



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.





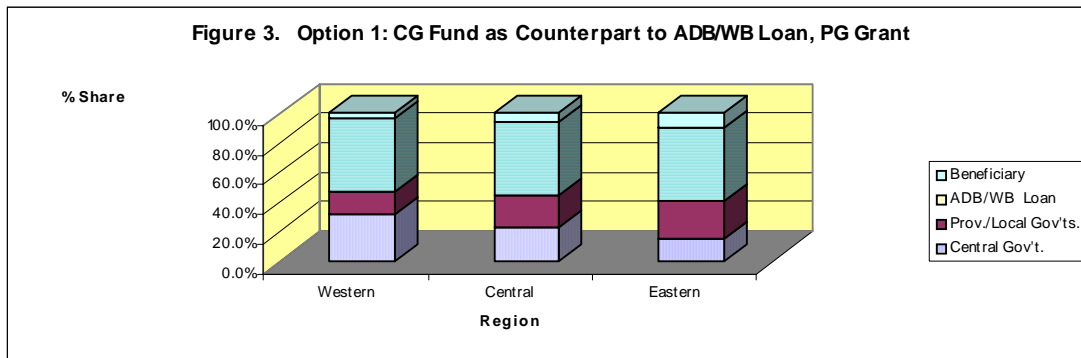
possibly apply in the West, Central and Eastern provinces where borrowing capacity exists.

- 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%



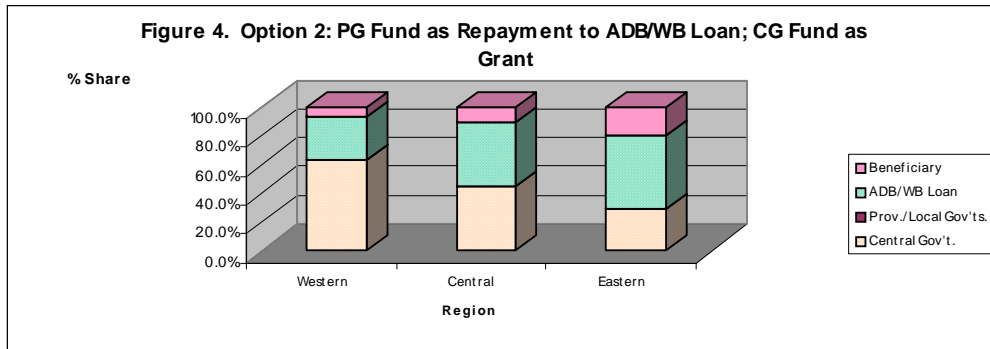
Option 2. It is proposed that 100% of Central Government funds which are intended for the regions for RWSS to be used as counterpart fund to ADB/WB loan while PG funds to be used loan repayment (not for capital cost contribution). ADB/WB loan will provide the balance of project cost in increasing proportion, 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%

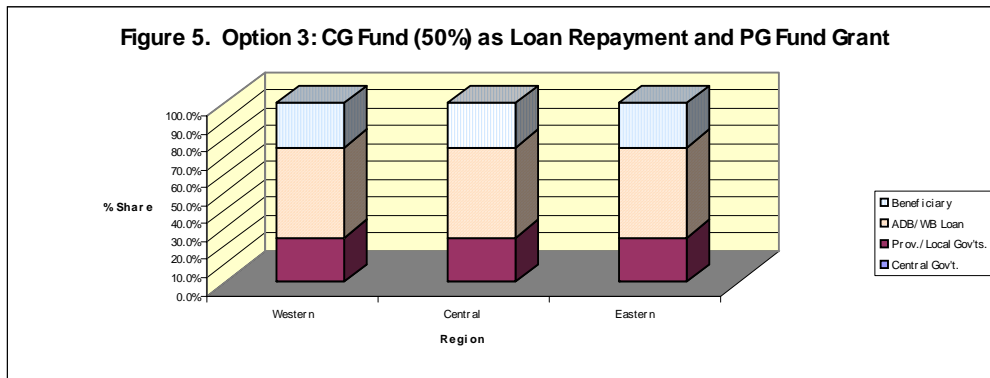


Option 3. It is proposed that Central Government funds which are intended for the regions for RWSS to be used as loan repayment to ADB/WB loan while PG funds to be used as counterpart fund part or 25% of the capital cost contribution. ADB/WB loan will provide 50% of project capital cost. Beneficiaries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

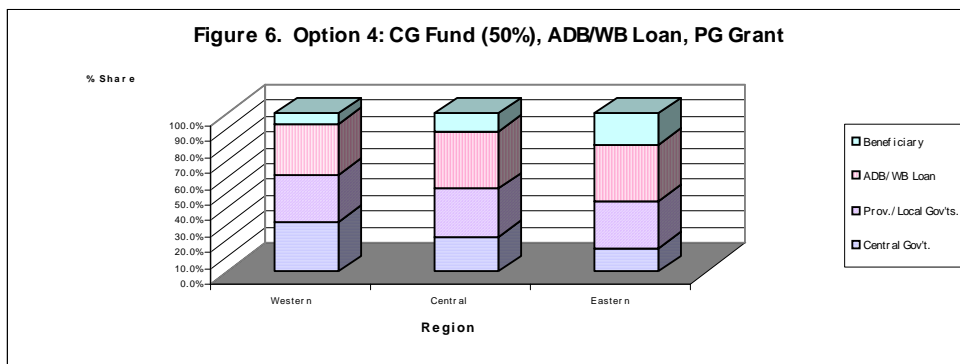




Option 4. It is proposed that 50% of Central Government funds which are intended for the regions for RWSS to be used as counterpart fund to ADB/WB loan while PG funds to be used as grant. ADB/WB loan will provide 50% of CG share in the NRWS model for capital cost. Beneficiaries will provide the balance 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

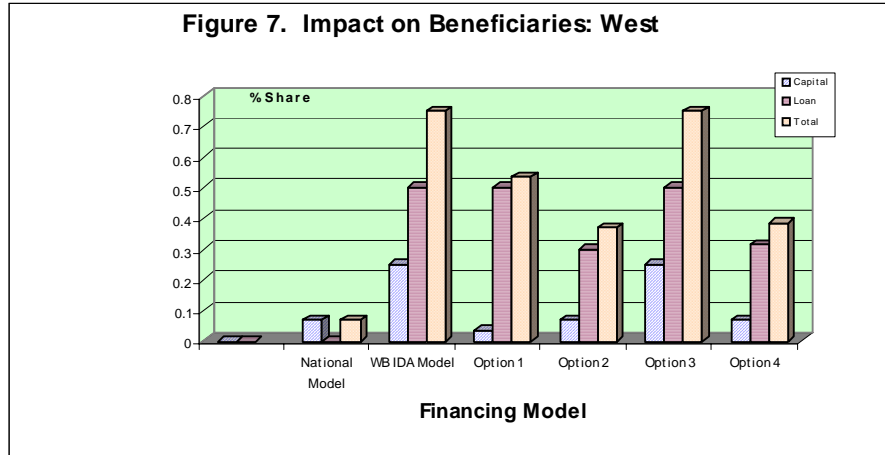
Financing Models	Beneficiaries – West			Beneficiaries – Central			Beneficiaries - East		
	Capital Cost Sharing	Loan Re-payment	Total	Capital Cost Sharing	Loan Re-payment	Total	Capital Cost Sharing	Loan Re-payment	Total
National Model	7%	0%	7%	11%	0%	11%	20%	0%	20%
WB IDA Model	25%	50%	75%	25%	50%	75%	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%

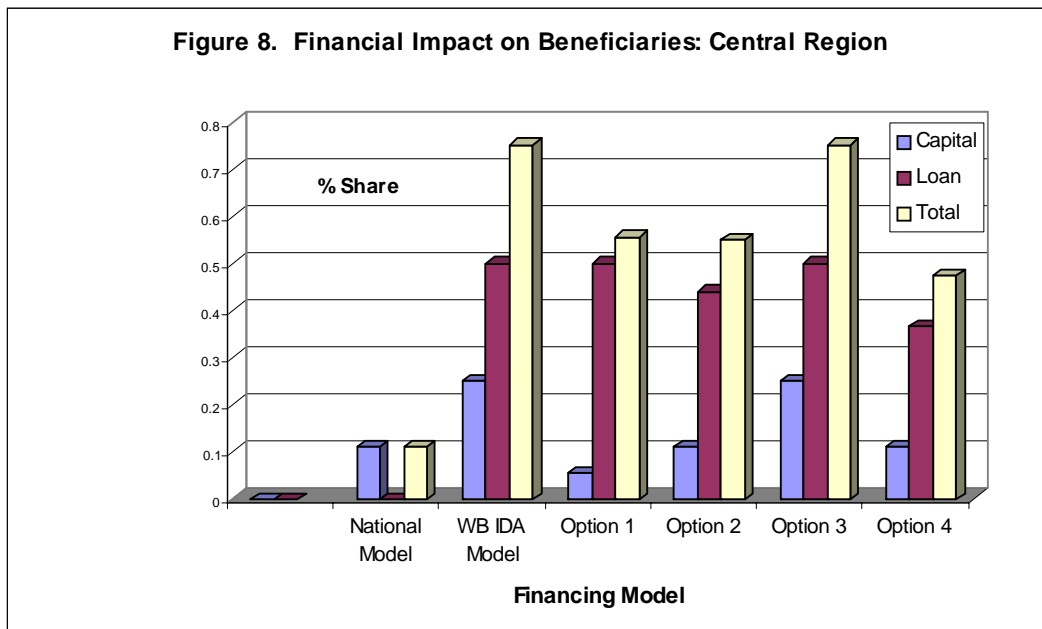




In the Central Region, Option 4 allows a 48% beneficiary share in the total project cost which is combined 11% share in capital cost and 36.5% in loan repayment. Other financing options have higher beneficiary contribution: 55% for Option 2, 56% for Option 1 and the highest is 75% for Option 3. Refer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

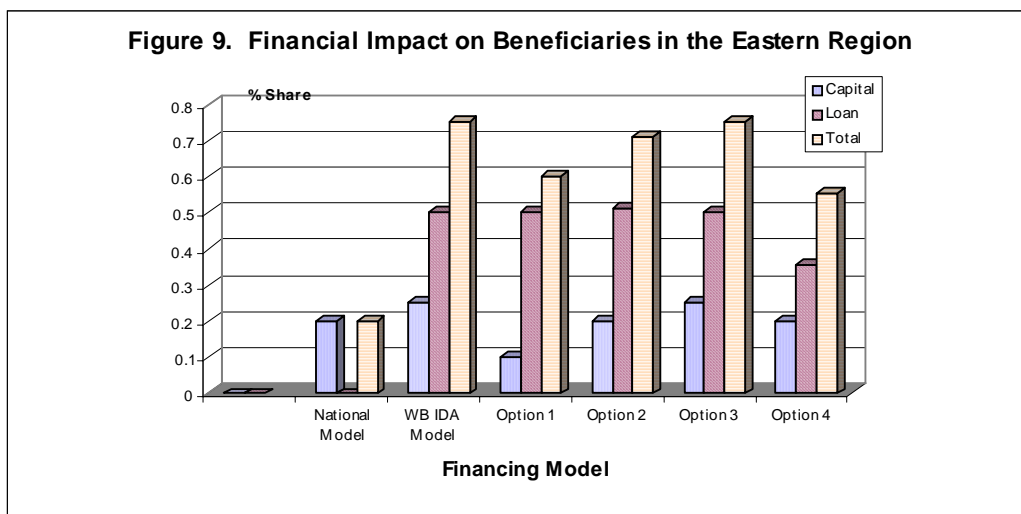




In the Eastern Region, Option 4 allows a 56% beneficiary share in the total project cost which is combined 20% share in capital cost and 35.5% in loan repayment. Other financing options have higher beneficiary contribution: 60% for Option 1, 71% for Option 2 and the highest is 75% for Option 3. Refer 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)	Tumotezuoquei	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	Use	Formula
1. Quantity of water supply Indicators	<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> $A4 = \frac{\text{Water outputs (ton) of a water plant in a month}}{\text{Days of the month} \times \text{Designed daily top water supply}}$
2. Water tariff Indicators	To measure water plant's operation & management status, its ability to re-pay its debt and overall social benefits	<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.

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)

