END-OF-CYCLE EVALUATION REPORT

UNICEF–GOVERNMENT OF CHINA
CHILD'S ENVIRONMENT AND SANITATION (CES) PROGRAMME
(2001–2005)

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Executive Summary

This report reflects the end-of-cycle programme evaluation, which assessed the achievements of the Child's Environment and Sanitation (CES) programme, 2001–2005. In particular, the evaluation looked closely at the quality, effectiveness and sustainability of the programme and its contributions toward achieving the national programme of action (NPA) for child development goals and the Government's five-year development plan (2001–2005) targets on sanitation coverage of 40 per cent and 55 per cent and water coverage of 95 per cent and 100 per cent, respectively.

The programme entailed three projects: 1. Rural Environment, Sanitation and Hygiene Education; 2. Safe Drinking Water Supply for Rural Areas; and 3. Water Quality on Arsenic Contamination of Drinking Water.

Project 1 – Rural Environment, Sanitation and Hygiene Education

The project was implemented in two types of project areas, as the following explains. Both projects are considered successful as the main objectives in each were achieved.

(1) Improve the supply of safe water and expand proper sanitation and hygiene habits in project counties

The project covered two counties in each of four provinces: Jilin, Sichuan, Gansu and Qinghai. During the implementation period, project activities expanded from 8 to 78 counties. Jilin and Qinghai provinces reached a sanitation coverage of 58.68 per cent and 58.22 per cent, respectively in 2004, which was higher than the Government's five-year development plan target of 55 per cent. Gansu achieved 47 per cent coverage. Although Sichuan reached only 35.94 per cent coverage in 2004, it was a 9.1 per cent increase over 2000 and represents the installation of 2.4 million new sanitary latrines. This reflects the province's determination to improve its sanitation and environment conditions.

(2) Expansion to six project provinces from the previous programme cycle, 1996–2000

Limited UNICEF funds were provided to six selected provinces (Anhui, Henan, Hunan, Jiangxi, Liaoning and Shanxi at RMB 50,000 (per province per year). The provincial governments organized various meetings and workshops to accelerate the sanitation coverage from the 'sanitation movement' momentum generated during the previous programme cycle. Three of the project provinces (Henan, Hunan and Jiangxi) achieved the Government's five-year development plan target of 55 per cent, while Anhui, Liaoning and Shanxi provinces achieved sanitation coverage above the NPA target of 40 per cent. This is equivalent to 65.7 million new sanitary latrines built in the rural areas over the project period (2001–2004) with government and family investment. It demonstrates that the provincial governments greatly valued the limited UNICEF inputs, which is reflected in their sizable investment, as well as families, to build sanitary latrines. Local investment helped induce behaviour changes among people that lead to a clean environment and ultimately strengthen economic development in rural areas.

Project achievements

UNICEF inputs in this cycle for the Rural Environment, Sanitation and Hygiene Education project was about 13 million RMB (US$1.6 million). The limited UNICEF investment generated a 'snowball' effect of more than ten times investment from the local governments and people in the project counties to cover latrine construction costs.

During this cycle, improved sanitation and hygiene activities focused on rural families, with a small component for school sanitation. The government, in addition, rehabilitated about 40 school latrines. In spite of the limited investment in schools, the intensive health and hygiene education efforts in the classrooms promoted good sanitation and hygiene habits among the school children, particularly for preventing intestinal worm infections and the role that good hygiene plays in breaking the cycle of transmission.

The achievements in the project provinces are attributed to the following key factors:

- The Chinese Government's commitment to increase sanitation coverage with set targets and time frame.
- The central Government and provincial/county governments issuing documents for and guidance on project implementation and allocating sizable funds for the project implementation.
- Leaders at all levels setting up offices at the county and provincial levels for effective project management and monitoring.
- Intensive social mobilizing through the media and house-to-house hygiene/health education by trained project personnel, which created the demand for sanitary latrines.
- Inter-sector collaboration, which enhanced effective motivation through the involvement of school children, women and youth and made possible technical support from relevant agencies for the quality construction of sanitary latrines. For example: connecting latrines to a bio-gas plant for the safe disposal of human excreta and pig manure to generate clean energy for household consumption, thereby saving on the cost of electricity and producing digested sludge as organic fertilizer.
- Making link to the Government's poverty alleviation programme on economic and eco-development of rural areas, such as integrating sanitary latrines as one item of the 'Eco-village Homeland Development – Six–one Scheme' in Sichuan province.
- Training a large number of project personnel on technical, quality control and promotional aspects for large-scale implementing of improved sanitation.
- Gradually and systematically expanding sanitation activities to other counties in the project provinces.

Recommendations for support to the environment, sanitation and hygiene project in the next cycle, 2006–2010

a) Intensive promotion of school sanitation

Increase support, with more allocation of funds to school sanitation, covering more schools in selected project areas with intensive hygiene/health education.

b) Large-scale promotion of rural sanitation

The promotion of rural sanitation should be intensified and continued in selected project areas for the construction of household sanitary latrines. This will help to strengthen children's good sanitation and hygiene habits they learn in school, which can be put into practice at home to create a clean environment, thereby lifting rural people's quality of living and creating further demand for household sanitary latrines, thus ensuring the programme's sustainability.

c) Adaptation of the following approaches for long-term sustainability:

- Forge strong links and integrate sanitation within the Government's poverty alleviation programme, economic development schemes for the western provinces and the provision of rural water supply;
- Collaborate more closely with all relevant departments and agencies on health, education and the Civilization Campaign to strengthen collaborative efforts for improved sanitation and clean environments to prevent the transmission of water/filth-borne diseases and intestinal worm and schistosomiasis infections in the endemic areas;
- Enhance capacity building for project personnel on both the technical and promotional aspects for better quality control in the construction of sanitary latrines and social mobilization;
- Promote and shift the financial investment on the construction of household sanitary latrines from 'government' to 'people'. It is necessary to develop various schemes of subsidizing latrine construction in rural areas, based on people's economic capability so as to generate financial investment from them for improved sanitation; and
- Encourage private sector involvement in marketing the improved sanitary latrines, with quality assurance.

d) Research and development

It is recommended to carry out the applied research studies on the following subjects; the outcomes of these studies would be used as guidance and reference for more effective programme implementation to accelerate sanitation coverage :

i) Develop an effective and appropriate plumbing system for multiple sanitary latrines (more than two latrines) inside rural houses and thus provide for the safe collection and disposal of human waste.

ii) Update the latrine designs for schools and the rural public, with adequate hand-washing facilities and appropriate technical guidance to ensure continuous improvements and quality assurance to meet the government requirements for hygienic, smell-free, safe, convenient, comfortable and eco-effective facilities.

iii) Design an effective bio-gas plant for treating human excreta from schools. The gas generated can be used to heat the water for school children to wash their hands in cold climate areas.

iv) Survey rural inhabitants' willingness to pay/invest in the construction of sanitary latrines inside the house.

v) Develop various cost-effective ways of rural household waste water disposal, as adequately safe water is now gradually being provided to rural households through piped water schemes. Proper recycling and safe use of the waste water from households for irrigation should be one of the key aspects in the study.

vi) Develop cost-effective technologies for the safe disposal of both organic and inorganic rural garbage. The technology developed should maximize the recycling and reusing of the treated garbage.

Project 2 – Safe Water Supply for Rural Areas

The evaluation team found that the project objectives and targets were achieved through effective implementation, as follows:

a) With UNICEF support, the central Government developed and issued, among others, the following important documents:
   - 'Strategy for Rural Safe Water Supply in China' – The strategy provides guidance for supplying rural water over the next 20 years (up to 2020) and recommends five types of appropriate technology, dependent upon the different stages of local economic development, targets, management, investment, operation and maintenance of the water supply scheme and the water tariffs, and
   - 'Framework for Planning of Rural Safe Water Supply in the Government's 11th Five-Year Plan, 2006–2010.'

b) The central Government issued documents and guidelines for the provision of arsenic- and fluoride-safe drinking water to the affected rural population by 2010.

c) The limited UNICEF financial inputs of 1.86 million RMB (US$232,910) stimulated Government investment of 18.3 billion RMB (US$2.28 billion) by end 2004 for the construction of piped-supply schemes that have provided safe water to a total of 56.2 million rural people at a cost of 325 RMB (US$40.60) per person.

d) Leaders at all levels now regard providing safe water to rural inhabitants a very top priority.

e) Large numbers of project personnel, including 28.5 per cent who are women, received training on technical aspects and participatory methods for involving users' participation in the management, including users-pay-for-the-water schemes. The women now manage three village water supply schemes.

f) The following recommendations would help further strengthen the achievements in the supplying of safe drinking water to ALL rural people in China:
   - Scale up the application of the participatory method by intensifying the training of project personnel as resource trainers to further prepare community members for self-managing a safe-water supply scheme.
   - Conduct intensive social mobilization and health education campaigns on the harmful effects of consuming water with high concentrations of arsenic and fluoride, in particular to children and women, to convince users to pay for the piped safe water rather than continue to drink contaminated water from their wells.
   - Establish a rural water-quality surveillance network.

- Research and development should be conducted in two primary areas; the outcomes would benefit people in arsenic- and fluoride-affected areas and rural schools in terms of being cost-effective and sustainable:
  i) Develop cost-effective and appropriate treatment technologies for removing arsenic and fluoride concentrations in drinking water sources. The technologies developed should be simple and easy to operate and maintain; most importantly, they need to be suitable for use in very cold climate conditions. Also the technologies need to include safe disposal of toxic arsenic-rich sludge generated from treating contaminated water.
  ii) Develop various designs of supply systems for schools, based on the student population, climate conditions and types of sanitary latrines (water flush, dry composting, urine separation and bio-gas plant), as they need to be appropriately matched to ensure sustainable use and maintenance and to provide hand-washing facilities.

Project 3 – Water Quality on Arsenic Contamination of Drinking Water

The project aimed to stimulate/motivate various levels of government to take action for the national survey of arsenic concentration in water wells in at-risk and potentially at-risk areas to determine/assess the magnitude of the contamination in drinking water and to develop appropriate solutions. The specific objectives were:

- To test the arsenic contaminated wells in the selected arsenicosis-endemic areas in Shanxi and Inner Mongolia and map the arsenic-contaminated wells and
- To develop a practical sampling method for cost-effective detecting of arsenic contamination in wells in at-risk and potentially at-risk areas.

Project achievements

- A cost-effective sampling method for detecting arsenic contamination in wells in at-risk and potentially at-risk areas was developed and applied in the project areas.
- Some highly arsenic-contaminated wells in certain arsenicosis-endemic areas were identified; the Government allocated financial support for constructing an arsenic-safe piped water supply to the affected villages during the project period.
- An accurate and simple field test kit for checking arsenic was developed and is in the process of being manufactured for wider use in the arsenic-affected areas in China.
- The project stimulated the Government into taking action to test for arsenic in wells in at-risk and potentially at-risk areas nationally in 2004. The Government issued documents and guidelines for providing arsenic-safe water to all people in the affected villages.

The evaluation of Project 3 is presented in a separate report.

Contents

References

NPHCCO, Ministry of Health and UNICEF Beijing (2004) 'China Rural Sanitary Latrine Technology Guideline'

Project 2 – Rural Safe Water Supply for Rural Areas

Part I Introduction

The 2001–2005 UNICEF-assisted Child's Environment and Sanitation (CES) programme in China has just finished. The end-of-cycle programme evaluation aimed to assess the achievements of the objectives and goals after five years of implementation. The primary objective was to evaluate the quality, effectiveness and sustainability of the programme and its contribution to government policies and strategies for improving rural environment and sanitation and providing safe water for rural inhabitants. The outcomes will guide the government programme as well as the UNICEF-assisted CES programme in the next cycle, 2006–2010, on improving sanitation, hygiene and safe drinking water in rural areas.

Background

Having adopted the World Summit for Children Declaration on 'Survival, Protection and Development of Children', the Chinese Government developed by February 1992 the 'Chinese National Programme of Action for Child Development in the 1990s (NPA) to promote the healthy growth and development of all Chinese children. The NPA also was designed to implement the World Summit Declaration. The NPA goals were set to provide coverage on sanitation at 40 per cent and water supply at 95 per cent of the population in poor, water-scarce areas by 2000. The 10th five-year Government Development Plan (2001–2005) targeted sanitation coverage at 55 per cent and providing safe water to all people, including 26 million who live in poor and remote rural areas.

The Chinese Government also adopted specific targets from the Millennium Development Goals (MDGs): to decrease by half, by 2015, the proportion of people without sustainable access to basic sanitation and safe water supply.

The UNICEF-assisted water supply programme, initiated in 1985, linked to the then UNICEF-supported Basic Services Project and was the first water supply project in Lunan county, Yunnan province. It later was extended to five provinces (1990–1993). They were relatively expensive piped-water schemes with little attention on improved sanitation or hygiene education. The subsequent UNICEF-supported Bridge Programme (1994–1995) was specifically designed for integrated water, sanitation and hygiene improvement; it utilized low-cost appropriate technologies for rural water supply and sanitation, coupled with hygiene promotion.

The UNICEF-assisted Water Supply and Environmental Sanitation (WES) programme in the 1996–2000 cycle adopted the '3-in-1' approach of integrating water supply, improved sanitation and hygiene education aimed at policy and strategy development for achieving NPA goals. With limited UNICEF financial support, the selected project counties in eight provinces (Anhui, Gansu, Hebei, Heman, Shaanxi, Shanxi, Xingjing and Yunnan) achieved the NPA goal of 40 per cent sanitation coverage by 2000. The coverage of rural water supply in the then-project counties in six provinces (Gansu, Heibei, Shanxi, Shaanxi, Xinjing and Yunnan) reached the NPA target of 95 per cent.

Child's Environment and Sanitation (CES) programme, 2001–2005

The current UNICEF-supported CES programme aims at increasing public and private support for the well-being and healthy development of all Chinese children. The main objectives are to increase awareness on the importance of a safe and healthy environment and support improved sanitation in homes and communities, including resource mobilization. The specific programme objectives are i) to increase the demand for improved sanitation and better hygiene and ii) to motivate provincial and county governments to increase their investment in providing safe water for rural areas.

As the following explains, the programme consisted of three projects: 1. Rural Environment, Sanitation and Hygiene Education; 2. Safe Water Supply for Rural Areas; and 3. Water Quality on Arsenic Contamination of Drinking Water.

Project 1 – Rural Environment, Sanitation and Hygiene Education

The project aimed to motivate government investment in creating a safe and healthy environment and enhancing public awareness and knowledge on how improved sanitation and hygiene as well as a clean environment impacts child survival, growth and development. The specific objectives of the project were:

- To increase public and private support for creating a safe and healthy environment through improved sanitation and hygiene;
- To increase people's awareness and knowledge on emerging environmental threats to children's health;
- To support family improvements in sanitation and hygiene; and
- To achieve the Government's five-year development plan sanitation target of 55 per cent by 2005.

Project 2 – Safe Water Supply for Rural Areas

The project aimed to stimulate local governments' investment in the provision of safe drinking water for all people in rural China. The specific objectives were:

- To increase safe water supply coverage in the project areas;
- To enhance people's knowledge on the importance of consuming safe water; and
- To introduce to communities the participatory methods of 'users pay' and 'community self-management' regarding safe water provided to them.

Project 3– Water Quality on Arsenic Contamination of Drinking Water

The project aimed to stimulate/motivate various levels of government to take action for the national survey of arsenic concentration in water wells in at-risk and potentially at-risk areas to determine/assess the magnitude of the contamination in drinking water and to develop appropriate solutions. The specific objectives were:

- To test the arsenic contaminated wells in the selected arsenicosis-endemic areas in Shanxi and Inner Mongolia and map the arsenic-contaminated wells and
- To develop a practical sampling method for the cost-effective detecting of arsenic contamination in wells in at-risk and potentially at-risk areas.

The evaluation of Project 3 is presented in a separate report.

Government policies to promote improved sanitation and provide safe water

Evolution of government policies to improve sanitation

In 1996 the central Government and State Council issued documents on 'Health Reforms and Development' and 'Strengthening Rural Sanitation Improvement'. The documents emphasized the need for safe water, sanitary latrines and good hygiene as the basis for improved sanitation and to prevent and reduce the spread of infectious diseases.

Since 2000, the Government has pushed for improvements in rural sanitation through people-centred action. Based on various local situations, the Government set annual increment levels for safe water supply and sanitation coverage. The Ministry of Health, the Central Government Planning and Reform Committee and the Ministry of Finance jointly issued a document called 'The Framework for the Development of Sanitation and Primary Health in Rural China, 2001–2010', which set targets and prioritized investment for improved sanitation and water supply to increase coverage. The document instructed the Ministry of Finance to allocate more funds for improving sanitation and water supply in rural areas.

Local governments in many provinces and counties subsequently issued documents and regulations requiring a sanitary latrine to be included in the construction of any new house. In addition, the Government's poverty alleviation programme on economic development in the poor areas was to integrate improved sanitation requirements, including building and promoting the use of sanitary latrines.

Government policies and commitments on providing safe water to rural areas

In response to the Government's NPA goal of providing water to 95 per cent of the population in the poor and water-scarce areas by 2000, the Ministry of Water Resources issued two important documents in 1996: 'The Ten-Year Programme for Rural Water Supply in China' and 'The Chinese Eight-Seven Poverty Alleviation Programme for Rural Water Supply'. This involved both central and local governments allocating resources and developing policies that encouraged external assistance from international organizations and NGOs in the rural water supply sector.

At the 15th Central Committee of Communist Party of China (CCCPC) in 1997 and the 9th National People's Congress in 1998, both President Jiang Zemin and then-Premier Li Peng stressed priorities to improve the living standards and the environment in urban/rural areas as well as to provide adequate drinking water for human and livestock consumption. Such priorities provided crucial political commitment to implement the '3-in-1' approach of integrating water supply, improved sanitation and hygiene education.

After achieving the NPA water coverage of 95 per cent in 2000, providing safe drinking water to the rural population became the Government's top priority. As the following highlights, high-ranking leaders issued directives and guidance over the years to achieve the coverage targets:

Directives from President Hu Jintao

July 2003: '…Government has to find effective ways to provide fluoride-safe drinking water for all people in the fluoride-endemic areas, no matter how difficult the task may be. People should not drink highly concentrated fluoride water any longer.'

March 2004: 'The provision of safe water for people should be an urgent action. Effective solutions should be found for practical implementation by assessing the problems in depth on a scientific basis. Thus, all Chinese citizens are able to drink safe water.'

March 2005: 'Proper protection of water sources and the provision of safe drinking water for all people are the Government's two top priorities. By adopting an effective surveillance system to monitor the water quality and systematic planning for safe water supply system in cities and rural areas, priority for providing safe water should be given to localities having unsafe water quality, such as highly arsenic and high concentrations of fluoride, saline, magnesium and manganese, which are above the Government's drinking water standards. In addition, the provision of safe drinking water for people living in water-scarce areas should also be a top priority.'

Directive from Premier Wen Jiabao

Report to the Government, 2005: '…the aims of our development efforts are to provide people with safe water for drinking, clean air for healthy life and good living and working environment.'

To effectively implement the high-level directives, relevant ministries and the All-China Women's Federation have taken the following actions:

- The Ministry of Water Resources put its highest priority on accelerating the provision of safe water to rural areas, according to its Minister, Mr. Wang Suchen, during the 2004 conference, 'National Rural Water Supply – Solutions for Providing Safe Water in Rural Areas'.
- The All-China Women's Federation organized a fundraising campaign for a 'Mother Water Reservoirs' project to provide safe drinking water to people living in the water-scarce rural areas in the western region.
- The Central Political and Commercial Committee listed safe water supply for rural areas as one of the important topics for discussion. Mr. Gan Yuping, member of the Central Political and Commercial Committee, proposed that solving the problem of safe water supply to all rural inhabitants should be the paramount topic for discussion in 2005. This was approved by Premier Wen Jaibao and was included as one of the subjects for discussion in the Central Planning and Reform Committee. Premier Wen also requested all concerned agencies to provide practical plans for implementation.
- The CCCPC organized a 'China Environment Protection March' in 2005 with the theme, 'Safe Drinking Water for All in China'.
- The main theme of World Water Day (22 March 2005) was 'Ensuring Safe Drinking Water for Healthy Life'.

In addition, business communities also committed to help provide safe water to rural areas.

Evaluation process and methodology

The evaluation was based on a desk review of reports from project counties and provinces and relevant government documents as well as a field assessment. The evaluation team consisted of one international consultant as team leader and two national consultants per Projects 1 and 2. (*See Appendix 1 for the framework for evaluation and terms of reference for international and national consultants.)*

Desk review and analysis

The desk review included analysing policy papers, end-of-cycle reports from project counties and provinces, programme documents, data collected and financial inputs.

Field assessment

(a) Field visit

Project 1 – Rural Environment, Sanitation and Hygiene Education: The team visited project villages in Chengxi county, Sichuan province, and in Delingha city, Qinghai province, on 21–29 September 2005.

Project 2 – Safe Water Supply for Rural Areas: The team visited several safe-water supply schemes in Damou county and Yeejinfolo county, Inner Mongolia Autonomous Region, on 10–14 October 2005.

(b) Tasks/activities in the field

- Site visits – visiting project sites, households and schools and talking with families members, school headmasters, teachers and students as well as managers of the safe water supply schemes;
- Briefing/discussion in the provincial and county offices; and
- Reviewing additional documents and data.

Limitations of the evaluation

The team made great effort to evaluate the project in depth, but there were some limitations, such as:

- Inability to review project reports prior to the field visits due to their unavailability;
- Limited time for field visits; and
- The late submission of end-of-cycle project reports and relevant documents from the project provinces created enormous pressure on the evaluation team to analyse and digest the information in a very short time. Fortunately, there was no need to translate these reports and documents from Chinese to English, thus saving much time and financial input, as the international consultant (team leader) is fluent in Chinese.

Part II Summary of Findings

Project 1 – Rural Environment, Sanitation and Hygiene Education

The project was implemented in two types of project provinces:

A) Project counties and provinces
The selected counties in the project provinces should be listed as national or provincial poverty counties, based on the Government's policy on developing the western region and convergence with the UNICEF-assisted Local Planning and Action for Children (LPAC). Two poverty counties each in Gansu, Sichuan, Qinghai and Jilin provinces were selected. (*See Appendix 2, Table 1A for the selected project counties and Table 1B for a summary of basic information on the project counties.*)

B) Extended project provinces from the previous WES programme cycle, 1996–2000
Six provinces under the previous WES programme cycle (Anhui, Henam, Hunan, Jiangxi, Liaoning and Shanxi) were given minimal support for activities at the provincial level in terms of advocacy, communication, information sharing and capacity building for continuous strengthening, sustainability and expanding improved sanitation and hygiene awareness.

The findings are reported separately for the two types of project provinces:

A. Project counties and provinces

Subnational policies and strategies

Following through on the Government's policies and commitment to improved sanitation and providing safe water, the project provinces and counties each developed official 'Red Letterhead' documents making the same pledges and providing guidance on programme implementation. For example, a Sichuan provincial document jointly issued by the Provincial Patriotic Health Campaign Committee Office (PPHCCO), Provincial Planning and Reform Committee, the Departments of Agriculture, Water Resources, Finance, Health, Education and Broadcasting, the Office of Poverty Alleviation, Youth Leagues and the All-China Women's Federation issued directives and assigned tasks and responsibilities to various agencies for effective programme implementation to achieve the targets of water supply and sanitation coverage of the 10th five-year Government Development Plan (2001–2005). (*A copy of this document and another one for the prevention of schistosomiasis through improved sanitation are attached as reference. See Appendix 3, Tables 1A and 1B for a complete list of 'Red Letterhead' documents.*)

Government documents on the tasks and responsibilities for implementing the CES programme

Implementing infrastructure and inter-sector collaboration

To help implement the CES project, the National Patriotic Health Campaign Committee Office (NPHCCO) set up project committees at each subnational level to provide guidance to county and provincial governments. These committees consisted of representatives from the provincial PPHCCO, the Departments of Health, Water Resources, Agriculture, Finance, Commerce, Electricity and Energy, the All-China Women's Federation, the Planning and Reform Commission and the Centre for Disease Control (CDC). (*See Appendix 3, Tables 2A and 2B for a description of the tasks and responsibilities of each agency, which illustrates the close inter-sector collaboration in Sichuan province.*)

The respective deputy provincial governors headed the provincial committee to promote improved sanitation and clean environments as well as intensive hygiene education and social mobilizing. The provincial committee supervised the activities of the county committees.

Project convergence and integration

The committees worked closely with the UNICEF-assisted LPAC programme for promoting improved sanitation, with the construction of sanitary latrines as one of the project components. The use of sanitary latrines was also integrated into the same areas where the Department of Water Resources provides safe water and where the Department of Agriculture constructed bio-gas plants for treating human excreta (from the sanitary latrines) and animal/pig manure.

The improved sanitation and hygiene components were successfully integrated into the ongoing 'Eco-Village Homeland Development – Six-One Scheme' in Chengxi county, Sichuan province. Inhabitants in the project county expressed delight that the government had introduced the sanitary latrines and provided technical assistance for building them. The following photos illustrate the 'six-one scheme' in one of the model villages where the CES-improved sanitation and hygiene activities were also implemented.

The 'Eco-Village Homeland Development – Six-One Scheme' consists of a sanitary latrine, bio-gas plant, improved kitchen with chimney, a separate pigsty, a water storage reservoir of 10–15 cubic metres (for irrigating farmland and home garden) and a concrete or stone lining of the lane leading to the farm house.

Home garden & concrete lining of village lane leading to farmhouse

Farmer's orchard

A family's water reservoir and a sanitary latrine

Improved household kitchen, using bio-gas for cooking and piped water

Household bio-gas plant treating human excreta and pig manure

Separate pigsty in farmhouse

The six-one scheme, particularly with the sanitary latrine connecting to the bio-gas plant, has helped transform many farmers' homes and farmlands into beautiful gardens and pear orchards, which attract tourists during the spring when the pear blossoms are in full bloom and in autumn when the pears are harvested, thus bringing

extra income to the farmers. The treated sludge from the bio-gas plant is used as organic fertilizer for the household's garden and orchard.

Project management

A management network was established to incorporate provincial, city, county and township officers as well as relevant departments and agencies to enable the easy flow of information for effective project management. As the following describes, implementation teams were established at the provincial, county and township levels with financial and human resources allocations from provincial, county and township governments to ensure smooth implementation.

(a) CES project implementation teams and offices were set up in the PPHCCO office at the provincial and county levels and were responsible for implementation, management, data collection and filing, etc. Department of Health officials were designated as the provincial and county team leaders. Team members consisted of personnel from the Departments of Health, Finance, Education and Transportation, the All-China Women's Federation, Youth Leagues, radio and television stations, newspapers and other media and the Civilization Campaign.

(b) The county CES health and hygiene education team consisted of health/education personnel responsible for social mobilization and intensive health/hygiene education through the media as well as posters, village bulletin boards and school blackboards and person-to-person communication.

(c) CES project implementation teams also were established in project villages.

The provincial and county team leaders annually reviewed the performance of these teams to ensure that effective implementation had been carried out and to provide additional personnel if they were needed.

Project monitoring and surveillance

The frequent monitoring of the project's progress included quality inspections of the sanitary latrines that were built. Households also were advised on the proper use and management of the latrines.

Constraints encountered during implementation were immediately addressed and solutions provided to ensure quality installation and project management. An office management system was set up for the systematic filing of project data, training materials, social mobilization materials, records of the latrines built in households as well as records on the use and management of vehicles, Xerox machines, computers, etc. that UNICEF had provided.

Advocacy, social mobilization and creating awareness

Wide-scale social mobilization in all project areas was carried out to create awareness on the need for improved sanitation and clean environments. Various participating leaders focused on motivating people to change their sanitation concepts first, then building a sanitary latrine at home. The use of radio, television, newspapers and

blackboard messages were important factors and channels in educating and motivating the rural masses for change.

School blackboard health and hygiene messages

Poster on water/filth-borne disease transmission routes and hygiene messages displayed in schools

CES sanitation and hygiene messages on a village bulletin board

Social mobilization in the project provinces effectively involved leaders, students and community members, as the following section describes. For example, a 'Long March for Health and Hygiene Education' campaign in Qinghai province included hygiene education films, hygiene leaflets and group discussion with people in the remote herding and farming communities. Such activities proved to be appreciated by locals and effective in convincing them to change their unhygienic behaviours. Project officers in Jilin province compiled lessons learned and experiences of their own and from the other project provinces and published them in quarterly newsletters. These newsletters were distributed throughout all provinces in the country as an information exchange toward promoting improved hygiene and sanitary latrines nationwide.

Leaders – Advocacy was widely carried out at provincial and county levels through meetings to create awareness among leaders on the need for improved sanitation and hygiene for a clean environment, thus motivating them to allocate funds and human resources for making improvements and providing safe water to poor communities.

Communities and families – Radio, television and leaflets were used to provide relevant information and knowledge to farmers on the benefits of improved sanitation through the safe disposal of human excreta and animal/pig manure to break the routes of water/filth-borne disease transmission that unsanitary and poor hygiene practices enable.

Students – Youth summer camps were organized annually, starting in 2001, in project counties for students from primary and lower secondary schools. The camps conducted various health-related activities and disseminated messages and knowledge on the importance of changing behaviours for better sanitary and hygiene habits, the construction of household sanitary latrines and the use of bio-gas plants for the safe disposal of human excreta and animal manure to prevent the pollution of the environment and transmission of intestinal worm and schistosomiasis infections. The youth summer camp activities strengthened the school sanitation programme and provided children with an opportunity to inculcate good habits from a young age for the sustainable clean environment in their homes and communities. A 'no smoking' campaign during the summer camp in Gansu province resulted in the 45,000 students

who attended, committing to not smoking as well as campaigning against smoking in their families and communities to create a healthy environment.

The outbreak of severe acute respiratory syndrome (SARS) in 2003 provided a timely good opportunity to promote improved sanitation and hygiene as preventive measures at the national level (*see box*). Provinces took up various tasks on prevention and breaking the routes of SARS transmission by promoting personal hygiene, building and using sanitary latrines and cleaning up the local environment. Radio, television and newspaper mobilization and street/village campaigns were effectively used to raise awareness. The concern for a possible outbreak of SARS in the project provinces and beyond generated an opportunity for intensively promoting improved sanitation and hygiene in many other provinces in China. In Gansu province, for example, the PPHCCO and Provincial Civilization Committee jointly declared a movement to clean up the environment in the entire province for SARS prevention. The movement tremendously improved the cleanliness in many villages and raised people's awareness about the importance of clean living environments and good hygiene habits.

National Hygiene Education Campaign for SARS Prevention

Madame Wu Yi, Vice Premier and assigned Minister of Health, instructed the nation in a drive for good hygiene practices, raising further awareness of good health knowledge nationwide during the SARS outbreak in 2003. In response to Madam Wu's instruction, the National Patriotic Health Campaign Committee and UNICEF jointly launched a nationwide hygiene education campaign for SARS prevention. A total of 2 million bars of medicated soap (procured by UNICEF and donated by Procter & Gamble, Guangzhou Ltd) were provided to Provincial Patriotic Health Campaign Committees (PPHCCO) in 10 affected provinces (Anhui, Guangdong, Hebei, Hunan, Inner Mongolia, Jilin, Liaoning, Nisha, Quanxi, Shanxi and Shaanxi) and two cities (Beijing and Tianjin) for distribution among families. Respective PPHCCOs also undertook the task to popularize infectious disease prevention knowledge and to teach farmers the correct way of washing their hands with soap, considered the most effective way of preventing the spread of SARS among rural inhabitants.

Developing IEC materials and training manuals

Various information, education and communication (IEC) materials, leaflets, posters and simple and key messages on school blackboards and village bulletin boards were developed in all project areas as effective tools for social mobilization as well as personal communication. Training manuals on health and hygiene education were developed for health personnel. Manuals for the construction of various types of sanitary latrines were developed to train technical personnel and masons. Different types of sanitary latrine were recommended to suit local climate conditions, people's habits, lifestyles and the beliefs and cultures of different ethnic groups /tribes in the project areas. (*See Appendix 3, Tables 3A, 3B and 3C for the IEC materials and training manuals developed during the project period*.)

Training manuals developed by project counties

Capacity building

The project provinces emphasized capacity building among project personnel at all levels for effective programme implementation and among journalists for effective social mobilization. The various trainings covered management, sanitary latrine technologies and its quality construction, and control, health and hygiene education knowledge, preventing human and animal waste pollution of water sources and home and community environments, school sanitation, food hygiene and preventing intestinal worm and schistosomiasis infections, as well as social mobilization and communication skills. In addition, the training of project personnel on promoting 'healthy villages' was carried out in line with government guidelines. (*See Appendix 3, Table 4 for a list of all personnel trained*.) The 4,721 trained personnel were actively involved in project implementation and management, social mobilization and development of IEC materials and quality control of newly built sanitary latrines.

Sanitary latrine technologies

The types of sanitary latrine that were promoted in the project areas was based on the suitability of local situations, culture, climate conditions and the application of human sludge as organic fertilizer, as the following describes. The designs of these latrines are illustrated in the 'China Rural Sanitary Latrine Technology Guideline (2004)'.

- Elevated dry composting latrine – the latrine consists of a squatting slab and a waterproof chamber on the ground or halfway underground. The excreta and urine are discharged into the waterproof chamber. Soil is used to cover the excreta after defecation. Cost per unit is about 800 RMB (the waterproof chamber costs 400 RMB and the brick/stone superstructure and roof costs 400 RMB).

Elevated dry composting latrine;
the opening at the back provides for the removal of the
digested sludge for use as organic fertilizer

- Eco-urine-faeces separation latrine – The latrine pan has a separate channel to drain away the urine, which is stored in a separate container. The urine is used as fertilizer after mixing with water at a radio of 1: 5. The excreta drop into a chamber under the latrine pan. Wood ash is used to cover the excreta after defecation. Cost per unit is about 800 RMB (the chamber compartment costs 400 RMB; the brick/stone or plastic superstructure and roof cost 400 RMB).

The squatting pan of urine-separate sanitary
latrine in an open and closed position

- Double urn latrine – The latrine has a water seal pan or non-water seal pan. The sludge is kept in the first urn, with effluent from the first urn overflowing into the second urn. The supernatant in the second urn will then be used as organic fertilizer after being kept for 30 days' detention time. Cost per unit is about 600–700 RMB, depending on the cost of the ready-made fibreglass urns or brick urns (the two urns and underground compartment costs about 300 RMB; the brick/stone or plastic superstructure costs 300–400 RMB).

- Bio-gas plant – The sanitary latrine is connected to the inlet of the bio-gas plant where it enters into the waste-reaction chamber and is mixed with pig's manure to produce bio-gas. The gas is used as fuel for cooking and lighting. The effluent from the reaction chamber and the sludge are used as organic fertilizer. The cost of the bio-gas plant ranges from 2,000–3,500 RMB, depending on the size (number of pigs the household keeps). The cost for connecting the sanitary

latrine outlet to the bio-gas plant is about 200–300 RMB. For the bio-gas plant, the provincial Department of Agriculture provides a subsidy of 1,000 RMB.

A bio-gas plant in a rural household treating human excreta and pig manure that generates clean energy for family cooking and lighting

The cost of the previous types of latrines varied as per the design and materials used. UNICEF provided five bags of cement and one latrine pan for each sanitary latrine built by a willing family. The provincial government provided about 200–300 RMB subsidies and the family contribution ranged from 400 RMB for a double urn or elevated dry compost latrine to more than 1,000 RMB for the bio-gas plant.

School sanitation

Few sanitary latrines were built in selected primary schools in the project counties. The provincial government constructed or rehabilitated more than 40 school sanitary latrines in the project areas.

A rural primary school, Sichuan

A primary school sanitary latrine building (dry composting type)

Dry composting pit openings at the back of the latrine building

Squatting holes as latrine seats with covers

The few school sanitary latrines the evaluation team visited in Chengxi county, Sichuan province, and Delingha city, Qinghai province, were quite satisfactory. Students were maintaining them in rotation, class-wide. Some schools had provided hand-washing facilities for students but no soap. Hygiene education in schools took place during physical training class. The evaluation team talked to the students in class II and III and found they were aware of the need and health benefits of washing hands with soap before eating and after defecation. Most students reported washing their hands with soap at home but not in school due to the lack of facilities or lack of soap. The headmaster reported that soap was provided but was wasted by students who tossed it around.

Suggestions for improvement:

- Provide hand-washing facilities in all project schools, if it is not yet available.
- Provide soap for students to wash their hands – To avoid being misplaced, wrap the soap in a piece of nylon net and hang it on the wall next to the water taps for use.

Basin for washing hands in a rural home;
soap is provided above the basin

Project achievements and impacts

The objectives were achieved during the project period: Sanitation coverage in the eight project counties reached, or nearly reached, the NPA target of 40 per cent (*see Appendix 3, Table 6).*

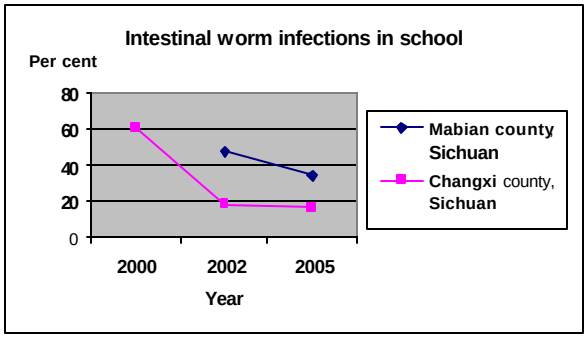
Project benefits

i) Environmental benefits – Through intensive social mobilization and hygiene education, great improvement was made in the cleanliness of households and the village environment in the project areas. The construction of separate pigsties and the use of bio-gas plants to treat the human excreta and pig manure resulted in a reduction of flies and cockroaches indoors. The rehabilitation of household kitchens, in particular the change of traditional cooking stove to the improved stove with chimney to vent the smoke outside the house and/or using bio-gas for cooking, helped to reduce the inhalation of harmful smoke by women and children

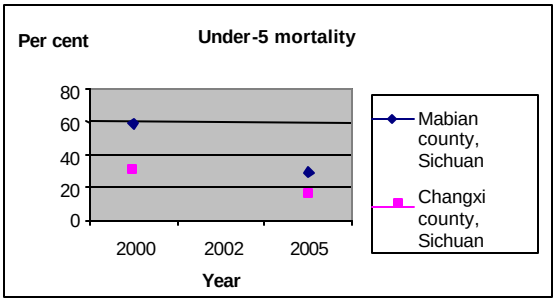
Traditional open fire kitchen in rural household

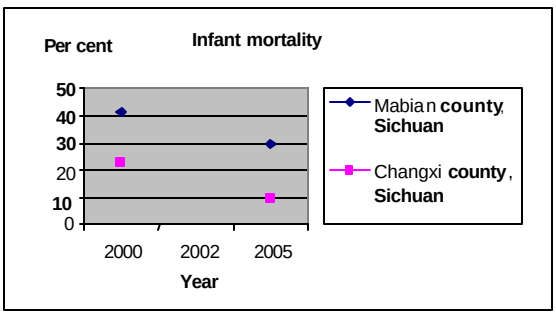
A rural housewife cooking with bio-gas cooker in her improved kitchen

ii) Health benefits – Promoting the construction and use of a sanitary latrine in households resulted in a significant reduction of intestinal worm infections among children in all project areas, as illustrated in the graphs below. In Changxi, Sichuan province, childhood intestinal worm infections decreased from 61 per cent in 2000 to 18.4 per cent in 2002 and to 16.38 per cent in 2004; meanwhile, infant mortality decreased from 22.87 per cent in 2000 to 9.4 per cent in 2004; under-5 mortality dropped from 31.24 per cent in 2000 to 16.2 per cent in 2004. Mid-level malnutrition of children younger than 5 in Changxi county decreased from 19 per cent in 2000 to 1.1 per cent in 2004. In Jilin province, gastrointestinal diseases were reduced from 49.95 per 100,000 in 2000 to 37.15 per 100,000 in early 2004.



Intestinal worm infections among school children





(iii) Social and economic benefits – The improvement of sanitation through the construction and use of sanitary latrines resulted in a savings in medical costs of about 5.24 RMB per person per year. That is equivalent to a savings of about 27.7 RMB million for the 56.8 per cent rural population (of 9 million) who use sanitary latrines. The application of household-produced digested excreta as organic fertilizer, in place of chemical fertilizer, helped people save money and also created a good soil conditioner for farmland. In addition, the use of organic fertilizer significantly increased crop yields. In Sichuan province, the gas generated from the bio-gas plants for lighting and cooking reduced the smoke generated in the kitchen from burning the agricultural wastes and coal and produced a monetary savings of about 900 RMB per year per family in energy costs.

(iv) Behaviour change – Intensive social mobilization and effective communication during the health and hygiene education activities in schools and communities raised awareness on the need for a clean environment and led to tremendous changes in behaviour. For example, about 96 per cent of villagers (including school children) in Sichuan province built and use the sanitary latrines and improved their personal hygiene practices.

A model village farmhouse with a government award of '10 stars', indicating clean house, a sanitary latrine, good manner, good neighbourhood, friendly attitude

A traditional latrine in a rural family

A farmhouse having a sanitary latrine inside the house

Programme expansion

By applying the experiences and lessons learned from the CES programme, the project has gradually expanded activities from two counties in each province in 2001

to a total of 78 counties in four provinces, with a provincial breakdown depending on the financial input from the respective governments. (*See Appendix 3, Table 5 for a list of all counties.*) The counties in the expansion were determined using two criterions:

- Better economic status in the selected counties – households can afford the cost of building a sanitary latrine, and
- Commitment of leaders in the selected counties who would allocate funds and personnel for implementing the programme.

Achieving accelerated sanitation coverage

The CES programme demonstrated a catalytic effect in motivating government and people toward changing behaviours and investing in sanitary latrines, which served to accelerate the achievements in the original two project counties per province. This resulted in reaching, or nearly reaching, the NPA target of 40 per cent (*see Appendix 3, Table 6*). For example, in Gansu province, the CES programme provided the two project counties with a total of 570 tons of cement at 5 bags (50 kg per bag) per family to build a sanitary latrine. The CES investment in the cement was enough to build 2,280 household sanitary latrines. Yet from 2001 to 2004, it motivated more than 25,000 families in the two counties to build a latrine. This demonstrated the 'snow ball' effect from motivating government investment and people's actions in both the project counties and other counties, which resulted in sanitation coverage increasing from 35.94 per cent in 2000 to 47 per cent in 2004.

The net increase in sanitary latrines in the project counties reflects tremendous provincial and county government efforts to accelerate coverage during the project cycle. In Sichuan province, for example, the sanitation coverage increased by 9.1 per cent from 2000 to 2004. This represents 2.4 million new latrines. Every 1 per cent increase in coverage represents more than 25,000 new latrines. However, while certain provinces have achieved a faster rate of increasing construction of sanitary latrines, most project provinces still lack behind the Government's five-year development plan target of 55 per cent (*see Appendix 3, Table 7*).

Financial investment

The limited financial inputs from UNICEF for the CES programme stimulated sizable contributions from the provincial and county governments and families as well (*see Appendix 3, Table 8 for details for the four provinces*). For example, in Gansu province, the UNICEF input of 1.6 million RMB for the two project counties attracted a total investment of 14.9 million RMB from the provincial and country governments and families at a ratio of about 1:10.

Programme sustainability

Through the CES programme, large numbers of personnel were trained in sanitary technology, management and social mobilization with government financial inputs, which has created a strong foundation for further expanding improved sanitation, hygiene and clean environment activities. When combined with government policies on 'Health Education for 900 Million Peasants', 'Healthy Village', 'Poverty Alleviation Programme' and economic development in rural areas, it is possible to

continuously expand the programme to all counties in the project provinces and beyond.

Positive lessons learned

Many positive lessons emerged during the CES programme process that can be of use in expanding activities:

- Establishing project committees and offices at the provincial, city, county, township and village levels with adequate personnel having technical and social mobilization expertise helped ensure effective and quality implementation, management and monitoring of activities (with some exceptions).
- Convincing leaders of the importance of improved sanitation, hygiene and a clean environment resulted in their allocating the necessary funds for the large-scale promotion of sanitation in project counties and provinces.
- Intensive social mobilization among the public created the demand for sanitary latrines and willingness to contribute personal investment in building them and ultimately changed hygiene behaviours.
- Intensive inter-sector collaboration and the collective utilizing of available resources made improving sanitation possible and thorough.
- Establishing model villages, townships and counties in the project provinces successfully demonstrated the key messages, which helped stimulate demand for improvements and commitment to them, particularly in expanding the programme.
- Building a strong surveillance and monitoring system helped ensure quality in implementing the programme, training personnel on the technical aspects of latrine construction and in socially mobilizing public awareness.

Problems and constraints

Various problems and constraints were encountered during the programme implementation, as the following summarizes, and should be rectified for future programming:

- UNICEF financial input to the CES programme cycle, 2001–2005, has significantly been reduced compared to the previous project cycle, 1996–2000, thus limiting its support for more project provinces that would benefit more children in rural China.
- Where leaders were not convinced or not made sufficiently aware of the importance of better sanitation and hygiene, there was a limited allocation of government funds and personnel for implementing the programme.
- Slow submission to UNICEF for reimbursement of funds from project provinces delayed implementing some project activities.
- Technical supervision on latrine construction was inadequate in some cases, thus affecting the quality of construction (some committees did not function properly on quality control/inspection).

- Training was limited to government staff; members of the local All-China Women's Federation and Youth Leagues were not included in any training.

B. Extended project provinces from the previous cycle, 1996–2000

Project actions

Anhui, Henam, Hunan, Jiangxi, Liaoning and Shanxi provinces received limited financial support from UNICEF to continue promoting improved sanitation and hygiene in order to accelerate sanitation coverage beyond the NPA target of 40 per cent. To strengthen the inter-sector collaboration at the provincial level in the extended project, representatives from the Departments of Education, Finance, Agriculture, Environmental Protection, Tourism and Health and the PPHCCO, Youth Leagues, All-China Women's Federation and the Planning and Reform Commission were invited to attend the CES programme planning meetings for discussion and review at the beginning of programme implementation. The lead agency for implementing the CES programme is the Department of Health.

The following activities, meetings and technical workshops were organized in each province to initiate the project:

- A provincial planning meeting for promoting rural sanitation in 2001 – Participants reviewed the progress and constraints of the past five-years of UNICEF support on sanitation and hygiene as well as the achievements and problems encountered in promoting rural sanitation. They then set the future direction for promoting sanitation activities in each project province.

- A workshop for assessing and endorsing sanitary latrine technologies, 2001 – National and provincial sanitation experts and representatives from the private sector producing sanitary wares and latrine parts were invited to attend the workshop. The participants adopted several types of sanitary latrines for wider promotion, based on their suitability for climate conditions, local culture and habits and, in the case of water-seal latrines, the availability of water for flushing.

- Field visits to selected cities and counties, 2001 – A sanitation and health team made the on-site visits to learn technical guidance on appropriate techniques in sanitary latrine construction and quality inspection during and after construction. The team members consisted of chief engineers, health personnel and doctors from the Provincial Centre for Disease Control and provincial agricultural and energy personnel. They learned in detail technical aspects on various types of sanitary latrines, such as three-compartment, dry composting, urine and faeces separation, double urn, bio-gas plant and water flushing. Implementation personnel later expressed appreciation for such practical field visits.

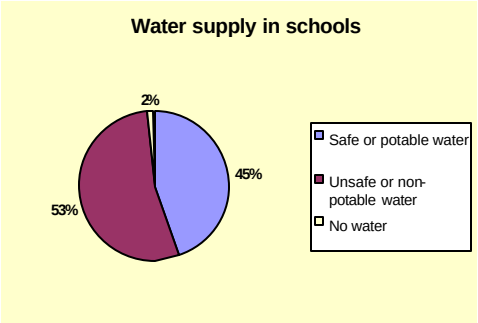
- A provincial meeting on improving the rural water supply and sanitation, 2003 – The Department of Health organized the meeting and invited representatives from relevant agencies in all provincial cities and counties. The participants discussed their experiences in implementing the Government's rural water

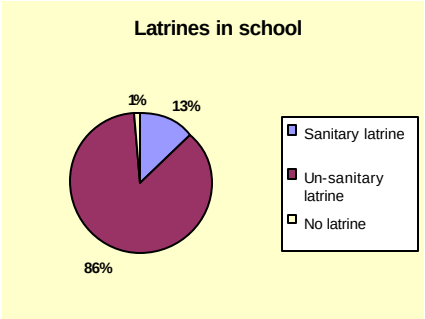
supply and sanitation activities and their relation to the targets and time frames for providing safe water and constructing sanitary latrines.

- A workshop for standardizing the designs of sanitary latrines and their demonstration, 2003 – In response to an NPHCCO call for promoting sanitary latrines in northern China, the workshop was organized to review and discuss various aspects of the household water-saving three-compartment sanitary latrine. Experts explained the technical issues, construction aspects and proper use and maintenance. Included was an organized field visit to a model village where the household three-compartment sanitary latrines have been built and are in use. The participants concluded the workshop with an endorsement of this type of sanitary latrine.

- Training on the household water-saving three-compartment sanitary latrine, 2004 – The workshop aimed to train technical personnel in the construction, quality control and promotion of this type of sanitary latrine, which will be promoted in rural areas where water is available for flushing.

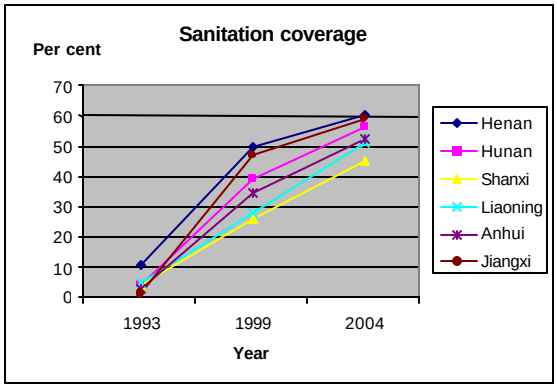
- Survey of water supply and sanitation in rural schools, 2005 – The survey was carried out in the selected cities/counties in the extended project provinces at the request of UNICEF. All project provinces have completed the survey, but the results are being analysed still in some provinces. Most schools surveyed still lack a safe water supply and sanitary latrines. For example, the survey in Liaoning province revealed that only 67 out of 892 schools surveyed have sanitary latrines. The following graphs show the status of water supply and sanitary latrines in rural schools surveyed in Gansu province.

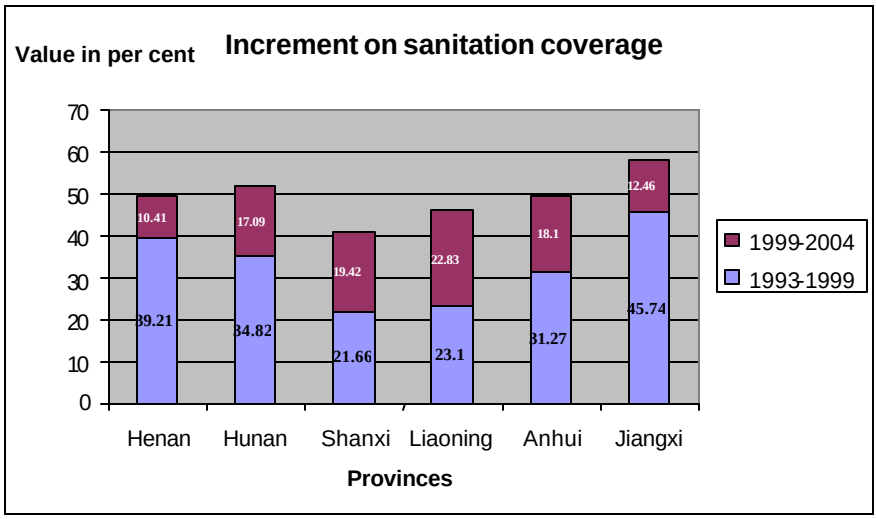




Project achievements

The sanitation coverage in these project provinces gradually has increased through the continuous and intensive promotion of sanitation and hygiene in the previous and current programme cycles. Sanitation coverage in these project provinces increased from an average of 4.72 per cent in 1993 (ranging from 1.3 per cent in Shanxi province to 10.6 per cent in Henan province) to an average of 34.23 per cent in 1999 (ranging from 25.76 per cent in Shanxi to 49.81 per cent in Henan) and to an average of 54 per cent in 2004 (ranging from 45.18 per cent in Shanxi to 60.22 per cent in Henan). The following graphs illustrate the great improvement in sanitation coverage in the six provinces (*see Appendix 3, Table 8 for an illustration of the province-wide sanitation coverage in China*):





Three of the six provinces achieved the 10th five-year development plan target of 55 per cent with an increase of sanitation coverage ranging from 10.41 per cent in Henan to 22.83 per cent in Liaoning from 1999 to 2004. This is equivalent to a total of 65.9 million* new sanitary latrines during the project period, 2001–2004. This has demonstrated that the provincial governments greatly valued UNICEF support (even at a limited amount), which triggered government and family investment in building and using sanitary latrines, thus inducing behaviour changes, creating cleaner environments and strengthening economic investment in rural areas.

* Note: New sanitary latrines built from 1999 to 2004 – Anhui: 12.1 million; Henan: 19.6 million; Hunan: 12.9 million; Jiangxi: 8.5 million; Liaoning: 6.9 million; and Shanxi: 5.9 million.

Project 2 – Safe Water Supply for Rural Areas

The project is implemented in seven provinces: Inner Mongolia, Gansu, Guanxi, Shaanxi, Sichuan, Yunnan and Xinjing.

Project effectiveness

Government commitment and strategies/guidelines developed

The Government announced its commitment to provide safe drinking water for all rural inhabitants and included a framework for implementation in its 11th five-year development plan (2006–2010). Several key documents on government strategies and guidelines were developed during the previous programme cycle to strengthen the implementation and management of rural safe water supply schemes, ensuring its output water quality meets the Government's drinking water standard (*see Appendix 6 for a description of all documents*). The following provides a brief description of several key documents:

(a) 'Strategy for Developing the Rural Safe Water Supply in China' – The strategy provides the following as the basis for scientific implementation of a safe water supply in rural areas:

- Guidance for the rural water supply development in the next 20 years (up to 2020).
- Recommendations for five appropriate types of technology for safe water supply schemes, based on the different stages of local economic development and targets set, management, investment, operation and maintenance of the water supply scheme and the water tariff.

(b) 'Guideline on Strengthening Rural Water Supply Management' – The guideline clearly states the basic objectives and requirements for implementing rural water supply schemes to ensure smooth operation and management for long-term sustainability. These include a management system, scheme operation and

maintenance procedures, water-quality surveillance and monitoring, setting the water tariff, effective collection of water charges from users, etc.

(c) 'Guideline on the Technical Aspects of a Rural Safe Water Supply Scheme' – The guideline provides guidance on various phases of engineering planning, design, construction and scheme operation and maintenance to ensure the sustainable outcome of a safe water supply scheme.

(d) 'Framework and Requirement for Planning a Rural Safe Water Supply Scheme within the Government's 11th Five-Year Plan (2006–2010) – Based on the framework, all counties and provinces developed action plans and have submitted them to the central Government. The Ministry of Water Resources and the Central Planning and Reform Commission will then develop the national rural safe water supply comprehensive plan for the 11th five-year development plan based on the provincial plans.

Project implementation and management

a) Implementing infrastructure

Provincial and county governments implemented the project under the guidance of the Ministry of Water Resources. Project committees were established at both provincial and county levels to oversee the implementation. Both committees were set up in the respective provincial or country water resources office and members consisted of respective representatives from the water resources department, the Planning and Reform Commission, All-China Women's Federation, Youth Leagues, Economic Commission and the Civilization Campaign. These offices were responsible for requesting funds from the various governments, personnel training, project implementation, management, supervising and following up on progress, etc.

b) Utilizing financial resources

UNICEF financial inputs to the safe drinking water supply project during this programme cycle was mainly for software, such as training on the participatory method of community self-management of water schemes and technical aspects on constructing a rural piped-water supply, as well as developing promotional materials. UNICEF funds were also used to develop project documents, such as the technical standards for a rural water supply, the framework for rural safe water supply as an input to the Government's 11th five-year development plan and the manual on participatory method for rural safe water supply (*see Appendix 7 for a complete list of documents developed with UNICEF support*). The Government's financial inputs were mainly used for constructing the rural piped-water supply schemes to provide safe drinking water for humans and livestock in the water-scarce areas.

c) Mobilizing financial investment from central and provincial governments

The UNICEF financial input to the 14 project counties in the seven project provinces in the programme cycle was US$232,910 and was mainly used for training and developing the documents, manuals and IEC materials. However, such limited

UNICEF input created a snowball effect in stimulating financial allocations from the seven project provinces and central Government for a total of 18.25 billion RMB (US$2.28 billion) by end 2004. The funds were used to implement many safe piped-water supply schemes, which resulted in supplying safe drinking water to a total of 56.9 million rural residents.

Every US cent of input from UNICEF mobilized US$98 investment from the Government at a ratio of 1:10,000. This demonstrated that the Government valued UNICEF support, even at such a meagre level. Government investment toward providing safe drinking water was linked with its economic development schemes in the western region (*see Appendix 8 for a listing of the financial investment from the project provinces and central Government*).

d) Capacity building and gender

The central and provincial governments organized training sessions on rural safe water supply management and the participatory method for rural safe water system management to train resource personnel at local levels, with women actively involved Thousands of project personnel from the project provinces and counties were trained. By 2003, a total of 3,693 persons were trained, with 28.5 per cent of them women. Once trained, women in several areas took responsibility for managing the water schemes. In Damou county, for example, women manage three of the village safe water supply schemes.

e) User's participation and willingness to pay

Villagers appreciate the participatory method for managing the piped-water supply, which involves them in decision making as well. According to a farmers' group representative, "The participatory method is good and allows us to be involved in the construction, which gives us the opportunity to understand the engineering and management aspects of safe drinking water supply. And we can discuss among ourselves to solve problems, if any. We manage our drinking water and we do it well." His comment was echoed by others and reflects the willingness to own and to pay for the water they consume, using meters installed in their homes.

f) Social mobilizing and communication

IEC materials were developed to promote messages on drinking safe water for better health and its links to the need for improving sanitation and hygiene. These promotional materials included posters and a leaflet for reaching school children and training manuals for teachers. Simple technical materials on constructing rural piped-water schemes and on operating and managing through the participation of water users who also pay water charges were also developed to provide villagers with basic technical and management knowledge. Children and other villagers expressed their appreciation for such materials.

In Xinjang province, a pictorial booklet, 'Solving the Problems of Providing Safe Water for the People in Xinjiang' was developed. Copies were sent to all counties and villages in the province. In Inner Mongolia, a technical pictorial booklet, 'Grassland Spring' also was developed on the theme of how to solve water supply scarcity. Large

billboards with the theme, 'Ensuring drinking water safety as the first priority', were displayed in public squares in Hohot City, Inner Mongolia. Live broadcasts of debates were televised on safe drinking water supply schemes and the user-pay system, with a hotline service for answering called-in questions from viewers.

Project sustainability

Users' willingness to pay for the water tariff is strongly linked to the project's sustainability. The relatively large piped-water supply scheme the evaluation team visited at Toomutad township in Damou county supplies water at 8,070 cubic metres per day to more than 150,000 people in 180 villages. The scheme was completed two years ago. Water pipelines have been extended to all villagers. Currently, inhabitants in 120 villages have agreed to pay the water tariff of 1.6 RMB (US$0.20) per cubic metre. The people in the remaining 40 villages are being contacted to discuss paying the water charge. Most inhabitants in those 40 villages have their own water wells fitted with hand pumps, but water in those wells have high levels of arsenic and fluoride. However, not all villagers are fully aware of the health hazards on chronic arsenic poisoning and fluorosis, so it may take some time to convince the remaining villagers of the need for an arsenic- and fluoride-safe water supply.

Water quality survey on arsenic and fluoride

The outcomes of Project 3 stimulated the Government to initiate a national survey of arsenic and fluoride levels in drinking water across the country in 2004. The survey was completed recently and revealed that about 3 million rural inhabitants have been drinking arsenic-contaminated water with a level higher than the government standard of 50 ppb. And more than 4 million rural residents consume high levels of fluoride in their water. The central Government has issued documents and guidelines for providing all rural people with arsenic- and fluoride-safe drinking water by 2010.

Project achievement

A total of 56.9 million people in the seven project provinces now have a safe-water supply. The financial investment from provinces and the central Government and the annual progress of water coverage to the rural population are presented in Appendix 5. For example, in Inner Mongolia, 30,000 people and 60,000 cattle in Yeejinfolo county and 27,500 people and 95,400 cattle in Damou county, previously water-scarce localities, all had a safe drinking water supply as of end 2004. Also in Inner Mongolia during this project cycle, 4.07 million people and 9.9 million cattle living in water-scarce areas, where high levels of arsenic and fluoride were found, were provided with a safe water supply. The cost for providing safe water to each person was 325 RMB, or US$40.60 (*see Appendix 5*).

Ground water is pumped to this storage tank to provide piped water by gravity to a newly built herders' resettlement colony

One of the newly built rural housing colonies for resettlement of herding families from the grasslands

Piped safe water is distributed to all rural houses in the resettlement colony

With the Government's huge investment to the rural safe water supply, almost all people living in rural areas in China were provided with an adequate water supply for domestic use by end 2004, although the water quality in some rural areas might not meet the government standard. It is the Government's aim to provide an adequate water supply as the first step in reducing the hardship of millions of people living in water-scarce and economically weak rural areas. The Government's next step is to provide safe drinking water to people consuming water of substandard quality. The Government's commitment to providing safe water for all was clearly stated in the guidance and directives documents mentioned in the previous section. The Ministry of Water Resources is planning to reduce the number of people consuming substandard water by 100 million by 2010, which is the end of current five-year development plan. By 2020, the Government expects that all people in rural China will have a safe supply of drinking water.

A government boarding school for primary and lower secondary grades for children of the herding families in the grasslands of Inner Mongolia

An elevated and insulated water tank providing safe water to villages, including schools

Hot and cold drinking water provided in the school classroom for students

Project impacts and benefits

The limited UNICEF inputs coupled with the sizable investment from the central and provincial governments provided safe water to 56.9 million rural residents and their livestock, many of them living in areas with high levels of arsenic and fluoride. Such large population coverage exceeded the target of the Government's 10th five-year

development plan in the project provinces. The project created a momentum to further accelerate the provision of safe drinking water to the rural population. It also enhanced the opportunity for closer collaboration between relevant agencies, resulting in the following highlights:

- Leaders at all levels now consider providing safe drinking water to rural residents a top priority.
- Technical and management personnel within the projects augmented their specialized knowledge through various trainings.
- Project personnel learned the effective ways of involving water users through the participatory method to motivate user self-management and financing through water charges. The participatory people-centred approach proved to be effective in creating users' 'ownership' of the piped-water supply system provided to them.
- Enrolment rates in primary schools reached 100 per cent in certain villages in the project counties because those schools now have a safe water supply.
- The provision of safe water in the project counties along with the hygiene education and health messages through radio, television and newspapers has made people, in particular women and children, aware of the benefits of drinking safe water and having good sanitation and hygiene practices.
- With available safe water at home, in most cases through piped water, people have improved their hygiene habits and constructed sanitary latrines. For example, in Danxi township in Sichuan province, all households now have a safe piped-water supply and sanitary latrines. Also in Sichuan province, the safe-water-supply project is linked with other activities on economic and agricultural development, known as '5-improvement and 3-construction',** which has led to improvements in the village environment, healthier children and extra income for farmers due to higher yields of crops from their use of digested sludge as organic fertilizer. This also demonstrates the positive impact of '3-in-1' package (integrated safe water supply, improved sanitation and hygiene education).

**** Note :** The agricultural development project on '5-improvement and 3-construction' in Sichuan province consists of improving safe piped-water supplies, drinking-water wells, kitchens, sanitary latrines and village roads (five areas of improvement) and constructing household water reservoirs, home gardens and family homes (three areas of construction).

The challenge

The Government has committed to providing the whole rural population with a piped safe-water supply by 2020. Currently, there are many areas where the water sources have high levels of arsenic and fluoride and other harmful elements. The challenge to achieve such a huge task requires:

- Sizable financial investment from all relevant sectors;
- Effective collaboration among the relevant government agencies;

- Cost-effective technologies to provide safe water for rural inhabitants who are currently consuming water of substandard quality in remote areas of cold climate and various topographic localities;
- Personnel with adequate technical and management skills in remote areas;
- Long-term sustainability of the safe piped-water supply schemes; and
- Effective operation and maintenance systems and users-pay collection system at the community level.

Constraints and problems

The following provides a summary of the constraints and problems encountered during the project cycle, which should be rectified in future programme implementation:

- Most project counties were classified as government poverty counties where people in rural areas are living in widely scattered localities with different topographies and severe water scarcity. In such circumstances, the construction of the water supply scheme encountered various difficulties, thus increasing the costs. In spite of the sizable investment from the Government, there still was a shortage of funds in many areas.
- In some cases, the water sources were located far from people and long pipelines needed to be laid. In the cold climate localities, pipelines needed to be buried below the ground's frozen layer. Often, there was a lack of technical personnel at the grassroots level to supervise and manage the construction.
- Due to the remoteness of many poverty counties, the transportation of materials and personnel often was a problem.
- The participatory method for involving water users to manage the water scheme provided to them were organized, in many cases, after the implementation of the scheme and not at the beginning of its planning. Thus, some potential users were not convinced to pay for the water because they did not understand the health hazards caused by unsafe drinking water from their wells, including high levels of arsenic and fluoride.
- Sustainability of the water scheme depends on users fully understanding the concepts of participatory method of managing the piped water scheme provided to them. Currently, it seems that the users' involvement is relatively weak.
- Project sustainability is threatened by the economic situation in rural areas. The fragile economic capacity of farmers and herdsmen can prevent them from contributing to the construction of the scheme and paying for the water charge. For example, in a new village in Yeejinfolo county of Inner Mongolia that the evaluation team visited, the piped-water supply scheme was designed to supply 25 herding families. They had migrated to this government-built village from their remote homes in the grasslands. Each family received a subsidy of 4,000 RMB for building their home in the new village. The piped-water supply scheme was built in early 2005; water from a 300 metre-deep artisan well is pumped to an elevated storage tank. The water scheme was formulated in such a way that the Government paid for building the deep well, the water storage tank and the pipelines. Through the participatory method of involving representatives of the 25 families, a village water committee was formed. The evaluation team talked to several people in the village who explained that from the beginning of the project, all families agreed to dig (or pay for labourers) the

trenches for laying the pipelines below the ground's frozen level of 1.7 metres. Work progressed for a while but then a sudden slump in the milk industry seriously affected the income of families in this newly established village. Because all the families depend on selling fresh milk and cows for income, many families were not able to hire labourers to dig the trenches. The male members of the households could not spare the time either to do the digging and as the ground soil is extremely hard, it is a very difficult job for females. This has resulted in suspending the laying of the pipelines. Consequently, it is impossible to supply safe water to all 25 families.

Project 3 – Water Quality on Arsenic Contamination of Drinking Water

Project achievements

- A cost-effective sampling method for detecting arsenic contamination in wells in at-risk and potentially at-risk areas was developed and applied in the project areas.
- Some highly arsenic-contaminated wells in certain arsenicosis-endemic areas were identified; the Government allocated financial support for constructing an arsenic-safe piped water supply to the affected villages during the project period.
- An accurate and simple field test kit for checking arsenic was developed and is in the process of being manufactured for wider use in the arsenic-affected areas in China.
- The project stimulated the Government into taking action to test for arsenic in wells in at-risk and potentially at-risk areas nationally in 2004. The Government issued documents and guidelines for providing arsenic-safe water to all people in the affected villages.

Part III Recommendations

Project 1 – Rural Environment, Sanitation and Hygiene Education

The positive experiences gained and lessons learned could be adopted for better implementing the programme on improving rural environment and sanitation. In particular, the sanitary latrines to be promoted for construction need to be culturally acceptable and suitable for local climate conditions, as does the hygiene and health education to create awareness on the need for clean homes and the community environment and thus changing age-old habits of bad sanitation and poor hygiene. The following recommendations aim to further improve and strengthen the programme implementation to achieve the sanitation targets within the time frame:

Large-scale promotion of rural household sanitation

Promoting rural household sanitation through the build-and-use sanitary latrine scheme should be continued in the project provinces, with expansion nationwide. Priority support should be given to the central and western provinces with targets and a time frame aiming at achieving the MGD sanitation target of 75 per cent coverage in China by 2015.

Intensive promotion of school sanitation and hygiene

School sanitation and hygiene should be continuously promoted in the current project provinces and gradually expanded to the whole country. Only 94 out of 2,120 schools (about 4.4 per cent) have sanitary latrines, safe water supply and hand-washing facilities, according to the school sanitation and hygiene survey in two project provinces during 2005. For the large-scale promotion of school sanitation, it is necessary for the Ministry of Education to issue a document/regulation indicating that all schools in the country should have sanitary latrines, safe water supply and hand-washing facilities. When a school is to be built, funds for constructing the sanitary latrines, hand-washing facilities and safe water supply should be allocated Adequate funds should be allocated by governments at the central, provincial and county levels for constructing or rehabilitating the water supply and sanitary facilities in all schools in rural China.

Intensive social mobilizing for behaviour change

Social mobilization has to be intensified to motivate people, from leaders to villagers, in linking the investment for economic development with improving sanitation and environment protection as well as changing hygiene behaviour to prevent the transmission of infectious diseases. It is also needed to convince rural inhabitants to change their outlooks from 'waiting for government's subsidy' to willingness to pay for the cost of building a sanitary latrine at home.

Appropriate rural sanitary latrine technologies and their promotion

Various types of sanitary latrine technologies should be promoted, with a correct design and method of construction and strict quality control as per the government standard to ensure non-pollution of the environment and prevention of water/filth-borne disease transmission. The types of sanitary latrine promoted should be acceptable to the people as per their culture and local climate conditions. The NPHCCO emphasizes that rural sanitary latrines should be hygienic, smell-free, safe, convenient, comfortable and eco-effective. The quality control of sanitary latrines built should be enhanced (*Refer to NPHCCO, Ministry of Health and UNICEF (2004) 'China Rural Sanitary Latrine Technology Guideline'*).

There is a need to more widely promote the building of sanitary latrines indoors, in particular in extremely cold climate conditions, for convenience and comfort. Currently, some farmers have installed a latrine inside their home, making them smell-free and appreciated by family members.

The private sector should be motivated to invest and market the sanitary latrine unit and latrine parts in rural areas. However, private sector should ensure that designs meet government standards.

Closer collaboration with all relevant agencies to ensure sustainability

There is a need to enhance closer collaboration with all relevant government agencies in real terms for effective programme implementation to ensure positive gains on improving environment, economic, social and health benefits. For example, the collaboration with the provincial Department of Agriculture to connect the sanitary latrine to the bio-gas plant that serves to safely treat the animal manure and human excreta to generate gas as clean energy for cooking and lighting. The well-digested sludge is then used as organic fertilizer for the farmland. Although the cost of constructing a bio-gas plant is higher than building a sanitary latrine, the financial gains from saving on the costs of energy and chemical fertilizer and, in the long term, from higher yields of crops are ultimately greater than the investment needed for a household bio-gas plant. Further, a bio-gas plant is environmentally friendly technology, which, if coupled with improved hygiene, prevents the transmission of intestinal worm, schistosomiasis and gastrointestinal infections.

UNICEF-assisted programme management and operation

To ensure early and smooth implementation of the programme in the next cycle, the project provinces should submit, on time, a request for reimbursement of funds from UNICEF. In situations where the project county needs advance payment, the request should be forwarded by the NPHCCO to UNICEF.

Research and development

Applied research studies should be carried out to find technical solutions and quality assurance for the following emerging issues, which are expected to be encountered as the promotion of rural sanitation expands in many areas in rural China:

(i) Develop an effective and appropriate system for more than one sanitary latrine to be built inside a rural house with the safe collection and disposal of human waste. In recent years due to better economic development in rural China, many farmers have built new houses or rehabilitated their farmhouses. For convenience and comfort, they built several sanitary latrines inside the house for the bedrooms and living room. It is, therefore, an urgent need for the Government to develop appropriate-designed plumbing systems that are suitable for different climate conditions and for the safe collection and disposal of human waste from the multiple sanitary latrines, as it should be different from the current design of one sanitary latrine at home.

(ii) Update the designs of school sanitary latrines and public latrines as well as hand-washing facilities for schools and rural public latrines. Although there are certain designs for building or rehabilitating, they are not satisfactory in meeting the government standards of hygienic, smell-free, safe, convenient, comfortable and eco-effective. There is a need for further updating the designs and providing technical guidance to ensure continuous improvement of sanitation in schools and rural public latrines, with quality assured.

(iii) Design an effective bio-gas plant for treating human excreta in schools. The gas generated can be used to heat the water for school children to wash their hands in the cold climates. The well-digested sludge can be given to nearby farmers as organic fertilizer, with the condition that they help to maintain the bio-gas plant. Alternatively, the digested sludge can be sold to farmers and the income can be used to maintain the bio-gas plant.

(iv) Develop an effective monitoring system for quality control and for inspecting household and school latrines that are built.

(v) Survey rural inhabitants' willingness to pay/invest in the construction of a sanitary latrine at home in various locations at different climate conditions. As a result of recent economic developments in rural China, rural residents' income has gradually been increasing. Many rural families now may be able to afford the cost of building a sanitary latrine. The outcomes of this survey would guide the right approaches for financial support to the right groups of rural residents in need of assistance. This would then allow financial inputs from various levels of government to benefit more rural families, in particular the economically weak communities.

(vi) Investigate and develop various cost-effective ways of disposing rural household waste water, as an adequate safe-water supply is gradually being provided to many rural households through piped-water schemes. Proper recycling and safe use of waste water from households for irrigation should be the priority.

(vii) Safe disposal of rural garbage should be investigated and a cost-effective safe disposal technology should be developed to maximize the recycling and reuse of treated garbage.

Project 2 – Safe Water Supply for Rural Areas

The water supply project during this programme cycle, 2001–2005, gained many positive experiences and learned several valuable lessons. Some of these could be shared with other developing countries. The Chinese Government has achieved its NPA water goal and 10th five-year development plan target of providing an adequate

water supply to almost all rural inhabitants by 2005. The Government's next step is to accelerate the provision of safe drinking water in its 11th five-year development plan (2006–2010), with the aim of achieving full safe-water supply coverage to all rural residents by 2020. The central Government has committed to allocating the financial investment for providing rural areas with a safe-water supply, with priority given to areas with high levels of arsenic and fluoride.

The following recommendations would help to further strengthen the achievements in providing safe water for everyone in rural China and for involving people in managing the safe piped-water system provided to them and paying the water fee.

Continued UNICEF support

Based on the experiences from this programme cycle, UNICEF support should be continued to China's water sector, through the Ministry of Water Resources. This is in light of the sizable financial inputs from the government at central and subcentral levels in response to very little UNICEF input.

Scaling up the participatory method and its application for effective water supply-system management in rural areas across the country

- Intensify the training of project personnel as resource trainers to further train community members on the participatory method for effective involvement of users for self-management of the water scheme through their willingness to pay a water tariff.
- Application of the participatory method to involve potential water users should take place at the beginning of the planning stage for construction of the safe piped-water system to gain maximum effectiveness for the sustainability of the water system in rural areas.
- Intensify social mobilization and health education on the harmful effects of high levels of arsenic and fluoride in drinking water on human health, in particular children and women, to convince the head of households to pay the water charge for safe piped water rather than continue to use unsafe/contaminated water from their wells.

Establish a rural water-quality surveillance network

A rural water quality surveillance network should be established at the county level with links to provincial and central water-quality monitoring systems to enhance the control of output water quality of all rural piped water systems to meet the government drinking water standards.

Research and development

(i) Conduct in-depth applied research studies to develop cost-effective and appropriate technologies for removing high concentrations of arsenic and fluoride in drinking water sources. The technologies to be developed should be simple and easy to operate and maintain and, most importantly, suitable for application in China, especially in very cold climate conditions. Also, the

technologies should include safe disposal of toxic arsenic-rich sludge generated from treating the water.

(ii) Develop various designs of water supply system for schools and boarding schools, based on the student population, climate conditions and types of sanitary latrine (water flush, dry or urine separation, bio-gas) to be constructed in schools. The water supply system to schools should match the types of school sanitary latrine designs for sustainable use and maintenance and the hand-washing facilities.

Project 3 – Water Quality on Arsenic Contamination of Drinking Water

Recommendations are included in a separate report.

Appendices

Project 1 – Rural Environment, Sanitation and Hygiene Education

Appendix 1 Framework for evaluation and terms of reference for international and national consultants

Appendix 2

- Table 1A Project counties in the four project provinces
- Table 1B Basic information of the project counties in the project provinces

Appendix 3

- Table 1A &1B Policy documents issued by the central Government and project provinces and project counties – Sichuan, Qinghai, Gansu and Jilin
- Table 2A Tasks and responsibilities of concerned department and agencies for promoting rural sanitation, Sichuan province
- Table 2B Promotional letter issued by the county governor, Dalinha county
- Table 3A List of training materials and manuals and IEC materials developed, Jilin province
- Table 3B List of training materials and manuals and IEC materials developed, Sichuan province
- Table 3C List of training materials and manuals and IEC materials developed, Gansu province
- Table 4 Technical and promotional personnel trained
- Table 5 List of extended project counties
- Table 6 Sanitation coverage in the project counties of four provinces
- Table 7 Sanitation coverage in all provinces
- Table 8 Government financial investment and people's contribution to sanitary latrine construction during the project cycle

Appendix 4 Evaluation report by Professor Wang Junqi

Appendix 5 Evaluation report by Assistant Professor Chen Yeji

Reference

NPHCCO, Ministry of Health and UNICEF Beijing (2004), 'China Rural Sanitary Latrine Technology Guideline'

Project 2 – Rural Safe Water Supply for Rural Areas

Appendix 6 Government strategies and guidelines for safe rural water supply

Appendix 7 List of documents developed with support of UNICEF

Appendix 8 Financial investments from government and progress on safe water supply coverage in the seven project provinces