2000, representing 47.55%. Among them, 123.44 million rural people or 13.22% earned less than RMB 1000. In the same year, the average net income of the rural people in the Eastern, Central and Western Regions were RMB 3266.70, 2165.20 and 1662.20 respectively.





- Foreign Private Sector Capital
- Collective Monetary Resources from Town and Village Communities
- Funds from Individuals, Contribution by Manual Labour in kind.

233. Funds from different sources could be matched and mixed into different models in accordance with the requirements and conditions pertinent to the funding sources. Some examples are:

- Central Government finances, with counterpart funding from Provincial and Local Government finances as well as from the beneficiaries mostly in the form of manual labour in kind
- Government Bond proceeds
- Poverty Alleviation Funds
- Grant Assistance from International Donor Agencies
- Loan Assistance from International Financial Institutions, with counterpart funding from Provincial and Local Government finances as well as from the beneficiaries mostly in the form of manual labour in kind
- Loan from Domestic Commercial Bank
- Loan from Domestic Development Bank: with Government subsidies on interest
- Domestic Private Sector (Non-government) Capital
- Foreign Private Sector Capital as well as from the beneficiaries mostly in the form of manual labour in kind
- Provincial and Local Government finances with counterpart funding from Collective Monetary Resources from Town and Village Communities as well as from the beneficiaries mostly in the form of manual labour in kind

Depending on different factors, the selection of different financing models and strategies will be discussed in Paragraph 290 to 305.

b. Inconsistencies in Financial Models, Counterpart Funding and Poverty Alleviation

234. There is an inherent difficulty in formulating viable financing models for RWSS sector primarily due to the following factors:

- (i) relatively huge investments required in providing drinkable water to the rural poor as well as sanitation and hygiene education;
- (ii) requirement for government subsidies (both the Central and Provincial/Local levels) and reducing the burden on rural poor;
- (iii) problems of cost recovery and financial sustainability of RWSS systems in the poorer areas and
- (iv) low borrowing capacity of rural areas to finance RWSS .

235. In previous RWSS projects, a major challenge was to target the investment funds on those who are poor but must have sufficient resources to upgrade their water supply whenever long-term financing can be provided. There was the risk that funds will be captured by middle-income communities rather than the poor. It has been a strategy to use a designated national or provincial level poor county as a targeting tool which has been successful in the past.

236. At present, amongst the financing models, only the Special Designated Fund from Central Government and the loans from World Bank are guaranteed to reach the project. The accounting reporting method adopted by World Bank is proved workable in ensuring the fund





will be allocated to the RWSS project site and be utilized accordingly. The availability of the promised counterpart funding varies from region to region. In general, the situation is reasonably well in Eastern and Central provinces but not so for the Western provinces. The main reasons are firstly weaker economies and secondly the higher demand for water, more RWSS projects and more stretched finances.

237. By the end of 2000, although the PRC has reached the level of “well-to-do”¹³ society, there are still 32 million people living in poverty and 62 million people without steady supply of food and shelter. Natural disasters and other adversity could drive these people back to poverty again. There is a strong desire and urgency to resolve the water supply problems for the people in rural poor regions and let the people have the access to safe drinking water. Because of low household income, it is difficult to raise fund for capital RWS projects and similarly for payment of water tariff. Therefore, people in rural poor regions are not able to afford commercial loans with market interest rates. Counterpart funding is another difficulty. Generally speaking people are willing to provide labour services in lieu of putting up funds.

238. Based on the above understanding, for the sake of financial model analysis purpose, four financing models which include loans as source of funds are developed as part of long-term financing strategy in order to maximize the use of government counterpart funds on central and provincial/local levels, for rural water supply and sanitation and health and sanitation education programs. Major objectives of the loan and equity financing mix are to accelerate assistance to poor villages in having access to safe water supply and enable poor beneficiary villages to pay lower upfront costs and reduce the burden of long-term capital costs. Detailed analyses are presented in [Appendix 3](#).

239. The following four options in respect of financing model which prescribe various loan-equity financing mix, which can possibly apply in the West, Central and Eastern provinces where borrowing capacity exists.

- Option 1: 50% of Central Government (CG) Fund as Counterpart Fund to ADB/WB Loan and 50% of Provincial Government (PG)/Local Government (LG) Fund as Grant.
- Option 2: CG Fund as Grant, ADB/WB Loan in Lieu of PG Fund for Capital Cost and PG Fund to be used for Loan Repayment and Not for Capital Cost.
- Option 3: 50% CG Fund for Loan Repayment, PG Fund as Grant (25% of Project Cost) and ADB/WB Loan (50% of Capital Cost).
- Option 4: 50% CG Fund, PG Fund as Grant (30% of Project Cost) and ADB/WB Loan (50% of CG Share).

240. A detailed analysis on the above four options has also been conducted in [Appendix 3](#). The results show that in the Western Region, Option 2 is considered as the most viable option as it allows a 37% beneficiary share in the total project cost which is combined 7% share in capital cost and 30% in loan repayment. For Central and Eastern with better economic condition, Option 4 is considered more suitable, as it allows 48% (11% share in capital cost and 36.5% in loan repayment) and 56% (20% share in capital cost and 35.5% in loan repayment) beneficiary share in the total project cost for Central and Eastern Region respectively.

¹³ “Well-to-do” society is a phrase describing the state of development of society attaining a reasonable prosperity.





E RWSS – Project Planning and Implementation

241. According to the PRC's RWS guidelines, the RWS in the past was implemented by (1) relevant Central and Provincial Government to organize the domestic and international projects and (2) Local Government and community organization.

242. Since 1980's, the Central Government has been organizing and conducting large scale RWS projects, including NPHCCO co-ordinating RWSS projects; MoH acting as the Executing Agency for World Bank's RWSS projects; MWR for projects "Separation of Drinking Water for Human and Animals"; and MWR/MoH for "Rural Safe Drinking Water Supply 2005-2006 Implementation Plan" and MRW for projects in respective FYPs.

243. Since the commencement of PRC's economic reform and market economy, the works of RWSS have received substantial assistance from international assistance organizations, including International Donor Agencies, International Financial Institutions and Foreign Governments unilateral agencies and multi-lateral agencies. The assistance from the international communities has contributed major benefits to the RWSS Sector, e.g. World Bank's RWSS projects. The major accomplishments are summarized as follows:

- Make up the insufficiency of PRC's RWSS funding, bundle the counterpart funding to expedite the development of RWSS facilities.
- Build upon the experience in implementation of the "3-in-1" concept in RWSS projects, promote integrated RWSS development to benefit the rural population.
- Introduce advance modern management practices and bring the project management practices closer to international standards.
- facilitate more scientific, systematic and regulated management in the construction and operation of the RWS projects.

244. The key objectives of World Bank RWSS projects are to strategically supply safe drinking water to rural poor villages, improve the drinking water quality, improve the general appearance and sanitary environment of the project villages and enhance the sanitary and health awareness and hygienic behaviors of the beneficiaries. In the implementation of the these projects, the PRC Government organized the international and domestic experts to formulate "Technical Standards for Rural Water Supply", "Regulations for Implementation of "National Standards for Drinking Water" in Rural Areas" and "Construction Management Regulations in Rural Water Supply Projects", as well as "Management Practice Manual" etc. The experts also compile the "Technical Guidelines", "Manual" and "Handbooks" for the planning, design, implementation and operational management of RWS. With the continuous exploration and improvement, these manuals, literature and documents have built a sound foundation for development of RWSS projects, have expedited the RWS in rural poverty area and have facilitated scientific, systematic and regulated management in operation of the RWS projects.

245. The objectives for MWR's "Separation of Drinking Water for Human and Animals" aim to resolve the serious problem of drinking water shortage for both human and animals. In the course of implementation of these projects, MWR has formulated the clear policies, project management guideline, methods and specific standards. Through years of unrelenting efforts, MWR has achieved the objective of providing access to drinking water for the rural population basically.





246. The NDRC, MWR and MOH have jointly drawn up the “Rural Safe Drinking Water Supply 2005-2006 Implementation Plan” to cater for the demand in RWS in the two years. The RWSS Sector has reached a new era of safe drinking water and sustainable development. The “Village Water Supply Technical Specifications”, “Village Water Supply Station Staff Organization Standards”, “Qualifications Requirements for Village Water Supply Stations” published by MWR. MWR has also commenced the preparatory works for the formulation of “Rural Safe Drinking Water Master Plan and 11th FYP”.

247. Currently, majority of the RWS systems, which are constructed under projects funded by domestic and international assistance agencies, are managed by township governments or village committees. However, some of them are operated by RWS project office or Water Usage Committees. The formats of management include direct responsibility of water resources department/bureau, direct appointment of individual personnel, by management set-up via shareholding, competitive management contract (out-sourcing), etc. In general, except for some large scale systems, the management and operation of most RWS systems are described as “crude”.

248. In 1980s, NPHCC carried out the “Investigation Study on Current Status of Rural Sanitary and Environmental Planning” in some provinces with a view to identifying and tackling the sanitary and environmental issues as a consequence of rapid rural social and economic development. This study provided scientific basis for formulation of policy in rural social and economic development. Subsequently, (1) the sanitary latrine reconstruction program was implemented and (2) the hygiene promotion and health education campaign for 900 million rural people was launched.

249. It is evident from some project experience of International Donor Agency funded projects that the enhancement on villager’s recognition and awareness of sanitation, hygienic habits and health education could be accomplished via project implementation and based community participation.

F Community Based Participation

250. In general, the rural community in the PRC has a complete community participation system. Village Committee is organized by villagers themselves. Village Sub-committee of Communist Party is the most basic organization of village. Villagers’ General Meeting, Villagers’ Representatives’ Meeting and Village Communists’ General Meeting are the main channels for the villagers to express their opinions and raise their proposals. With the implementation of the “Villagers Organization Regulations”, villagers can participate in decision making on important matters related to the village. However, the functionality, capacity and authority of decision making of the above village organizations vary from village to village. Thus the relationship, capacity, communication and negotiation with outside parties are different. For those village development projects that would involve “outsiders”, Village Organization would participate in the process of decision making in order to protect the interest of the villagers and reflect community-based participation in project arrangement, project implementation and project management. This will provide an opportunity to encourage the villagers to participate in the process.

251. Under the legal framework and mechanism regarding villages’ autonomy, villages





enjoy a certain degree of autonomy. There are sufficient grounds for villagers to participate at the community level in RWSS development projects. In previous RWSS projects, community-based participation was not seriously exercised. The right to be informed, to express, to decide and to manage was not exercised, especially regarding the ownership and operational management issues. Moreover, at different locations, different project officers have different concepts, understanding and methods in respect of villagers' participation and thus the accomplishments are different. For the purpose of a more consistent approach, it is necessary to prepare a CBO participation plan with contents of the concept, objectives, standards, process, methodology and monitoring assessment system, as well as the expenditure in the cost estimate in the planning and design stage of projects.

252. During the project implementation, the lack of or the very minimal community-based participation by the villagers would forego better quality decisions in resolving matters, such as cost control, service quality, water tariff collection, financial management, water resources management and staff organization, etc and these will eventually affect the sustainability of the project.

253. According to the findings of case studies, villagers and communities general consider the RWSS projects as Government undertakings. Even though they provide counterpart funding by labour services in kind, they do not desire for share ownership. Villagers usually concern the water tariff and water quality, and would not show great interests in the sustainability of the project, financial and management problems. Sometimes they show no interests in tariff and quality matters. If the villagers consider the tariff is too high or encounter problem with water quality, they will have take passive attitude by reducing consuming water or refusing to pay. In some areas, villagers even resume to use unsafe water resources. They seldom proactively participate in protection on their right of water usage.

254. The ownership of the RWS system is unclear. The responsibility and right of the RWS system are not well defined. The formats of management include direct responsibility of water resources department/bureau, direct or indirect appointment of individual personnel. This would happen especially near completion stage of the project when the project office is disbanded. The unclear ownership and responsibility of the RWS system would constraint the participation of villagers and communities in project implementation management and post project operation and maintenance management. It is therefore recommended that an independent legal entity is established in accordance with the ownership mix of the RWS systems. The role of Government would be transformed from owner/operator to regulator, technical and service support. In this regard, the ownership of the RWS system and operation mechanism is the prominent question after the completion of the project. This report will provide the relevant Research and Development sub-program to further investigate the various feasible models of ownership and O&M management of the RWS systems and to recommend reasonable and practical model of operation and management of RWS systems with due regards to various forms of ownership.





G Social Benefits, Economic Benefits and Health Benefits

255. According to the statistic of NPHCC, up to the end of 2003, the accumulative beneficiary population from improvement of RWS have reached 874 million, accounting for 92.71% of the total rural population. The rural population with piped water supply is 548 million, accounting for 58.18% of the total rural population.

256. The RWS works in the rural poor villages have been expedited through the implementation of the RWS projects funded by international assistance. An additional benefit is that the RWS projects nurtured an army of capable management and technical personnel for half of the Provinces in the PRC who have since executed and managed the implement the RWS works in a scientific and effective way.

257. The development of RWS projects has produced remarkable social, economical and health as listed in the following:

Social Benefits:

- Provide for basic necessity for living
- Improve the standard of living and state of health of the rural population
- Save manpower in fetching water, reduce the women's burden in fetching water or caring for the sick
- Provide basic rural infrastructure
- Promote the rural social and economic development
- Reduce poverty
- Reduce the disparity between major urban centers and rural areas
- Maintain a harmonious and stable community.

Economical Benefits

- Save manpower in fetching water and enabling employment
- Reduce incidence of diseases and save costs on medical treatment
- Develop rural businesses and small scale commercial and industrial operations
- Develop rural cattle rearing, fish farming.

Health Benefits

- Improve villagers' state of health
- Reduce incidence of diseases and save costs on medical treatment.

258. RWSS projects help the rural population in improving their living standards and also alleviate poverty in rural areas. In [Appendix 4](#), details regarding the accomplishments of "3-in-1" concept in integrated RWSS projects are presented.

259. In summary, the implementation of "3-in-1" concept in integrated RWSS projects bears great significance in producing tremendous social, economical and health benefits and continuous unflinching efforts should be devoted in the further development of the RWSS Sector.





VII RWSS Sector Development Policies and Strategies in next Five Years (2006-2010)

A RWSS Sector Development Objectives

260. The PRC Government has established very clear objectives in the development of the rural water supply, sanitation, hygiene promotion and health education sector (RWSS). Table 26 is a summary of the targets for respective planning periods:

- (i) By the end of 2003, the access to drinking water for 874 million people were improved to different extents, accounting for 92.7% of the total rural population. Among them, the population with drinking water by piped water supply services was 549 million, accounting for 58.18%. With regard to the sanitation facility, the coverage rate of rural sanitation latrine was 50.9%.
- (ii) By 2010, the beneficiaries' coverage rate of piped water supply to rural area will achieve 70% of the total rural population, the prevalence rate of rural sanitation latrine will achieve 65% of the total rural households.
- (iii) In the "Preliminary Sanitation and Health Education Directives for the Rural Areas (2001-2010)" it has promulgated the need for county and above level of governments in strengthening the efforts in RWSS, by incorporating increasing hygiene promotion and health education initiatives into the "Preliminary Sanitary and Health Program" and "Rural Sanitary Improvement Plan". By year 2010, It has set targets for "Knowledge of Core Sanitary and Health Information" for Eastern, Central and Western Regions to be 80%, 70% and 60% respectively. The targets for "Formation of Hygiene Behaviour" are set for 70%, 60% and 50% respectively likewise.
- (iv) The RWSS is an important commitment by the PRC Government in achieving United Nation's "Millennium Development Goals" (MDG). By the end of 2015, it is targeted that population who are unable to obtain or afford safe drinking water will be reduced by half.
- (v) In accordance with the PRC Government's proposal of "well-to-do" society, the relevant planning objectives for RWSS are that by 2020, 80% of the rural household should be serviced with piped water supply and above 70% rural household should enjoy the sanitation latrines".





Table 26 Targets and Accomplishment of Various Planning Periods in RWSS Sector

| Indicators | 9 th FY Plan | 1996-2000 | 10 th FY Plan | 2001-2005 | 11 th FY Plan | Long Term Plan | 2020 |
|---|-------------------------|------------|--------------------------|-------------|---|----------------|---------------|
| | 2000 Target | Completion | 2005 Target | End of 2003 | 2010 Target | 2011-2015 | 2020 Target |
| Beneficiaries of RWS | 90% | 92.38% | 95% | 92.7% | N.A. | N.A. | N.A. |
| Beneficiaries coverage rate of piped RWS | 50% | 55.22% | 60% | 58.18% | 70% | Achieving 75% | About 80% |
| Prevalence of sanitary latrines | 40% | 44.85% | 55% | 50.9% | 65% | Achieving 70% | Exceeding 70% |
| Knowledge of Core Sanitary and Health Information | | | | | Eastern 80% Central 70% Western 60% | | |
| Formation of Hygiene Behaviour | | | | | Eastern 70% Central 60% Western 50% | | |

Note: The 2015 target is computed by reducing the non-beneficiaries portions in the 2000 targets by half.

N.A. means not applicable.

261. On the basis of the above targets for RWSS Sector development, “Rural Safe Drinking Water Supply 2005-2006 Implementation Plan” will provide safe drinking water to 21.20 million people. In the subsequent 11th FYP, water supply will be provided to a further 60–80 million people. In other words, from now to 2010, about 100 million people will see their drinking water problem resolved.

262. In Table 26, the targets set for “Knowledge of Core Sanitary and Health Information” and “Formation of Hygiene Behaviour” are ambitious targets and would require great determination and unrelenting action. In this respect, the PRC Government has already allocated a Special Fund in 2005 for the purpose of implementing RWSS projects, including latrine construction and sanitary and health education issues.

263. In the development of the RWSS Sector, the PRC Government has established very clear objectives. By measure of the volume of work to be achieved, the tasks ahead are very arduous. Great efforts are needed in the further development of the institutional setup, capital, management models, technical capability, human resources and institutional capacity building. It is imperative that a well-defined framework of policies is formulated for the RWSS Sector to facilitate its development and produce solid and tangible benefits for the rural communities of the PRC.

B Sustainable RWSS Sector Development Policies and Strategies

a. Development Strategies for Rural Water Supply

264. The basic requirements in the meaning of “safe drinking water” consist of reliability of water supply, convenience of access, adequate quantity of the water supply as well as water



quality meeting the drinking water standards. Of course sufficient quantity of clean water is the essence.

265. The Government of the PRC will implement the RWSS works comprehensively in order to ensure the water quality meeting the drinking water standards; the stable quantity of the water resources; high reliability of water supply and the convenience of access to safe drinking water. In the near term, the PRC Government will target to resolve the problems of high fluorine content, high arsenic content, high saline content water in drinking water, contaminated water and areas suffering from severe water shortage.

266. The guiding policies in the development of safe drinking water for the rural community are: respecting people as the fundamental principle, according to the basic principle of comprehensive, harmonious and sustainable scientific development, the PRC Government will construct a “well-to-do” society¹⁴. In the context of RWS, the policy is to strengthen the scientific development of the rural water supply infrastructure, to improve the community based rural water supply services, to protect the safety in drinking water, and to implement comprehensive preventive and corrective measures for the overall objective of supplying sustainable and safe drinking water to the rural population.

267. The principles in the implementation of the policy in rural water supply are:

- (i) Government takes a leading role, ministries collaborate;
- (ii) Government co-ordinates overall planning and solicit finances from multiple sources;
- (iii) Identifies key issues with due consideration of local factors;
- (iv) Develop RWS infrastructure (i.e. planning, design, construction, test and commission) in accordance with scientific principles;
- (v) Establish reasonable water tariff rates;
- (vi) Operate the RWS facilities in accordance with scientific management principles;
- (vii) Encourage community based participation.

268. At the same time, all levels of government and communities should work collaboratively; protection of water sources and treatment raw water should be integrated to protect water quality; comprehensive management of water supply, water conservation and domestic wastewater disposal should be practised; construction of RWS facilities and operation and maintenance of RWS facilities should be co-ordinated.

269. Following good spells of economic development, some rural communities enjoying high income have started to move up in water consumption. The prevailing concept of “solving RWS problems by providing piped supply to households” shows signs of stress. Merely supplying drinking water with no provisions for water conservation and wastewater disposal results in severe water resources consumption and widespread environmental pollution of surface water bodies and groundwater, both factors undermining sustainability. Such phenomena are widespread during the process of social and economic development of rural communities. The achievement of poverty reduction, social and economic development of the rural communities will be eroded by severe water resources consumption and widespread environmental pollution. As the PRC is growing at such a vast pace, it is imperative in the next 10 years that a comprehensive study is organized and conducted to

¹⁴ “Well-to-do” society is a phrase describing the state of development of society attaining a reasonable prosperity.





investigate the issues and to recommend a new policy in dealing with “Sustainable RWS” in the context of “3-Components” of water supply. This policy will help to resolve crises already taking shapes in the Eastern Region and to address issues and prevent situations in the Central and Western Regions respectively.

b. Development Strategies for Rural Sanitation

270. The basic requirements for rural sanitation are: to construct “harmless”¹⁵ sanitary latrines for village households, public toilets and schools. The harmless treatment means necessary treatment of the latrine wastes to eliminate pathogens, micro-organisms and parasite ova such that the wastes will not affect the environmental adversely.

271. In the past decade or so, the installation of sanitary latrines in rural households has pronounced benefits on the overall living standards improvement in rural communities. There are significant public health benefits in the reduction of intestinal infectious diseases. NPHCCO has issued new regulations for rural household latrines, specifying comfortable, convenient, odourless, intramural and indoor requirements, emphasizing the importance of hygienic habits and healthy living. Rural people now realize the social, economic as well as their own benefits. Also, people now have a range of selection of sanitary latrines.

272. There is a need to integrate the hygiene promotion and health education with sanitary latrines installation, to help the rural villagers to use and maintain their latrines in a proper manner, ensuring the latrines’ sanitary function.

273. In view of the inadequate publicity in promoting “harmless” sanitary latrines, it is recommended to strengthen the construction of demonstration latrines in rural households, school toilets and public toilets in the RWSS project villages.

c. Development Strategies for Health Education and Hygiene Promotion

274. In the implementation of integrated RWSS projects, hygiene promotion and health education are important components. Through hygiene promotion, the beneficiary population will master self-conscious hygienic habits and basis health protection skills, and in turn will be encouraged to participate in RWSS matters in the community level. Through installation of sanitary latrines, the household hygiene conditions are greatly improved. Via mass health education, the habits of communities could be improved and incidences of disease drastically reduced. Some strategic measures include:

- (i) Mobilize the communities and place health education in rural communities in the agenda for systematic and long term mission. Government leadership and community participation are equally essential. It is recommended to encourage establishment of “Rural Health Education Funds” at the village level to promote the health education programs.
- (ii) Establish an integrated health education organization. With health professional bodies at its core, other social groups comprise a health network in the continuous promotion of the rural health education. For example, the county health education unit act as a

¹⁵ “Harmless treatment” of latrine waste is based on the “China Rural Sanitary Latrine Technology Guidelines” jointly published by UNICEF and NPHCC in 2001. It is a collective term meaning the employment of biological, physical and chemical means to destroy and eliminate pathogens, harmful micro- organisms and parasite ova in latrine wastes to achieve the objectives of diseases control, flies control, odour control and pollution control.





- core, expanding outwards to form a “Province-City-County-Town-Village” network with help and support from schools, township clinics, and other news and mass media.
- (iii) Mobilize volunteers in particular medical researchers, education workers, hospital and clinic workers, medical students, retired medical professionals, social workers etc. in hygiene promotion and health education.
 - (iv) Enhance the health standards of the rural population: identify key locations, key demographic groups and key content for programs of health education, hygienic behaviour and personal habits. Key areas could be areas attaining a reasonable economic development and areas recently graduated from poverty status. Key demographic groups refer to housewives, primary and secondary students, village officials and village school teachers.
 - (v) Combine both on going efforts and ad hoc efforts in health education, via multi-channels such as, consultations, interviews, propaganda, intervention, education and eventually behaviour change.

d. Overall Policies and Strategies for “3-in-1” Concept for Integrated Development in RWSS Sector

275. This strengthened “3-in-1” concept with components of rural water supply, rural sanitation and hygiene promotion/health education emphasizes the integrated approach for the comprehensive developments in these three areas in the RWSS Sector. It is a successful experience in the implementation of World Bank’s four phases of RWSS projects. In its Project Appraisal Document, it focuses on skeleton groups as well as beneficiaries and promote education in 4 steps: (1) Commencement phase, (2) Preparatory phase prior to piped water supply, (3) Training upon piped water availability and (4) Health behaviour intervention phase. Emphasis is placed on person-to-person communication supported by mass communication with themes customized for the target recipients. For housewives, themes are washing hands, kitchen cleanliness, protection of drinking water and toilet hygiene. For students, themes are washing hands, drinking boiled water, washing fruit and personal hygiene habits. In the UNICEF program, integrate hygiene promotion and health education in RWSS projects. In addition to rural water supply and latrines construction, the program also consists of public bathing houses, demonstration latrines, free-gifts of soap and towel, as well as dissemination of health education messages via broadcast, blackboard, training mechanisms.

276. At present, rural water supply occupies a central part in RWSS projects. For some RWSS projects visited in the case studies, the maintenance of the sanitary latrines is severely improper. Villagers extract solids from the first compartment for fertilizer, basically defeating the purpose of triple compartment septic tanks. Some Methane Generation Digester Type latrines become defunct due to lack of maintenance. It is therefore important to implement the health education elements in “3-in-1” concept to the community level: (1) correct use of sanitary latrines, (2) domestic wastewater and household garbage are pollutants adversely affecting surface and ground water resources, (3) social and public health benefits of sanitary latrines in demonstration village and demonstration households and (4) monitoring of handling/disposal of domestic faeces.

277. With emphasis in the integrated development of the rural water supply, sanitation and hygiene promotion/health education, the PRC Government is implementing relevant strategies and specific procedures:

- (i) Incorporate RWSS goals into the national social and economic developments as part





- of the MDG.
- (ii) Promulgate the “Preliminary Sanitation and Health Education Directives for the Rural Areas (2001-2010)”, “Directives for Social Development of Women in China (2001-2010)” and “Directives of Social Development of Children in China (2001-2010)” to implement the improvement of the coverage rates of piped water supply and prevalence rate of sanitary latrines.
 - (iii) Communicate the “Action Plan for Health Education of the Rural Population”.
278. More specific measures in the “3-in-1” concept of integrated development are:
- (i) Strengthen leadership, identify clear responsibility, and encourage cooperation;
 - (ii) Integrate project planning with emphasis on multi-channel health education;
 - (iii) Explore and improve the “3-in-1” concept of integrated development in RWSS;
 - (iv) Promote community-based participation, and ensure sustainability of RWSS development;
 - (v) Strengthen the monitoring and evaluation to measure target accomplishment; and
 - (vi) Establish institutional framework for health education.

C Policy and Legal Framework

a. National Policies

279. With emphasis in the integrated development of the rural water supply, sanitation and hygiene promotion/health education, the PRC Government has incorporated RWSS goals into the national social and economic developments programs in achieving United Nation’s Millennium Development Goals. By the end of 2015, it is targeted that population who are unable to obtain or afford safe drinking water will be reduced by half.

280. Having recognized the major imbalance in the state of economic development amongst the Western, Central and Eastern Regions of the country, the PRC Government has formulated national policies providing differential treatment in favour of the Western Region. Although the sources of investment capital for economic developments are respectively Central Government finances, local government finances and collective contributions from villagers, their proportions vary. In the RWSS Sector, Central Government finances play the key role in the Western Region; Central Government finances are more supplementary role in Central Region and for the Eastern Region, local government finances are the key player.

281. At present the social and economic development in the urban cities and rural villages are also unbalanced with great disparity in economic and physical infrastructure. For cities, water supply is a government responsibility fully funded by government. However for rural villages, most rural water supply facilities are constructed by village communities and by villagers themselves. In recent years, the Central Government has expanded PRC’s agricultural policies transforming from the previous sole objective in pursuit of economic growth to a balanced social and economic development, with particular emphasis in harmonious development in social sectors such as education, sanitation, drinking water and communities services for the “poor” regions of the country.

b. Laws and Regulations

282. The relevant laws, regulations, standards and codes of practice have been listed in Paragraph 65 to 68. Also local government authorities have promulgated local regulations respecting local conditions and environment. The promulgation of these laws, regulations,





standards and codes provides a regulatory framework for the development of RWSS.

283. It is recommended to introduce more market mechanisms in the RWSS Sector by exploring private sector (non-government) investment, construction, operation and management models. At this moment, the institutional setup and the mechanisms to facilitate private sector participation are in their infancy, there is a need to introduce new laws and regulations.

D Economic and Financial Evaluation Strategy

a. Economic Evaluation Strategy

284. Economical analysis consists of assessments of the economical and social effectiveness from the national economy's point of view. To determine the effectiveness on national economy, the use of shadow tariff, shadow salary and shadow rate of currency exchange is necessary for the assessment the feasibility of the RWSS projects.

b. Financial Evaluation Strategy

285. Financial analysis is conducted to examine the cost effectiveness from an enterprising point of view. The analysis is based on a number of financial parameters, such as return on investment, debt-repayment ability, foreign exchange risk tolerance etc. to assess the financial viability of the project. The major parameters of financial analysis are the internal rate of return, breakeven period and net present value. Financial analysis can help determine a reasonable water tariff and an appropriate investment plan, and predict the financial situation of project implementation. It also enables the optimization of the capital and operation costs. Currently, the expenditure of water tariff in rural water supply is regulated at not more than 5% of net annual income.

c. Strengthening of Financial Management Strategy

- **Effective Financial and Accounting Management System:** For RWS facilities. proper financial and accounting management methods and practices are set up for the construction, management, operation, water rates setting, water tariff collection, maintenance, water resources protection, asset depreciation, overhaul maintenance, cash management.
- **Employment of Qualified Full-time or Part-time Financial and Accounting Personnel:** It is essential to ensure the day-to-day accounting duties, accounting and financial reports, independent audits and full profit and loss responsibility are properly conducted.
- **Reasonable Setting of Water Rates:** The procedures in setting water rates must be transparent involving public hearing, debate and discussion with experts and officials. The price setting should be scientific with due regards of the RWS facilities in question. The drinking water supply to households, the principle is basic quantities and at cost pricing. For production use, prices should increase with increasing consumptions. For commercial use such as restaurants, bath houses, progressive stepwise rates should be adopted. A reasonable water rates structure together with good collection efforts are necessary ingredients for a long term sustainable RWS project.
- **Establishment of Reserves:** Reserves to cater for asset depreciation, major overhaul maintenance are necessary to ensure that RWS facilities upgrading and maintenance can be carried out in good time. For RWS with outstanding debt liability, repayment commitments should also be accounted for.





E Strategies in Financial Models

a. The Intrinsic “Public Goods” Nature of RWSS

286. In the reform of the investment and financing sectors of the economy in 1994, the PRC Government has classified investment development items into three categories:

- Competitive Investment Items: Business enterprises will play key roles and assemble finances from capital markets.
- Infrastructure Investment Items: while the Central Government will strengthen strategic investment decisions, investments by the regional, provincial and local governments as well as by business enterprises are also encouraged.
- Investment Items with “Public Goods” Nature: Government finances are the main source of funding.

287. Rural water supply, sanitation, hygiene promotion and health education on the whole belongs to the category of “Public Goods” nature. Sanitation, hygiene promotion and health education bearing significant social and environmental benefits but no economic benefits are definitely “Public Goods” nature. Rural water supply bears good social benefits as well as economic benefits. Its product exhibits certain market characteristics and should be consumed at a cost. The collection of water tariff leads to economic returns. Thus rural water supply is a quasi-“Public Goods”. Even in USA, this conclusion is also valid¹⁶. In Document No. 1 in 2005, the PRC Government has reiterated its Agricultural Policy. The Central Government will provide more preferential treatment to the Western Region in the strategy of economic and social development. Many public services such as education, rural water supply, sanitation will receive favourable policy and financial support from all levels of governments. This national policy is a great boost in the development of RWSS in the rural poor areas.

288. Sanitation, hygiene promotion and health education are definitely “Public Goods” nature and should be funded by Government finances with financial assistance from International Donor Agencies in the form of grants. It is recommended that the sanitation, hygiene promotion and health education components should take up to 10% of the total investment in the RWSS project.

b. Needs for Funds and Financing Mixes

289. Based on the target rural population of 300 plus million, the average per capita investment for RWS is about \$42-\$48 (RMB350-RMB400) per person, plus 10% for sanitation and health education. For the coming 16 years (2005-2020), the total required investment for this sector is about \$14 billion to \$16 billion (RMB115.5 billion to RMB132.0 billion). From now to 2010, the required investment is about \$4.7 billion to \$5.3 billion (RMB38.5 billion to RMB44 billion). The need for capital is huge, funds from diversified sources and multiple combination financing mixes should be considered for raising such large quantity of capital. In order to accelerate the development in the RWSS Sector, the Central Government has increased the financial investments via Government finances, National Bond monies and International Donor Agencies’ assistance. Moreover, domestic and foreign private sector capital should also be solicited.

¹⁶ “Duty Visit Report of US Water Supply Sector”, Urban Water Supply No.2 2004 – in USA, piped water supply is considered as infrastructure facilities and public utility demanding heavy financial investments with long return period with no profit or extremely limited profit earning ability. It should mainly be a government undertaking.





290. Various sources of finances and possible mixes have been discussed in Paragraphs 232 and 233 for the RWSS Sector development. Four options on financing model to analyze the appropriate usage of these funding sources and mixes in respect of the different state of economic development in the Western, Central and Eastern Regions of the counter, with due consideration of the relevant policies have also been considered. Based on the major source of finance, four categories are identified as listed in Table 27.

Table 27 Major Funding Sources and Appropriate Usage

| Major Funding Sources | Description | Appropriate Usage |
|--|--|---|
| Central Government finances as the mainstay | <ul style="list-style-type: none"> Central Government finances, with counterpart funding from Provincial and Local Government finances as well as from the beneficiaries mostly in the form of manual labour in kind Government Bond proceeds Poverty Alleviation Funds Loan from Domestic Development Bank: with Government subsidies on interest | In poor areas with lag-behind economic development, e.g. rural areas in the Western Regions; focusing on concentrated RWS systems with demonstration sanitary latrines. |
| Provincial/ Local Government finances as the mainstay | <ul style="list-style-type: none"> Provincial and Local Government finances Domestic Private Sector (Non-government) Capital Loan from Domestic Commercial Bank | The regions achieving certain level of economic development like the Eastern and Central Regions possess better economic strength and could afford the loan conditions better. There are pressing needs for infrastructure development especially for those rural locations at the outer fringe of towns and cities. Thus it is feasible to develop RWS systems at rural townships merging the villages at the fringe of the towns, achieving social and economic developments and poverty reduction. |
| Collective Contribution of Rural Communities and Villagers' own contribution as the mainstay | <ul style="list-style-type: none"> Collective Monetary Resources from Town and Village Communities and Funds from Individuals, Contribution by Manual Labour in kind. Domestic Private Sector (Non-government) Capital Loan from Domestic Commercial Bank | Distributed, small-scale and village-scale RWS works such as open well, water cellar, hand pumps. Investments are usually small. |
| Assistance from International Donor Agencies as the mainstay | <ul style="list-style-type: none"> Grant Assistance from International Donor Agencies Loan Assistance from International Financial Institutions, with counterpart funding from Provincial and Local Government finances as well as from the beneficiaries mostly in the form of manual labour in kind | <p>Grant assistance is suitable for small scale RWSS projects (including capacity building programs) in rural poor areas in the Western Region</p> <p>The loan assistance is suitable for RWSS projects in areas achieving a certain level of economic development, e.g. Central and Eastern Regions. In these areas, with increase living standards, both expectation and demand for water are high. Local</p> |





| Major Funding Sources | Description | Appropriate Usage |
|-----------------------|-------------|--|
| | | Government finances and rural communities have the ability to bear the load conditions and repayment obligations. The focus should be reasonable scale of RWS systems as well as upgrade and expansion of existing RWS facilities. |

c. The Compatibility of Financing Models with the State of Economic Development of Major Regions of PRC

291. The PRC is a vast country with great variability in the natural conditions as well as economic conditions with broad classification into the Western, Central and Eastern Regions. Even within a single region, there are also differences in the state of economic development. Therefore it is important that the model of financial mixes to fund RWSS projects should be compatible with the specific economic conditions of the location in question.

292. Western Poor Areas – represented by the vast Western Region yet includes rural poor areas in the Central and Eastern Regions. Central Government finances and provincial Government finances should be the mainstay, supplemented by loans from domestic development banks or from commercial sources, and from collective community contribution and beneficiaries’ contribution. The governing principle is the RWSS projects in these areas should represent a true poverty reduction initiative, unlike previous projects where major share of the financial burden is placed on the beneficiary population, water plants or the lowest level of Government. Some previous projects have resulted in high water rates, self-motivated restricted consumption, financial difficulties of water plant, weak sustainability as well as overburden on local Government finances. The mismatch of strong demand for poverty area with the inability to bear the economic burden is an intrinsic inconsistency.

293. Rural Areas in Central Region: represented by Central Region. Recently, the Central Government put forth a strategy for accelerated economic development in the Central Region. The region has better conditions than the Western Region in many aspects. There are pressing needs for infrastructure development especially for those rural locations at the outer fringe of towns and cities. It possesses better economic strength and could afford the loan conditions better. One form of RWS systems is to merge existing neighbouring and scattered small scale RWS systems into a larger RWS network system. As revealed in the case studies, towns’ population are more concentrated with sound ability to repayment loans. Water treatment plants are more cost effective and financial sustainable and could offset the weak contribution of the villages. Thus it is feasible to develop RWS systems at rural townships merging the villages at the fringe of the towns, achieving social and economic developments and poverty reduction.

294. Rural Areas in Eastern Region - the Eastern Region has sustained major economic growth and has accumulated significant social assets. In these areas, agriculture developments, industrial developments as well as town enterprises are fairly well established. For larger scaled RWS systems, there are feasible channels to deploy private sector capital or loan assistance from International Donor Agencies.





d. Financial Models with Government Funds as Major Funding Sources

295. The PRC Government has recognized the major imbalance in the state of economic development amongst the Western, Central and Eastern Regions of the country, and has formulated national policies providing differential treatment in favour of the Western Region. This policy is reflected in the contribution ratios “Rural Safe Drinking Water Supply 2005-2006 Implementation Plan” as shown in Table 28 below:

Table 28 Contribution Ratios for the “Rural Safe Drinking Water Supply 2005-2006 Implementation Plan”

| Regions | Contribution Ratios (%) | | |
|---------|-------------------------|-------------------------------|--------------------------------|
| | Central Government | Provincial / Local Government | Beneficiaries (Labour in Kind) |
| Western | 63 | 30 | 7 |
| Central | 45 | 44 | 11 |
| Eastern | 29 | 51 | 20 |

296. In summary, there should be differential strategies in favour of the rural poor areas especially those in the Western Regions. Some strategies related to the financing of RWSS projects are:

- (i) The Central Government should step up its effort in financing RWSS projects, by methods of special fund allocation, national bond proceeds, poverty alleviation and transfer payment for Western Region.
- (ii) The People’s Bank should formulate favourable strategies for the Western Region, e.g. lower commercial lending rates, longer repayment periods, subsidies for investment or subsidies for loan interests, aiming to attract private investments and commercial banks in the RWSS projects in the Western Region.
- (iii) Seek financial assistance from International Donor Agencies. The loan conditions may not match with the feeble loan repayment ability, some forms of grants to soften the loans should be necessary.
- (iv) The private sector in the Western Region is small and weak. The private sector in the Eastern Region should be encouraged to invest in the RWSS in the Western Region.

e. Financial Models with International Donor Agencies as Major Funding Sources

297. Major sources from International Donor Agencies are the World Bank, UNICEF, DFID, AusAid, JBIC etc. World Bank has contributed loans totaling \$330 million in the four phases of RWSS projects in 178 counties in 18 provinces.

298. In 2000, the PRC, with its GDP reaching \$830, graduated from the International Development Association (IDA) and could only qualify for loan assistance from the International Bank of Reconstruction and Development (IBRD). The PRC is a Development Member Country (DMC) of ADB. As the GDP of the PRC has reached the level of \$925 (\$925 at 1997 prices), it has graduated to Group B2 DMCs and is eligible for ADB’s financial assistance in the format of Ordinary Capital Resources (OCR) with limited Asian Development Fund (ADF) under particular circumstances. The terms for OCR are based on full cost recovery similar to those commercial rates, using LIBOR as reference rates. The repayment period is 25 years with 5 years grace period. There are also requirements for counterpart funding, commitment fees, procurement procedures and project implementation





management.

299. The principle of full cost recovery for the loan assistance is not consistent with the poverty alleviation nature of the RWSS projects. There is a strong desire and urgency to resolve the water supply problems for the people in rural poor regions and let the people have the access to safe drinking water (The affordability is about 5%). However, because of low household income, it is extremely difficult to raise fund both for capital RWSS projects and for payment of water tariff. People in rural poor regions simply are not able to afford commercial loans with market interest rates. Counterpart funding is another difficulty. Generally speaking people are willing to provide labour services in lieu of putting up funds.

300. Although most of the provinces and cities in the Western Region are willing to accept the loans from international and domestic development banks, the expectations of different locations are different. Some wish the repayment period to be as long as possible, however, accepting a repayment period of 20 years with grace period of 5 years. As for loan interest rates, some request for "interest-free loans" and some accepts interest rates up to 4% p.a. On the issue of counterpart funding, some express wishes for a large share to be borne by the Central Government in alleviating the burden on local Government and the beneficiaries. Other requests include Government subsidies for the loan interests, collection of water tariff in financing loan repayment and seeking of grants. There are also requests for international financial assistance in the form of grants, low-interest loans with long repayment periods. Recently, the Provincial RWSS project organized by the World Bank-DFID-PRC Government has a mix of \$25 million (WB loan) - \$25 million (DFID Grant) - \$25 million (Counterpart funding) is a good example for reference. The project covers the Provinces of Sichuan and Shanxi.

301. The financial assistance from International Donor Agencies should be directed towards RWSS projects of a reasonable scale. It is suggested that differential loan interest rates treatment, differential counterpart funding requirements as well as differential securing and distribution of grants should be adopted in financing RWSS projects with due respect for the disparity of the Western, Central and Eastern Regions of the PRC. For the developed regions, the interest rate could be slightly higher, subject to the ceiling of domestic commercial rates, with a shorter repayment period. For Central Region and Western Region, lower interest rates with longer repayment periods should be considered. Please refer to Table 29. In conjunction with the provision of the loan, it is recommended to seek grant assistance for 10% of the RWSS project costs to support the sanitation, hygiene promotion and health education components of the RWSS project, in line with International Donor Agencies' pro-poor and social policy. For this grant, the ratio of distribution could be 1:3:6 for Eastern, Central and Western Regions respectively, with a view to maximizing the benefit to the Western Region.





Table 29 Suggested Differential Interest Rate Treatment for International Donor Agencies in Financing RWSS Projects Respective Regional Disparity of PRC

| Region | Loan Interest Rate | Repayment Period (year) | Distribution of Grant to respective Regions |
|---------|---------------------------|-------------------------|---|
| Western | At least 2% below LIBOR | 30 | 60% |
| Central | At least 1% below LIBOR | 25 | 30% |
| Eastern | At least 0.5% below LIBOR | 15 | 10% |

Note: Loan Interest Rate is set for respective repayment period based on London Inter-Bank Offer Rate (LIBOR).

302. With the pro-poor policy of International Donor Agencies in rural water supply developments and with due respect to the disparity of the Western, Central and Eastern Regions of the PRC, it is recommended to greatly relieve the finance burden on local government and on the beneficiaries by substantially reducing the proportions of counterpart funding. Major shares of the funding are shouldered by international loans, grants and Central Government finances. A suggested example is listed in Table 30.

Table 30 Suggested Differential Counterpart Funding Requirements for International Donor Agencies in Financing RWSS Projects Respective Regional Disparity of PRC

| Region | Grant & Loan Ratio (%) | | Counterpart Funding Ratio (%) | | |
|---------|----------------------------------|---------------------------------|-------------------------------|-------------------------------|------------------------------|
| | International Donor Agency Grant | International Donor Agency Loan | Central Government | Provincial / Local Government | Fund Raised by Beneficiaries |
| Western | 10 | 45 | 28 | 14 | 3 |
| Central | 10 | 45 | 20 | 20 | 5 |
| Eastern | 10 | 45 | 13 | 23 | 9 |

Note: Total Counterpart Funding is 45%, the split follows the ratio adopted in Table 28

303. The International Financial Institutions consider that the GDP of the PRC has already reached the level of US\$ 830 and determine that the PRC is no longer entitled to special terms for non-commercial financing. One possible suggestion to handle the situation is for the institutions to centralize all loans and grants at the Central Government level, and allow the PRC to distribute and co-ordinate the amounts of loan, the interest rates and repayment periods to the various regions. While overall aggregated terms of the distributed loans will comply with the loan conditions prescribed by the International Donor Agencies, the flexibility allow the PRC Central Government to solicit tougher conditions for the better-off regions so as to offset the preferential conditions offered to the worse-off rural poor areas in the Western Regions. Notably the poorer regions would be granted more generous terms than the 'richer' regions. As ADB would not provide grants or different lending terms and conditions for the different Regions. (ADB has only OCR (LIBOR) 25 years including 5 years grace period.) The proposed terms and conditions of loans could be considered to be implemented through the PRC Government channels. An example assuming an allocation ratio of 50:25:25 for the Western, Central and Eastern Regions is shown in Table 31.





Table 31 Suggested Differential Interest Rate Treatment in Financing RWSS Projects Respective Regional Disparity of PRC (When only Ordinary Commercial Rate Loan is administered).

| Region | Loan Interest Rate | Repayment Period (year) | Distribution of Loan to respective Regions |
|---------|--------------------|-------------------------|--|
| Western | LIBOR minus 1.00% | 30 | 50% |
| Central | LIBOR plus 0.50% | 25 | 25% |
| Eastern | LIBOR plus 1.50% | 15 | 25% |
| Overall | LIBOR | | 100% |

Note: Loan Interest Rate is set for respective repayment period based on LIBOR.

The maximum Loan Interest Rate is LIBOR+1.50% and shall not exceed the Prevailing Commercial Rate.

304. The financial assistance offered by International Donor Agencies would be transacted in US Dollar. In the World Bank's RWSS projects, the risks arising from fluctuation of exchange rates of US Dollar between the loan administered date and repayment dates were borne by the provincial government. It is proposed that the risks arising from exchange rate fluctuation should be borne by the Central Government. At present, it is believed that the risks of depreciation of RMB against US Dollar is extremely low, and thus the currency exchange risks are considered insignificant.

f. Domestic and Foreign Private Sector Funding Sources

305. Rural water supply, sanitation, hygiene promotion and health education on the whole belongs to the category of "Public Goods" nature. RWSS projects usually demand heavy capital investments with no profit or extremely limited profit earning ability. It is difficult to attract private sector capital. Certain favourable conditions need to be satisfied in order to attract domestic and foreign private sector funding sources. These include: locations should reach a certain degree of economic development, sound economic and financial benefits, mature legal and regulatory framework and support from the supervising Government.

F RWSS Integrated Development – Program Organization, Planning, Implementation, Operation and Management Strategies

a. Needs Assessment for Safe Drinking Water – Regional Distribution (Western, Central and Eastern Regions of PRC)

306. According to "Rural Safe Drinking Water Supply 2005-2006 Implementation Plan", there are 300 million rural people without access to safe drinking water. Amongst them a total of 97.28 million people suffer from high fluoride content ($F > 2.0$ mg/L), high arsenic content ($As > 0.05$ mg/L), high saline content (Salt content > 2.5 g/L), areas infected by leech (schistosome) and micro organisms, contaminated (organic and inorganic pollutants) as well as severe water shortage (as listed in Table 32). The plan aims to provide solution to these people in the next two years.





Table 32 Target Beneficiaries under the Rural Safe Drinking Water Supply 2005-2006 Implementation Plan (Thousands People)

| Region | High Fluoride Content | High Arsenic Content | High Saline Content | Contaminated Water | Severe Shortage | Total |
|---------|-----------------------|----------------------|---------------------|--------------------|-----------------|-------|
| Western | 2905 | 819 | 3976 | 13604 | 13134 | 34438 |
| Central | 6597 | 785 | 4254 | 12341 | 7230 | 31207 |
| Eastern | 4181 | 129 | 2942 | 12224 | 12160 | 31636 |
| Total | 13683 | 1733 | 11172 | 38169 | 32524 | 97281 |

b. Program Organization

307. For RWSS projects funded by the Central Government finances as well as those funded by International Donor Agencies, the fundamental principles of project management are: under the leadership of various levels of governments, strengthen co-operation among ministries and department and implement management practices at national, provincial and county levels. With due respect of the scope and magnitude of the RWSS projects, develop comprehensive management policies, regulations, methods and manuals. The roles and responsibilities of Government Agencies participating in the RWSS projects shall be clearly defined. Project implementation management as well as post-project operation management are equally essential. Sound scientific management practices and regulations shall be followed. Initiatives should be explored in introducing market elements, encouraging private sector involvement in finances, planning, construction, operation of RWSS projects.

c. Program Planning and Preparatory Phase Strategies

308. Program Planning and Preparatory Phase Strategies include:

- RWS projects should be scientific in exploitation and protection of water resources, and feasible, operable and sustainable with full regards of the local conditions.
- Resolve the rural water supply problems attaching priority to high fluoride, high arsenic, high saline, leech and contaminated problems.
- Clearly define the ownership of RWS systems from the very beginning and when deciding on the post-project management model.
- Formulate policies to attract capital from rural community collective organization and from rural inhabitants, manual services in kind, shareholding formats etc.
- Reasonable scale of RWS facilities.

d. Program Implementation - Project Design, Procurement and Construction Management Strategies

309. Program Implementation - Project Design, Procurement and Construction Management Strategies include:

- Ensure full compliance with relevant laws, regulations, standards and codes of practice.
- Select appropriate design for water conveying systems as well as water treatment technologies with full recognition of the local geographical, hydrological and engineering conditions.
- Procurement of equipment and materials should follow International Competitive Bidding (ICB), Local Competitive Bidding (LCB) and by Quotations (Shopping). As revealed in case studies, there are difficulties in implementing ICB such as long procurement cycles, exchange rate risks, change procedures etc. Considering that (1) the PRC has acceded to the World Trade Organization, numerous, (2) numerous countries are sourcing material





- from the PRC and (3) the equipment and material used in RWSS projects are not rare uncommon material, it is recommended that more LCB procurement should be adopted.
- The vetting and approval of RWSS projects should be vetted and approval by national, provincial and county government authorities in according with the estimate project estimates,
 - Construction management will be mandatory for all civil engineering construction works.
 - Test and Acceptance upon completion and commissioning should be jointly undertaken by relevant bureaux and departments.
 - The accounting, reporting and audit systems shall be established and observed strictly. Special designated funds shall be handled by special designated accounts.
- e. Program Operation – Project Facilities Operation Management Strategies
310. Program Operation – Project Facilities Operation Management Strategies include:
- Clearly define the ownership of RWS systems: large scale RWS projects: Water Resources Dept to organize, own and manage; or set up legal entity to own and manage; Distributed and small scale RWS projects: Village Collective organizations to organize, own and manage; Tiny scale RWS facilities such as cellar, hand pumps: household villager own and operate. Introduce market mechanisms in operation management, ensure compliance with MWR’s “Village Water Supply Station Staff Organization Standards”, “Qualifications Requirements for Village Water Supply Stations”.
 - Develop comprehensive management policies, regulations, methods and manuals, ensure scientific and regulated management practices.
 - Introduce market elements, encouraging private sector involvement in finances, planning, construction, operation of RWSS projects. Explore new operating management models such as service contract, leasing, management contract, build-operate-transfer, build-own-operate-transfer etc.
 - Strengthen the qualification and training of RWS operational and management personal.
 - Set up accounting, reporting and audit systems, determine water tariff rates reasonably with due consideration of the economic factors, affordability and willingness to pay, tie tariff to consumption and separate rate structures for different uses.
 - Rectify problems of unaccounted for water, reduce leakage and ensure water tariff collection.
 - Protect source of water supply.
 - Strengthen the monitoring of water quality of raw water at water sources and of treated water at water treatment plants and at consumption points.

G Strategies for Poverty, Social and Gender Aspects

311. In rural poor areas, the lack of safe drinking water, sanitary latrines, and essential hygiene knowledge generally aggravate the problem of poverty. In particular, during the dry season, the rural community needs to expend plenty of energy and time to find water, the quality of which is not guaranteed. The use of unsafe water causes local epidemics, including intestinal track infectious diseases. Women and children are the most vulnerable groups. Gynecological illnesses and diarrhea amongst children increase health care expenses, and reduce productivity. Past experiences support the merits of the “3-in-1” concept which brings great social, economic and health benefits to the poverty stricken areas.

a. Poverty Related Issues and Strategies

312. In order to strike a balance between providing RWSS projects in the rural poor areas,





and to prevent financial over-burdening of local villagers, local community and the local government, financing responsibility for RWSS projects should principally come from the Central Government and the Provincial Government, supplemented by loans, collective community contributions and community based participation.

313. Some rural poor areas are remotely located with a dispersed population. These areas are not easily accessible; have poor electricity, roads and water supply systems. The construction of rural water supply systems to these areas is considered to be of low efficiency. In view of these unfavorable conditions, financing should principally come from the Central, provincial and the municipal levels of government together with loans and grants from various financial agencies, thus alleviating financial burden on the villagers and local government.

314. Whereas for rural poor areas that are relatively close to towns and cities urban centers, and with amore concentrated population, international organizations may be more interested in participating in the financing. However the terms granted should take into consideration the differing economic status of each area. They should consider lower interest rates, longer the loan repayment period, and higher proportion of grants for the poorer areas. Likewise the upper levels of Government should also exercise such differential treatment.

315. The International Financial Institutions consider that the GDP of the PRC has already reached the level of US\$ 830 and determine that the PRC is no longer entitled to special terms for non-commercial financing. As suggested in Paragraph 303, it is recommended for the institutions to centralize all loans and grants at the Central Government level, and allow the PRC to distribute and co-ordinate the amounts of loan, the interest rates and repayment periods to the various regions. Notably the poorer regions would be granted more generous terms than the 'richer' regions.

316. The PRC Government would provide ultimate guarantee on repayment for loans from International Financial Institutions. In this aspect, the Government of the PRC has an immaculate track record on repayment without any default. Thus the risk on bad debt is extremely low, close to zero. It is more or less equivalent to purchasing Government Bonds and enjoys zero-risk repayment of principal and interests. With such favourable conditions, the loans by International Financial Institutions including ABD should not impose full cost recovery terms to the loans. With the privilege of fully guaranteed by the PRC Central Government, the International Financial Institutions should have the flexibility to offer better terms to the rural poor areas in RWSS projects and other projects of "Public Goods" nature.

b. Social Development Issues and Strategies

317. On the basis of case studies conducted, the following 3 social issues have been identified:

- (i) In the light of experience in the Western or other rural poor regions, the provision of RWSS reaps tremendous economic and social benefits. Future RWSS projects should continue to improve the coverage rate (of population with piped water supply), improved project implementation management and post project operation management. At the same time, installation of sanitary latrines, hygiene promotion and health education should be strengthened. To genuinely reap the benefits of "3-in-1", equal emphasis should be put on sanitation and health education, instead of a hitherto overemphasis on water supply.
- (ii) In the Central Region, and for regions with substantial economic development, there





is a need to introduce to the villagers concepts of water conservation together with technical methods to conserve water. For example in Gaocheng of Henan Province, the groundwater level has been lowering at an average rate of 0.68m annually due to over 20 years of over exploitation. The existing wells sunk in 1970-80 to depths of about 20 meter have encountered more frequent incidences of water pollution and drought. Moreover rapid economic development and higher water consumption have lead to pollution of the water environment. Almost all villages and towns have requested an increase in water supply by sinking deeper wells. Suggested solutions include (1) the use of water levy adjustment regulation; (2) implement water-saving flushing systems (up to 80% reduction of flushing water); (3) reasonable introduction of the concept of water recycling, and the implementation of water of differential quality to cater for different water usages. In areas of concentrated population with median income level and suffering from water shortage, it is proposed to introduce the concept of “3-Components” in water management i.e. a ‘bundle’ approach for drinking water supply, water conservation and domestic wastewater collection/disposal. Demonstration, pilot application and eventual policy formulation would be recommended.

- (iii) In the Eastern Region, some rural areas have already merged their rural water supply systems among themselves or with nearby towns and cities. The per capita consumption approach that of urban consumption levels. In these areas, the prevalence of properly designed and operated domestic wastewater systems is very low. So is the concept of water conservation. There is a growing concern that increased consumption results in widespread surface water bodies contamination, severely threatening the sustainability. It is recommended that new emphasis on the issue of water supply-water conservation-wastewater collection/disposal “3-Component” concept should be put on RWSS projects in addition to the well understood “3-in-1” concept. The successful implementation of this water supply-water conservation-wastewater collection/disposal would help to alleviate the stressed water resources and to reduce the widespread contamination due to domestic wastewater arising from increased consumption. This policy will help to resolve crises already taking shapes in the Eastern Region and to address issues and prevent situations in the Central and Western Regions respectively. International Donor Agencies should support a research and development program to investigate this “3-Component” concept and help formulate strategies to combat the situation.

c. Female Gender Issues and Strategies

318. A survey conducted for World Bank’s RWSS projects showed that in general women did not participate actively in various phases of the RWSS projects. The main reason is the traditional role of women in the Chinese culture. They tend to show less self-determination, and in general are very family oriented. Decisions of a social and public nature are often left to the male members in the family. Hence to promote the above strategies, women can be a target group to be organized and mobilized into taking a more active part.

319. A problem often overlooked is the health of women in the villages, in particular those in rural poor areas. The quality of water supply can affect the health of women. In previous RWS projects, this has been overlooked. It is proposed that in the future the sanitation, hygiene promotion and health education would need to be addressed specifically.





d. Exceptionally Under-Privileged People

320. When implementing procedures, due consideration should be given to the exceptionally under-privileged who are the poorest, and will have great difficulty in shouldering the financial burden of any RWSS improvement projects. Although some regions do provide subsidy or exemption to the exceptionally under-privileged, such assistance should be formulated into policies and regulations. It is proposed that a certain proportion of investment (say 0.5-1%) could be used for assistance to the this group of people subject to means assessment. In so doing, the very poor could share in the fruits of improvement.

H Strategies for Capacity Building in RWSS Sector

a. Capacity Building for RWSS Integrated Development - Executing Agencies

321. In case where Government Financing as the mainstay of RWSS development: with respect to the source of funding allocated by the Central Government, the designated Ministry should be the leading Executing Agency. The Executing Agency should co-ordinate with other ministries which should afford their assistance to the RWSS programs. Emphasis is on “3-in-1” concept in RWSS Sector development.

322. Funding from International Donor Agencies as the mainstay of RWSS development – it is suggested the Ministry of Health will act as the Executing Agency. The Executing Agency should co-ordinate with other ministries which should afford their assistance to the RWSS programs. Emphasis is on “3-in-1” concept in RWSS. The Executing Agency will organize a hierarchy of project management offices comprising the National Project Management Office, Provincial Project Management Office and County Project Management Office. All PMOs shall be given clear roles and responsibilities.

- (i) Roles and Responsibilities of the National Project Management Office
 - Overall responsibilities for the RWSS program consisting of organization, planning, co-ordination, training, supervision, direction, monitoring and evaluation.
 - Organize the execution of research and development programs.
 - Organize the execution of baseline survey and post-project evaluation.
 - Organize the vetting and approval of project items submissions and the commissioning/acceptance testing upon project items completion for large scale RWSS projects.
 - Direct the Material Procurement and Civil Engineering Construction Procurement of RWSS projects.
 - Prepare Overall Reports for the Entire RWSS Program, Compile Accounting and Audit Report submitted from PPMO and CPMO for RWSS project items.
- (ii) Roles and Responsibilities of Provincial Project Management Offices
 - Provincial responsibilities for the RWSS program consisting of organization, planning, co-ordination, training, supervision, direction, monitoring and evaluation.
 - Organize the vetting and approval of project items submissions and the commissioning/acceptance testing upon project items completion for medium scale RWSS projects.
 - Organize Material Procurement and Civil Engineering Construction Procurement of RWSS projects.
 - Prepare Accounting and Audit Reports for RWSS project items.
- (iii) Roles and Responsibilities of County Project Management Offices
 - County responsibilities for the RWSS program consisting of organization, planning, co-ordination, training, supervision, direction, monitoring and evaluation.





- Organize the vetting and approval of project items submissions and the commissioning/acceptance testing upon project items completion for small scale RWSS projects.
- Organize Civil Engineering Construction Procurement of RWSS projects.
- Prepare Accounting and Audit Report for RWSS project items.
- Provide guidance on the operation and management arrangements for RWSS projects.

b. Institutional Capacity Building

323. The key strategies in institutional capacity building include:

- (i) Governance of Government: strengthen leadership, define clear roles and responsibilities, organize administration structure, formulate strategies, mobilize community participation and co-ordinate multi-departmental co-operation.
- (ii) RWSS Project Management Capabilities: organize program execution, administer loan and other finances arrangements, direct execution, organization, planning, co-ordination, training, supervision, direction, monitoring and evaluation of RWSS projects.
- (iii) Operation and Management of RWS systems (Water Treatment Plants): Emphases on production organization, personnel organization, job description for all positions, water treatment performance management, production safety management, financial and accounting management, system evaluation.
- (iv) Sanitary Capabilities: Emphases on technical standards, design, construction, operation and maintenance of sanitary Latrines.
- (v) Hygiene Promotion and Health Education Capabilities: Emphases on the communication skills in health knowledge dissemination, production of dissemination material, monitoring and evaluation techniques.
- (vi) Water Quality Monitoring Capabilities: Emphases on national monitoring and laboratory standards, use and maintenance of monitoring and laboratory equipment, analyses of monitoring results.
- (vii) Water User Group Capability: Emphases on increase of knowledge and improvement in behaviour of water users – such as understanding of benefits on RWSS projects, personal hygiene habits, protection of water sources, water conservation etc.

c. Human Resources Capacity Building

324. The key strategies in human resources capacity building include:

- (i) Training for comprehensive management knowledge.
- (ii) Training for technical knowledge in rural water supply and sanitation.
- (iii) Training for financial and accounting management.
- (iv) Training for customer services.

325. It is recommended that a human resources capacity building plan is prepared to implement the scope mentioned above. The formats of training include: classroom lecture, field investigation and seminars:

- (i) Provide qualified training personnel to conduct the training;
- (ii) Train the trainers from project provinces and in turn the provincial trainers train the county, town and village personnel and participants.
- (iii) Directly train the provincial, county, town and village personnel and participants.





I Strategies for Community Based Participation

326. The key issue of community based participation is the inadequate participation of the village communities and rural population. In future RWSS projects, it is recommended that clear procedures and measures are put in place to encourage the participation of villagers and village communities in the implementation of the RWSS projects. Matters such as project planning, project design, project finances, project construction and the post project operation management. The right to know, to express, to recommend, to monitor should be explained. For County level RWSS projects, CPMO should invite representatives from villages to take part in the CPMO's works. The representatives should be elected in Village General Meetings. For Village level RWSS projects, the Village General Meeting will elect a Village RWSS Project Management Group to participate directly in the RWSS project.

327. The participation format of community-based participation emphasizes both top-down as well as bottom-up modes of interaction. The key aspects are:

- (i) Effective communication with community: via assemblies, meetings and visits, disseminate the principles, processes and operation methods of community based participation to the rural population; in turn listen actively for the feedbacks;
- (ii) Effective mobilization of women: Promote women in the community involvement and empowerment of women in decision making process in RWSS projects;
- (iii) Identification of issues, analyses of factors and facilitation of consensus decisions of the rural population; conduct field visits, explain issues with visual aids, organize group discussion and solicit support from the rural population;
- (iv) For RWSS projects with self-financing by beneficiaries, solicit the widest support from beneficiaries to amass sufficient funds, at the same time ensure proper management and transparency in accountability; and
- (v) Involvement of the community in the monitoring and evaluation process: devise formats of community based participation in the design, execution, monitoring and evaluation of RWSS projects, borrowing experience from previous international assistance projects.

328. Further explore the issues of ownership and operation management models - this topic is put forward as a research and development topic.

J Environmental Impact Assessment for RWSS Sector Development Projects

329. Drinking water is extracted from surface sources or underground sources. For drinking water to be safe, the ambient environment needs to be conserved, and therefore the protection of water resources is important. Measures are recommended in the Pollution Control and Management Regulations for the Protection of Drinking Water Resources. With appropriate mitigation measures, the RWSS facilities are not considered major pollution sources. Based the 6 case studies, it is found that no adverse environmental impacts arising from the existing water supply facilities. Some mitigation measures were taken as appropriate depending on the scale of RWS facilities, for example, in Yuyao City of Zhejiang Province, sludge was dried in drying beds and disposed of.

330. In order to achieve the integration of water resource management, it is important to coordinate with relevant organizations, including State Environmental Protection





Administration (SEPA) and local Environmental Protection Bureaus (EPBs). SEPA is a national regulatory agency and its major roles of SEPA are (1) to formulate environmental protection policies, regulations, technical guidelines and (2) enforcement and prosecution of environmental protection legislation. The SEPA delegates its authority and powers to Provincial and Municipal bureaus. With respect to RWSS, it is a normal practice that in the feasibility study reports for RWS projects, the environmental issues should be identified, addressed and submitted for EPB's approval, similar to other necessary project feasibility approvals.

331. The project-specific environmental impact assessment objectives and scope shall be set out in the feasibility study, typical study objectives may include the following:

- (i) to describe the proposed project and associated works together with the requirements and environmental benefits for carrying out the project;
- (ii) to identify the elements of the community and environment likely to be affected or likely cause adverse impacts including both natural and man-made environment;
- (iii) to identify and quantify emission sources from the perspective of air, water, noise, solid waste, ecology and etc. and determine the significance of impacts on sensitive receivers and potential affected uses;
- (iv) to identify and quantify potential losses or damage to flora, fauna and natural habitats;
- (v) to identify any negative impacts on sites of cultural heritage
- (vi) to propose the provision of infrastructure or mitigation measures to minimize the pollutions, environmental disturbance and nuisance during construction, operation (or decommissioning) of the project
- (vii) to investigate the feasibility, effectiveness and implication of the proposed mitigation measures;
- (viii) to predict and evaluate the residual environmental impact and cumulative effects expected to arise during construction, operation (or decommissioning) of the project in relation to the sensitive receivers and potential affected uses;
- (ix) to assess and specify method, measures and standards to be included in the detailed design, construction, operation (or decommissioning) of the project.
- (x) to design and specify the environmental monitoring and audit requirements; and
- (xi) to identify any additional studies necessary to implement the mitigation measures or monitoring and proposals

332. The review on long termed and short termed environmental impact review in respect of the RWSS Sector development is as follows:

a. Long Termed Environmental Impacts

333. For the RWSS Sector development, the long term environmental impacts are assessed:

- (i) The rural drinking water supply requires the extraction of water resources. The total extraction for rural water supply represents 5.4% of the total national extraction. The extraction is also spread over a vast area; from the perspective of overall exploitation of water resources, the extraction of water resources for rural water supply would not produce adverse impact.
- (ii) The RWS systems consist of engineering works such as intake structure, raw water pipelines, water treatment plants, treated water distribution pipelines. These works are usually small in scale and scattered over vast area. The engineering works would





- not impose adverse impacts to ecological environment, vegetation cover and geological structures. With appropriate green measures specified in the engineering works such as landscape works in water plants, the long term impact of RWS engineering works should be acceptable.
- (iii) Along with more convenient access to safe drinking water, rural population would improve their living environment such as clean and hygienic court yards, more gardening landscape planting. The impact to the living environment is positive.
 - (iv) Along with more convenient access to safe drinking water and increase in living standards, more domestic wastewater will be generated. There should be appropriate planning, collection, treatment and disposal strategy to prevent environmental pollution. The environmental impact of the World Bank's RWSS projects are assessed Class B – meaning that the impacts are acceptable.
 - (v) The improved prevalence rate for sanitary latrines will greatly reduce the faecal contamination of soil and the incidence rate of intestinal track infectious diseases. The extraction of treated faecal solids for fertilizers will not cause contamination of the crops.
 - (vi) The refuse collection points and village drains will help to collect and treat the solid waste and wastewater of domestic origin and reduce the contamination to surface and ground water resources.

b. Short Termed Environmental Impacts

334. The RWS systems consist of engineering works such as intake structure, raw water pipelines, water treatment plants, treated water distribution pipelines. These works are usually small in scale and scattered over vast area. The construction periods are short and the environmental impacts transient. For example, impacts like dust, noise, obstruction to access are short term and the disturbance could be fully reinstated. The impacts are considered acceptable. The environmental impact of the World Bank's RWSS projects are assessed Class B – meaning that the impacts are acceptable.

K Strategies for Monitoring, Evaluation and Dissemination Aspects

a. Monitoring

335. With the aim for effective management of the water quality of rural water supply and prompt identification and action on incidences of unsafe water quality issues, the NPHCCO formulated a “National Monitoring System for Water Quality Rural Drinking Water Supply” in 1991 and commissioned monitoring networks in 1992. The program has since provided effective continuous monitoring of drinking water quality in rural areas. It enables early alert for water-borne diseases, safeguard of drinking water hygiene and support data for improvement efforts in rural water supply. After ten years of work, the monitoring network of drinking water quality in rural area in the PRC is basically established.

336. At present, 17 water quality parameters are monitored. From 2004 onwards, arsenic monitoring will be added. In 2003, UNICEF sponsored a study on the issue of arsenic monitoring and MoH successfully incorporates the arsenic into the monitoring systems in 11 provinces. By 2004, a total of 14 provinces have implemented arsenic monitoring.

337. The strategy is to formulate an effective monitoring institution, establish the staffing requirement and solicit funding for implementation. The new technology for monitoring,





laboratory analysis could be employed. The adoption of geographical information systems (GIS), geo-position systems (GPS) and the internet services could provide a real-time geographical platform to disseminate and share water quality monitoring information and sanitary latrine harmless treatment monitoring information. The will benefit the development of the RWSS Sector, especially useful for the PRC Governments, International Donor Agencies, RWSS participants, water user groups and beneficiaries.

b. Evaluation

338. In establishing an effective monitoring system to collect various monitoring data, it is also necessary to establish scientific evaluation methods to assess the transparency, impact, and sustainability of the RWSS projects. As a way forward for RWSS projects, some of the methods are listed below:

- (i) Initialization Evaluation: understand the characteristics of the target groups and their views on RWSS work, devise public health education messages and survey questionnaires;
- (ii) Process Evaluation: Assess the implementation of the plans; assess the working conditions of monitoring staff; assess project pre-experiments, education materials, propaganda material and survey questionnaires;
- (iii) Impacts Evaluation: Assess the short and medium term Knowledge-Action-Practice (KAP) difference of the target groups, change of viewpoints of key stakeholders;
- (iv) Results Evaluation: Assess the long term KAP observation to evaluate the achievement of ultimate objectives of the health promotion program. Effects of RWSS works in improving the health condition of the target group and benefits of RWSS in improving the living standards of target groups in terms of long term social, economic, environment and health benefits; and
- (v) Overall Evaluation: Assess the overall effectiveness of RWSS works by summarizing all relevant evaluation data, objective achievement, completion status, experience sharing, lessons learned and considerations for future planning.

c. Dissemination

339. The information of monitoring and evaluations should be credible and transparent; the data and interpretation analysis should be published through the communication channels to ensure the public is able to make reference to. For different target audience, e.g. Government officials, community leaders, project management personnel, RWSS participants, RWSS beneficiaries etc, different methods and media such as public television, internet, news release, broadcast interviews, seminars and participative evaluation panels could be employed for information dissemination. Of particular breadth an depth of penetration is the Internet. It would be very cost efficient and effective to utilize the Internet Web Brower method to disseminate the RWSS information in multi-media formats. In addition, safeguard measures such as resettlement plans, ethnic minority frameworks and gender development plan should also be included.





VIII Proposed RWSS Medium Term (2006-2010) Sector Development Plan for ADB

A Introduction

340. This RWSS Medium Term (2006-2010) Sector Development Plan consists of :
- (i) Technical Assistance Projects for the PRC's RWSS Sector, including R&D Subprograms.
 - (ii) Investment projects for the PRC's RWSS Sector.
 - (iii) Technical Assistance in Capacity Building for the PRC's RWSS Sector.

B Technical Assistance Projects for the PRC's RWSS Sector, including R&D Subprograms

a. Technical Assistance Projects for the PRC's RWSS Sector

341. It is recommended that ADB will conduct a Project Preparation Technical Assistance (PPTA) project to investigate the feasibility of the loan assistance project. This PPTA, entitled, "Project Preparation Technical Assistance for A Sector Loan in the RWSS Program in the PRC" (RWSSSP) would investigate the feasibility of ADB's loan investment in integrated development of the "3-in-1" concept in the RWSS Sector. The study will provide a consolidated work plan on the organization and implementation for future RWSS projects and will investigate the feasibility of some representative selected locations of the project.

b. Project List for R&D Technical Assistance Consultancy

342. Having reviewed the current status of RWSS, hygiene promotion and health education, it is considered that some topics should be further investigated in a research and development (R&D). The following are the relevant R&D topics which should be carried out prior to the major loan project and it is recommended to be included in the PPTA consultancy with high priority:

- Comprehensive Study on Sustainable RWS - In rural areas attaining a certain level of economic development, there is a need to investigate "Sustainable Rural Water Supply in the context of "3-Components" of water supply, water conservation and wastewater disposal. The investigation consists of scientific planning for the reasonable scale of RWS facilities, water conservation at rural household level, water reuse at rural communities level and proper facilities for rural wastewater collection, treatment and disposal.
- Study on RWS Operation and Management Models - Ownership, Public Policy, Laws and Regulations, and Models.
- Development of Project Monitoring Systems - including development of Monitoring Parameters Systems and assessment methodology.
- Development of Remote/Distant Information Management System – Build and extend the existing Information Technology (IT) infrastructure and communication network platforms to carry out remote/distant management of project information for RWSS Sector projects undertaken by various PRC Government ministries and department and by various International Donor Agencies for the purpose of information dissemination and knowledge sharing.
- Assessment of Health Education Participation and capacity building in Water Supply and Sanitation Projects.

343. Please refer to [Appendix 6-4](#) for preliminary outlines of the R&D topics.





C Investment Projects for the PRC's RWSS Sector

344. In Jan 2005, the Consultants' Team carried out a Questionnaire Survey for 12 Provinces/Autonomous Regions in the Western Region and three areas of Xiangxi in Hunan Province, E'xi in Hubei Province and Yanbian in Jilin. The aim of the survey is to collecting data to support the need assessment for the planning years of 2006-2010 for RWSS Sector in these regions. A sample of the survey questionnaire is enclosed in [Appendix 6-1](#). The collected data is tabulated in [Appendix 6-2](#).

345. According to the information submitted, there are substantial needs and desires in the RWSS Sector in the Provinces in the Western Region. For rural water supply, based on the returned information, the needs for RWS facilities are mainly centralized water supply systems targeting a beneficiary population of 32.5 million and a budgeted capital investment of \$1.1 billion (RMB 9.15 billion).

346. Although most of the provinces and cities in the Western Region are willing to accept the loans from international and domestic development banks, the expectations of different locations are different. Some wish the repayment period to be as long as possible, however, accepting a repayment period of 20 years with grace period of 5 years. As for loan interest rates, some request for "interest-free loans" and some accepts interest rates up to 4% p.a. On the issue of counterpart funding, some express wishes for a large share to be borne by the Central Government in alleviating the burden on local Government and the beneficiaries. Other requests include Government subsidies for the loan interests, collection of water tariff in financing loan repayment and seeking of grants. There are also requests for international financial assistance in the form of grants, low-interest loans with long repayment periods.

347. In addition, according to the Case Study findings of Gaocheng and Yuyao, the Central and Eastern Regions also exhibit certain demands in RWSS Sector development. These regions have identified their needs for RWSS projects and also confirmed their ability and willingness to seek interest-bearing loans from International Financial Institutes. For the case of Gaocheng in Hebei Province, the relevant government bureaux are jointly preparing proposals of RWSS project items for inclusion in the 11th FYP. The plans include protection and reasonable use of water resources, appropriate planning for new water supply facilities, strengthening of scientific management.

348. In the case of Yuyao City in Zhejiang Province, some of the existing RWS facilities are required to be expanded in order to cope with increase demand arising from social and economic development of the city. Due to the shortage of capital, some of the aged distribution pipe networks could not be rehabilitated or replaced in conjunction with the extension of the water supply facilities. As a result, there are contamination caused by pipe corrosion as well as serious leakage in the distribution networks. Rusty water attracts complaints from customers. There is an urgent need for rehabilitation and replacement of trunk raw water supply mains, distribution trunk pipelines as well as distribution networks.

349. With due recognition of the financial models with International Donor Agencies as major funding sources, RWSS projects of a reasonable scale should be selected. It is suggested that differential loan interest rates treatment, differential counterpart funding requirements as well as differential securing and distribution of grants should be adopted (As





ADB would not provide grants or different lending terms and conditions for the different Regions. (ADB has only OCR (LIBOR) 25 years including 5 years grace period.) The proposed terms and conditions of loans could be considered to be implemented through the PRC Government channels in financing RWSS projects with due respect for the disparity of the Western, Central and Eastern Regions of the PRC. Please refer Table 31 for details.

350. With the pro-poor policy of International Donor Agencies in rural water supply developments and with due respect to the disparity of the Western, Central and Eastern Regions of the PRC, it is recommended to greatly relieve the finance burden on local government and on the beneficiaries by substantially reducing the proportions of counterpart funding. Major shares of the funding are shouldered by international loans, grants and Central Government finances. A suggested example is listed in Table 30.

351. As revealed in the survey, most of the Provinces and Cities in the Western Region are willing to seek loans from international and domestic development banks: amongst these, the total beneficiary population is 26 million and the required investment capital is \$0.9 billion (RMB 7.5 billion). Please refer to **Appendix 6-3** for details. The average investment per capita for RWS is approximately \$35 (RMB288) which is close to the estimate figure of \$37¹⁷(RMB307) in the 10th FYP for RWS investment in provinces, cities and townships and \$36 (RMB 298.5) of the 4 phases World Bank’s “RWSS in the PRC” Projects.

352. In order to maintain the quality of drinking water, resolve the problems of high fluoride content, high arsenic content and high saline content water in drinking water, and improve the sub-standard water treatment and supply facilities, the investment per capita should take into account a reasonable increase in investment in the water treatment processes (by about 10-20%). In addition, the investment per capita should also take into consideration the inflation rate (about 2-3%) in the recent years. Therefore, approximately \$42~\$48 (RMB 350~400) is adopted for estimation purpose for the investment per capita in RWS facilities.

¹⁷ According to Ministry of Water Resources—“Rural Safe Drinking Water Contingency Plan 2005-2006”, the investment per capita for RWS is as follows:

| Region | RWS Investment per capita in Provinces, Regions and Cities in “10 th FYP” | | | Investment per capita of 4 Phases of World Bank’s “RWSS in the PRC” Projects | | |
|-----------------------|--|----------------------|---|--|----------------------|-----------------------------------|
| | Total Investment (\$Million) | Population (Million) | Investment per capita in “10 th FYP” (\$/person) | Total Investment (\$Million) | Population (Million) | Investment per capita (\$/person) |
| North-Eastern | 165.6 (RMB 1367.51) | 5.01 | 33 (RMB 273) | 1.85 (RMB 15.29) | 0.50985 | 36 (RMB 300) |
| Northern | 550.37 (RMB 4546.03) | 14.39 | 38 (RMB 316) | - | - | - |
| Eastern | 122.95 (RMB 932.99) | 3.78 | 30 (RMB 247) | 1.59 (RMB 13.20) | 0.43320 | 37 (RMB 305) |
| Central-Southern | 216.42 (RMB 1787.61) | 5.96 | 36 (RMB 300) | 2.76 (RMB 22.81) | 0.78622 | 35 (RMB 290) |
| South-western | 388.69 (RMB 3210.62) | 9.16 | 42 (RMB 350) | 4.98 (RMB 41.14) | 0.13768 | 36 (RMB 299) |
| North-west | 520.77 (RMB 4301.52) | 12.07 | 43 (RMB 356) | - | - | - |
| Investment per capita | | | 37 (RMB 307) | | | 36 (RMB 298.5) |





353. Assuming that ADB is to provide an OCR loan of \$90 million to the PRC with grant of \$20 million (10% of total project investment) and the PRC’s count-part funding of \$90 million, the total sum of funding will be \$200 million (RMB1.65 billion). According to the investment plan as discussed, the ratio of distribution for Western, Central and Eastern Regions will be 50: 25: 25. Table 33 shows the fund distribution on RWSS and hygiene promotion and health education in respect of different Regions for the whole project as below:

Table 33 Fund distribution on RWSS and health education in respect of different Regions for the entire project

| Region | Ratio of Distribution (%) | Total Fund (\$Million) | Rural Water Supply (\$Million) | Rural Sanitation (\$Million) | Hygiene Promotion and Health Education (\$Million) |
|---------|---------------------------|------------------------|--------------------------------|------------------------------|--|
| Western | 50 | 100 | 90 | 8 | 2 |
| Central | 25 | 50 | 45 | 4 | 1 |
| Eastern | 25 | 50 | 45 | 4 | 1 |
| Total | 100 | 200 | 180 | 16 | 4 |

Note: Subtotal of Sanitation, Hygiene Promotion and Health Education is 10% of the total investment.

354. In the Western Region, the portion of RWS is about \$90 million (RMB 747 million), the investment per capita is \$45 (RMB 375) and the beneficial population is about 200 million. From either the basis of investment capital or the basis of beneficiary population, the investment project will meet 8% of the demand of the surveyed Provinces and Cities. In other words, 4 to 5 provinces can be selected from [Appendix 6-3](#) to make up 8% of the surveyed demand. It is recommended that potential areas (one Eastern Region (e.g. Zhejiang) and a few Western Regions (e.g. Yunnan, Hunan, Gansu, Inner Mongolia and/or the Regions listed in Appendix 6-3 of the Final Report) could be further investigated and identified in order to bundle them together with single lending term for a PPTA. Also from case studies findings, there are needs expressed by Chuxiong City of Yunan Province, Tianshui City of Gansu Province, and Tumotezuqi of Inner Mongolia to use the loan assistance. Other considerations can also be given to RWS projects in Central and Eastern Regions for \$45 million each. In the Final Report Workshop in December 2005, representatives of six provinces, namely, Guizhou, Inner Mongolia, Gansu, Hainan, Hebei and Zhejiang expressed interests in applying for ADB loans for their RWSS projects.

355. In the selection process, due regards should be given to exclude those provinces which are being selected for the implementation of “World Bank and DFID’s Provincial RWSS Projects” in order to avoid unnecessary overlap in the investment plan.

D Technical Assistance in Capacity Building for the PRC’s RWSS Sector

356. In order to ensure sustainable development of the RWSS sector and favorable condition for execution of ADB’s investment projects, there is a genuine need for good capacity building both in terms of institutions as well as human resources capital. The main purpose of capacity building plan is to develop the capacity of the institutions and organizations and to provide adequate training to staff. The targeted personnel are the





Central Government officials (i.e. officers in the ministries, departments and National Project Office), provincial officials, local government officials and community based staff. There are two major phases of implementation: (1) capacity building plan to be implemented before the execution of the Sector Program Loan, the main purpose is to develop the capacity of Central Government officials and relevant staff. (2) capacity building plan to be implemented after the execution of the Sector Program Loan, the targets are provincial officials, local government officials and community based staff of location of the project area. The proposed capacity building plan consists of the following items:

- Capacity Building Training for Integrated RWSS Project Implementation - including provision of training for Executive Agency officials on institutional set up, organization, staff establishment and management.
- Initial-phase (pre-Sector Program Loan) Training for Integrated RWSS Project Implementation - including project planning, feasibility study, project organization, engineering design, in order to ensure the pre-project preparation works can be executed in a reasonable manner and meeting the requirements of ADB.
- Capacity Building Training for Project and Post-Project Monitoring and Assessment – including modules on guidelines and standards, and adoption of methodology and procedures.

E RWSS Sector Road Map

357. The Medium-Term RWSS Sector Development Plan of ADB in the next five years will be focused on the pro-poor objective in the PRC including the promotion of safe drinking water, sanitation, hygiene promotion and health education development. The implementation road map can refer to the following program (Table 34):

Table 34 Implementation Road Map

| Date | Task | Content |
|-----------------------------------|---|---|
| 9/2005~3/2006 | ADB's Project Preparation Technical Assistance Project | ADB to invite consultants to prepare the PPTA for Sector Loan |
| 4/2006~6/2006 | Liaison between ADB and the PRC to work out the loan agreement of the Sector Loan | Following the completion of the PPTA (project preparation for sector loan,) ADB will consolidate the loan agreement with the PRC after liaison with NDRC and MoF. |
| 7/2006~9/2006 | Initial-phase (pre-Sector Program Loan) Training | Capacity Building Plan — main focus on capacity building of Central Government ministries and departments, Departmental organization and personnel. |
| 10/2006~9/2010 | ADB's RWSS Sector Loan investment project | Project Execution |
| 6/2008~12/2008 and 6/2010~12/2010 | Project and Post-Project Monitoring and Assessment | ADB to invite consultants to provide monitoring and assessment for mid phase and final phase |





F Summary

358. Table 35 summarizes the above-mentioned types of projects in the proposed Medium Term Sector Development Plan for ADB. The specific matters in terms of project type, scope, needs, content, benefits, cost estimate, sources of funding and implementation etc. are itemized as follows:

Table 35 Technical Assistance Projects for the PRC's RWSS Sector, including R&D Subprograms:

| | |
|-----------------|---|
| Project Type: | (i) Technical assistance projects for the PRC's RWSS sector, including R&D subprograms |
| Scope: | Project Preparation Technical Assistance (PPTA) project to investigate the feasibility of the loan assistance project; the study area should cover the Western, Central and Eastern Regions of the PRC. Research & Development sub-programs (App. 6-4). |
| Needs: | It is a standard procedure for ADB to prepare PPTA for a Sector Loan. The rapid growth of the PRC would bring new concepts and opportunities to this sector, with respect to both management aspects and technical aspects, and thus there is a strong need for R&D sub-programs. |
| Content: | See Paragraph 341 and 342. |
| Benefit: | With enormous benefits to the RWSS Sector. |
| Cost Estimate: | \$1 million. |
| Source of Fund: | Grant assistance provided by ADB, or by other single or multiple funding sources. |
| Implementation: | The PPTA is proposed to be implemented by 2007/08. |

| | |
|-----------------|--|
| Project Type: | (ii) Sector Loan for the PRC's RWSS Sector |
| Scope: | The project coverage will be rural areas in the entire PRC, mainly in Western Region plus suitable locations in Central and Eastern Regions. |
| Needs: | Introduction of loan and grant from ADB to release the capital high demand pressure in the PRC market. The projects are also tally with ADB's pro-poor objective and water resources protection policy, and thus it is mutually benefit. |
| Content: | See paragraph 354. |
| Benefit: | Pronounced benefits in the social, economical and public health dimensions. |
| Cost Estimate: | \$200 million. |
| Source of Fund: | ADB's OCR loan to mix with grant provided by ADB or other International Donator Agencies, single or multiple funding sources and also with the counterpart funding provided by government and beneficiary people, see paragraph 353. |
| Implementation: | Following the completion of PPTA for a Sector Loan, ADB to consolidate the loan agreement after liaison with NDRC and MoF. |



| | |
|-----------------|--|
| Project Type: | (iii) Technical assistance in Capacity Building for the PRC's RWSS Sector |
| Scope: | The main purpose of capacity building plan is to develop the capacity of the institutions and organizations and to provide adequate training to staff. The targeted personnel are the Central Government officials (i.e. officers in the ministries, departments and National Project Office), provincial officials, local government officials and community-based staff. |
| Needs: | In order to ensure sustainable development of the RWSS sector and favorable condition for execution of ADB's investment projects, there is a genuine need for good capacity building both in terms of institutions as well as human resources capital. |
| Content: | See paragraph 356. |
| Benefit: | Obvious economic benefits, especially the management and organization improvement aspects. |
| Cost Estimate: | \$0.40 million. |
| Source of Fund: | Plan 1: if the capacity building plan is to be implemented before the execution of the Sector Loan, funding can be provided by ADB's grant. Plan 2: if the capacity building plan to be implemented after the execution of the Sector Loan, funding can be provided by ADB's Sector Program Loan, and allocated when individual projects are established locally. |
| Implementation: | Plan 1: if the capacity building plan is to be implemented before the execution of the Sector Program Loan, the main purpose is to develop the capacity of Central Government officials (i.e. officers in the ministries, departments and National Project Office). Plan 2: if the capacity building plan to be implemented after the execution of the Sector Program Loan, the targets are provincial officials, local government officials and community based staff of location of the project area. |





IX RWSS Sector Development Policies and Strategies in next Ten Years (2006-2015)

A RWSS Sector Development Objectives

359. In Paragraph 260 and Table 26, the long term objectives for the RWSS Sector for the next 10 years (2011-2015) have been presented. The RWSS is an important commitment by the PRC Government in achieving United Nation's "Millennium Development Goals" (MDG). By the end of 2015, it is targeted that population who are unable to obtain or afford safe drinking water will be reduced by half. By measure of the volume of work to be achieved, the tasks ahead are very arduous. Great efforts are needed in the further development of the institutional setup, capital, management models, technical capability, human resources and institutional capacity building. From 2011 to 2015, the PRC Government is committed to resolve the safe drinking water problem for about 100 million people.

B Sustainable RWSS Sector Development Policies and Strategies

360. The central theme of the strategy in the RWSS Sector from now to 2010 is to continue with the current strategy and further enhance the "3-in-1" concept in the integrated development in the rural water supply, sanitary, hygiene promotion and health education and emphasize on the sustainable development capabilities. The further development in the RWSS Sector should also recognize and work in co-ordination with the social, economic, cultural and other facets of development of the rural communities and in the context of the whole country. Some key strategies are:

- (i) Continue with the development strategies for rural water supply: the Government of the PRC will implement the RWSS works comprehensively in order to ensure the water quality meeting the drinking water standards; the stable quantity of the water resources; high reliability of water supply and the convenience of access to safe drinking water.
- (ii) It is recommended that new emphasis on the issue of water supply-water conservation-wastewater collection/disposal "3-Component" concept should be put on RWSS projects in addition to the well understood "3-in-1" concept. The successful implementation of this water supply-water conservation- wastewater collection/disposal would help to alleviate the stressed water resources and to reduce the widespread contamination due to domestic wastewater arising from increased consumption. This policy will help to resolve crises already taking shapes in the Eastern Region and to address issues and prevent situations in the Central and Western Regions respectively. As the PRC is growing at such a vast pace, it is imperative in the next 10 years that a comprehensive study is organized and conducted to investigate the issues and to recommend a new policy in dealing with "Sustainable RWS" in the context of "3-Components" of water supply. This policy will help to resolve crises already taking shapes in the Eastern Region and to address issues and prevent situations in the Central and Western Regions respectively.
- (iii) Continue with the development strategies for rural sanitation: to strengthen the construction of demonstration "harmless" sanitary latrines for village households, public toilets and schools.
- (iv) Continue with the development strategies for hygiene promotion and health education.
- (v) Strengthen the overall policies and strategies for "3-in-1" concept for integrated





- development in RWSS Sector.
- (vi) On the basis of the widely accepted “3-in-1” concept in the integrated development of the rural water supply, sanitary, hygiene promotion and health education, proactively emphasize the importance to increase the funds to support programs for women’s and children’s hygiene promotion and health education, especially in the poor rural areas.
 - (vii) In view of the region disparity of the Western, Central and Eastern Regions of the PRC, ensure the compatibility of financing models with the status of economic development of these different regions.
 - (viii) Continue to strengthen the capacity building efforts for the RWSS Sector.





X Roles of Asian Development Bank

A ADB's Policies in RWSS

361. ADB's poverty reduction strategy describes poverty as a deprivation of essential assets and opportunities. These include basic needs such as shelter, education, water and sanitation, and health care. Three key elements of ADB's strategic framework for poverty reduction are:

- (i) Pro-poor sustainable economic growth, which covers broad based growth-promoting activities, including investments in both physical and social infrastructure, and an environment program that promotes environmentally sound development; in particular to reduce the gap between the inland provinces and the coastal provinces, and between the rural and urban areas;
- (ii) Inclusive social development, which will include investments in social support programs and a policy and reform agenda that will promote equity and empowerment, especially for women and disadvantaged groups; and
- (iii) Good governance for effective policies and institutions, which will include support for public sector management at all levels; legal and judicial reform; and improving public accountability. Governance must also promote processes and procedures for more effective participation in decision making to promote equitable and inclusive growth, especially by civil society.

362. Water scarcity impacts on health, availability of food, and the conditions in which people live. The poor are particularly vulnerable when water is either unclean or in short supply. The lack of water accentuates the hardships of the poor. The inequity is harsh-the poor have less time to spend on productive work, fall sick more often, and spend more on getting well. With the PRC's rapid population growth, rising industrialization, increasing environmental degradation and pollution, ADB is now emphasizing the need for integrated water resource management encompassing issues of allocation, distribution, equity, conservation, pricing, regulation, education, participation, and sustainable use.

363. The ADB's water policy is to promote the concept of water as a socially vital economic good that needs increasingly careful management to sustain equitable economic growth and to reduce poverty. This water policy has the following principal elements:

- (i) promote a national focus on water sector reform;
- (ii) foster the integrated management of water resources;
- (iii) improve and expand the delivery of water services (including decentralization and private sector participation models);
- (iv) foster the conservation of water and increase system efficiencies such as cost recovery, awareness education;
- (v) promote regional cooperation and increase the mutually beneficial use of shared water resources within and between countries;
- (vi) facilitate the exchange of water sector information and experience; and
- (vii) improve governance consisting of elements of legal and regulatory systems, building capacity, participative social involvement including gender issues.

B Relationship Between PRC and ADB

364. The PRC is a Development Member Country (DMC) of ADB. As the GDP of the PRC





has reached the level of \$925 (\$925 at 1997 prices), it has graduated to Group B2 DMCs and is eligible for ADB's financial assistance in the format of Ordinary Capital Resources (OCR) with limited Asian Development Fund (ADF) under particular circumstances.

365. ADB, being an International Development Bank, shares a lot of common interests in co-operating with the PRC. In the years 2004-2006, ADB intend to administer loans at about \$1,000 million to the PRC, of which more than 80% will be designated for the rural poor Western Region. The projects mainly cover agricultural developments, transportation & energy as well as environmental projects. RWSS belongs to the environmental categories.

366. In the RWSS Sector in the PRC, ADB could play an important role in the following aspects:

- (i) Make up the insufficiency of RWS funding, direct the investment of national counterpart funding to expedite the development of RWS facilities.
- (ii) Build upon the experience in implementation of the "3-in-1" concept in RWSS projects, promote integrated RWSS development to benefit the rural population.
- (iii) Introduce advance modern management practices to facilitate more scientific, systematic and regulated management in the construction and operation of the RWS projects.
- (iv) Strengthen the community-based participation and arouse the concerns on poverty and gender issues.

367. In addition to loans, ADB could also play an important role in providing technical assistance in knowledge and technology transfer products. ADB could provide the technical assistance programs such as policy and strategy research, social studies, management skills and institutional studies, technical expertise relating to the planning, design, construction, and operation & maintenance in RWSS, and other consultancy assistance as supplementary products to the ADB loans for the beneficiaries. These knowledge based products will be essential to equip the capacity of the RWSS Sector in meeting the challenges in the economic development of the PRC as well as satisfying the mission and objectives of ADB.

C Financial Issues in ADB's Potential Involvement in PRC's RWSS Projects

368. The compatibility of the financial assistance of ADB with the status of economic development of the regions: as discussed in Paragraph 301. The financial assistance from ADB should be directed towards RWSS projects of a reasonable scale. As ADB would not provide grants or different lending terms and conditions for the different Regions. (ADB has only OCR (LIBOR) 25 years including 5 years grace period.), it is suggested that differential loan interest rates treatment, differential counterpart funding requirements as well as differential securing and distribution of grants could be considered to be implemented through the PRC Government channels in financing RWSS projects with due respect for the disparity of the Western, Central and Eastern Regions of the PRC. For the developed regions, the interest rate could be slightly higher, subject to the ceiling of domestic commercial rates, with a shorter repayment period. For Central Region and Western Region, lower interest rates with longer repayment periods should be considered. Please refer to Table 29.

369. The Government of the PRC would provide ultimate guarantee on repayment for ADB's loan. In this aspect, the Government of the PRC has an immaculate track record on





repayment without any default. Thus the risk on bad debt is extremely low.

370. As the PRC could only access ADB's OCR with limited ADF under particular circumstances, maximum leverage should be exercised to seek grant assistance in order to soften the loan. In conjunction with the provision of the loan, it is recommended to seek grant assistance for 10% of the RWSS project costs to support the sanitation, hygiene promotion and health education components of the RWSS project, in line with ADB's pro-poor and social policy. For this grant, the ratio of distribution could be 1:3:6 for Eastern, Central and Western Regions respectively, with a view to maximizing the benefit to the Western Region.

371. There are significant needs in the development of the RWSS Sector in the PRC. ADB is keen to devote financial assistance to the PRC in the development of RWSS as it conforms with ADB's "Poverty Reduction Policy" and "Water for People Policy". There are mutual benefits for both the PRC and ADB.





XI Conclusions

372. In broad terms, the Consultants Team has completed all required tasks for this ADTA and achieved the objectives as required by the Terms of Reference. In this Final Report the Team has documented the key progress of the ADTA and presented the findings of the Strategic Study.

- (i) In Section 3 - the current status of development in various aspects of population, social and economical development, geography, climate and hydrology have been described.
- (ii) In Section 4 - the existing status, profile and relevant constraints of the rural water supply and sanitation sector have been presented with relevant facts and figures.
- (iii) Section 5 describes and discusses major tasks accomplished for the six Case Studies, including the background and objectives, current status with respect to the developments in the RWSS Sector, relevant analyses towards formulation of appropriate strategies, and the preliminary recommendations.
- (iv) In Section 6, based on the discussions in previous Section 4 and 5 on RWSS Sector status and constraints in a general context as well as Case Studies specific context, a detailed analysis of the RWSS Sector is presented.
- (v) Section 7 is an important section as it discusses and formulates the policies and strategies for the development in the RWSS Sector in next five years (2006-2010). A continuation note of these policies and strategies for the following five years (2011-2015) is presented in Section 9.
- (vi) In line with the Sector Strategy, the Proposed RWSS Medium Term (2006-2010) Sector Development Plan for ADB is formulated in Section 8.
- (vii) As a wrapping up, the role of ADB towards the development of the RWSS Sector is discussed in Section 10. It also recommends possible investment framework and suggest potential investment projects for ADB's consideration.

373. As a summary in this Final Report, the Consultants Team has discussed, analyzed and formulated the RWSS Sector Development Policies and Strategies for the PRC. Major strategies are presented in the following:

- (i) The Government of the PRC will implement the RWSS works comprehensively in order to ensure the water quality meeting the drinking water standards; the stable quantity of the water resources; high reliability of water supply and the convenience of access to safe drinking water.
- (ii) In addition to the well understood "3-in-1" concept, the "3-Component" concept for water supply / water conservation / wastewater collection & disposal should be properly addressed for RWSS projects, in particular in the in the Eastern Region.
- (iii) Strengthen the construction of demonstration "harmless" sanitary latrines for village households, public toilets and schools. In the implementation of integrated RWSS projects, strengthen the hygiene promotion and health education components.
- (iv) For poverty alleviation programs and projects with "Public Goods" nature, the Central Government should play a leadership role and provide main source of funding. RWSS Sector falls within this description of "Public Goods". The principle of full cost recovery for the loan assistance is not consistent with the poverty alleviation nature of the RWSS projects.
- (v) It is important that the model of financial mixes to fund RWSS projects should be compatible with the specific economic status of the location in question:
 - Western Poor Areas – represented by the vast Western Region yet include rural





- poor areas in the Central and Eastern Regions. Central Government finances and provincial Government finances should be the mainstay, supplemented by loans from domestic development banks or from commercial sources, and from collective community contribution and beneficiaries' contribution.
- Rural Areas in Central Region - represented by Central Region and possess better economic strength and could afford the loan conditions better. One form of RWS systems is to merge existing neighbouring and scattered small scale RWS systems into a larger RWS network system.
 - Rural Areas in Eastern Region – represented by the Eastern Region with major economic growth. In these areas, agriculture developments, industrial developments as well as town enterprises are fairly well established. For larger scaled RWS systems, there are feasible channels to deploy private sector capital or loan assistance from International Donor Agencies.
- (vi) The financial assistance from International Donor Agencies should be directed towards RWSS projects of a reasonable scale. It is suggested that differential loan interest rates treatment, differential counterpart funding requirements as well as differential securing and distribution of grants should be adopted in financing RWSS projects with due respect for the disparity of the Western, Central and Eastern Regions.
- (vii) It is recommended to continue with the strategies in program organization, planning, implementation, operation and management strategies.
- (viii) Strategies for poverty, social and gender aspects include: The “3-in-1” concept in integrated RWSS development brings great social, economic and health benefits to the poverty stricken areas. With particular emphases on alleviating the burden on the poor, improving the position of the female gender and taking care of the exceptionally under-privileged people, the undertaking of RWSS projects will help to construct a harmonious society.
- (ix) Strengthen the capacity building of the RWSS Sector, including institutional set up, roles and responsibilities definitions, organization staffing, human resources development.
- (x) Clear procedures and measures should be put in place to encourage the participation of villagers and village communities in the implementation of the RWSS projects. Matters such as project planning, project design, project finances, project construction and the post project operation management.

374. There are significant needs in the development of the RWSS Sector in the PRC. The PRC Government is fully cognizant of the importance of this RWSS Sector and has on numerous occasions postulated major policies and key initiatives to further the development of this sector. Despite the magnitude and the widespreadness of the issues, the PRC Government will not relent its efforts. It will stay the course to see steady and continuous progress made in the RWSS development.

375. The International Donor Agencies would play important roles in the RWSS development, namely in providing affordable financial assistance and in technology and knowledge transfer. In these two aspects, both the physical infrastructure and the social infrastructure will be improved toward the development of a harmonious society.

376. ADB is keen to devote financial assistance to the PRC in the development of RWSS as it conforms with ADB's “Poverty Reduction Policy” and “Water for People Policy”. There





are mutual benefits for both the PRC and ADB.

377. As an overall conclusion, there are great, practical and feasible opportunities for the PRC Government and the ADB to cooperate and contribute to a steady, healthy and promising development in this RWSS Sector.





Appendix 1 — Terms of Reference for the ADTA





Appendix 2-1 — Case Studies - Work Plans





Appendix 2-2 — Case Studies - Sample Questionnaire





Appendix 2-3 — Case Studies - Summary of Results for Survey Questionnaire for Village Households





Appendix 2-4 — Case Studies - Photographs of Field Visits





Appendix 3 — Financial Analyses





Appendix 3 — Financial Analyses

a. Difficulty in Formulating Financing Models for RWSS Investments

There is an inherent difficulty in formulating viable financing models for RWSS and health and education sector primarily due to the following factors:

- (i). relatively huge investments required in providing drinkable water to the rural poor¹⁸ as well as sanitation and hygiene education;
- (ii). requirement for government subsidies (both the Central and Provincial/ Local)¹⁹ and reducing the burden on rural poor;
- (iii). problems of cost recovery and financial sustainability of RWSS systems in the poorer areas²⁰ and
- (iv). low borrowing capacity of rural areas to finance RWSS²¹.

In previous RWSS projects, a major challenge was to target the investment funds on those who are poor but must have sufficient resources to upgrade their water supply whenever long-term financing can be provided. There was the risk that funds will be captured by middle-income communities rather than the poor. It has been a strategy to use a designated national or provincial level poor county as a targeting tool which has been successful in the past. Thus, in each province participating counties were selected according to:

- (i). rural poverty, in which poorest counties were given priority to participate;
- (ii). relatively high percentage of rural poor lacking access to improved water supplies;
- (iii). number of people exposed to unsafe water, such as those with fluoride or alkali content, or by incidence of gastrointestinal illness;
- (iv). existing provincial and local development plants that have prioritized rural water improvement;
- (v). proof of ability to provide the needed counterpart funds; and
- (vi). willingness to form and staff a county project office to agreed standards.

Particularly in the West, given the repayment constraint, an RWSS loan financed program may not be able to target the poorest of the poor villages which evidently are not able to afford the long-term costs of an RWSS project. While many of these villages are in need of

¹⁸ As of end 2004, 62.1% of rural poor is served of safe water supply. For sanitation sector coverage, 51% is served.

¹⁹ Rural water supply has been a priority in social development and economic reconstruction in every five year plan from 1986 to 2000, and local governments have included improvement in water supply in their local development plans.

²⁰ In previous WB 2nd NRWS project, there were a limited number of over designed water systems with negative impact on cost recovery. In the 3rd WB NRWS there was a rigorous review of designs to ensure that they are realistic with actual local requirements. Further financial sustainability also relates with cost efficiency in operations and maintenance. There is a need for project design to include the cost of training in operations and finance to local water plant staff to maintain the quality of water schemes.

²¹ As in WB experience in Projects I and II, some rural areas could not provide the counterpart funds on time which have delayed project implementation. Thus, in selecting project areas, there is a need to assess their ability to provide for counterpart funding.





improved water supply, these poorest villages have to rely on purely government grant programs to provide financing. Hence, poorest people will be guaranteed access to safe water²². Any financing mix with loan, will have to target poor villages with resources to upgrade their water supply once long term financing is available.

b. External Financing

External financing may be viable in less poor villages/ counties./ townships where full cost recovery is ensured which is a Central Government policy. In these areas, there will be townships/ counties which can afford to borrow international loans at LIBOR-based rates or OCR loans which have longer repayment terms or even domestic loans (but require shorter repayment periods).

The poorer counties, with assistance from their respective Provinces, may likewise avail external financing but may need to be blended with government funds either as grants, comprising of counterpart funding or even as part of loan repayment to cushion the impact of interest-bearing funds on beneficiaries. Financing mix of loan and equity are presented and financial impact on beneficiaries have been calculated to show which options might provide lower financial cost.

c. Domestic Financing

The Central Government, just recently had devised a cost-sharing scheme that would allow an increasing proportion of Central Government funds to be utilized for rural water supply and sanitation projects in the East, Central and West Regions, which reflects a more equitable distribution of funds to poor areas in these regions.

Provincial and local government funds will likewise provide an increasing share of investment requirements in Central and East Regions as compared to Western provinces which are considered economically poorer areas.

Setting a Revolving Fund for RWSS on the Provincial Level and Earmarking Public Funds (5% of Budget Allocation to RWSS) can be a viable scheme in the long-run to ensure that long-term investments will have a guaranteed source of financing.

d. Financing Models

Several financing models which include loans as source of funds are proposed as part of long-term financing strategy in order to maximize the use of government counterpart funds on central and provincial/local levels, for rural water supply and sanitation and health and sanitation education programs. Major objectives of the loan and equity financing mix are to

- (i). accelerate assistance to poor villages in having access to safe water supply; and
- (ii). to enable poor beneficiary villages to pay lower upfront costs and reduce the burden of long-term capital costs.

There are four financing options which prescribe various loan-equity financing mix, which can

²² From case studies, beneficiary villagers in poor villages consider health gains from clean water supply well worth the minimal upfront costs.





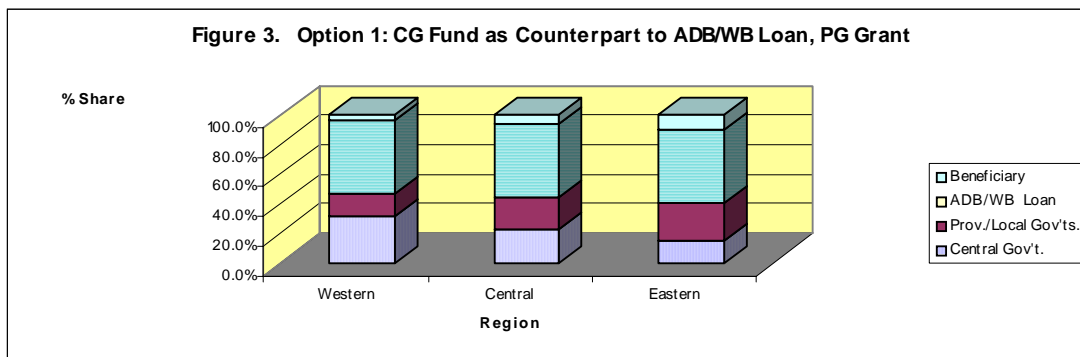
possibly apply in the West, Central and Eastern provinces where borrowing capacity exists.

- Option 1: 50% of CG Fund as Counterpart Fund to ADB/WB Loan and 50% of PG/LG Fund as Grant.
- Option 2: CG Fund as Grant, ADB/WB Loan in Lieu of PG Fund for Capital Cost and PG Fund to be used for Loan Repayment and Not for Capital Cost.
- Option 3: 50% CG Fund for Loan Repayment, PG Fund as Grant (25% of Project Cost) and ADB/WB Loan (50% of Capital Cost).
- Option 4: 50% CG Fund, PG Fund as Grant (30% of Project Cost) and ADB/WB Loan (50% of CG Share).

Option 1. It is proposed that 50% of Central Government funds which are intended for RWSS in the regions will be used as counterpart fund to ADB/WB loan while 50% of the PG funds to be used as grant. Beneficiaries will contribute the balance which is about 10% of capital cost in East and lower amounts of 6% in Central and 4% in the West. ADB/WB loan will provide 50% of project cost. Refer to Table 3 and Figure 3.

Table 3. Option 1: CG Fund (50%) as Counterpart Fund to ADB/WB Loan ; PG/LG Fund (50%) as Grant

| | Western | Central | Eastern |
|---------------------|---------|---------|---------|
| Central Gov't. | 31.5% | 22.5% | 14.5% |
| Prov./Local Gov'ts. | 15.0% | 22.0% | 25.5% |
| ADB/WB Loan | 50% | 50% | 50% |
| Beneficiary | 4% | 6% | 10% |
| Total | 100% | 100% | 100% |



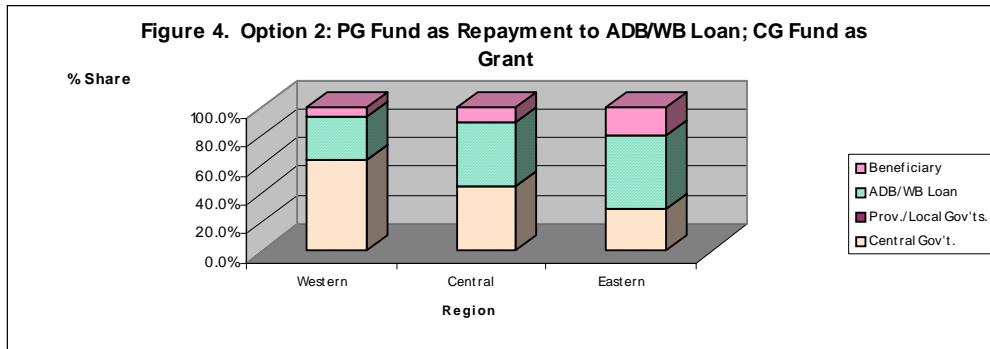
Option 2. It is proposed that 100% of Central Government funds which are intended for the regions for RWSS to be used as counterpart fund to ADB/WB loan while PG funds to be used loan repayment (not for capital cost contribution). ADB/WB loan will provide the balance of project cost in increasing proportion, 30% in West, 44% in Central and 51% in East. Beneficiaries will put up in increasing proportion contribution to capital cost of 7% in the West, 11% in Central and 20% in the East. Refer to Table 4 and Figure 4.





Table 4. Option 2: PG Fund as Repayment for ADB/WB Loan; CG Fund as Grant

| | Western | Central | Eastern |
|---------------------|-------------|-------------|-------------|
| Central Gov't. | 63.0% | 45.0% | 29.0% |
| Prov./Local Gov'ts. | 0.0% | 0.0% | 0.0% |
| ADB/WB Loan | 30% | 44% | 51% |
| Beneficiary | 7% | 11% | 20% |
| Total | 100% | 100% | 100% |

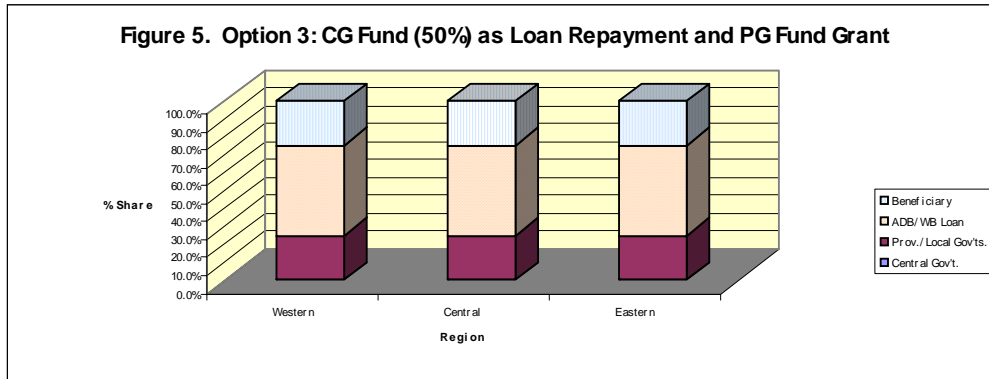


Option 3. It is proposed that Central Government funds which are intended for the regions for RWSS to be used as loan repayment to ADB/WB loan while PG funds to be used as counterpart fund part or 25% of the capital cost contribution. ADB/WB loan will provide 50% of project capital cost. Beneficiaries will provide 25% of the capital cost. Refer to Table 5 and Figure 5.

Table 5. Option 3: CG Fund (50%) as Loan Repayment for ADB/WB Loan; PG Fund as Grant

| | Western | Central | Eastern |
|---------------------|-------------|-------------|-------------|
| Central Gov't. | 0.0% | 0.0% | 0.0% |
| Prov./Local Gov'ts. | 25% | 25% | 25% |
| ADB/WB Loan | 50% | 50% | 50% |
| Beneficiary | 25% | 25% | 25% |
| Total | 100% | 100% | 100% |

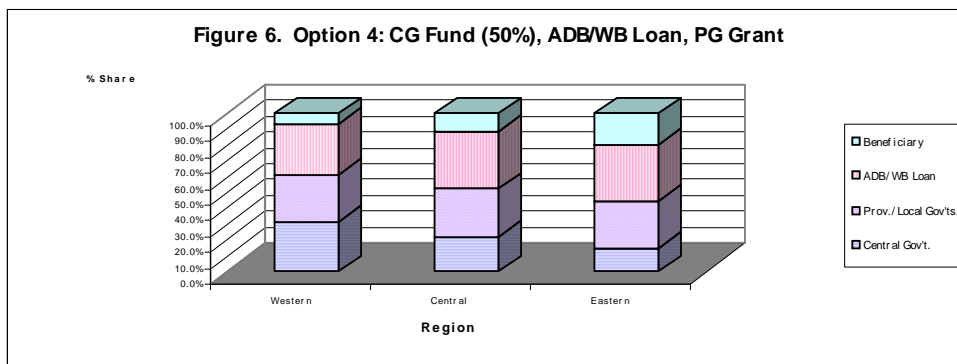




Option 4. It is proposed that 50% of Central Government funds which are intended for the regions for RWSS to be used as counterpart fund to ADB/WB loan while PG funds to be used as grant. ADB/WB loan will provide 50% of CG share in the NRWS model for capital cost. Beneficiaries will provide the balance in increasing proportion to capital cost: 7% in West, 11% in Central and 20% in the East. The project will adopt an ADB/WB loan management model. Refer to Table 6 and Figure 6.

Table 6. Option 4: CG Fund (50%), ADB/WB Loan PG Fund as Grant

| | Western | Central | Eastern |
|---------------------|---------|---------|---------|
| Central Gov't. | 31.5% | 22.5% | 14.5% |
| Prov./Local Gov'ts. | 30.0% | 30.0% | 30.0% |
| ADB/WB Loan | 31.5% | 36.5% | 35.5% |
| Beneficiary | 7% | 11% | 20% |
| Total | 100% | 100% | 100% |



e. Summary

Shown in Table 7 is a comparative summary of the impact on beneficiaries of the various financing models in terms of capital cost sharing and in loan repayment. It is shown that under the NRWS model beneficiaries will have the lowest contribution in capital cost (combined upfront cash, materials and labor) since the Central Government and Provincial/Local Governments will share the majority of the cost. Hence, beneficiaries will have the lowest contribution to project cost: 7% in the West, 11% in Central and 20% in the East. Under the previous WB IDA model, beneficiaries have shouldered at least 75% of the





project cost, 25% upfront for capital cost and another 50% for loan debt repayment, equivalent to 50% of project cost. Hence, beneficiaries had to shoulder 75% of total project cost.

In order to accelerate the investments in rural water supply and sanitation improvements, it is proposed that financing mix which considers international loan to blend with the grants from Central Government and Provincial /Local Government to cushion impact on beneficiaries. This takes into account the relative poverty levels in the West, Central and East Regions of China.

Table 7. Comparative Summary of Financing Models' Impact on Beneficiaries

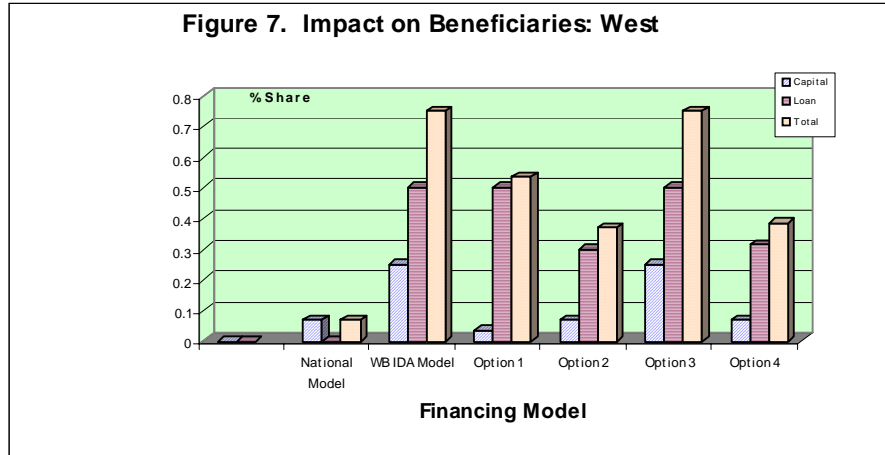
| Financing Models | Beneficiaries – West | | | Beneficiaries – Central | | | Beneficiaries - East | | |
|--|----------------------|-----------------|-------|-------------------------|-----------------|-------|----------------------|-----------------|-------|
| | Capital Cost Sharing | Loan Re-payment | Total | Capital Cost Sharing | Loan Re-payment | Total | Capital Cost Sharing | Loan Re-payment | Total |
| National Model | 7% | 0% | 7% | 11% | 0% | 11% | 20% | 0% | 20% |
| WB IDA Model | 25% | 50% | 75% | 25% | 50% | 75% | 25% | 50% | 75% |
| Option 1: 50% CG Counterpart; 50% PG Grant; ADB/WB Loan | 4% | 50% | 54% | 6% | 50% | 56% | 10% | 50% | 60% |
| Option 2: PG Fund as Repayment CG Fund Grant; ADB/WB Loan | 7% | 30% | 37% | 11% | 44% | 55% | 20% | 51% | 71% |
| Option 3: CG Fund as Loan Repay. PG Fund as Grant; ADB/WB Loan (50%) | 25% | 50% | 75% | 25% | 50% | 75% | 25% | 50% | 75% |
| Option 4: PG Fund Grant (30%); CG Fund (50%) Grant; ADB/WB Loan | 7% | 31.5% | 39% | 11% | 36.5% | 48% | 20% | 35.5% | 56% |

In the Western Region, Option 2 allows a 37% beneficiary share in the total project cost which is combined 7% share in capital cost and 30% in loan repayment. Other financing options have higher beneficiary contribution: 39% for Option 4, 54% for Option 1 and the highest is 75% for Option 3. Refer to Table 8 and Figure 7.

Table 8. Financial Impact on Beneficiaries in the West

| | Capital Cost Sharing | Loan Repayment | Total |
|-----------------|----------------------|----------------|------------|
| National Model | 7% | 0% | 7% |
| WB IDA Model | 25% | 50% | 75% |
| Option 1 | 4% | 50% | 54% |
| Option 2 | 7% | 30% | 37% |
| Option 3 | 25% | 50% | 75% |
| Option 4 | 7% | 32% | 39% |

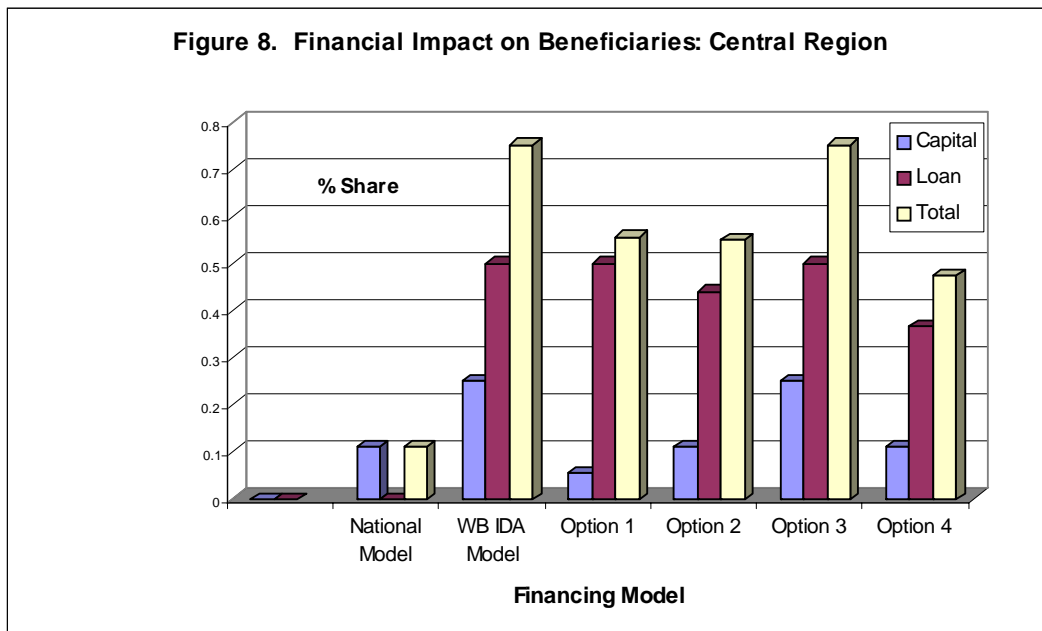




In the Central Region, Option 4 allows a 48% beneficiary share in the total project cost which is combined 11% share in capital cost and 36.5% in loan repayment. Other financing options have higher beneficiary contribution: 55% for Option 2, 56% for Option 1 and the highest is 75% for Option 3. Refer to Table 9 and Figure 8.

Table 9. Financial Impact on Beneficiaries in Central Region

| | Capital Cost Sharing | Loan Repayment | Total |
|-----------------|-----------------------------|-----------------------|--------------|
| National Model | 11% | 0% | 11% |
| WB IDA Model | 25% | 50% | 75% |
| Option 1 | 6% | 50% | 56% |
| Option 2 | 11% | 44% | 55% |
| Option 3 | 25% | 50% | 75% |
| Option 4 | 11% | 37% | 48% |

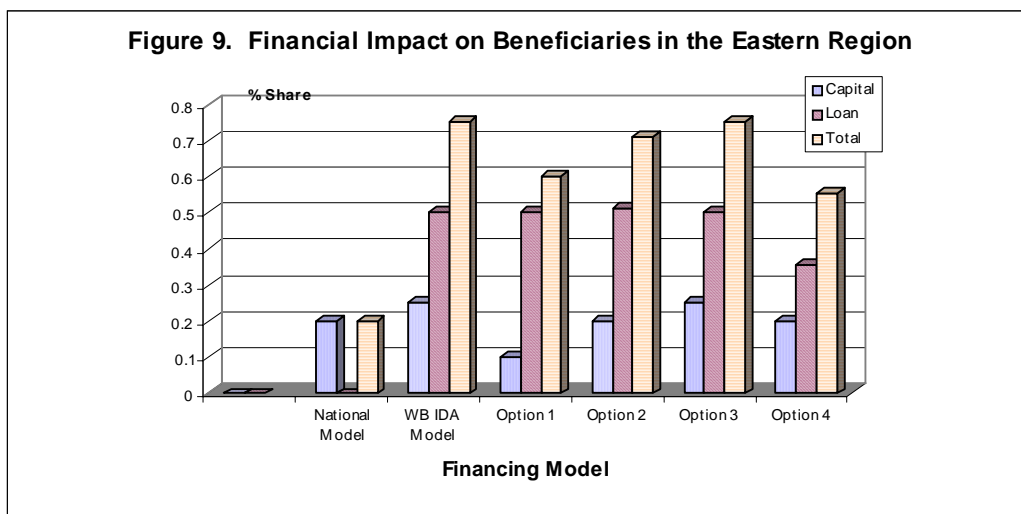




In the Eastern Region, Option 4 allows a 56% beneficiary share in the total project cost which is combined 20% share in capital cost and 35.5% in loan repayment. Other financing options have higher beneficiary contribution: 60% for Option 1, 71% for Option 2 and the highest is 75% for Option 3. Refer to Table 10 and Figure 9.

Table 10. Financial Impact on Beneficiaries in Eastern Region

| | Capital Cost Sharing | Loan Repayment | Total |
|-----------------|-----------------------------|-----------------------|--------------|
| National Model | 20% | 0% | 20% |
| WB IDA Model | 25% | 50% | 75% |
| Option 1 | 10% | 50% | 60% |
| Option 2 | 20% | 51% | 71% |
| Option 3 | 25% | 50% | 75% |
| Option 4 | 20% | 36% | 56% |



For loan repayments, in order to reduce impact on beneficiaries, the credit terms may be softened by the Central Government in the sub-lending agreement with the Provincial Government/Local Governments. Under the WB IDA loan financing, credit terms at community level are:

- RWS I: (From province to the counties/villages): 10-15 years, including 2-4 years grace period, 0% interest.
- RWSS II: (to subproject entities): Maximum of 20 years, 5-years grace period and 4% interest per annum.
- NRWSS III: (to subproject entities): 5-years grace, 17 years term, 3% service charge on IDA credit, 0.5% commitment charge

In the case study reports, repayment terms were found to be reasonable although poorer villages have difficulty paying the full cost recovery tariffs which cover both the O&M and debt repayment. Refer to Table 11. In these villages, the county governments assisted in repaying the loan, which is being taken from their respective budgetary allocations.





Table 11. Repayment Terms of WB IDA RWSS Projects

| Location | Chuxiong | Fenghuang | Tianshui (II) | Tianshui (III) | Tumotezuoqui | Yuyao |
|-------------------------------|--------------|-----------------------------------|------------------------------------|-----------------|---|---------|
| Repayment Period | 15 | 20 | 10 | 10 | 15 | 25 |
| Grace Period (years) | 5 | 5 | 6 | 2 | 5 | 5 |
| Interest Rate (%) | 4 | 4 | 4 | 3 | 4 | 4 |
| Tariffs (RMB/m ³) | 0.50 (start) | 0.4(Xinchang WTP) 1.60 (Jixin) | 0.52-2.0 (County) 2 (Maiji WTP) | 1.21 (Zhongshi) | 1.30 (WTP) 5/person/year Heigou Village WTP | 0.5-1.0 |

Hence, longer repayment period of 20 to 25 period may be more affordable to beneficiaries with interest rates of about 3% p.a. (the Province can provide subsidized rates since the LIBOR-based rate for international loans will be about 4.75% p.a.). Grace period for principal amortization is 5 years. Thus, loans can supplement the government financial resources and village resources to significantly improve rural water supply and sanitation in a sustainable manner.

f. Other Financing Issues

Full Cost Recovery Policy on Tariff Setting

The tariff policy in China for rural water supply has been that users have to pay for the water they get at a tariff rate that will fully recover the operating and maintenance costs, in addition to the debt service²³ during loan repayment period or a reasonable depreciation²⁴ of fixed assets after the loan has been repaid. Tariffs are to be paid directly by the households, or by the collective or work unit through deductions from the share of collective income that will be distributed to households, or a combination of these two.

Based on previous RWSS experience, there has been a regulatory risk which is the possible resistance to a timely implementation of required tariff structure or increases for water supply. There are cases whereby local price bureaus intervene in increasing water tariffs to full cost recovery levels which compromise the financial sustainability of the water supply systems' operations. Hence, there must be a commitment and agreement to a pricing formula in the Loan Agreement and need to be reviewed by the local price bureaus prior to committing to any investment scheme. If the local price bureau has a major disagreement to the tariff setting procedures, then the proposed investment will be redirected to other villages or counties.

Community Beneficiaries

The communities that will benefit from the RWSS project, are expected to:

- (i). decide on their participation in the RWSS project and the level of service through a village commitment letter and paying an upfront cash contribution or if not, provide in-kind contribution of labor and materials needed in the construction of the water facilities;

²³ Lending rate passed down by the Ministry of Finance was approximately 3% and 17 years maturity.

²⁴ Based on a depreciation rate of 3.5 percent.





- (ii). provide the water facility manager, operator and accountant responsible for operating and maintenance of the systems and collecting tariff revenues;
- (iii). pay water tariff sufficient to meet the operating revenue targets; and
- (iv). coordinate with the County Finance Bureaus repayment of loan. In the past, it has been covenant with communities (either at county, township, or village level), will take over ownership of the water facilities depending on the scope of investments.

Benefits Using Loan Financing

- (i). One of the benefits of Bank lending assistance is to bring in international experience on issues of health and sanitation education, more so on effective implementation to support China's mass education campaigns. Alternative sanitation designs and more effective targeting can be ensured with the Bank's involvement in RWSS sector financing.
- (ii). Bank loan financing will allow beneficiary upfront capital contribution to fall from 75% to 37% of the total investment and the scheme will considerably increase the number of villages able to invest in safe water supply²⁵ and allow the Government funds to reach as many poor villages as possible. In previous WB RWSS financed project, water charges can be as much as Y29 to Y62 per person per year depending on location, type of service and water consumed or about Y90 to Y180 per household per year. From case study income results, these expenses are affordable by the rural poor.²⁶

With the Central Government providing grants, the potential use of these funds either as counterpart funds or for loan repayment to blend with international loans, will accelerate RWSS program implementation and its benefits to rural poor in terms of larger service coverage from 1% to 3% or higher per year in the priority areas in East, Central and West. Further, the project will promote mitigation of various health diseases which eventually will offset the costs of treatment of these waterborne diseases among the rural poor. Based on the results of the case studies, Fenghuang residents spend about RMB 475 per year for treatment of diarrhea and other waterborne diseases and minimum amount of RMB 43 per year in Tianshui, Gansu.

Hence, if water supply improvements can be implemented in a more accelerated pace, in areas where water quality is so poor and contaminated in particular, there will be tremendous health savings to the rural poor²⁷. In other rural communities where time

²⁵ This will allow rural poor in the different regions to be covered by improved water systems, reduce rates of waterborne disease (especially in areas where shallow wells are main sources of drinking water), reduce incidence of dysentery, typhoid, schistosomiasis and fluorosis and morbidity rates. Further, the projects will provide for the construction of composting latrines and public school latrines and provide more effective health education and training programs.

²⁶ Results of case studies indicated that total household cash income ranges from as low as RMB 3,430 in Fenghuang, Hunan to RMB 8,500 in Chuxiong, Yunnan. Based on these income levels, 3% of their annual income would be about RMB 103 and RMB 255, respectively. Hence, for these households direct subsidies are needed for upfront capital costs and long term loan repayments (softer terms).

²⁷ In the critical areas, there are cases where rural residents suffer from visible skin cancer and "speckled tooth" diseases, bacterial contamination, viral hepatitis, arsenic poisoning and dangerous levels of fluoride.





spent in fetching water can adversely reduce income generation, improved water supplies will allow better living standards and yield monetary benefits in terms of time spent on productive work (cottage industry, etc.)²⁸.

It is important that rural water supply and sanitation is integrated with health education and training to maximize the benefits of project implementation and thus ensure sustainability of intended benefits.

²⁸ As indicated in ADB Poverty Reduction in China (1998), p.371 Chap.19 on Rural Development, “drinking water for humans and animals typically ranges from a 20-minute to one hour walk from villages and that water is collected between 2x to 4x a day. On average, a family of 4 to 5 people, with 1 ox and 2 pigs, uses a minimum of 150 kg of water per day. Each family spends on average 2 hours everyday fetching water – in a village of 200 households, that means a total of 400 hours each day are spent fetching water. There is an economic and social costs.” These include: (i) given the difficulty to fetch water for human consumption, this limits family’s ability to expand opportunity to expand fruit tree production or animal raising. (ii) water borne diseases have resulted to morbidity and mortality, particularly women and children. (iii) water shortages may give rise to fights between neighboring villages over water supplies, which calls for inter-village cooperation.





Appendix 4 — Survey Information Illustrating the Effectiveness of RWSS Development in Achieving Social, Economic and Public Health Benefits





Appendix 4 — Survey Information Illustrating the Effectiveness of RWSS Development in Achieving Social, Economic and Public Health Benefits

A Health and Hygiene Benefits

According to the survey conducted by Liaoning Province PMO on 292 RWS systems (servicing a total population of 1.11 million) constructed under World Bank's Phase 1 RWS projects, comparison is made to pre/post of project implementation:

- The enteritis disease incidence rate decreased by 87.8%
- The dysentery disease incidence rate decreased by 80.4%
- The hepatitis A disease incidence rate decreased by 78.1%
- After implementation of RWS system at the high fluorine content regions, there is no new fluorine poison case reported.

According to the survey conducted by Liaoning Province Yingkou county's PMO of World Bank Phase 1 on 29 project villages and 24 non-project villages in 1985-1986, 1 year after the implementation the project, the incidence rate of three kind of intestinal tracts infectious diseases of the enteritis, the dysentery, the hepatitis A at the project villages decreased by 68.74% while in the non-project villages, the rate only decreased by 29.9%.

According to survey conducted by the World Bank Phase 3 RWSS project in 2001 in the project villages in 5 provinces of Hebei, Hubei, Inner Mongolia, Jiangxi and Yunnan, the results are:

- Household water consumption rate increased from the baseline of 20 L/capita-day to 41.1 L/capita-day.
- Prevalence Rate of household sanitary latrine increased from baseline of 4.2% to 22.9%.
- Primary schools students' "before meal" hand washing rate increased from 72.5% to 88.5%; the "after toilet" hand washing rate increased from 56.4% to 71.6%; "clean finger nail" rate increased from 36.1% to 55.9%, housewife's "before meal" hand washing rate increased from 24.7% to 71.5%; "using soap" hand washing rate increased from 65.1% to 91.5%; "fruit" washing rate increased from 33.8% to 76.5%; and the rate of not using cloth wiping bowl increased from 45.6% to 77.7%.
- The rate of "using Flies Screen to cover household kitchen tableware and meal" increased from 60.8% to 91.9%; the rate of "clean" water storage container increased from 55.7% to 94.3% and the rate of "clean" kitchen increased from 7.4 to 34.8%.

Monitoring and evaluation were conducted to determine the disease prevention effectiveness in Changge City in Henan Province for rural water supply and sanitary latrine projects. Data were analyzed for project villages (1) along the timeline of pre-project, immediately post-project and in the 1st, 3rd and 10th year after project implementation and (2) for project villages and referenced villages:

- Flies density: post latrine improvement compared to pre project, the rate decreased by 43.42%.
- Flies density: at 1st and 10th year post rural water supply cum latrine improvement compared to referenced villages, the rates decreased by 52.11% and 68.19% respectively.
- Diarrhea incidence rate: post rural water supply improvement compared to pre project, the rate decreased by 41.25%. Post rural water supply improvement cum latrine improvement compared to rural water supply improvement, the rate further decreased by





60.91%.

- Diarrhea incidence rate: immediately post-project and in the 1st, 3rd and 10th year after project implementation compared to referenced villages: the rates decreased by 39.35%、69.52%、44.71% and 44.91% respectively.
- For tapeworm infection rate among Primary Schools students: in the 3rd year after project implementation compared to referenced village before pest control and compared to referenced villages 6 months after pest control, the rates decreased by 12.71% and 33.61% respectively.
- For tapeworm infection rate among Primary Schools students: in the 10th year after project implementation compared to referenced village before pest control and compared to referenced villages 6 months after pest control, the rates decreased by 41.16% and 55.09% respectively.

It is concluded that the implementation of rural water supply and sanitary latrine can significantly reduce flies density, villagers diarrhea incidence rate and tapeworm infection rate among Primary Schools students with obvious health benefits.

According to the analysis on water correlated infectious disease Zhenjiang City in Jiangsu Province in 1985-1995, the typhoid incidence rate decreased from 178.57/100,000 to 20.47/100,000; The dysentery incidence rate is reduced from 543.05/100,000 to 68.75/100,000.

According to the case study investigation on pre/post RWS project implementation in Longyan City in Fujian Province in 1991-1992, the total incidence rates of dysentery, hepatitis, diarrhea and total diseases after project implementation decreased by 58.24%, 51.36%, 42.14% and 44.45% respectively. The significant difference in the incidence rates reveal that of the RWS project has obvious benefit.

According to the case study investigation on RWS project implementation in 6 counties of Hunan Province, the incidence rates of water related intestinal tract infectious disease of enteritis, dysentery, hepatitis A, typhoid and etc have been reduced from 37.2% to 17.8% before and after the RWS project. Again, it is the benefit of RWS project.

B Social Benefits:

According to investigation conducted for the World Bank Phase 3 RWSS project in 2001 in 11313 households in 48 project villages in 5 provinces of Hebei, Hubei, Inner Mongolia, Jiangxi and Yunnan: Before the implementation of the project, household would take on average 20 min. to 60 min. to fetch water; in the drought season of 3–5 months, the required time would be longer. Based on the average of 30 min, each household, now being served with piped water, can save 183 labour-hour annually. The labour released from “fetching water” could be redirected to education of children, cultivation, rearing and other employment. In general, the chore of “fetching water” is mostly carried out by women and children, after the implementation of RWS, the burden on women and children could be released.

C Economic Benefits – Household Income Increases:

According to the investigation conducted by Liaoning Province PMO in rural communities served by the 292 RWS systems constructed under World Bank’s Phase 1 RWS Project, the rural business enterprises and household industries (support by rural water supply) increased by 76.3%.





According to the investigation by Inner Mongolia's PMO for World Bank's Phase 2 RWS project in 280 households in Xiju Village in Tumotezuqi, after the implementation of the RWS system, each household commenced growing vegetables, grape and apple trees, the whole village had produced additional income of RMB 94,000 (\$11380) in a year, the average income per household increased by RMB335 (\$40). For RWS project at Wujiuyingzi Village in Tongliao City, after the implementation of the RWS system, households commenced rearing pigs, the average annual income per household increased by RMB1000 (\$121). Households in the village have also grown vegetables generating an annual income of RMB2000 (\$242).

According to the investigation by Linxia County PMO in Gansu Province for World Bank's Phase 2 RWS project, after the implementation of the project, the development on agriculture, forestry, and cattle rearing industries have been strengthened. According to the statistics from Statistic Bureau and Finance Bureau, the no of farms employing plastic scaffolding for vegetable growing increased to 597, generating annual production of RMB 6 million (\$0.73 million). In 2002, the villager annual per capita income in project area has reached RMB1486.11 (\$180) which is 2.39 times of the value before the RWS project in 1993. The economic development triggers higher water consumption, and consequently high water tariff revenue with pronounced benefits on the healthy operation and sustainability of the RWS systems.

D Overall Benefits:

According to the investigation by Suzhou City in Jiangsu Province, RWS projects would bring the comprehensive benefit to the entire rural community:

- Lower Intestinal tract infectious disease incidence rate
- Improve the household hygienic environment
- Enhance and increase the economic benefits
- Provide and promote the development of the market economy
- Promote the reconstruction tasks of rural sanitary latrine





Appendix 5 — Monitoring Parameters for RWSS Sector





Appendix 5 – Monitoring Parameters for RWSS Sector

I. Monitoring:

1. Methods of Monitoring: Baseline Survey, Subsequent Surveys

2. Monitoring Systems for RWSS Sector: On the basis of the previous experience in monitoring of project implementation for World Bank RWSS projects, the following parameters are relevant to this TA Study. Indicators include Water supply indicators, Indicators for sanitary latrine construction & Indicators for sanitation and health education:

A. Water supply indicators:

| Indicator | <u>Use</u> | <u>Formula</u> |
|--|--|--|
| <p>1. Quantity of water supply Indicators</p> | <p>A1 A2 A3 to measure the amount of water used per person; a measurement over time will also reflect beneficiaries' hygiene behavior and quality of life</p> <p>A4 to monitor a water plant's degree of meeting its full capacity</p> | <p>A1. Per-person water consumption 1:</p> $A1 = \frac{\text{Water outputs (ton) of a water plant in a month} \times 1000}{\text{Days of the month} \times \text{Number of beneficiaries covered}} \text{ (L/day)}$ <p>A2. Per-person water consumption 2:</p> $A2 = \frac{\text{Meter-based village water supply(ton) in a month} \times 1000}{\text{Days of the month} \times \text{number of villagers connected}} \text{ (L/day)}$ <p>A3. Per-person water consumption 3:</p> $A3 = \frac{\text{Meter-based household water supply(ton)in a month} \times 1000}{\text{Days of the month} \times \text{Number of household members}} \text{ (L/day)}$ <p>A4. Water supply index:</p> $A4 = \frac{\text{Water outputs (ton) of a water plant in a month}}{\text{Days of the month} \times \text{Designed daily top water supply}}$ |
| <p>2. Water tariff Indicators</p> | <p>To measure water plant's operation & management status, its ability to re-pay its debt and overall social benefits</p> | <p>A5. Tariff index 1:</p> $A.5 = \frac{\text{Actual water tariff (RMB/ton)}}{\text{Logical water tariff designed (RMB/ton)}}$ <p>A6. Tariff index 2:</p> $A6 = \frac{\text{Actual unit cost of water tariff (RMB/ton)}}{\text{Logical water tariff balanced (RMB/ton)}}$ |





| Indicator | <u>Use</u> | <u>Formula</u> |
|---|---|--|
| 3. Indicators related to Domestic Uses | To indicate the proportions of domestic uses from tariff payment computations | <p>A7. Consumption by domestic users (computed by tariff payment):</p> <p>Total tariff payment from domestic users (RMB) $A7 = \frac{\text{Total tariff payment from domestic users (RMB)}}{\text{Logical water tariff balanced (RMB/ton)}} \text{ (ton)}$</p> <p>A8. Proportion of domestic use:</p> <p>$A8 = \frac{A7 \text{ (ton)}}{\text{Total Output from Water Plant (ton)}} \times 100\%$</p> <p>A9. Per-person consumption (computed by tariff payment):</p> <p>$A9 = \frac{A7 \text{ (ton)} \times 1000}{\text{No. days in month} \times \text{No. of People Served.}}$</p> |
| 4. Reliability Indicator | To measure the continuous availability of water supply | <p>A10. Continuity rate of water supply:</p> <p>$A10 = \frac{\text{Cumulated days with continued water supply in a year}}{365} \times 100\%$</p> |
| 5. Beneficiaries coverage rate | To measure the percentage of people benefited by the water systems | <p>A11. Beneficiaries coverage rate:</p> <p>$A11 = \frac{\text{Persons Actually Covered}}{\text{Persons Proposed to Cover}} \times 100\%$</p> |
| 6. Quality of water quality Indicator | To measure the water quality compliance rate | <p>A12. Compliance rate of water quality:</p> <p>$A12 = \frac{\text{Number of samples meeting WQ criteria}}{\text{Total number of samples tested}} \times 100\%$</p> |
| 7. Household survey indicator | To measure the overall satisfaction of households | <p>A13. Household Satisfaction Index:</p> <p>$A13 = \frac{\text{Average score of household survey}}{\text{Maximum score of the questionnaire}} \times 100\%$</p> |





B. Indicators for sanitary latrine construction & Indicators for sanitation and health education

| Indicator | Use | Formula |
|---|--|--|
| 1. Indicators for sanitary latrine construction | To measure the percentage of hygienic latrines built among all project households | B1. Prevalence of sanitary latrines: $B1 = \frac{\text{Number of sanitary latrines}}{\text{Total number of household surveyed}} \times 100\%$ |
| 2. Behaviour Indicators | To evaluate the effectiveness of health education | B2. Prevalence of clean kitchen: $B2 = \frac{\text{No of household meeting the criteria to be a clean kitchen}}{\text{Total number of household observed}} \times 100\%$ B3. Proportion of people with habits of washing hands before meals: $B3 = \frac{\text{Number of people washing hands before meals}}{\text{Total number of people surveyed}} \times 100\%$ |
| 3. Proportion of primary school students meeting the health knowledge standard | To evaluate impact of health education intervention of target group | B4. Percentage of grade 3 and above students reaching the standard: $B4 = \frac{\text{Number of students met the standard}}{\text{Total number of students surveyed}} \times 100\%$ |
| 4. Proportion of housewives met the health knowledge standard | To evaluate impact of health education intervention of target group | B5. Percentage of housewives met the standard: $B5 = \frac{\text{Number of housewives meeting the standard}}{\text{Total number of housewives surveyed}} \times 100\%$ |
| 5. Indicators for health status | To evaluate the effectiveness of project in reducing prevalence of waterborne infectious disease | B6. Incidence of waterborne infectious disease: $B6 = \frac{\text{New case from project counties (villages) each year}}{\text{Total population of the project counties (villages)}} \times 100\%$ |





**Appendix 6-1 — Need Assessment of Rural Water Supply, Sanitation and Health
Education in Western Region (2006 – 2010) — Sample of Questionnaire**





**Appendix 6-2 — Need Assessment of Rural Water Supply, Sanitation and Health
Education in Western Region (2006 – 2010) — Summary of Collected Data**





Appendix 6-3 — Need Assessment of Rural Water Supply, Sanitation and Health Education in Western Region (2006 – 2010) — Regions Willing to Accept Loan from International and National Development Banks





Appendix 6-4 — Proposals for Research and Development (R&D) Topics





Appendix 6-4 — Proposals for Research and Development (R&D) Topics

Project List for R&D Technical Assistance Consultancy

- (i) Comprehensive Study on Sustainable RWS - In rural areas attaining a certain level of economic development, there is a need to investigate “Sustainable Rural Water Supply in the context of “3-Components” of water supply, water conservation and wastewater disposal. The investigation consists of scientific planning for the reasonable scale of RWS facilities, water conservation at rural household level, water reuse at rural communities level and proper facilities for rural wastewater collection, treatment and disposal.

| | |
|---------------|--|
| Background | <p>Following good spells of economic development, some rural communities enjoying high income have started to move up in water consumption. The prevailing concept of “solving RWS problems by providing piped supply to households” shows signs of stress. Merely supplying drinking water with no provisions for water conservation and wastewater disposal results in severe water resources consumption and widespread environmental pollution of surface water bodies and groundwater, both factors undermining sustainability.</p> <p>Such phenomena are widespread during the process social and economic development of rural communities. As the PRC is growing at such a vast pace, it is imperative that a comprehensive study is organized and conducted to investigate the issues and recommend a new policy in dealing with “Sustainable RWS” in the context of “3-Components” of water supply. It is appropriate to commence relevant investigations, planning, pilot testing and field trials to support the new policy of integrated development of rural water supply, water conservation and domestic wastewater collection/treatment/disposal. This policy will help to resolve crises already taking shape in the Eastern Region, and to address issues and prevent situations in the Central and Western Regions respectively.</p> |
| Objective | Investigate and research the shortage of water resources related to high water consumption. Conduct a feasibility study on water conservation measures and technologies and the way to handling large quantities domestic wastewater. Mitigate the impact and provide new concepts and models for RWSS. |
| Methodology | Review existing documents, field investigation and surveys. Identify the current situation of the issue, especially on the feasibility and operability of the mitigation measures. Understand the key issue, measures and technologies thoroughly via investigations and field visits to local government departments, rural communities, villages and related sectors. Provide investigation report including sector profile, government policies, rural development studies, water usage related studies, possible solutions and feasibility study etc. |
| Duration | 6 months |
| Cost Estimate | \$100,000 (Domestic Expert: \$60,000 for 12 man-months, and International Expert: \$40,000 for 2 man-months,) |





(ii) Study on RWS Operation and Management Models - Ownership, Public Policy, Laws and Regulations, and Models

| | |
|---------------|---|
| Background | <p>According to the Annual Report on RWS issued by NPHCC, by end of 2004, the total number of RWS systems in the PRC is 640,000. At present, these vast number of RWS systems exhibit the following key characteristics:</p> <ul style="list-style-type: none"> (i) Scale of RWS systems too small: majority of the RWS are small facilities with the daily treatment capacities in the order of 10's or 100's m³/d; only few exceed 1000 m³/d. (ii) Ownership unclear: Except for RWS systems owned by single proprietor, those owned by private capital through shareholding or village-scale RWS systems owned villages, the ownership of most RWS systems is not well defined. (iii) Numerous Formats in Operation and Management: Majority of the RWS systems are managed by township governments or village committees, the formats of management include direct responsibility of water resources department/bureau, direct appointment of individual personnel, by management set-up via shareholding, competitive management contract (out-sourcing), etc. (iv) Crude Operational Management: Except for some large scale systems, the management and operation of most RWS systems are "crude". <p>Along with the PRC's national reform and open policy in social and economic development, sustainability is now an essential requirement in the development in RWSS Sector. A comprehensive review of the existing crude and unregulated formats of operation and management of RWS systems is needed. A scientific and rational approach to identify appropriate models of operation and management of RWS systems would be beneficial for the development of the RWSS Sector.</p> |
| Objective | <p>By means of a comprehensive review and investigation of the existing formats of operation and management of RWS systems, identify, analyze, improve and recommend feasible and practical models of operation and management of RWS systems with due regards to various forms of ownership, relevant laws and regulations and government policies with a view of implementation in ADB funded RWSS projects.</p> |
| Methodology | <p>Select adequate quantities of different operational management modes and different scales of RWS systems in Eastern, Central and Western Regions and carry out the investigation.</p> |
| Duration | <p>6 months</p> |
| Cost Estimate | <p>\$80,000 (Domestic Expert: \$50,000 for 10 man-month and International Expert: \$30,000 for 1.5 man-month)</p> |





(iii) Development of Project Monitoring Systems - including development of Monitoring Parameters Systems and assessment methodology

| | |
|---------------|---|
| Background | Monitoring and assessment of the progress and status of RWSS projects during various stages of project implementation are very important. The information and data collected should be relevant and effective. Therefore the proper design and correct selection of relevant parameters are essential for an effective, practical and implementable Project Monitoring System. Therefore, it is necessary to develop a comprehensive Monitoring Parameters System and the associated Assessment Methodology and Procedures to enable the monitoring and assessment of the progress and status of RWSS projects during various stages of project implementation from inception to post project evaluation. |
| Objective | Develop a comprehensive Monitoring Parameters System and the corresponding Assessment Methodology and Procedures to enable the monitoring and assessment of the progress and status of RWSS projects during various stages of project implementation from inception to post project evaluation. |
| Methodology | Conduct literature search and data gathering on monitoring parameters relevant to RWSS Sector, economic development, disease monitoring, financial management and institutional capability measurements. Analyze and evaluate the effectiveness, applicability of the monitoring parameters. Pilot test in the fields. Recommend Monitoring Parameters System and the associated Assessment Methodology and Procedures. Implement the system in ADB funded RWSS projects. |
| Duration | 6 months |
| Cost Estimate | \$100,000 (Domestic Expert: \$50,000 for 10 man-month, and International Expert: \$50,000 for 2.5 man-month) |





- (iv) Development of Remote/Distant Information Management System – Build and extend the existing Information Technology (IT) infrastructure and communication network platforms to carry out remote/distant management of project information for RWSS Sector projects undertaken by various PRC Government ministries and department and by various International Donor Agencies for the purpose of information dissemination and knowledge sharing.

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| Background | Following the widespread use of computers and internet networks, it is recommended to establish special internet-based network platform to manage the project information exchange and day-to-day project workflow for RWSS Sector projects. The platform will facilitate effective information management for RWSS projects covering project status reporting, technical guidance, work practice discussions, monitoring data dissemination, etc. for various PRC Government ministries and department and by various International Donor Agencies for the purpose of information dissemination and knowledge sharing. |
| Objective | The system can provide an effective tool for fast and convenient information exchange, progress monitoring and effective communication channel for RWSS project management teams for domestic and international agencies. |
| Methodology | Organize representatives from RWSS project management teams in various domestic and international agencies to determine the needs for information to be communicated, the concerns of common interests and the knowledge to be shared in the Internet-based Website. Provide input to access control, layout design, data format and database design. IT specialists will construct the Web-Page Arrange for Web-page hosting and long-term service and maintenance contracts. Collaborate with various user agencies to upload data. Upon satisfactory testing, go live and publicize the web page for public browsing. |
| Duration | 6 months |
| Cost Estimate | \$80,000 (Domestic Expert: 10 man-month, \$50,000 and International Expert: 1.5 man-month, \$30,000) |

