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NEPAL WATER SUPPLY AND SANITATION SECTOR PROFILE

ASIAN DEVELOPMENT BANK

February 1985

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This profile has been prepared by consultants with the assistance of the staff of the Water Supply Division of the Asian Development Bank and in consultation with the Government of Nepal. The Profile does not necessarily reflect formal Bank or Government views of the sector.

ABBREVIATIONS

DHS	-	Department of Health Services
DP	-	District Panchayat
DWSS	-	Department of Water Supply and Sewerage
EEC	-	European Economic Community
ESS	-	Environmental Sanitation Section
HMGN	-	His Majestys Government of Nepal
IDA	-	International Development Association
IDWSSD	-	International Drinking Water Supply and Sanitation Decade
IRD	-	Integrated Rural Development
MPLD	-	Ministry of Panchayat and Local Development
MOF	-	Ministry of Finance
MOH	-	Ministry of Health
MWR	-	Ministry of Water Resources
NGO	-	Non Government Organizations
NP	-	Nagar Panchayat
NPC	-	National Planning Commission
ODA	-	Overseas Development Administration of United Kingdom
PPU	-	Project Preparation Unit, UNDP/World Bank, Sri Lanka
RNAC	-	Royal Nepal Airline Corporation
SATA	-	Swiss Agency for Technical Assistance
WSSB	-	Water Supply and Sewerage Board
WSD	-	Water Supply Division of Asian Development Bank
WST	-	Water Supply Technician

NOTES:

- (i) The Fiscal Year (FY) commences on 16 July.
- (ii) In the Report, "\$" refers to US dollars and "Rs" to Nepalese Rupee.
- (iii) A rate of \$1.00 = Rs 13.10 has been used. This was the rate generally prevailing during the preparation of the Report.

SUMMARY OF BACKGROUND AND CONCLUSIONS

1. On 15 September 1982 the Bank approved technical assistance to Nepal in the amount of \$50,000 for Water Supply and Sanitation Sector Profile Project. The Bank's Mission was carried out from 7 to 27 November 1982 mainly by S. Liu, Project Engineer/Mission Leader (5 to 12 November), P. Wallum, Project Economist (15 to 27 November) and three consultants - a water supply engineer, a rural water supply expert and a sanitation expert. The Manager/WSD was present during the final two days of discussions with the Government.
2. The objective of the Mission was to review the water supply and sanitation sector, including institutional aspects and implementing capability, and to determine the potential and timing of the Bank's future assistance in the sector.
3. In Nepal about three per cent of total public sector development expenditure was invested in the water supply and sanitation sector during the period 1965-1980. Since 1980 the sector has been given increased priority. This is reflected in the Sixth Five-Year Development Plan (1980-1985) and the Ten Year International Drinking Water Supply and Sanitation Decade (IDWSSD) Development Plan (1980-1990). ^{1/} At present, 4.6 per cent of total development expenditure is invested in the sector. For the decade the Government intends to provide \$120 million from its own resources and will be requesting \$358 million (or 75 per cent) in foreign assistance. To date, \$60 million have been committed by donors (see para 55).
4. The World Bank (IDA) has provided, since 1974, three credits totalling \$46.8 million through the Water Supply and Sewerage Board (WSSB) to provide improved water supply services in major urban communities and has plans to continue this program. The Ministry of Panchayat and Local Development (MPLD) is supported extensively by UNICEF and many other external agencies in providing water supply to the smallest rural communities. The finding of the Mission was that the Bank's support was most needed by the Department of Water Supply and Sewerage (DWSS) to serve communities with populations generally between 1,500 and 10,000.
5. DWSS activities are organized in five regions: Eastern, Central, Western, Mid-Western and Far-Western. Owing to past inequalities in the development aid provided to the regions, the Government has requested the Bank to give priority in the following order of regions: Far and Mid-Western, Western and lastly Central. Due to difficult access to rural areas, limited availability of trained manpower and lack of effective coordination between sector ministries, it appeared that the most appropriate initial approach for the Bank was to provide a sector loan and support the full program of the DWSS Far-Western Regional Office.

^{1/} Prepared by the Department of Water Supply and Sewerage of Ministry of Water Resources, December 1980. This document has been approved by HMG and is used as the official "Ten Year Plan for the Provision of Drinking Water Supply and Sanitation in Nepal".

6. To achieve maximum benefit from any investments in the rural communities, it is essential that low-cost sanitation, surface drainage and public hygiene education should be integrated components within any future Bank water supply project. Hence the Sanitation Division of DWSS and the Environmental Sanitation Division of Ministry of Health should have active involvement in the program. Some aspects of current standard project design concepts for water supply and sanitation schemes should be modified and a system devised to ensure effective inter-disciplinary coordination.

7. It is the Government's policy that respective panchayats (groups of villages) should take over the systems on completion and maintain them. The operation and maintenance staff that will need to be employed by the panchayat will be trained by DWSS. Also, it is the intention of the Government that: (i) the scheme on completion will be operated and maintained by the Department for not more than three years before it is handed over; and (ii) during the period DWSS is operating a scheme the Department will assist in developing a tariff structure to enable the panchayats to operate it on a self sustaining basis. DWSS has proposed an increase in the present tariff level for household connections. This measure is needed although the present financial situation is not known since there is no separate budget allocation for operation and maintenance costs of existing water supply system operated by the Government; it is however, estimated that approximately 10 per cent of DWSS's development budget is utilized for this cost.

8. The Mission found that in order to prepare a project for possible Bank financing a technical assistance was required. The technical assistance should identify all components of the project, review technical details including service levels, design criteria, surface drainage requirements and construction procedures, define management, administration and implementation procedures, and confirm post-completion operation, maintenance and appropriate levels for tariffs. Terms of reference for the consultants under the proposed technical assistance to prepare the project would be prepared separately.

9. It was estimated that the technical assistance for project preparation would cost a maximum of \$150,000. 1/ The technical assistance was tentatively intended to prepare a project to be financed as a sector loan covering 60 water supply schemes over an implementation period of three years starting in 1984 and to cost about \$20 million. The first phase starting 1984, and with a duration of a year and a half, would cover approximately \$10 million and an allocation was made in the Country Program for 1984. 2/

1/ On 12 May 1983 the Bank approved technical assistance (TA No. 514-NEP) in the amount of \$150,000 to the Government of Nepal to prepare a Project for the provision of water supply and sanitation to rural communities in the Mid- and Far-Western regions of Nepal.

2/ On 11 December 1984 the Bank approved a loan (Loan No. 719-NEP) in the amount of \$9.6 million (total cost \$12.0 million) for a Rural Water Supply Sector Project for piped water supply in 75 communities and tubewells with handpumps in 175 communities in the Mid- and Far-Western regions.

TABLE OF CONTENTS

	<u>Page</u>
MAP	
I. INTRODUCTION	1
II. FINDINGS AND RECOMMENDATIONS	3
A. The Urban Situation	3
B. The Rural Situation	3
C. The Sixth Five-Year Plan and the Decade Plan	4
D. Potential Bank Involvement	6
III. BACKGROUND	8
A. The Country	8
B. Demography	9
C. The Economy	12
D. Climate and Water Resources	12
E. Public Health	13
IV. SECTOR ORGANIZATION/PARTICIPATION	14
A. The Responsible Agencies	14
B. The Ministry of Water Resources	14
C. The Ministry of Panchayat and Local Development	16
D. Assessment of Sector Agencies	16
E. District Panchayats	16
F. Associated Government Agencies	17
G. The External Agencies	17
V. THE PRESENT STATUS	22
A. Water Supplies - Urban	22
B. Water Supplies - Rural	25
C. MPLD Schemes in the Mountains and Hills	25
D. DWSS Scheme in the Mountains and Hills	25
E. Schemes in the Terai	29
F. Operation and Maintenance	30
G. Urban Sanitation	31
H. Rural Sanitation	32
I. Legal Situation	34
J. Water Tariff Structure	35
VI. ONGOING PROGRAM IMPLEMENTATION ASPECT	40
A. Project Selection and Identification	40
B. Consulting Capacity	40
C. Implementation Organization	41
D. Contracting Capability	42
E. Materials and Manufactured Capability	42

	<u>Page</u>
VII. SECTOR PLANNING	44
A. Previous Development Plans (1965-1980)	44
B. The Decade Plan (1980-1990)	48
C. The Sixth Five-Year Plan (1980-1985)	50
VIII. OUTLINE FOR BANK INVOLVEMENT	55
A. Justification	55
B. Project Preparation	55
C. Project Concept	56
D. Project Location	56
E. Project Objective	57
F. Project Size and Schedule	58
G. Operation, Maintenance and Tariffs	60
APPENDIXES	62

I. INTRODUCTION

1. His Majesty's Government of Nepal (HMGN) has adopted very ambitious targets under both its Sixth Five-Year Development Plan (1980-1985) and its Ten-Year Plan for the Provision of Drinking Water Supply and Sanitation during the International Drinking Water Supply and Sanitation Decade (1980-1990) (see para 11). Support in meeting these targets has been obtained from the World Bank (IDA) in respect of the largest urban areas and from the UN agencies (notably WHO and UNICEF) as well as a large number of other non-government organizations (NGOs), principally in respect of the smaller rural communities. 1/

2. Following discussions with a Country-Programming Mission in early 1982, HMGN requested the Bank in March 1982 to provide sector support. A Technical Assistance was scheduled for 1983 2/ and subsequently provision for US\$10 million made in the Bank's lending program consequently for in 1984. 3/ Mr. S. L. Liu, Project Engineer of the Bank's Water Supply Division visited Kathmandu in July/August 1982 as a member of the Bank's Country Study Mission and continued the dialogue concerning possible Bank participation. At that time, the Terms of Reference (TOR) for a Sector Profile Mission were discussed and agreed in principle with HMGN. These were later refined in Manila (Appendix 1). On September 15, 1982, the Bank approved the provision of technical assistance to HMGN in an amount up to \$50,000 for this purpose.

3. This report is based on the findings and conclusions of a Sector Profile/Project Identification Study that visited Nepal between 7 to November and remained in Manila up to 7 December 1982 to finalize the report. The members of the Mission were:

Mr. D. A. Howarth (23-26 November)	-	Manager (WSD)
Mr. S. L. Liu (5-12 November)	-	Project Engineer(WSD) Mission Leader
Mr. P. J. Wallum (15 November - 7 December)	-	Project Economist, WSD
Mr. J. B. Kirch (5 November - 7 December)	-	Staff Consultant Team Leader
Mr. J. Sidwick (7 November - 1 December)	-	Staff Consultant/Urban Rural Sanitation Expert
Mr. C. Walters (6 November - 1 December)	-	Staff Consultant/Rural Water Supply Expert

1/ For 1980-1990, \$60 million has been committed as follows: World Bank \$27 million, UNICEF \$13.5 million, ODA \$6.5 million, EEC \$5 million and the balance mainly by UNDP, WHO, SATA, USAID and ICM.

2/ TA No. 514-NEP: Rural Water Supply and Sanitation (\$150,000) 12 May 1983.

3/ Loan No. 719-NEP: Rural Water Supply Sector Project (\$9.6 million) 11 December 1984.

4. Apart from the many persons in Nepal who contributed to the work of the Mission, particularly the Chief Engineer DWSS and his staff and the Water and Energy Commission (WEC) resident engineers (see Appendix 2 for list of persons met), the following were directly involved:

- Mr. P. M. Singh Pradhan - Deputy Chief Engineer, Department of Water Supply and Sewerage (DWSS) of HMGN who acted as counterpart and accompanied the Mission to ADB Headquarters (7 November to 6 December).
- Dr. H. Bista - Anthropologist, Kathmandu under contract to World Bank/Technology Advisory Group (TAG) for Global Project in low-cost sanitation who also accompanied the Mission to Manila (18 November to 6 December).
- Mr. R. S. Singh - World Bank/TAG, New Delhi who visited Kathmandu (23 to 26 November) and participated in the final phase of discussions.
- Ms. J. Romm - UNDP/World Bank Project Preparation Unit (PPU), Sri Lanka, who discussed with the Mission in Kathmandu the type of assistance could provide for preparing the Project (24 to 26 November).

5. The Mission was able to meet its terms of reference, with the exception of some minor data-gathering details.

II. FINDINGS AND RECOMMENDATIONS

A. The Urban Situation

6. The urban population of Nepal, which is defined for convenience as those people residing in 29 designated Nagar (town) Panchayats, numbers approximately one million or only seven per cent of the total 1983 population of 16 million. Piped water supply systems are available in all towns. However, many are in a rudimentary condition providing service for only a few hours per day. By 1985, when the first three World Bank (IDA) assisted projects are due for completion in 12 Nagar Panchayats, ^{1/} it is estimated that about 720,000 people in these towns (83 per cent of their population) will have access to a safe water supply. In the remaining Nagar Panchayats, with the exception of Tansen which has recently been the recipient of Japanese aid for a new water supply scheme, present coverage is much lower. New schemes are proposed, either under the Fourth World Bank Project or by HMGN with some external assistance, for execution during the International Drinking Water Supply and Sanitation Decade (IDWSSD).

7. Sewerage is available only in the Kathmandu Valley serving a population estimated at 25,000 in the capital area and perhaps 9,000 in the nearby town of Bhaktapur. Renovations, extensions and new treatment units (stabilization ponds), have been financed by World Bank (IDA). The sewerage system in Bhaktapur works effectively but the treatment units are grossly overloaded and additions have not been commenced.

8. A 1979 household survey in 16 urban communities showed that septic tanks and private latrines are used quite widely. A more than 30 per cent coverage was found in half of the towns surveyed. The Ten-Year Development Plan for IDWSSD estimated an average 1980 coverage of 12 per cent by individual sewerage systems serving 86,000 people in 12 towns. Public latrines are not common, and are usually badly maintained, so that the great majority of the urban population depend upon open-air defecation.

B. The Rural Situation

9. For their domestic water supply the very large rural population (93 per cent) traditionally utilizes the most convenient sources of water, almost irrespective of quality, and access to sanitation facilities is almost non-existent. The Government has set about tackling this situation actively but the problems are immense and the coverage to date in numerical terms modest. In aggregate in the last 10 years or so some 400 to 500 rural water supply projects and up to 1,500 local improvement schemes have been completed by the central ministries serving perhaps one million people or seven per cent of the total rural population. An unknown number of small schemes has been completed by many private and non-government organizations and by local

^{1/} World Bank (IDA): 1st credit \$7.8 million in 1974 and supplemented with \$4 million in 1977; 2nd credit \$8million in 1977 and supplemented with \$3million EEC Special Action Credit; and 3rd credit \$27 million in 1980.

governments, but details have not been assembled. Indeed, the true status of rural water supply quantity and quality is not known. At this stage of development sector planning in the usual sense is, and perhaps, cannot be carried out with the existing data base. Projects are fed into the implementation pipeline as a result of local requests for assistance and are then subject to the scrutiny of officials both at this stage and at the completion of the feasibility study for a particular project.

C. The Sixth Five Year Plan and the Decade Plan

10. The Government's Sixth Five-Year Plan (1981-1985) devotes 25.6 per cent of total development expenditure to the Social Services Sector. The Social Services component covers Education (7.6 per cent), Health (4.9 per cent), Drinking Water (4.6 per cent), Panchayat programs (5.0 per cent), Housing and Town Planning (1.1 per cent), Information and Broadcasting (0.5 per cent) and Administrative Reforms, etc. (1.4 per cent). Thus the provision of improved water supplies has been granted high priority.

11. The Decade Plan (1980-1990) sets ambitious targets for improved service. ^{1/} In the Mountains and Hills areas, 2,266 ^{2/} gravity piped water supply systems are needed to provide at least one scheme in each village panchayat by 1990 while in the Terai, 100 per cent coverage with 32,000 shallow tubewells and handpumps was planned at a density of one unit per 200 people, within a walking distance of not greater than 150 m. These programs were expected to provide for 94 per cent coverage of urban populations and 67 per cent coverage of rural communities by the end of the Decade, or a combined total of 12.18 million people of a projected 1990 population of 17.59 million or 60 per cent.

12. Sewerage and sanitation targets are more modest but equally challenging. By 1990 it is planned to have sewerage systems in the urban core areas of 12 towns serving 215,000 persons and individual systems serving another 125,000 - a combined total of one-third of the populations in these towns. Specific sanitation planning objectives were not included for the remainder of the urban dwellers. For the rural communities, it is projected that 286,000 latrine units will be constructed to serve about 13.1 per cent of the population, with preference given to the Terai where low-cost sanitation is believed to be most needed and widely acceptable.

13. Capital requirements for the Decade program have recently been re-assessed at \$478 million, some 217 per cent higher than projected in the Decade Plan. This reflects in part inflation and also takes better account of the costs of actual construction, particularly in remote areas. Of this \$475 million, the Government expects to provide 25 per cent from internal resources and is seeking 75 per cent (about \$350 million) in external aid. Commitments to date, largely from IDA, total about \$60 million assuming recent negotiations with British Aid (ODA)

^{1/} Prepared by Department of Water Supply and Sewerage, December 1980 and approved by the Government.

^{2/} The number of village panchayats has been increased significantly since the Plan was prepared in 1980.

and the EEC prove successful. ^{1/} Thus a foreign aid shortfall of nearly \$300 million exists at present.

14. Distribution of the capital requirements under the Decade Plan is approximately 35 per cent to the Water Supply and Sewerage Board (WSSB) for urban projects largely funded by IDA, 19 per cent to the Ministry of Panchayat and Local Development (MPLD) for rural schemes serving less than 1,500 persons and largely committed to programs funded by UNICEF, SATA and other NGOs over the next few years, and 46 per cent to DWSS which has, to date only one proposal from ODA for \$6.5 million for a rural water supply project in the Eastern Region. DWSS has had its annual development budgets increased significantly year by year from \$2.3 million in 1979/80 to \$10.1 million in the current year and has achieved an average 75 per cent budget utilization over the last three years (see Table 18).

15. Both the Sixth Five-Year Plan and the Decade Plan recognize that satisfactory progress towards meeting the objectives depends upon overcoming certain constraints affecting the Sector. Undoubtedly the most severe of these is the question of access. Many of the schemes needed to meet planned targets will be located many kilometers from either airstrip or roadhead, so that transportation of construction materials not available on site, such as pipe, fittings and cement, has to be effected by foot. The difficulties have been aggravated by the inability of Royal Nepal Airways (RNA) to charter aircraft capacity to DWSS to deliver materials to the small airstrips which are quite well distributed throughout the Mountains and Hills areas.

16. Money, management and manpower are the other development constraints perceived by the Decade Plan (see para 15). To date, HMGN has provided from internal resources as much funding as DWSS can realistically utilize with its available manpower and management resources and money has not been a constraint. However, the Government is facing severe budget deficit problems and is looking for much greater levels of financial support from external sources throughout the remainder of IDWSSD. Management constraints will continue, as the depth of experience in the sector is limited, and government service conditions are not sufficiently attractive to encourage large recruitment or high performance from the majority of personnel. Manpower constraints no doubt exist in relation to meeting planned targets but the Mission finds that this is not a current constraint except at the lowest technical levels where responsibility for operation and maintenance of the completed schemes is conspicuous by its almost total absence. The principal difficulty with professional and skilled manpower is the failure of the Government to create an environment wherein the designated personnel will put up with inconvenience and discomfort to serve in remote locations so as to ensure that progress is achieved and targets met. The principle of allowing civil servants to

¹ World Bank \$27 million, UNICEF \$13.4 million, ODA \$6.5 million, EEC \$5 million and the balance mainly by UNDP, WHO, Swiss Association for Technical Assistance (SATA), USAID and Indian Cooperation Mission (ICM).

perform consulting work for Government outside of their normal working hours no doubt ratifies the need, at modest cost, to obtain engineering feasibility and design services but with most consultants' work being performed in Kathmandu it also inhibits their preparedness to travel away from their homebase (usually Kathmandu) on supervisory assignments.

D. Potential Bank Involvement

17. The principal reason for Bank involvement was that in order to make a major input to the unsatisfactory water supply and sanitation situation additional funding was urgently needed. The Mission found that DWSS had demonstrated an improved capacity to complete development projects over the previous three years and was capable of acting as Executing Agency for a Bank Project. Because of the physical, financial and institutional states of development of the subsector, it was considered that the only feasible, workable manner for the Bank to become involved in the subsector was for it to consider a project consisting of the entire program of one of the DWSS Regional Offices for a period of three to four years. This approach will enable the Bank to monitor one project implementation office rather than being involved with several offices, thereby becoming involved in a situation of diversified responsibility. The Government requested the Bank to work in the most underserved parts of the country - the Mid-Western and Far-Western Development Regions - operating out of Regional Headquarters in Nepalganj. The Mission noted this request but considered that reasonable progress could only be achieved in this Region if measures were taken to ensure adequate delivery of materials to the project sites so that construction delay should be avoided.

18. In general terms, the Mission estimated that a three-year program in the Mid-Western and Far-Western Development Regions would cost in the order of \$22 million based upon the following components:

- (i) 45 water supply schemes (gravity) in the Mountains and Hills serving some 225,000 persons;
- (ii) 15 piped or shallow tubewell/handpump schemes in the Terai serving some 60,000 persons;
- (iii) Demonstration public latrine programs in most 'subproject' villages;
- (iv) Low-cost sanitation 'subproject' in a small number of larger communities with cash subsidies and technical assistance provided together with hygiene information to encourage the construction of private latrines;
- (v) Water supply and latrine construction program to be supported by public hygiene information and technical assistance in carefully-chosen larger communities with urban core areas;
- (vi) Surface water and sullage drainage works associated with public standpipe placement in all subproject communities;

- (vii) Manpower training with emphasis upon village level technicians who would become responsible for post-commissioning maintenance; and
- (viii) A Management Information System to provide a basis for future project planning in the project region.

19. The overall average cost per beneficiary would be about \$70 to \$80. The Government requested that schemes be constructed within the Sixth Plan, i.e. in 1984-85, which required the upgrading of the project in the 1984 Nepal program from a pipeline project to a firm project. TOR for the required TA for project preparation was finalized during a Fact-Finding Mission in February 1983.

20. The UNDP/World Bank Project Preparation Unit (PPU) stationed in Sri Lanka indicated a willingness to assist HMGN (at no cost) in preparing a project for Bank financing. TOR was prepared with this potential support in mind. During the Mission discussions were held on the involvement of PPU and as this was the first time that the Bank, PPU and DWSS would be involved in project preparation, care was taken to determine the role of PPU so that it would support DWSS in such a way so that project preparation did not become dependent on PPU's input.^{1/}

21. Issues concerning project acceptability were as follows:

- was the general scope and concept acceptable;
- would HMGN accept the indicated level of expatriate management consulting support;
- was the Government in agreement with the proposed schedule and would it request the proposed technical assistance from the Bank; and
- would post-project operation and maintenance be handled and paid (in part) by the beneficiaries.

The Mission received provisional affirmative answers to all of the above and concluded that the way was clear for Bank involvement in the Water Supply and Sanitation Sector in Nepal.

^{1/} PPU prepared in March 1984 a proposed Western Development Region Rural Water Supply and Sanitation Project.

III. BACKGROUND

A. The Country

22. The land-locked Kingdom of Nepal has a gross area of about 147,000 sq kms. It is bordered on the north by China (Tibet) and on the other three sides by India. Since its crossing points on its border with China are confined to a few passes at high altitude in the Himalayan Range, the country is effectively dependent on India as an entrepot and trading partner.

23. Politically, Nepal is divided in 75 districts, each with its own (panchayat) administration and elected assembly. Within these districts there are more than 4,000 village panchayats each with its own elected assembly under the leadership of the Pradhan Pancha. These assemblies have authority to pass and enforce by-laws (subject to District Panchayat approval) covering water supply, sanitation, public health and irrigation and have local taxing powers covering land, property and public services. District Panchayat (DP) assemblies are elected from the nine-electoral subdivisions within each district. These assemblies can overrule village panchayat actions and are now required to plan on a district basis. DPs receive grant funds from HMGN to cover their administrative organization and minor development projects. The Local Development Officer (LDO) is a Secretary in the DP organizations. Until 1981, National Panchayat (legislative assembly) representatives were elected by DP and village representatives. However, National Panchayat members are now elected for each district (two, if the population is greater than 100,000) by the electorate as a whole.

24. For overall planning purposes, the country is divided into five Development Regions (Eastern, Central, Western, Mid-Western, and Far-Western) and into 14 Zones. A map of Nepal illustrates the locations of these major subdivisions (see page v).

25. In geographical terms, as well as from a development planning viewpoint, it is useful to think of the country in several bands running more or less east-west across the country. Bordering India, on the south, is the Terai. This is the northern limit of the Gangetic Plain, which averages about 30 km in width in Nepal. It lies generally below an elevation of 300 m, a.m.s.l. To the North of the Terai are the Siwaliks or Churia Hills, a narrow band of hills rising to a maximum of about 2,000 m. Further to the north is the Mahabarat Lekh, another range of hills, usually heavily forested and rising to about 3,000 m. This range which occasionally becomes snow-covered in winter, marks the border between the tropical climate of the Ganges lowlands in northern India and the more temperate climate of the mountains and valleys to the north. In a few places the valley between the Mahabarat Lekh and the Siwaliks widen into large fertile valleys, called Duns. This is the Inner Terai and the best known duns are the Dang and the Chitwan. The total area of the Districts located within the Terai, which within the context of this report includes the Inner Terai, is about 34,000 sq. km. - approximately 23 per cent of the whole country.

26. Bordering China on the north are the high mountains of the Himalayan range. In the context of this report these are referred to as the "Mountains". They cover an area of about 48,000 sq. km. (about 33 per cent of the country) and generally lie above an altitude of 2000 m. Several of the highest peaks in the world, including Sagarmatha (Everest) are located here.

27. Between these two bands are the Hills, covering about 65,000 sq km or nearly half of the country. They consist of numerous hills and valleys generally lying between 600 and 2000 m, each with its own micro-climatic characteristics.

28. The biggest constraint to the development of Nepal is the lack of a national transportation network to afford reasonable access to all part of the country. The East-West Highway, which traverses the country from east to west within the Terai generally provides reasonable access therein during the dry season. However the highway is not complete and several major rivers, which generally flow south to the Ganges, have not yet been bridged. Transportation to the Far-Western Region necessitates access through India. Within the Hills, road access is available to some major towns in the Central, Western and Eastern Regions but not in the Mid and Far-West. Elsewhere, the only available access is by air, or by the traditional porter routes. Most districts now have at least one small airstrip nearby, suitable for Twin Otters run by RNAC which has a modest fleet. More ships being constructed by RNAC has a modest fleet. The service to many airfields is only once weekly.

B. Demography

29. Results from the 1981 Census show that, since the last full count in 1971, the population has increased by nearly one-third to 15,020,451; equivalent to a mean annual growth rate of 2.67 per cent.^{1/} The distribution, however, has changed markedly with individual mean growth rates of 1.3 per cent in the Mountains, 1.8 per cent in the Hills and 4.1 per cent in the Terai. Clearly the migration trend out of the Mountains and Hills, has been significant. Details of the population distribution by zone are presented in Table 1 and population densities are shown in Table 2. It may be noted that the eastern portion of the country is considerably more densely populated than the less-accessible western regions. The density for Karnali Zone, only 11 persons per sq. km. gives an impression of population scatter in the Mountains and the 175 persons per sq. km. in Lumbini Zone is representative of densities in the Terai.

30. Nepal has a young population. Over 18 per cent are pre-school children and more than 43 per cent are under the age of 15. Crude birth and death rates are 42 and 19 and the infant mortality rate averages 150

^{1/} The 1983 population was estimated at 16 million. 10 per cent of the population lived in the Mountains, 50 per cent in the Hills, and 40 per cent in the Terai. It was also estimated that 15 million (93 per cent of total population) lived in rural areas spread over 4,000 village panchayats and one million (or seven per cent) lived in 29 urban communities. Almost half of the urban population lived in the Kathmandu valley.

Table 1. Population Distribution - Nepal, 1981

Zone	Population	DISTRIBUTION		
		Mountains	Hills	Terai
<u>Eastern</u>				
Mechi	927,724	116,884	330,784	480,056
Kosi	1,421,672	129,513	414,662	877,497
Sagarmatha	1,354,452	87,444	509,341	757,667
	<u>3,703,848</u>	<u>333,841</u>	<u>254,787</u>	<u>2,115,220</u>
<u>Central</u>				
Janakpur	1,697,079	150,494	351,702	1,194,883
Bagmati	1,783,169	262,569	1,520,600	-
Naryani	1,435,659	-	499,316	936,343
	<u>4,915,907</u>	<u>413,063</u>	<u>2,371,618</u>	<u>2,131,226</u>
<u>Western</u>				
Gandaki	1,111,614	6,210	1,105,404	-
Lumbini	1,571,599	-	612,402	959,197
Dhaulagiri	452,341	12,399	439,942	-
	<u>3,135,554</u>	<u>18,609</u>	<u>2,157,748</u>	<u>959,197</u>
<u>Mid-Western</u>				
Rapti	877,325	-	611,078	266,247
Karnali	238,873	238,873	-	-
Bheri	837,111	-	431,073	406,038
	<u>1,953,309</u>	<u>238,873</u>	<u>1,042,151</u>	<u>672,285</u>
<u>Far-Western</u>				
Seti	790,064	196,190	335,615	258,259
Mahakali	521,769	90,497	265,266	166,006
	<u>1,311,833</u>	<u>286,687</u>	<u>600,881</u>	<u>424,265</u>
Total	<u>15,020,451</u>	<u>1,291,073</u>	<u>7,427,185</u>	<u>6,302,193</u>
		8.6%	49.4%	42.0%

Source: 1981 population census.

Table 2. Population Density per Geographical Distribution, 1981

Region	Mountains			Hills			Terai			Total		
	Pop	Area <u>a/</u>	Density	Pop	Area	Density	Pop	Area	Density	Pop	Area	Density
Eastern	333,841	8,460	39	1,254,787	12,540	100	2,115,220	7,070	299	3,703,848	28,070	132
Central	413,063	6,380	65	2,371,618	11,320	210	2,131,226	10,060	212	4,915,907	27,760	177
Western	18,609	5,110	4	2,157,748	17,430	124	959,197	5,330	180	3,135,554	27,870	113
Mid-Western	238,873	19,180	12	1,042,151	13,590	77	672,285	5,880	114	1,953,309	38,650	51
Far-Western	286,687	7,640	38	600,881	7,760	77	424,265	4,330	139	1,311,833	19,730	66
Total	<u>1,291,073</u>	<u>46,770</u>	<u>28</u>	<u>7,427,185</u>	<u>62,640</u>	<u>119</u>	<u>6,302,193</u>	<u>32,670</u>	<u>227</u>	<u>15,020,451</u>	<u>142,080^{b/}</u>	<u>106</u>
Per Cent	8.6	32.9	-	49.4	44.1	-	42.0	23.0	-	100	100	-

a/ Area in sq kms.

b/ The Mission has located three printed variations of the total area of the country between 142,080-147,181 sq kms.

Sources: (a) Agricultural Statistics of Nepal, 1972, for physical area.

(b) Census 1981, for population figures.

per 1,000 live births and may reach over 250 in some areas where child mortality in the under five group is also at a similar level. Mean life expectancy is 45 years.

C. The Economy

31. Over 60 per cent of the Gross Domestic Product (GDP) comes from agriculture which occupies more than 90 per cent of the population in spite of the fact that less than 15 per cent of the land area is under cultivation. Nepal is one of the poorest countries in the world with a per capita annual income of \$170 in 1982 - a rate that has not risen in real terms over the last decade. The principal cash crops are sugarcane, oil seeds, potatoes, tobacco and jute. Food crops include rice, soya beans, wheat and great variety of fruits and vegetables. In general, Nepal has been able to feed its citizens but that situation is deteriorating as the area of cultivatable land is severely limited and the population continues to grow at a very high rate.

32. In terms of industry, Nepal is still at an early stage of development. The principal industries supporting the country's growth are cement manufacture, jute, fruit and tea processing, sugar refineries and small-scale agricultural implements and machinery. Brick and tile kilns are abundant but do not at present meet demand. Semiprecious stones and many other natural indigenous materials provide for active cottage industries. In recent years, tourism has made major contributions to foreign exchange earnings.

D. Climate and Water Resources

33. Except in the highest mountains, the climate of Nepal is governed by the summer arrival of the south-east monsoon between June and September. It lasts for a shorter period in the west than in the east. Mean annual rainfall is about 1,500 mm varying with location between 250 and over 5,500 mm. Generally 80 per cent or more of annual precipitation is experienced during the monsoon period.

34. The high Himalayas have an alpine climate with short cool summer and cold dry winters. Precipitation is least in the west and greatest in the centre and east. With perennial recharge, springs in these areas are reliable and abundant, providing a good source of potable water.

35. In the upper Hills area, annual precipitation can be as low as 1,000 to 2,500 mm in the Far Western and Eastern Regions and as high as 4,500 where in the Western Region. Numerous small streams and springs draining fissured rocks and porous strata in valley bottoms, provide good sources of potable water. However, depending upon origin, many of the surface and spring sources vary considerably in yield and many dry up in the pre-monsoon period.

36. Within the Mahabarat and Siwalik mountains, the climate varies, mostly with altitude, from moist sub-tropical to humid tropical. Summer rainfall is predominant and winter precipitation occasionally falls as snow. The total fall varies in the range 1,500 to 2,000 mm in the far west up to 3,000 mm in the central and eastern areas. Thick forests cover large parts of the Mahabarat Range. Springs are abundant and probably perennial where forest cover remains, but little information is available. In the Siwalik range, the Strata are usually very porous. The northern slopes have vegetation cover and small springs may be found. The southern, exposed slopes, however, are often bare and dry and do not retain water to yield perennial sources. Groundwater, however, is usually plentiful in the valleys.

37. Climate in the Terai is tropical. Summer temperatures can reach 50°C and winters remain mild. Rainfall varies narrowly in the range, 1,500 to 2,000 mm, although there is a better annual distribution in the west with the same winter precipitation. Potable water supplies have to be obtained from groundwater aquifers which may be artesian, shallow or deep depending upon geological formulation.

E. Public Health

38. As one of the least-developed countries and one that is most in need in terms of health requirements, Nepal has been selected for special attention and support by the international community. HMCN has adopted a national policy and strategy to attain "Health for All by the Year 2000" - an objective that, under existing severe economic and financial pressures, will necessitate the input of very large quantities of aid.

39. Although progress has been made, the very large, scattered, rural population aggravates the rate at which meaningful levels of health care can be provided. Many isolated people have little or no access to health facilities. Indeed, the average accessibility varies from one health post per 31,000 in the Mountains to one per 38,000 in the Terai. At present there is one doctor per 34,000 and one bed for each 5,000 with much higher availabilities in Kathmandu.

40. Typical health statistics show that more than 50 per cent of patients are suffering from gastro-intestinal disorders. Worms are endemic in the children and diseases such as tuberculosis and leprosy are widespread. Acute respiratory problems are common, particularly in the mountain areas. The lack of safe water supply and the absence of suitable sanitation facilities are both important components of the public health situation. However, most rural people are not conscious of the linkages between disease and hygiene. Thus the provision of improved facilities by themselves will yield limited benefits. Since the literacy rate is barely one in four and among women, less than four per cent, the educational process needed to change this situation will require time. There will have to be a high commitment to the training of educators and the preparation of simple teaching materials to be utilized for health education and community motivation carried at a larger cross-section of the population.

IV. SECTOR ORGANIZATION/PARTICIPATION

A. The Responsible National Agencies

41. Responsibility for the provision of water supply and sewerage/sanitation facilities rests with Ministry of Water Resources (MWR) and Ministry of Panchayat and Local Development (MPLD). Nominally the former handles all schemes serving populations in excess of 1,500. In practice, however, both the cost and complexity of a proposed scheme, its location and the nature of local conditions may determine which agency assumes construction responsibility.

B. The Ministry of Water Resources

42. Within MWR are two interrelated groups totally involved with the sector - the Department of Water Supply and Sewerage (DWSS) and the Water Supply and Sewerage Board (WSSB). The latter agency was established to meet the needs of the World Bank assisted urban water supply and sewerage projects which commenced about ten years ago. Thus, the Board, whose Chairman is the Chief Engineer of DWSS, at present has responsibility for sector services in twelve of the principal urban centres and, as new studies and subsequent projects are completed, it is presumed that another ten will be added to their complement in 1985. In principal, DWSS has responsibility for all other urban and rural community water supplies (and sanitation where facilities exist). However, the Department is only directly concerned where new schemes are either in course of study and completion or have recently been commissioned but not yet handed over to the community for operation. It also maintains a number of older systems that have not been transferred to the panchayat organization due to lack of technical capability and/or maintenance funds.

43. An organization chart showing both groups within the Ministry is presented as Appendix 3. The Board now has Managers in Pokhara and Kathmandu, and Divisional Engineers in the several zones where their schemes are located. The present technical staff of WSSB numbers about 750 of which 30 are engineers and the remainder construction supervision and operating personnel.

44. DWSS has a large staff distributed across the country. The head office management and administrative personnel are stationed in Kathmandu. Engineers are located in the Eastern, Central, Western and Mid-Western Development Regions, and several sub-regional offices, each under the management of a Divisional Engineer. The senior level technical personnel are listed in Table 3. All personnel are permanent although many have been temporarily promoted to a higher grade in recognition of their acceptance of hardship postings in field offices away from Kathmandu.

45. Many of the junior engineers, however, are temporary personnel contracted specifically to supervise construction projects. Since lack of qualified manpower has consistently been identified in Nepal as a serious development constraint, this procedure has at least helped to satisfy the requirement for numbers. However, most of these engineers

are new graduates lacking experience. Their youth and natural reticence to apply their newly-learned skills in the context of the traditional attitudes they encounter in the remote communities where they are obligated to work, all combine to limit their supervisory effectiveness. In consequence at almost all construction sites, poor quality control and a slow pace of project implementation are largely due to the lack of experienced manpower.

Table 3. DWSS - Senior Level Technical Personnel, 1982
(excluding personnel seconded to WSSB)

	<u>Engineers</u>		<u>Overseas</u>	<u>Plumbers</u>	<u>Others</u>
	<u>Senior</u>	<u>Junior</u>			
Management	2	-	-	-	-
Head Office-Kathmandu	5	6	19	2	14
Eastern Region-Dharan	2	16	19	20	-
Central Region-Chitwan	4	22	35	46	-
Western Region-Pokhara	2	17	25	26	-
(Far) Mid-Western Region - Nepalganj	5	20	28	31	
Total	<u>20</u>	<u>81</u>	<u>126</u>	<u>125</u>	<u>14</u>

Source: DWSS, 1982.

46. Recently, the Department adopted a decentralization policy. This requires more accountability from the Department's regional superintendents and divisional engineers, by relaxing the requirements for prior head office approval. This trend should lead to the improvement of implementation capability but should be augmented by a monitoring and reporting system that keeps management routinely informed on progress. The organizational structure of DWSS appears to be logical, and will improve as staff members gain more experience. Although all districts are supposed to have a District Technical Officer (DTO) to be headed by an Assistant or Acting Assistant Engineer, more only two years or less makes it difficult to maintain continuity and establish a long-term accountability.

47. The Mission noted that the availability of information concerning the existing status of water supply and sanitation facilities, in all parts of the country, was very limited. In addition, an inventory of data relating to the quantity and quality of sources used for public water supplies is not available. To overcome these problems, DWSS has indicated its desire to have a comprehensive Management Information System (MIS).

C. The Ministry of Panchayat and Local Development

48. MPLD is in a strong position to meet the basic needs of rural populations because it is the only central ministry that has representatives stationed in every District Panchayat (DP). However, traditionally these local DP officials are more concerned with the political and administration concerns of their jurisdictions. Although all districts are supposed to be assigned a District Technical Officer (an Assistant Engineer or Acting Overseer), most lack technical personnel, at least in the development sense, and the District Technical Offices are not able to provide competent project supervision. In 1981/82, MPLD technical manpower consisted of four Divisional Engineers, fifteen Assistant Engineers and ten Overseers. This represented a fourfold growth in Divisional Engineers since 1979/80 but an equivalent reduction in Assistant Engineers and a threefold decrease in Overseers. Not being a traditional technical ministry itself, MPLD has limited experience in planning and executing engineering works and has only a modest complement of technical personnel in the water supply and sanitation sector. A comprehensive external evaluation of the role and staffing of District Technical Offices has been requested by MPLD. Its projects have been assisted extensively by a variety of non-government and bilateral agencies in terms of volunteer assistance as well as grant-funding.

D. Assessment of Sector Agencies

49. The Mission concluded that, since WSSB was already fully committed to a program of urban water supply and sewerage improvements with World Bank support, any Bank-financed project should be directed towards the rural subsector. In addition, discussions with MPLD, as well as with others involved in providing technical assistance and financial support, lead the Mission to conclude that the general size and scope of a project that was required to meet the pressing needs of the subsector was beyond the additional assimilative capacity of this ministry. Accordingly, the Mission concentrated the bulk of its reconnaissance activities upon DWSS and this report consequently deals mainly with the experiences and programs of DWSS. Nevertheless, the individual Mission experts reviewed all aspects of the water supply and sanitation sector (see Appendixes 6 and 7).

E. District Panchayats

50. The 75 District Panchayats (DPs) have received grant funding from the Government to carry out their own small-scale development programs and provide for a local administrative organization. DPs can also raise funds themselves from taxes to augment their resources. It is DP that initiates the request to the central ministries for an improved water supply or other development project and it is the Government's expressed intention that, after commissioning, all water supply schemes (except those in Nagar Panchayats being transferred to WSSB) will be transferred to the benefiting Panchayat for operation and maintenance.

51. In the future, however, it is a newly formulated Government policy that DPs will be expected to play an even greater role in development. Under the terms of the Decentralization Bill, which has

recently been signed into law, all District Panchayats must prepare their their own development plans for both local and central funding to reflect their perceptions as to local priorities. In future, the Five-Year Development Plans and the annual funding allocations will be based on these District Plans.

F. Associated Government Agencies

52. Inevitably, other government agencies have an impact upon the work of the principal executing ministries. To improve the level of interministerial cooperation and coordination in the water supply and sanitation sector, a National Group has been formed with present membership from all sector agencies. Either the Chief Engineer, DWSS or the Additional Secretary, MPLD serves as Chairman. Included in the Group are representatives of Finance and the National Planning Commission (NPC) who are concerned with overall budget provisions and inter-sector allocations as well as the distribution of funds within the sector according to need and equity between the different Development Regions. The Mission was advised by NPC that, in the light of past funding levels and existing new commitments, HMGN would appreciate the Bank giving priority to the western areas of the country commencing in the Far-Western Development Region, with decreasing priority moving eastwards.

53. The Department of Health Services (DHS) will be expected to perform the principal role in executing the "Health for All by Year 2000" (HFA/2000) program. All indications point to a large flow of development funds to this ministry and hence a restricted capacity to support peripheral activities. HFA/2000 envisages accelerated development of primary health care posts in all areas of the country and an integrated program of health-related support services which includes the provision of water supply and sanitation services. An Environmental Section (ESS) has been formed within DHS to be responsible for the adoption of suitable low-cost sanitation facility designs, public hygiene and education programs and coordination with the executing ministries. ESS is reportedly not yet active and indeed will probably require strong internal support through the National Group if all aspects of an integrated plan to improve public health are to be coordinated effectively.

54. Participation in the meetings of the National Group (which have been held several times a year since preparation of the Decade Plan commenced) by the Senior WHO Sanitary Engineer helps to forge a close-liaison with the UN group of agencies which, as noted in the following section, are most supporting of the work in the sector.

G. The External Agencies

55. Over the last decade, Nepal has received considerable sector support from a large number of international, bilateral and volunteer agencies. There are, for example, 43 NGOs registered in Nepal and most have engaged in some form of water supply improvement program. The Mission was able to collect information concerning a selection of external agencies but the list is not complete. The major known ones

are briefly described below. While the contributions of the others are no doubt appreciated greatly by the actual beneficiaries, they represent in aggregate a modest contribution to meeting the very large demands as reflected in the Sixth and Decade Plan targets discussed in Section VII.

56. The Bank has since 1969 provided a total of \$295 million for 33 loans to Nepal, mostly for agricultural related projects. However, the Bank has not participated in the water supply and sanitation sector with the exception of minor components added to its Integrated Rural Development (IRD) program. Preliminary consideration was given to a possible rural water supply project of approximately \$12 million three years ago, but was not taken up because at the time the Bank did not provide sector loans.

57. The World Bank has already credited \$46.8 million in IDA funds to the Government for onward loaning to WSSB in support of improved urban water supply and sewerage. The first credit of \$7.8 million for water supply and sewerage facilities in the city of Kathmandu (population 335,400) and the town of Pokhara (population 54,300), was approved in 1974 and a supplement of \$4.0 million added in 1977. Progress to completion remains slow principally because of difficulties with installation of the sewerage system in Kathmandu. The second credit of \$8.0 million for improvements and expansion to the water supply and sewerage facilities in the Kathmandu Valley, Pokhara, Biratnagar and Birganj was approved in 1977. An EEC Special Action Credit of \$3.0 million was provided to assist the Board in financing the civil works for the project. Both projects include some water supply improvements in adjacent rural communities. Also included were funds for additional feasibility studies.

58. The Third Credit for \$27.0 million covering further improvements in the towns already assisted plus six additional Nagar Panchayats was approved in 1980. This project also provides funding for additional feasibility studies in ten more Nagar Panchayats. The Fourth Credit will be based on the findings of these studies and is planned for approval in about 1985, when WSSB will take over responsibility for sector operations in these towns.

59. It may be noted here that the existing WSSB projects provide for sewerage in the core areas of Kathmandu and Lalitpur only and do not include any low cost sanitation alternatives in any of the communities supported by the program. As executing agency for the UNDP-funded Global Project GLO/78/006, the World Bank is preparing an "Eight-town feasibility study" of low cost sanitation effectiveness. This study is being guided by TAG/Delhi in support of DWSS as the executing agency, but full funding is not yet available. Should this study be completed successfully and provide positive results, it is understood that the World Bank will consider including a 'low cost sanitation' component for urban areas in its Fourth Project provisionally scheduled for 1985.

60. The UNDP provides the focal point for mobilizing technical assistance and capital support under the IDWSSD program. Current UNDP-funded programs within the sector include:

- the technical assistance/feasibility study components of the WSSB program;

- a study to prepare a manpower requirement and training plan for the sector; 1/
- the preparation of water and sanitation projects technical assistance group (PPU) based in Colombo, Sri Lanka;
- decade advisory services project (intercountry project) based in New Delhi; and
- support to mobilize national NGO's participation in the Decade.

61. WHO assistance to the Sector in Nepal dates back to an agreement signed in 1954. Two projects are at present in progress under the promotion of Environmental Health Program, as follows:

- NEP BSM 001 Community Water Supply and Sanitation; and
- NEP BSM 002 Training of Manpower for the Drinking Water Sanitation Program

Under the first project, WHO is providing the services of two sanitary engineers to work closely with the responsible ministries in planning and supporting the Decade Plan activities. Because of their long-term involvement in the sector, the two WHO staff provided considerable assistance to the Mission.

62. With the assistance of WHO, HMGN prepared its Decade Plan in November 1980 and has made commendable efforts to meet the targets defined therein (see Section VII). Lack of technical manpower at all levels was identified as the single most severe constraint to meeting these targets. Under the second project, which is funded by UNDP (para 61), WHO is helping to train Nepali personnel in the sector. The immediate objectives are:

- to provide fellowships in suitable institutions for the training of 88 engineers at the bachelor course level;
- to provide 14 fellowships for post-graduate studies in sanitary engineering;
- to develop a Decade Manpower and Training Coordination Function (DEMCOF); and
- to provide in-service training through workshops and seminars.

1 The Mission discussed with the World Bank coordinator for this study the need for the TORs being drafted to include all agencies active in the Sector - not just the WSSB as originally contemplated.

63. This project has experienced difficulty in placing the Bachelor level fellows in regional universities and has instead sought to strengthen the Institute of Engineering in Kathmandu so that Bachelor level courses can be offered in Nepal. This will be effected through a "twinning" arrangement with a University in the region but arrangements have not yet been completed. It had been hoped to arrange an interim provision for 48 fellows so that their studies could commence in October 1982, but this proved impractical. The total number of post-graduate fellowships has been reduced to seven and three have been placed at Asian Institute of Technology (AIT) in Bangkok.

64. UNICEF and Swiss Agency for Technical Assistance (SATA) have both been very active in the sector through MPLD. UNICEF projects are active in small rural communities i.e. less than 1,500 population in four of the five development Regions serving almost all Districts that are in the Mountains and Hills with the exception of those that are already provided for under Integrated Rural Development projects. Between them, UNICEF and SATA are providing funds and volunteers for all of the small rural water supply projects being executed by MPLD in these areas. MPLD personnel, with some UNICEF funding, are handling projects in the Central Region only.

65. Volunteers from Britain, USA, Germany, Netherlands, Japan, serving in MPLD under integrated and regular projects as well as some NGOs have helped to plan and execute small rural water supply developments in communities with less than 1,500 population. However, it was not possible for the Mission to obtain any meaningful assessment of the total contributions by such persons. Unfortunately, in many instances the lasting effect has been disappointing because no arrangements to maintain these systems have been established.

66. Integrated Rural Development (IRD) Projects are in progress in 23 Districts under World Bank, the Bank, USAID, ODA (and other) funding. Some of these projects contain a modest rural water supply and small sanitation components to be executed by MPLD (and occasionally by DWSS for the larger schemes) in cooperation with the Ministry of Agriculture under whose jurisdiction primary responsibility for project implementation lies. The Mission was unable to contact personnel from all IRD projects but has formed the impression from limited discussions that the water supply and sanitation components of these IRD projects are difficult to execute mainly because the planning for their implementation being a relatively small component of a project was not given the intention they deserve and hence inadequate commitments were obtained from MPLD at the time of project preparation and appraisal. Financial, organizational and staffing arrangements are generally unsatisfactory. Monitoring is virtually non-existent and responsibilities for ongoing operation and maintenance have not been established. A somewhat better success with execution has reportedly been achieved in the Mahakali Zone (IRD Far-West Region) where UNICEF has been retained as the executing agency for MPLD. The IRD projects also provide for a sanitation component usually involving the construction of demonstration latrines in public buildings, schools and

and other institutions, health posts, etc. together with health education. However, again because of being a small component of a project the effectiveness of the programs appear to have been very limited.

67. Isolated small rural water supply schemes have been constructed by the Indian Cooperative Mission (ICM, the British and Indian Gorkha Boards, the Canadian aid (CIDA) and, as previously noted, by many NGOs. The German agency GTZ carried out a detailed appraisal of a possible multi-scheme water supply program for possible funding by KfW in the Western Region but no commitment exists at the present time. While the Mission was in Kathmandu, the British aid (ODA) was finalizing the preparation of a program to construct 17 water supply projects, including some rehabilitation, with a population between 1,500 and 10,000 in the Eastern Region. The proposed ODA project was provisionally approved at a cost of nearly \$6.5 million. It includes a budget for promoting and constructing appropriate types of latrine in the project towns and for periodic visits by a Health Adviser to help design a health education program. Funds are also provided for manpower training. Finally, the European Economic Community (EEC) is giving consideration to aid in the amount of \$5 million, possibly as a contribution to UNICEF Projects.

V. THE PRESENT STATUS

A. Water Supplies - Urban

68. It is customary and useful to consider urban and rural populations separately when reviewing the water supply subsector (for details see Appendix 6). However, in the sense of large, densely-populated, urban core areas found in much of Asia, Nepal has very few truly urban centres. One is the Kathmandu-Lalitpur area, with a total population of about 320,000, where rapid growth is taking place and urbanization pressures are being experienced. Populations in the 12 largest towns grew at an average annual rate of 5.6 per cent in the 1971-81 decade and seem likely to double again by 1991. Evidently, the growth of urban core areas is continuing. Nevertheless, many of the 29 Nagar (Town) Panchayats have only small, or non-existent, urban core areas. They resemble collections of villages rather than urban communities.

69. For purposes of convenience and clarity in this report, the term "urban" has been used only to refer to the designated Nagar Panchayats. All other communities are included under the "rural" classification. On that basis the urban population of Nepal is currently about one million, about seven per cent of the total population (see para 29).

70. Availability of service varies considerably between towns in this group but it has been estimated that an average of nearly 80 per cent of the urban population have access to piped water out of which two-thirds are served by public standpipes and one-third by separate house connection. In some towns water supply is inadequate and service is infrequent. The norm, however, is for water to be available for a nominal four hours each morning and evening. A few large centres now have a 24-hour service but more will be improved to this level as WSSB and DWSS urban rehabilitation and system expansion schemes are completed.

71. WSSB operates the water supply facilities in 13 Nagar Panchayats (NPs) which in 1981 had a population of about 765,000. One NP operates its own water supply system (but may be transferred to DWSS) and the remaining 15 are already operated by DWSS (see Table 4).

72. The Third Water Supply and Sewerage (World Bank) Project includes provision (with UNDP funding) for feasibility studies of water supply schemes in 10 towns (see Table 4). It is intended, that WSSB will take over responsibility for operation in 1985, prior to their inclusion in the proposed Fourth Project scheduled for appraisal in 1985. No indication has been given as to whether, or when, the remaining six Nagar Panchayats will be transferred. However, since the schemes operated by WSSB are required to meet their full operating costs, including asset depreciation, an assessment of affordability and service levies, etc. would need to be made before transfer would be possible. All of the ten towns scheduled for feasibility studies by UNDP and the remaining six NPs reportedly need upgrading due to:

- an inadequate source of supply and lack of suitable treatment;
- high rates of leakage and illegal connections;

Table 4. Urban Water Supplies Served by WSSB and DWSS, 1981

Zone	Served by WSSB			Served by DWSS		
	Nagar Panchayat	1981 Population	Water Source	Nagar Panchayat	1981 Population	Water Source
Mechi				Tilam ^{a/}	9,300	S/C
				Bhadrapur ^{a/}	14,900	W/P
				Demak	6,800	W/P
Kosi	Biratnagar Dharan	93,900	W/P	Dhankuta ^{a/}	13,200	S/G
		42,700	S/G			
Sagarmatha				Rajbiraj ^{a/}	16,300	W/P
				Lahan ^{a/}	12,900	W/P
Janakpur	Janakpur	35,200	W/P	Jaleswar	11,700	W/P
Bagmati	Kathmandu)	316,100	RSW/GP			
	Lalitpur)					
	Bhaktapur	50,500	R/G			
	Banepa	n.a.	S/G			
Narayani	Birganj	45,900	W/P	Bharatpur ^{a/}	26,700	S/G
	Hetauda	32,700	S/G	Kalalya	n.a.	W/P
Gandaki	Pokhara	48,600	R/G			
Lumbini	Bhairawa	30,100	W/P	Tansen	12,100	R/P
	Butwal	22,900	RS/PG	Taulihawa	n.a.	W/P
Rapti				Tribhuvan N ^{a/}	19,300	R/G
Rheri	Nepalganj	33,900	W/P	Birendra N ^{a/}	13,900	R/G
Seti				Dhangari ^{a/}	26,100	W/P
				Dipayal ^{b/}	n.a.	n.a.
Mahakali				Mahendra N	41,600	W/P
TOTAL						

Legend:

R - River
S - Spring
W - Groundwater
P - Pumped
G - Gravity

^{a/} Nagar Panchayats due for transfer to WSSB in 1985.

^{b/} This scheme has not been transferred to DWSS by the Panchayat.

Source: WSSB and DWSS, 1981.

- inefficient capacity and storage facilities;
- limited population coverage;
- less than 24-hour service; and
- little or no effective measures provided for maintenance.

73. New WSSB schemes are developed for continuous service with consumption rates forecast to be in the order of 60 to 140 lcd by 1990. The higher figure is for the Kathmandu Valley area and includes industrial demand. Percentages of the population to have private connections are expected to increase to 84 per cent in the Kathmandu Valley, and to between 40 and 75 per cent in the other towns by 1990. Standpipe demand is normally assumed to be 45 lcd. Treatment is avoided if possible or limited to simple sedimentation and filtration. Chlorination is provided for surface water supplies. WSSB has introduced almost uniform metering for private house connections but, because of accuracy difficulties when service is intermittent, has not been able to bill all customers on the basis of usage.

74. DWSS schemes in both urban and rural areas are designed, generally by consultants (see para 129) according to established planning and design criteria which must be followed precisely. While this ensures work of acceptable quality (providing the field surveys are carried out accurately) and has no doubt been essential during the initial period of generating experience by consultants, it has also reduced the opportunities for development of more appropriate, lower-cost or more effective designs by innovative firms.

75. The design parameters are listed in Appendix 4. Of importance is the question of hours of service. In many areas, water sources have been considered inadequate to supply water 24 hours a day but in other cases even when plenty of water is available, schemes are operated for four hours only twice a day. While it must be acknowledged that the design guidelines published by the Department call for 24-hour service whenever supplies permit, the Mission believes that an 'eight-hour per day' philosophy exists and little pressure is felt to provide 24-hour service as the normal condition. For schemes where system pressures are maintained by pumping one can accept that, at the present stage of development, the beneficiaries can not afford to meet the fuel costs of pumping 24-hours a day. However, such schemes are not common in Nepal. For all other types of scheme, where system pressure is maintained, there would appear to be no sound reason except water scarcity for restricting service to only brief morning and afternoon periods. Claims of misuse, wastage, etc., need to be counteracted by good system maintenance and community education, not by turning off the source of water.

76. One other design feature, or rather lack of it, needs to be rectified. An overview by the Mission of a number of typical feasibility study and design reports prepared for DWSS by local consultants indicated that, on the layout drawings, public standpipe locations are conceptual only and installation details are not provided. The Department's

"General Specifications for Construction of Water Supply Schemes" deals with quality of workmanship, material requirements, etc. but does not address the matter of public standpipe location or, of particular importance, drainage of wastewater. Mission members visited public standpipe locations in many panchayats and almost without exception found that little or no attempt had been made to channel water that is spilled or 'used' adjacent to the public standpipe away from the standpipe area in an acceptable manner. The result is large, muddy areas with grey water that are a health hazard in that it is difficult to keep the containers in which the water is carried clean and the grey water areas are often used as a source of water.

77. Little improvement in public health can be expected while it is easier to draw water from a polluted surface drain nearer to the house than to wait one's turn at the public standpipe. It appears that provision of the washing of clothes should be made at the public standpipes.

B. Water Supplies - Rural

78. Both DWSS and MPLD are active in the rural water supply subsector. For shallow tubewell projects in the Terai, DWSS has agreed to work in the Central, Mid-Western and Far-Western Development Regions and MPLD in the Eastern and Western Regions. For gravity supply schemes in the Mountains and Hills, MPLD projects are in communities of less than 1,500 persons. DWSS plans and implements all larger schemes and all projects involving pumping or deep tubewells. The boundaries are not rigidly followed and there has been some confusion concerning which ministry takes up which project.

C. MPLD Schemes in the Mountains and Hills

79. MPLD is responsible for four types of rural water supply schemes:

- grant-in-aid projects costing less than \$7,600 where the money is given directly to the District Panchayat and MPLD provides only technical assistance support;
- IRD projects which are funded by other (usually external) agencies where MPLD provides both design assistance and construction supervision for the water supply components;
- UNICEF-aided projects where MPLD leaves all responsibility to UNICEF as executing agency on its behalf or, as in the Central Region utilizes UNICEF funds for materials and provides its own technical services; and
- projects which are similar to the UNICEF Projects with the difference that MPLD fully finances and provides technical personnel for its implementation.

80. To date, about 1,500 grant-in-aid projects have reportedly been completed. However, a comprehensive follow-up has not been carried out and the degree of effectiveness is not known. Some 150 IRD and 150 to 200 UNICEF-aided schemes have been constructed and new ones are being completed at the rate of 30 to 40 per year. It is estimated that about 750,000

people, five per cent of the rural population, live in communities served by these schemes.

81. Service standards for MPLD schemes are basic, commensurate with the level of operational skills that can be found at the small village level. Only public standpipes are provided and source and storage requirements are based, wherever possible, on a usage rate of 45 lcd. The most unpolluted source of adequate capacity within reasonable distance is selected and steps taken to limit the ingress of pollutants above the source. Treatment is not provided even though some surface sources have to be used where natural springs are not available. The basic policy is that the piped water is firstly a great convenience, and secondly a vast improvement on the available alternatives. It is felt that until all components of a public health improvement campaign can be put into place, a reasonably clean, protected source of adequate quantity is no longer the weak link in the disease transmission cycle that the old polluted sources once were. The "Health for All by Year 2000" policy document clearly acknowledges that an improved water supply can not by itself break the cycle. To achieve maximum benefit it is essential that sanitation, surface drainage and public hygiene education are integrated within all water supply schemes.

D. DWSS Schemes in the Mountains and Hills

82. The Department is at present responsible for maintaining water supply schemes in 62 rural communities and assists the District Technical Offices with maintenance in another 17 communities. The distribution of these (and the urban) schemes is shown in Table 5. Of the nearly 80 locations, 30 are District Headquarters. In aggregate, the rural systems are estimated to serve some 250,000 persons. The preponderance of schemes, and the much larger populations serviced in the Eastern, Central and Western Region are evident. However, in proportion to the rural populations in each Region the difference are not marked. Of greater significance, total coverage is still only about two per cent of the total rural population.

83. Unit capital costs for new gravity schemes, based on recently contracted works, are as follows:

Table 6. Unit Costs for Water Supply Project DWSS

Mountains	Rs 1000 per capita	(\$76)
Hills Eastern	650 per capita	(\$50)
Central	750 per capita	(\$57)
Western	680 per capita	(\$52)
Mid-Western	850 per capita	(\$65)
Far-Western	650 per capita	(\$50)

Source: DWSS, 1982

These estimates include all construction and material costs but exclude management and supervision by the Department.

Table 5. Existing Water Supply Schemes Maintained and Assisted by DWSS (Urban and Rural), 1982

Region	Zone	No. of Schemes	Design Population
Eastern	Mechi	5	31,600
	Kosi	9	37,400
	Sagarmatha	<u>8</u>	<u>28,600</u>
		<u>22</u>	<u>97,600</u>
Central	Tanakpur	5	14,600
	Bagmati	11	36,000 ^{a/}
	Narayani	<u>6</u>	<u>33,700</u> ^{a/}
		<u>22</u>	<u>84,300</u>
Western	Gandaki	12	33,200
	Lumbini	8	45,100
	Dhaulagiri	<u>7</u>	<u>26,600</u>
		<u>27</u>	<u>104,900</u>
Mid-Western	Rapti	5	16,700
	Karnati	1	3,500
	Bheri	<u>4</u>	<u>17,200</u>
		<u>10</u>	<u>37,400</u>
Far-Western	Seti	6	16,400
	Mahakali	<u>5</u>	<u>18,900</u>
		<u>11</u>	<u>35,300</u>
Overall Total		<u>92</u>	<u>359,500</u>

a/ Population figures should include one extra town in each zone for which data are not available.

Source: DWSS, 1982.

84. The number of new urban and rural schemes that have been completed annually by DWSS during the past few years varies from none in fiscal years 1978 and 1979 to 18 in 1981. A total of 38 has been completed since 1975 but the rate has been improving; 33 schemes (including 4 urban improvements) were completed in fiscal year 1982. The Department has almost 100 new projects under construction and more than another 100 at the feasibility and design stage. Another 100 schemes have been identified and some 600 have applications from the panchayats pending feasibility studies. The great majority of these projects are (or will be) simple gravity schemes designed in accordance with the criteria identified in Appendix 4.

85. Implementation problems identified by DWSS officials include:

- unsatisfactory work furnished by consultants, although this is improving as the better ones gain experience and the poorer ones are dropped from the eligibility lists;
- transportation of materials to sites that are not accessible by road;
- lack of availability of skilled labor for construction, particularly in remote areas; and
- difficulties of construction supervision, again particularly in remote areas, due to lack of available staff in relation to long travel times.

86. The Mission agreed that these are real issues, especially those related to sites that are remote. However, it noted that the Department had a staff of 81 junior engineers, 126 overseers and 125 plumbers (see Table 3) to service less than 100 existing schemes and supervise construction of about 100 new ones. This ratio of professional and skilled personnel to projects is high and should be more than ample to ensure good progress and satisfactory quality control. Discomforts of travel and living in remote areas are not underestimated and the Government must rectify the situation by providing improved allowances to staff in the field. Hiring of more staff to help with supervision does not appear to be the solution.

87. If the logistics of materials delivery could be better handled (if RNAC can not do it with their present fleet then alternative arrangements will have to be made) it should be possible to finish construction of most small gravity schemes in one season, generally between October and May to avoid the monsoon. Each junior engineer should be assigned to be responsible for two or three projects, depending upon location and experience, and required to visit each one for several days at a time every month. At the start of construction he would need somewhat longer to check all materials on site, confirm layouts, arrange contractors, supplies of funds and office rental (or construction if necessary). The project overseer should accompany the engineer on the initial visit to become acquainted with the job. Thereafter, he should be required to stay with the job until completion, apart from being briefly relieved by a replacement overseer or plumber for a short vacation half way through the construction period. Coincidentally, he should be required to train a local person appointed by the panchayat so that knowledge is imparted to, and maintenance capability is left with, the community after the work is completed.

E. Schemes in the Terai

88. Only a few DWSS schemes are located in the Terai and utilize pumped deep tubewells as their source. Storage is provided and supply is mostly through public standpipes although demands for private house connections is increasing. Technical problems with these schemes are not serious. However, high levels of iron and manganese in the Eastern Terai have occasionally resulted in water of unpleasant taste and colour. A treatment plant has been installed to cope with this problem at Rajbiraj. As yet MPLD has not been very active in the Terai. A small number of handpumps has been installed but a major program to reduce the very large demand for a safe supply has not been mounted.

89. On behalf of both Ministries, UNICEF has assisted with funding and volunteer support for a shallow tubewell "pilot" project which was executed over two years (1981-83) at a cost of about \$0.6 million of which UNICEF funded nearly 80 per cent. The project included 1,600 shallow tubewells ^{1/} but the primary objective of the program was to develop techniques for construction, organization and management as the basis for planning a program of many thousands of such wells to be implemented during the remainder of the Decade.

90. First year targets (1981) of the UNICEF Program were to install 200 units for MPLD in the Western Region and another 200 units for DWSS in the Central Region. In the second year, the work expanded into the Eastern and Mid-Western Regions. However, no shallow tubewells were constructed under this program in fiscal year 1981 and the schedule was compressed, with all 1,600 units constructed in 1982 by MPLD and DWSS. The Bangladesh No. 6 pump, which is the preferred unit for use in the Terai, was not available in the market and was imported from India. The Government's plans to manufacture these handpumps in Nepal have reportedly not yet materialized although the Mission was advised that the capability exists.

91. UNICEF advised that it had been planned to evaluate the pilot phase project (see para 90) with a view to progressing rapidly into the main project execution phase in accordance with Decade Plan objectives. In the meantime, both Ministries have budgeted small amounts for shallow tubewell schemes but no commitments have been made for an accelerated program. Since such schemes can be constructed at an estimated cost of about Rs.25 per head (\$1.90), it is evident that, in terms of cost effectiveness, a large program of shallow tubewells in the Terai would help to meet Decade targets at minimal cost.

92. Recently, DWSS has reconsidered its approach to meeting the water supply needs of the Terai. Mountain and Hill populations are getting systems that offer the option of private house connections and Terai communities will now have this option made available. For the remainder of the Sixth Plan, DWSS and MPLD is planning on the basis that 25 per cent of Terai communities served by new water supply schemes will opt for piped systems and the remainder i.e. 75 per cent will be covered by public standpipes. Few Terai schemes are ready for implementation and no designs for piped supplies have been prepared.

^{1/} Sanitation and manpower training aspects were also included.

F. Operation and Maintenance

93. Undoubtedly the most thorny issue related to the improvement of all DWSS water supplies, particularly in rural areas, is the problem of maintaining schemes in good working order once they have been completed. It has been the policy of the Government that commissioned schemes should be handed over to the panchayat organization for operation and maintenance within a reasonable period after completion and after DWSS has trained a local person to become responsible. This policy remains in effect and was emphasized as critically important by senior members of the Government to the Mission.

94. Unfortunately, in many cases the local panchayat has failed to attend to maintenance or has simply refused to accept responsibility claiming lack of both operating funds and technical expertise. The Mission emphasized that it could not recommend to the Bank to proceed with a project to be implemented by DWSS until this issue had been definitely resolved. ^{1/} The discussion held by the Mission on this issue clearly show that the Government fully understands the budgetary implications of continuing to provide all system with operating, maintenance and repair costs from costs from central revenues at no cost to the beneficiaries and is prepared to accept that projects must be formulated to maximize cost recovery.

95. The situation with MPLD (UNICEF) schemes is little different. A survey in 1977 of all schemes completed by MPLD (then LDD), UNICEF and WHO between 1973 and 1976 (70 in total) showed that:

- nine per cent were not in operation;
- 41 per cent had major faults; and
- 50 per cent were working satisfactorily (but many with uncorrected deficiencies)

Only half the schemes had the ability to meet the demands of those served throughout the year and 16 per cent did not even meet requirements during the wet season. Less than 10 per cent yielded water of acceptable bacteriological quality (defined as 50 coliforms per 100 ml). Routine maintenance was not carried out for any scheme. The principal reasons for failure were stated to be:

^{1/} On 11 December 1984, the Bank approved a loan (Loan No. 719-NEP) in the amount of \$9.6 million (total cost \$12.0 million) for a Rural Water Supply Sector Project for piped water supply in 75 communities and tubewells in 175 communities in the Mid- and Far-Western region, and the Bank also approved an administrative and operational technical assistance (TA NEP-644 Rural Water Supply Sector) for \$200,000 for advisory services to DWSS to review feasibility studies carried out earlier by local consultants; assist local consultant prepare detailed design and tender document; and assist DWSS in project implementation.

- poor design;
- improper construction (lack of supervision);
- natural disasters;
- vandalism; and
- inadequate preventive maintenance.

96. Following the Jhapa Conference ^{1/} on the Rural Water Supply Program (September 1980), DWSS Regional Offices in the Western and Eastern Development Regions carried out surveys of the existing status of rural water supplies. The results indicated:

- of 45 projects visited in the Western Region, seven were not working, 16 had serious deficiencies and 22 were working satisfactorily or had minor faults; and
- of 31 projects visited in the Central Region, 70 per cent had major deficiencies.

Reasons for inoperation again included all of the above plus lack of design standardization in the Central Region where no overall control was available.

97. Arising out of these findings, the Ministry of Water Resources and the Ministry of Panchayat and Local Development have started their determination to train local Panchayat people as Village Maintenance Workers (VMWs) - MPLD version, or Water Supply Technicians (WSTs) - DWSS equivalent. However, lack of funds and training facilities is hampering progress.

G. Urban Sanitation

98. It was estimated during preparation of the Decade Plan that in 1980, 86,000 persons (12.3 per cent of the population in the 12 towns surveyed) had access to private individual sewerage systems. The remainder presumably used either public or private latrines or open-places (for details see Appendix 7). A Household Budget Survey carried out by the Nepal Rastra Bank in 1973-75 (published 1978) revealed that, in the 16 urban communities sampled, half had a better than 30 per cent coverage of latrines, and Kathmandu had over 82 per cent. Private latrines inspected by Mission members were, almost without exception, well-maintained and clean. Public facilities on the other hand, were invariably filthy demonstrating a total absence of care and attention.

99. Consolidated data have not been gathered on the existence of sanitation facilities in all urban communities, especially outside the core areas, but it is believed that a wide range of latrine types from simple pits to pour-flush units exists.

^{1/} The objective of the conference was to improve the operation and maintenance situation.

100. Of the 29 towns (Nagar Panchayats) in Nepal only the capital Kathmandu has a properly developed sewerage system. A combined sewerage system has existed in the core area of Kathmandu since around 1900. In 1974 it was found to be almost non-operational and the first World Bank (IDA) Water and Sewerage Project provided equipment for sewer cleaning so that WSSB could carry out rehabilitation work. Under the first IDA project (1974 to 1976) the system was extended and a three-stage stabilization pond treatment plant was added. The second and third projects provided for further system extensions including a sewerage and separate treatment plant for Lalitpur, to serve an estimated population of 67,000 (total population of the urban core area of Kathmandu is 90,900). However, serious implementation delays have been encountered and neither the new sewerage system nor the treatment units are yet in operation.

101. In Bhaktapur (population 64,300) the sewerage system has been installed under aid from Federal Republic of Germany (FRG) and now serves some 1,100 houses (about 8,000 population). However, the treatment plant has not been completed and, as a result, the pollution problem has been transferred to the Hanumanti River. With few exceptions, an outstanding one being Bhaktapur, sullage is disposed haphazardly to ground, to surface water channels, or to water courses; surface water collection is badly designed and channels and ditches mainly inoperable; and solid wastes are dumped at any convenient spot, often into surface water drains. These practices result in a level of pollution, particularly in the more heavily populated areas, that is both aesthetically objectionable and hazardous to health. The importance of safe sullage disposal, surface water collection and solid wastes collection cannot be overemphasized in the context of this report.

102. Under the WSSB projects no other towns are definitely scheduled for installation of sewerage systems in their core areas. However, the Board has in hand Master Plans for sewerage systems in the core areas of six towns. Feasibility studies have been completed for six more and are planned for a further eight. The Ten-Year Development Plan envisages sewerage systems in 17 Nagar Panchayats by 1990 out of the total of 29 Nagar Panchayats serving 715,000 persons.

103. The WSBB water supply projects now providing improved water supply facilities in 12 Nagal Panchayats do not include sanitation components. It is noted that the Fourth Project, provisionally depending upon the findings of the UNDP Global Project demonstration units and the eight town feasibility studies, is scheduled to commence shortly.

H. Rural Sanitation

104. Data on rural sanitation practices are almost non-existent but it is clear that open-air defecation is very widely practised. In the Mountains and Hills chute latrines are often installed on the second floor of houses where animals are kept inside on the ground floor, the accumulated excreta being periodically removed for use as fertilizer.

105. Under guidance of the TAG Mission operating out of Delhi under the UNDP Global Project and with sustained enthusiastic support from Dr H. Bista of Tribhuvan University and others in Nepal, DWSS has constructed over 250 pour-flush latrines in Kirtipur, a very old hill-top community, beside the University outside Kathmandu. The program has been very successful and the demand for still more units (all private) in this densely-populated urban community of over 8,000 people continues to grow.

106. An evaluation of the Kirtipur Demonstration Project was carried out recently by the Development Research and Communications Group of Kathmandu with Dr H. Bista as the principal author. The principal findings are that:

- even indifferent communities can be converted into supporters of low-cost sanitation initiatives if the approach is handled carefully;
- the women have embraced the program enthusiastically because the alternative sanitation facilities for them were unattractive;
- while the health-related reasons for building a private latrines are not well understood, having one has been seen as a status symbol and a matter of great convenience; and
- external assistance both technical and financial was essential in obtaining acceptance of the program.

107. Work has now commenced upon a second demonstration project at Ilam in the Eastern Region, Mechi Zone where some 20 units have been installed to date. DWSS has formed an Environmental Sanitation Division (ESD) to take over responsibility for all aspects of sanitation falling within its responsibility. The initial person in-charge of this group was recently granted a fellowship for post-graduate training in the Netherlands. The new appointee is becoming familiar with the program. DWSS has endorsed in principle the concept of an eight-town demonstration project followed by feasibility studies but does not want to accelerate the program at this time.

108. The Chief Engineer concurred that low-cost sanitation program should support water supply projects. However, DWSS has no specific plans for commencing further demonstration sanitation projects in any town within the immediate future.

109. In advising the Mission, Dr H. Bista has drawn attention to a basic ethno/cultural factor that will greatly affect the acceptance of Nepali people to low-cost sanitation options. The people of Kirtipur are not only mostly good masons and hence able to construct their own latrines with little difficulty, they are also Jyapu (peasants) - hard working people with a tradition of using decomposed excreta, both animal and human, as fertilizer and of working with such materials with their hands.

110. Like the Tibetan-speaking people in the mountains and others, the Jyapu people will accept the need to empty the latrine pits themselves periodically. In other locations such as Terai, Indo-Aryan peoples have an occupational caste system where the availability of a scavenger class to empty composted pits will ensure latrine acceptability. In other areas, however, where neither situation exists, the introduction of latrines will prove more difficult and further study will definitely be required.

111. The Mission believes that all sector ministries have paid too little attention to the satisfactory disposal of sullage and the handling of surface drainage. Because of this, the health benefits of water supply schemes are often much less than they should be. All waste water disposal must be viewed as an essential adjunct to the creation of an improved water supply.

I. Legal Situation

112. The existing laws which concern the provision of water supply and sanitation facilities are briefly described as follows:

- The Irrigation, Electricity and Related Water Sources Act (1967), which is designed to regulate the development of hydro-electric power and irrigation projects, but also relates to other uses of water;
- The Water Tax Act (1966), which governs the rate and method of collection of charges for water connections made from Water Supplies owned and operated by the Government;
- The Town Council Act or Nagar Panchayat Act (1962) and the Gram Panchayat Act (1962), which define, among other items, the powers of panchayats (town and village councils) to provide water supply and sanitary services and to collect revenues;
- The Development Board Act (1956) and the Corporation Act (1964), which provide for and regulate the formation and operation of organizations which might be considered suitable to provide water supply and sanitation services. Under the Development Board Act (1956) the Water Supply and Sewerage Board (WSSB) was formed under order 1973; and
- The Administrative Execution Act (1956), under which the Water Tariff (Realization) Rules (1975) are made, regulates the water tariff structure for the Department of Water Supply and Sewerage (DWSS).

113. With the exception of The Irrigation, Electricity and Related Water Sources Act (1967) which imposes some restraints on the development of the water supply and sanitation sector, the above laws form an acceptable legal basis for the development of the sector. The Government requested the Bank to consider financing a part of the rural water supply development program. The distribution of water to

consumers under this program would be mainly via public standpipes. The above legal enactment "Irrigation Electricity and Related Water Resources Act (1967)" empowers water tariffs to be levied and dues to be collected from consumers using water from public standpipes. However, it should be noted that the Act merely imposes an obligation upon the license holder to pay prescribed charges and annual fees to the Government. Also, the license may impose and collect water charges from consumers only provided that the approval of the Government has been obtained before imposing and collecting water charges. The form and amount of water charges is completely unspecified. The Government has not reserved to itself the right to impose water charges direct but to approve any water charges which might be proposed by a licensee. Dues have never been collected from consumers using water from public standpipes. The Government is paying Rs140 (\$11) per month per public standpipe to WSSB, thus directly subsidizing the water supply to the poorest segment of the population within WSSB's supply area. It is estimated that gravity schemes total operation and maintenance cost could be recovered with an average tariff in the order of Rs 1-2 (\$0.10-0.20) per month per household from families within a distance of 150 meters of each public standpipe. The average monthly household income in the poorest area in Nepal (Far Western Development Region) is estimated at \$20-30 ^{1/} and this tariff would represent less than one per cent of the income.

114. The Water Act (1966) provides for the setting of tariff and connection fees for all systems owned and operated by the Central and District Governments. In addition the Administrative Execution Act (1956) and the Water Tariff (Realization) Rules (1975) are used by DWSS to regulate the tariff structure for household connections. The town Council Act (1962) empowers the councils which operate systems to charge their own rates. It is the Government policy that beneficiaries pay the cost for operation and maintenance of water supply systems and sewerage where they have private connections. However, to date, the Government has been very reluctant to level water charges to the beneficiaries with the exception of consumers with metered household connections operated under WSSB.

J. Water Tariff Structure

115. WSSB's water charges were first introduced in 1975 as part of the World Bank first loan covenants when only very limited information and operating experience was available. A tariff study in October 1979 concluded that in order to achieve gradually the loan covenant rate of return of six per cent on average net fixed assets in operation, new tariffs would need to be introduced. The study also proposed that tariffs should be set at levels that the average consumer is able and willing to pay and further estimated that this level is about three per cent of the average family income. In addition the study concluded that the Nepalese population has a low degree of willingness to pay for water because alternative sources of water supply are available in many areas.

^{1/} National Planning Commission, A Survey of Employment, Income Distribution, and Consumption, Kathmandu, 1977. (It is considered that the income has not increased since this study was produced.)

Table 7. Water Rates for Unmetered and Metered Connections DWSS, 1982

<u>Unmetered</u>	<u>Old Tariff ^{a/}</u>		<u>New Tariff ^{b/}</u>	
	<u>Main Line</u> Rs/mo.	<u>Additional Branch</u> Rs/mo.	<u>Main Line</u> Rs/mo.	<u>Additional Branch</u> Rs/mo.
Size (in.)				
1/2	9	3	13	4
3/4	30	6	45	9
1	60	12	90	10
1-1/2	170	30	270	45
2	340	50	450	75
3	930	100	1,350	150
4	1,930	235	2,800	340
Standpipe	100	-	145	-

<u>Metered</u>	<u>Old Tariff ^{a/}</u>		<u>New Tariff ^{b/}</u>	
	<u>Minimum Charge</u> Rs/mo.	<u>Maximum Consumption</u> Liter/mo.	<u>Minimum Charge</u> Rs/mo.	<u>Maximum Consumption</u> Liter/mo.
1/2	5	10,000	7	10,000
3/4	20	29,000	28	27,000
1	40	54,000	56	50,000
1-1/2	120	154,000	168	140,000
2	200	254,000	280	235,000
3	600	754,000	840	700,000
4	1,200	1,504,000	1,680	1,400,000

For the Excess of Maximum Allowable Consumption

Old Rate ^{a/}	Rs 0.8 per 1,000 liters
New Rate ^{b/}	Rs 1.2 per 1,000 liters

<u>Size</u> (in.)	<u>New Connection Charges</u>	
	<u>Up to 100 ft</u>	<u>Excess of 100 ft</u> Per each additional ft
1/2	Rs 100	Rs 0.75
3/4	200	1
1	400	2
1-1/2	600	3
2	800	4
3	1,200	6
4	1,600	8

^{a/} Effective April, 1975

^{b/} Effective September, 1982

Source: WSSB, 1982.

116. It was not considered politically feasible to raise tariffs immediately to the equivalent of three per cent of average family income, a level that would fully cover operation and maintenance costs of all water supply systems. Instead it was decided to import a step by step increase over the next several years. An average tariff level increase of not less than 45 per cent is required. The World Bank requires that revenues should cover at least the operating expenses and depreciation. Table 7 shows WSSB's present water rates.

117. In September 1981 the Government increased its payment to WSSB to Rs145 (\$11) per month per public standpipe (previously Rs 100 or \$7.6) further directly subsidizing the water supply to the poorest segment of the population within WSSB's supply area. Tariffs for sewerage amounting to 25 per cent of the water charge of any customer with sewer connection were introduced in late 1983.

118. MPLD has the responsibility of providing gravity feed piped water supply and shallow hand-pump wells to rural communities with less than 1,500 population, and to look after major repairs, rehabilitation and extension of completed schemes. The Government's present efforts have been strongly concentrated on the fulfillment of the Decade population coverage targets, and the operation and maintenance institutional structure of MPLD has not been given the attention that is needed in order that systems will be operated and maintained efficiently.

119. In principle each village is required to establish a village water supply committee prior to construction of a scheme. These committees are required to make minor repairs (up to Rs 1,000 or \$75). The responsibility of the Water Supply Technician or Overseer at District level is to handle major repairs (over Rs 1,000 or \$75 up to Rs 12,000 or \$915). For rehabilitation and extensions costing more than \$915, funds are provided from the District Panchayat's water supply construction budget.

120. According to the recently passed Decentralization Bill, all water supply systems will be handed over to the panchayats from MPLD and DWSS once they have been constructed. However, MPLD and DWSS are still operating and maintaining more than half of the projects which should in principle be maintained by the panchayats. The reasons for this lack of handling over are reported to be a claimed lack of financial resources and willingness by villagers to maintain constructed water supply schemes.

121. DWSS's existing tariff structure has been in force since January 1975. The rate is applicable to the whole country for water supply systems operated by the Department. It applies to unmetered household connections (see Table 8).

122. DWSS has proposed to HGMN a new tariff structure also including metered household connections (see para 13). This proposal is at present under discussion. The requested changes, for the unmetered connections, are that the charge for 1/2 in. pipe (the predominant size for household connections) is to be increased to Rs13 (\$1.0), and the charge for 3/4 in. pipe to be decreased to RS 20 (\$15).

Table 8. Water Rates for Unmetered Connections, DWSS, 1982

<u>Paper Size</u>	<u>First Tap</u>		<u>Other Tap</u>	
	<u>Main Line</u>		<u>Additional Branch</u>	
	Rs/month	Rs/month	Rs/month	Rs/month
1/2 in.	5	0.4	3	0.2
3/4 in.	30	2.3	6	0.5
1 in.	90	6.9	12	0.9
1-1/2 in.	170	13	30	2.3
2 ins.	340	26	50	3.8
3 ins.	930	71	100	7.6
4 ins.	1,930	147	235	18

Source: DWSS, 1982.

123. It is now also proposed that, where possible, household connections should be metered. This has already taken place in four towns, but the charges are still based on the unmetered tariff structure, because meters do not give accurate readings when used on the present intermittent flow. The proposed rates for metered connections are (subject to minimum tariffs per month) Rs 0.50 (\$0.04) per 1,000 liters for consumption below 10,000 liters per month; and Rs 0.80 (\$0.6) per 1,000 liters for consumption in excess of that amount. In addition, for new household connections, a connection charge of 1/2 in. pipe of Rs 45 (\$3.4) is made for distances of up to 100 ft. from the main to the household, and Rs 32 (\$2.4) for each additional 100 ft. The proposed minimum charges per month for metered household connections are as follows:

Table 9. Minimum Charges for Metered Connections, DWSS, 1982

<u>Paper Size</u>	1/2 in.	3/4 in.	1 in.	1-1/2 in.	2 in.	3 in.	4 in.
Tariff							
<u>Rs/month</u>	5	20	40	120	200	600	1,200
<u>\$/month</u>	0.4	1.5	3.1	9.2	15.3	46	92

Source: DWSS, 1982

124. The principle of charging for water in rural areas is a new concept in Nepal, and largely as a result of negotiations with bilateral and multilateral donors who have expressed doubts about the Central Government's continued ability to fund the recurrent cost involved in the ambitious target for the Decade for the water supply and sanitation

sector. It is certainly desirable to shift the operation and maintenance cost to the beneficiaries of the schemes. The Bank consider it essential that the tariff structure should cover at least the recurrent expenditure involved in operation and maintenance. It is the Government's policy to subsidize the investment cost of rural water supply and sanitation facilities. The total capital cost for rural water supply is normally a subsidy. The rate of subsidy for pour-flush latrines is given as Rs 50 (\$4) per head amounting to a total of approximately Rs 300 (\$23) per house which is about one third of the total cost per pour-flush latrine. At present, in a poorer rural community, on average, only half of the population would be able to afford, and be willing to pay for, the relatively low cost of operation and maintenance of water supply or the material cost of a subsidized latrine. However, it is important to introduce water supply and sanitation facilities progressively since the conception of affordability will change as the attraction of convenient facilities and linkage with good health become better appreciated.

VI. ONGOING PROGRAM IMPLEMENTATION ASPECTS

125. As proposed earlier in this report (see paras 17 to 19) it was recommended by the Mission that the most appropriate involvement by the Bank was in the rural water supply and subsector in Nepal with project execution being the responsibility of DWSS. This Section investigates this recommendation in detail. Hence the following paragraphs are principally concerned with DWSS and reference is only incidentally made to the experience of both WSSB and MPLD where it is useful for comprehension and comparison.

A. Project Selection and Preparation

126. While MPLD has set up a rather formal, comprehensive, local participation and involvement process for selecting projects, DWSS operates basically on a "first-come-first-served" basis. The request for a project originates at the local level but many are transmitted to the Department by the local, District or even National Panchayat representative. The request is registered and normally takes its turn on a schedule of projects to be designed and implemented by DWSS. A period of at least five years from request to execution is usual.

127. Each year, the Department selects consultants to carry out project studies on its behalf. The consultant's terms of reference involve a two-stage process. Initially, he is required to visit the community to be served for the purpose of confirming feasibility. If an adequate source for a simple gravity water supply cannot be found, or if difficulties such as the need for a high pressure supply main are encountered, the work may be terminated at this point until a practical solution can be found. In most cases, however, the consultant completes the surveys and proceeds to the completion of design drawings utilizing standard components, the drawings and specifications for which are provided by DWSS. In this way, study costs are reduced to Rs 30,000 to 50,000 (or \$2,300 to \$3,800) per project.

128. The Survey and Design Division of DWSS checks the consultant's work and when the report is acceptable, the project takes its turn in the list for execution. In due course, the Division responsible for the District in which the schemes is located receives the report and drawings, funds are allocated in the Department's budget and responsibility for implementation passes to the Divisional Engineer (see Appendix 3). Consultants are not used for implementation supervision.

B. Consulting Capability

129. DWSS has, in the past, used foreign consultants for feasibility studies but was not well served. Its experience is that, for small simple schemes, particularly in remote areas, local firms can do a better job and more accustomed to travel, difficult access and living conditions. Nearly 30 firms have now worked for DWSS. Initially, the schemes were poorly conceived and inaccurately surveyed. However, capability has improved significantly and the Department is becoming familiar with the technical competence of the consulting firms.

130. The principle of depending upon consultants for study and design has now been accepted and satisfactory progress is being made. Hopefully, as more experience is gained, the Department will no longer need to continue a program of 'testing' inexperienced firms and will be able to rely upon people of experience who have proved themselves. However, that is not the principal problem. Most of the personnel in the consulting firms that provide services to the Government (and to the private sector) are public services employees that are permitted to join consulting groups to improve their earnings level by working outside office hours. Thus, the need for them to remain in Kathmandu at such times is important to them and is one of the reasons why most engineers being assigned to the Divisional and Regional Offices.

131. No doubt this arrangement meets the present needs of the Government at an apparently modest cost but it cannot be an adequate long-term solution. Reasonable salaries for professionals, commensurate with their training, experience and competence are essential if the Government is to receive a better service from the employees. To ensure good staff morale, it must also provide its staff with challenging work. Capable engineers will not be kept satisfied if their main job is to check the work of others. They need to be involved in innovative work of their own i.e., the Design Division needs to have its personnel carry out survey and design. Other alternatives would be to: (i) utilize consultants further to supervise implementation of projects; (ii) reduce the Government's staff to core levels; and (iii) further increase the building up the local consultants.

C. Implementation Organization

132. Under the overall supervision of the Regional Superintending Engineer, the Divisional Engineering personnel are responsible for materials procurement, transportation to site, engagement of contractors, construction supervision and project commissioning. An engineer is assigned to each scheme and an overseer is supposed to supervise all work to ensure that specifications are followed. In many areas, where experienced contractors do not exist, DWSS engages only a labor foreman to be responsible for mobilizing unskilled workers, and the overseer provides the technical know-how to construct the works. The Department also makes available a plumber when suitable artisans are not available for hire in the project area. At many locations in the Mountains and Hills, construction work has to be timed to avoid labor peaks in the agricultural sector because surplus labor does not exist at times of planting and harvest.

133. As previously noted, poor supervision is a major problem with construction of rural water supply schemes. Remote locations may be several days trek from the nearest roadhead or airport, and consequently the transportation of materials to the construction site becomes a project in itself. DWSS has, in the past, relied upon the airline RNAC to move pipe, cement and fittings to the nearest airport but the airline cannot meet the demand for charter craft and long delays are routine. Periodically entire seasons are lost. Pre-scheduling of procurement and

transportation would help. In view of the area to be served and the cost of building roads in the Hills and Mountains, it will be a long time before road access will be available to the majority of panchayats. Accordingly, investment in additional aircraft and construction of suitable temporary (or permanent) airstrips near future project sites may prove to be cost effective in comparison with other transportation alternatives.

D. Contracting Capability

134. For the relatively straight forward gravity schemes constructed by DWSS, complex construction management techniques are not required. The Department has used a number of Nepali contractors for local work and they reportedly do satisfactory work. WSSB has also engaged local contractors for simple pipe-laying, etc. but uses international firms ^{1/} for complex structural, electrical and mechanical work under World Bank financing. A number of smaller contracts that have been let to Indian or Nepali firms have been plagued with problems mainly concerned with lack of adequate personnel to maintain progress and lack of funds to meet payroll costs in accordance with the contract terms. There are ways of improving contractor's financial standing overtime e.g. steady program of work and regulation of contractors allowed to bid, and these need to be discussed with the Government.

135. The construction firms used by DWSS are all located in the major urban centres and DWSS finds it difficult to obtain reasonable construction bids for work remotely located. Thus, the alternatives are to find a local, often inexperienced contractor with limited equipment, manpower and financial resources or to hire a labor contractor and complete the work on a daily paid, piece-rate, basis. Such practices require close supervision in the absence of which both financial and quality control suffer badly. Overall supervision needs to be improved.

136. The Department used to experience considerable difficulty with transfer of funds from the Central Government on time to meet progress payments. Recently, the Government has sought to place more responsibility in the hands of regional officers and has arranged to transfer funds directly through the Government's Regional banks. This means that funds can be raised at the District level as long as bank is satisfied that the payments made are within budget authorization for a sanctioned scheme.

E. Materials and Manufacturing Capability

137. The Mission did not address this aspect thoroughly and it will need to be considered fully during preparation of any large project. For its small gravity schemes, DWSS is able to purchase most of its material requirements by inviting tenders locally.

^{1/} Firms with headquarters outside Nepal but with local representative.

138. Most manufactured goods are made from imported materials. High density polyethylene (HDP) pipes are widely available and the largest manufacturer advised the Mission that he had recently increased his capacity from 400T to 1,200T annually. Equipment and important materials come mostly from the Federal Republic of Germany but both UNICEF and the U.K. Crown Agents have commented that local quality control is not always satisfactory. PCV screens for tubewells could also be manufactured locally if groundwater development is required for a large project.

139. In the Bairawa/Butwal area and south of Kathmandu, a number of small manufacturing facilities have produced Bangladesh No. 6 handpumps and diesel-driven irrigation pumps. Most of these items of equipment and many other items such as taps and tubewell pumps and screens are available from India. However, demand exceeds supply.

VII. SECTOR PLANNING

140. The Ministry of Finance (MOF) and the National Planning Commission (NPC) are responsible for the formulation of sector policy, the setting of priorities and the allocation of financial resources. MOF is the central government agency for making recommendations to the Cabinet on the determination of sector allocations of available funds, and on the negotiation for multi- and bilateral aid for the sector program.

141. The sector implementing agencies have little experience in programming on a long term basis. A need exists to build up effective programming and monitoring units within WSSB, DWSS and MPLD. Annual sector budgeting is now linked with the population coverage targets of the Nepal Decade Plan for Provision of Drinking Water Supply and Sanitation (1980-1990) (see para 148). The sector allocations have increased by a factor of two times over the last three years and demonstrates the high priority which the Government is giving water supply and sanitation.

142. Revenue from income, property and water taxes is rather low not only because of the slow economic growth of Nepal but also, and in large part, because of weak tax administration. Land, property and water taxes, which are an important source of municipal revenue in other countries on the sub-continent, is collected and retained by the central government in Nepal and yield only a very small revenue of about seven per cent of the Government's total revenue collection. This is partly due to the narrow tax base, for example in the Kathmandu only 5,000 out of 50,000 properties are registered for property tax purposes and assessed property value is much less than market value.

143. The 1981 Government budget was \$351 million, of which approximately 24 per cent was for recurrent expenditure and 76 per cent for development expenditure. The total 1981 revenue was \$233 million, and, therefore, the budget deficit was \$298 million, an increase in deficit of 133 per cent from 1980 to 1981 (see Table 10). The 1981 budget deficit was covered to the extent of 36 per cent by foreign grants (\$107 million), 45 per cent by foreign loan borrowing (\$134 million) and 19 per cent by domestic borrowing (\$58 million).

A. Previous Development Plans (1965-1980)

144. The level of investment in the sector was relatively low during the Third to Fifth Five-Year Development Plans (1966-1980). About \$30 million in 1980 prices was invested in sector development during this period which was approximately three per cent of the total development expenditure.

145. The Government's expenditure for water supply and sanitation increased by a factor of three during the period of the Fifth Five-Year Development Plan (1976-1980) to a total of Rs 80.7 (\$6.2) million in 1980 (Table 11). The revenue from water supply system increased from Rs 0.2 (\$0.02) million in 1975 to Rs 0.6 (\$0.05) million in 1980 (Table 12).

Table 10. Central Government Budgetary Performance, 1975-1981
(in million Rs)

	F Y						
	1975	1976	1977	1978	1979	1980	1981
<u>Expenditure</u>							
Recurrent Expenditure	654	784	815	982	1,055	1,330	1,659
Capital Expenditure	1,239	1,948	1,808	1,979	2,309	2,760	5,334
Net Lending	-14	-12	-15	-17	-15	-11	-39
<u>Total Expenditures and Net Lending</u>	1,879	2,271	2,608	2,944	3,349	4,079	6,954
<u>Revenue</u>							
Tax Revenue	912	1,102	1,248	1,480	1,534	2,057	2,606
Non-Tax Revenue	185	200	312	311	319	347	442
<u>Total Revenue</u>	1,097	1,302	1,559	1,792	1,853	2,404	3,047
<u>Budget Deficit</u>	-782	-968	-1,049	-1,152	-1,495	-1,675	-3,907
<u>Financed by</u>							
Foreign Grants	360	393	467	599	806	956	1,400
Net Foreign Borrowing	130	146	364	390	512	631	1,751
Net Domestic Borrowing	292	430	218	163	178	189	754

Note: Totals and sub-totals may not add up due to rounding.

Source: Ministry of Finance, 1982.

Table 11. Expenditure of the Central Government, 1975-1981
(in million Rs)

	FY						
	1975	1976	1977	1978	1979	1980	1981
I. Recurrent Expenditure	654.1	754.1	815.0	982.1	1,055.4	1,329.7	1,659.1
General Public Services	201.0	226.9	248.7	292.0	328.9	407.0	467.0
Defense	134.6	162.3	167.9	192.2	223.0	264.6	288.0
Social Services	141.5	134.2	148.6	175.5	184.5	213.0	257.3
Education	77.1	67.9	69.1	80.8	82.5	99.0	108.3
Health	33.2	34.5	41.5	52.2	57.7	66.7	82.4
Drinking Water	0.9	1.1	1.4	2.3	2.8	3.1	3.8
Panchayat	16.3	16.1	17.9	21.0	21.8	22.8	35.0
Other	14.0	16.7	18.7	19.2	19.7	21.4	27.8
Economic Services	72.4	91.0	91.7	98.9	105.7	115.0	136.8
Miscellaneous	104.7	169.6	158.1	223.5	213.3	330.1	510.0
II. Capital Expenditure	1,238.9	1,498.3	1,808.0	1,978.8	2,308.6	2,760.0	5,333.7
General Public Services	5.0	6.7	3.4	4.1	14.8	26.7	38.0
Social Services	320.8	420.0	464.8	533.5	444.3	630.2	1,396.0
Education	152.3	185.6	201.2	234.5	248.1	286.1	449.3
Health	93.3	92.6	96.3	98.5	72.2	116.7	202.5
Drinking Water	29.4	61.3	46.9	63.6	58.5	77.6	181.1
Panchayat	29.5	55.5	94.9	98.0	39.1	111.9	448.8
Other	16.3	25.0	25.5	38.9	26.4	37.9	114.3
Economic Services	885.8	1,033.4	1,300.4	1,401.5	1,813.3	2,055.0	3,849.7
Agriculture	207.3	181.9	189.5	196.5	153.4	227.7	731.0
Irrigation	98.1	127.4	142.1	226.3	232.7	336.5	476.6
Land Reform	9.8	11.1	10.8	9.9	11.3	14.1	23.7
Cadastral Survey	13.2	20.4	23.6	35.7	25.7	26.1	38.7
Forest	37.0	44.8	76.3	66.8	94.2	113.0	179.6
Industry, Mining & Commerce	113.6	149.4	115.9	71.5	113.2	106.0	610.3
Communications	9.4	12.9	13.2	14.3	25.6	27.8	79.5
Transportation	337.0	423.0	471.9	488.2	648.3	580.2	920.4
Electricity	42.3	48.8	243.1	263.6	494.3	605.2	730.4
Other	18.1	13.9	14.0	28.7	14.6	18.4	59.5
Misc., Contingencies, etc.	27.3	38.1	39.4	39.7	36.2	48.1	50.0
III. Net Lending	-14.3	-11.9	-15.1	-17.3	-15.4	-11.0	-38.5
Loan Payment	4.2	8.8	7.6	3.0	11.7	11.2	14.3
Loan Repayment	-18.5	-20.7	-22.7	-20.3	-27.1	-22.2	-52.8
Total Expenditures and Net Lending	<u>1,878.7</u>	<u>2,270.5</u>	<u>2,607.9</u>	<u>2,943.6</u>	<u>3,348.6</u>	<u>4,078.7</u>	<u>6,954.3</u>

Note: Totals and subtotals may not add up due to rounding.

Source: Ministry of Finance, 1982.

Table 12. Revenue 1975-1981
(in million Rs)

	FY						
	1975	1976	1977	1978	1979	1980	1981
I. <u>Tax Revenue</u>	<u>912.1</u>	<u>1,101.8</u>	<u>1,247.5</u>	<u>1,480.2</u>	<u>1,533.6</u>	<u>2,057.0</u>	<u>2,605.6</u>
Taxes on Net Income and Profit	88.6	135.3	140.4	112.2	115.9	130.9	203.6
Taxes on Property and Property Transfer	133.7	144.7	147.8	121.1	136.3	180.8	214.6
Taxes on Goods and Services	293.9	435.7	500.8	620.2	673.4	896.2	1,107.9
Taxes on International Trade	358.5	386.2	458.8	626.7	608.0	849.1	1,079.5
II. <u>Non-Tax Revenue</u>	<u>185.1</u>	<u>200.4</u>	<u>311.8</u>	<u>311.4</u>	<u>319.3</u>	<u>346.9</u>	<u>441.6</u>
Revenues from Department Enterprises	19.7	30.2	41.7	31.1	31.8	51.1	60.0
Irrigation	0.3	0.6	0.9	0.7	1.3	0.7	1.1
Water	0.2	0.3	0.5	0.6	0.6	0.6	0.8
Electricity	3.3	6.7	12.1	4.2	1.9	7.0	7.9
Post Office	9.5	14.3	22.4	19.3	17.1	21.8	22.9
Aviation	4.3	6.4)				
Railway and Ropeway	2.1	1.9)	5.8	6.0	10.9	27.3
Administrative Charges & Misc.	19.2	27.3	88.8	113.1	103.2	106.9	146.1
Dividends and Interest	107.1	77.3	110.9	80.3	94.9	103.7	130.1
Royalties	4.8	13.0	6.8	4.2	2.9	2.4	3.0
Forest Revenue	24.0	43.6	63.6	82.7	86.5	82.8	102.4
Current Revenue (I + II)	<u>1,097.2</u>	<u>1,302.2</u>	<u>1,559.3</u>	<u>1,791.6</u>	<u>1,852.9</u>	<u>2,403.9</u>	<u>3,047.2</u>

Note: Totals may not add up due to rounding.

Source: Ministry of Finance, 1982.

146. The 1981 recurrent expenditure for water supply and sanitation was Rs 3.8 (\$0.3) million and the 1981 revenue, Rs 0.8 (\$0.06) million. Thus, in 1981 the Government provided a total subsidy of Rs 3 (\$0.24) million or 79 per cent of the cost of operation and maintenance of water supply facilities (Table 13). In addition, it was estimated that 10 per cent of the annual development budget was in fact utilized for the cost of operation and maintenance.

Table 13. Recurrent Expenditure/Revenue - Central Government
Water Supply and Sanitation Sector, 1975-1981
(in million Rs)

	FY						
	1975	1976	1977	1978	1979	1980	
<u>1981</u>							
Recurrent Expenditure <u>a/</u>	0.9	1.1	1.4	2.3	2.8	3.1	3.8
Revenue <u>b/</u>	0.2	0.3	0.5	0.6	0.6	0.6	0.8
Deficit or Subsidy for Operation and Maintenance cost <u>c/</u>	0.7	0.8	0.9	1.7	2.2	2.5	3.0

a/ From Table 11

b/ From Table 12

c/ The Government's subsidy for regular expenditure increased annually. However, the percentage, revenue vs. capital expenditure decreased, and last year approximately 21 per cent of total sector recurrent expenditure was covered by revenue.

Source: Ministry of Finance, 1982.

B. The Decade Plan (1980-1990)

147. The total funding required to implement the Nepal Ten-Year Plan for Provision of Drinking Water Supply and Sanitation (1980-1990) was estimated at \$478 million. The Government is expected to provide \$120 million from its own resources and \$358 million is expected to come from foreign assistance. To date, approximately \$60 million have been committed by donors.

148. The 1990 targets are to increase the water supply coverage from the present 11 per cent to 69 per cent of the population (Table 16) and sanitation coverage from less than one per cent to 15 per cent in the same period (Table 14).

Table 14. Sanitation ^{a/} Situation - Population Targets,
1980 - 2000

Item	Period Ending				
	5th Plan 1980	6th Plan 1985	7th Plan 1990	8th Plan 1995	9th Plan 2000
A. Urban Sector					
1. Total Estimated Population ^{b/}	861	1024	1217	1468	1616
2. Population Served with Sewerage	47.3	89	214.7	n.a.	n.a.
3. Population Served with Individual	85.6	137.3	126.6	n.a.	n.a.
4. Total Population Served	132.9	226.3	341.3	n.a.	n.a.
5. Per Cent Population Served	15.4	22	28	n.a.	n.a.
B. Rural Sector					
1. Total Estimated Population	13149	14663	16373	19408	21973
2. Population Served	0	4317	2148	4696.7	7646.6
3. Per Cent Population Served	0	2.95	13.12	24.2	34.8
4. No. Household Latrines ^{b/} Installed	-	72	358	783	1274
5. Average Annual No. Household ^{c/} Latrines Installed	-	14.4	57.2	85.0	98.2
6. No. School Latrines Installed	-	4.5	22.5	54.0	<u>d/</u>
7. Average Annual No. School Latrines Installed	-	0.9	3.6	5.3	<u>d/</u>
C. Total Sanitation Sector					
1. Total Estimated Population	14010	15687	17590	20876	<u>e/</u> 23589
2. Population Served	132.9	658	2489.3	4696.7	<u>e/</u> 7646.6
3. Per Cent Population Served	1.0	4.2	14.2	22	<u>e/</u> 32.4

a/ Sanitary excreta disposal only.

b/ Population and latrines in thousands. Population projections based on 1980 estimate.

c/ Private on-site disposal.

d/ After 1995, all new schools have latrines.

e/ Excluding urban service.

n.a. - Not Available

Source: DWSS, 1982.

149. The Decade Plan envisages covering the rural population in the Mountains and Hills, through construction of 830 medium and 1,450 small-size new gravity-fed piped water supply schemes. The rural population of the Terai will be served by some 32,000 hand-pumped shallow tubewells. In the 23 urban centers, the existing 22 water supply schemes will be improved and extended and also one new scheme is planned to be built.

150. In the rural areas, the Government will provide supplies and material and technical supervision and in smaller communities the local villagers are supposed to contribute with voluntary labor and local material. In the urban areas, capital and operational costs will be collected from consumers through a water charge. In the rural areas it is considered that only operational costs can be charged to the beneficiaries.

151. The top priority of the sanitation objectives is the construction of low-cost latrines in the rural and a large part of the urban communities. A subsidy system in respect of some construction items (e.g. cement) as an incentive to households, is under consideration. During the decade it is also planned to cover the core part of the six big urban centers with sewers. The cost of construction of sewerage schemes and their continued operation is planned to be recovered from consumers.

152. Among the support projects, the first phase of a large project to train 148 engineers and provide extensive in-service training has already started. ^{1/} The National Institute of Engineering will be upgraded through the project and the engineers will be educated in the country. Specific procedures and guidelines for community participation have been established by MPLD for community involvement in planning, construction and operation and maintenance of completed schemes. Individual projects for integration of health education, communication and promotion campaigns during the decade are under preparation.

C. The Sixth Five-Year Plan (1981-1985)

153. The Government projection of the required financial resources to implement the Sixth Five-Year Plan (1981-1985) is Rs 2,340 million (\$179 million) 40 per cent from domestic funds, and Rs 3,820 million (\$292 million) 60 per cent from foreign aid.

154. Since 1980, the water supply and sanitation sector has been given increased priority. During the present Sixth Five-Year Plan (1981-1985) the allocation for Drinking Water Supply is 4.6 per cent of total development expenditure, as compared with the Fifth Five-Year Plan allocation of 2.9 per cent (Table 15).

^{1/} UNDP funded and executed by WHO, with the objectives of training of manpower needed for the Decade Plan.

Table 15. Allocation of Development Expenditure
in the Public Sector, 1976-1985
(NRs in million)

<u>Item</u>	<u>Fifth Plan Period</u> <u>1976-80</u>		<u>Sixth Plan Period</u> <u>1981-85</u>	
	<u>Amount</u>	<u>Per Cent</u>	<u>Amount</u>	<u>Per Cent</u>
<u>Agriculture, Irrigation</u> <u>and Forest</u>	<u>2,349.7</u>	<u>26.5</u>	<u>6,600</u>	<u>30.4</u>
<u>Industry, Mining and Power</u>	<u>1,679.2</u>	<u>18.9</u>	<u>5,600</u>	<u>25.8</u>
<u>Transport & Communications</u>	<u>2,380.6</u>	<u>26.8</u>	<u>4,230</u>	<u>19.4</u>
<u>Social Services</u>				
Education	1,027.7	11.6	1,660	7.6
Health	474.0	5.3	1,066	4.9
Drinking Water	258.7	2.9	1,000	4.6
Panchayat	336.8	3.8	1,090 ^{a/}	5.0
Housing & Town Planning)	131.9	1.5	250	1.1
Information & Broadcasting)			100	0.5
Administrative Reforms and				
Planning	47.7	0.6	160	0.7
Administrative Reforms	5.7	0.1	20	0.1
Planning	26.9	0.3	80	0.4
Statistics	15.1	0.2	60	0.2
Miscellaneous	184.3	2.1	-	-
Total	<u>8,870.6</u>	<u>100.0</u>	<u>21,750</u>	<u>100.0</u>

a/ Inclusive of the development grant of NRs 600 million to be given to the panchayats.

Source: Ministry of Finance, 1982.

155. By the end of the Sixth Plan in mid-1985 it is anticipated that in the rural areas 3.8 million people, representing 26 per cent of the total rural population, will have safe drinking water supply (Table 16). The target for population coverage by 1985 for the urban areas is 89 per cent.

156. It has been estimated that the sector requires a total of \$106 million over the Sixth Five-Year Development Plan 1981-1985 (see Table 17).

157. The World Bank (IDA) has, since 1974, provided three credits totalling \$46.8 million through the Water Supply and Sewerage Board (WSSB) to provide improved water supply services in major urban communities and has plans to continue this program through the Sixth and Seventh Five-Year Development Plans.

158. The Ministry of Panchayat and Local Development (MPLD) has the responsibility of providing safe drinking water through gravity feed piped water supply in the Mountains and Hills for rural communities of less than 1,500. The Ministry also has the task of covering the rural Terai population in the Eastern and Western Development Regions with shallow hand-pump wells. The program has been running for over 10 years.

159. The total capital requirement for MPLD's Water Supply and Sanitation Program in the Sixth Five-Year Plan is estimated to be \$26 million of which \$19.5 million is expected to be met by external funds. UNICEF has already committed over \$7 million and another \$6.5 million is in the pipeline.

160. The Department of Water Supply and Sewerage (DWSS) urban water supply program during the Sixth Five-Year Plan (1981-1985) is to provide piped water supply to approximately 155,000 or 80 per cent of the total population residing in 11 urban centers with a total population in 1980 of 162,000; and also provide augmentation of existing urban projects.

161. The DWSS's rural water supply program for the same period is to provide piped water supply to 400,000 persons in the Mountains and Hills areas; to provide shallow tubewells fixed with handpumps, to one million population of the Terai area in the Central and Far Western Development Regions; and to provide 90,000 people in the Terai areas with deep tubewells water supply schemes.

162. DWSS's capital requirements for the Sixth Five-Year Plan, including schemes to be completed under the Seventh Five-Year Plan and therefore partly to be financed under the Seventh Plan, are as follows: urban water supply system Rs 33 million (\$2.5 million); rural piped water supply schemes in the Mountains Rs 46 million (\$3.5 million); rural piped water supply in the Hills Rs 261 million (\$20 million); deep tubewells scheme in the Terai Rs 46.7 million (\$3.5 million); gravity schemes in Terai Rs 40 million (\$3 million); and shallow tubewells in the Terai Rs 20 million (\$1.5 million). The total amount for urban and rural water supply program for DWSS implementation during the Sixth Plan is Rs 445 million (\$34 million).

Table 16. Water Supply Situation - Population Targets,
1980 - 2000

<u>Item</u>	<u>Period Ending</u>				
	<u>5th</u> <u>Plan</u> <u>1980</u>	<u>6th</u> <u>Plan</u> <u>1985</u>	<u>7th</u> <u>Plan</u> <u>1990</u>	<u>8th</u> <u>Plan</u> <u>1995</u>	<u>9th</u> <u>Plan</u> <u>2000</u>
A. <u>Urban Sector</u>					
1. Total Estimated Population ^{a/}	861	1024	1217	1468	1616
2. Population Served	714	911	1147	1468	1616
3. Per Cent Population Served	83	89	94	100	100
4. No. Urban Centres Served	22	28	48	66	all
B. <u>Rural Sector</u>					
1. Total Estimated Population	13149	14663	16373	19408	21973
2. Population Served	861	3853	11634	15138	19775
3. Per Cent Population Served	6.6	26	67	78	90
4. Piped Water Service - Communities Served	437	1112	2703	4333	6213
5. Shallow Tubewells Handpumps No. Installed	-	9190	31210	56210	88210
C. <u>Total Water Supply Sector</u>					
1. Total Estimated Population	14010	15687	17590	20876	23589
2. Population Served	1575	4764	12181	16606	21391
3. Per Cent Population Served	11	30	69	80	91

^{a/} Population in thousands. Population projections based on 1980 estimate.

Source: DWSS, 1982.

Table 17. Financial Requirement for Water Supply and Sanitation, 1980-1990
(\$ million)

FY	Sixth Plan	Seventh Plan	Decade Plan
	1981-1985	1986-1999	1980-1990
Total Financial Requirement	106	373	479
Government Budget ^{a/}	31	93	124
External Aid ^{b/}	48	No commitment	48
Resources Required (shortfall)	27	280	307

^{a/} Actual budget 1980-81, estimates for 1982-84 and projections for 1985-1989.

^{b/} IDA, UNICEF, UNCDF, UNDP, SATA, ODA, USAID, CIDA, FRG and Dutch.

Source: DWSS, 1982.

163. DWSS' annual development budget in the fiscal year 1982, was increased by 80 per cent as compared with 1981 and was Rs 132.6 million (\$10.12 million) (see Table 18), of which Rs 21.6 million (\$1.65 million) was for the Eastern Region; Rs 35.6 (\$2.72 million) for the Central Region; Rs 20.97 million (\$1.6 million) for the Western Region; Rs 17.69 million (\$1.34 million) for the Mid Western Region; Rs 27.12 million (\$2.07 million) for the Far Western Region.

Table 18. DWSS' Development Allocations and Actual Capital Expenditure, 1979-1982
(Million)

F.Y.	Annual Budget		Annual Increase %	Expenditure		
	Rs	\$ (Equivalent)		Rs	\$	% Disbursement
1979	29.9	(2.3)	-	21.1	1.6	71
1980	33.2	(2.5)	11	25.8	2.0	78
1981	77.3	(5.9)	133	58.3	4.5	75
1982	132.6	(10.1)	80	-	-	-

Source: DWSS, 1982

VIII. OUTLINE FOR BANK INVOLVEMENT

A. Justification

164. The Government has a funding shortfall of nearly \$300 million towards meeting its Decade targets in the Water Supply and Sanitation Sector. Present coverage of safe water supplies is moderate in urban areas (and these are being improved under existing programs) but is less than 10 per cent in the rural areas. Low-cost sanitation facilities are almost non-existent in rural Nepal and in most areas this constitutes a severe health hazard. Thus a large demand for services and a major funding shortfall exists in relation to the objectives of the Decade Plan.

165. Need has to be related primarily to convenience. While the public health statistics for Nepal are among the most unsatisfactory in the world, the great majority of rural people do not understand the basic principles of hygiene and disease transmission but they do see collecting water (dirty or clean) as a major inconvenience that keeps women and children away from more-productive pursuits. The Government is now embarking on a major campaign, with strong WHO support, to attract donors to the HFA/2000 (Health for All by the Year 2000) Program. Under this Program it is recognized that a clean water supply and a clean latrine are not in themselves assurances of good health but they do constitute an integral part of the overall HFA/2000 Program and, providing efforts are made to introduce the Primary Health Care (PHC) and hygiene education components, can be seen as contributing to improved public health as well as meeting basic "felt needs."

166. Perhaps the most important justification for investment in the sector is the very high level of demand for better access to water being expressed by rural communities all over the country. The Government has responded to this demand and has greatly increased its allocations to the sector (in spite of severe current deficit problems) in an attempt to maintain its ambitious Decade targets. The Mission recommended that the Bank should provide support for the Sector.

B. Project Preparation

167. The results of discussions with the Government on the form of Bank support and the timing of the financing of a project, indicated a strong desire that the Bank was to move rapidly and to provide funds for a project in mid-1984 i.e. within the period of the Sixth Plan (see para 9). The Mission noted this preference and proposed the schedule, as follows:

February 1983	Fact-Finding Mission for TA discusses and agrees TOR with the Government
March 1983	Request for TA from the Government
July-December 1983	Project preparation under TA

February-April 1984 Appraisal

July 1984 Loan effectiveness

168. The project preparation technical assistance 1/ mainly concentrated on project scope identification and the organization, administration, financial controls, tariff structure, cost recovery, operation, maintenance and manpower training aspects of the proposed Project. Technical reviews were implemented under the technical assistance covering design standards, treatment, materials procurement, transportation, construction procedures and supervision requirements. For the gravity supplies designed to suit conditions in the Mountains and Hills, the present level of detail and the quality of work covered in the project feasibility/design reports prepared by local consultants was generally sufficient for appraisal purposes. However, general provisions were included in all scheme designs for the proper placement of public standpipes and the effective removal of sullage water from standpipe areas. This aspect was not normally addressed by the local consultants following the standard Government layouts.

C. Project Concept

169. As discussed in para 17 to 19 it was recommended that the Department of Water Supply and Sewerage (DWSS) should be the Executing Agency for the Project. This is the largest Government Department working in the sector, and has the largest budget and the biggest Decade targets to reach. It is subject to normal civil service constraints. It was recommended that the Project be organized in such a way as to take on the entire program of one of the DWSS Regional Offices, the reason for this, being that direct responsibility for implementation was assured in that all projects handled by that Regional Office during the Project period would be Bank-financed projects and all contracting arrangements, materials procurement, accounting procedures and supervisory activities could be carried out in accordance with Bank requirements. The Chief Engineer endorsed this recommendation.

170. There was strong opposition to the creation of another separate agency within the Ministry of Water Resources, and the Mission's view was that creation of such a new agency could not be justified. Senior staff of DWSS are familiar with World Bank requirements under IDA funding for the WSSB projects and agreed in principle that, during the first project financed by the Bank, expatriate consultants would be needed to help meet Bank requirements and to train counterpart personnel (see para 94).

D. Project Location

171. The Mission was informed that the reasons for that Government requested a Bank-financed Project in the western part of the country was the serious water supply deficiencies being

1/ TA No. 514-NEP: Rural Water Supply and Sanitation (\$150,000)
12 May 1983.

experienced in that area and the past inequalities in the amount of aid granted to these less-developed part of the nation. The view of the Mission was that primary consideration should be given to the Far-Western and Mid-Western Development Regions.

E. Project Objectives

172. In addition to the major objective of the Bank-financed Project, 1/ which will provide rural water supply system in rural communities whose present water supply is unsatisfactory, the Project will include provision for the following supportive objectives:

- a manpower training program, primarily oriented to the education of Water Sanitation Technicians (WSTs) from each subproject panchayat to enable WSTs to take over responsibility for operation, maintenance and minor repairs and replacements after project commissioning;
- a baseline survey throughout the Project region to develop a comprehensive inventory of existing water supply; and
- a review of sector needs and existing and proposed programs together with the preparation of a Second Project, to follow the First, in the same or another Development Region.

173. Sanitation demonstration units, supported with funds and technical assistance to encourage the construction of private sanitation facilities, could be included in all communities to be provided with water supply systems under the Project. While this may be possible, and is believed to be desirable, the "Kirtipur experience" (see para 105) has indicated that a cautious approach is necessary. Even in Kirtipur, where technical, cultural and financial conditions were all reasonably favorable, acceptance was long in coming. Also, which is perhaps more important, it is highly undesirable to give rise to expectations which cannot be fulfilled. It must be recalled that in Kirtipur, acceptance once obtained, developed into a major demand for subsidy and technical assistance that could not be met from allocated project funds.

174. Based on the above factors the Mission proposed that the Bank in formulating a project for financing should initially only consider a small number of carefully chosen communities with high population density areas for sanitation inputs, together with a hygiene information support program considered to be essential. This approach should enable those communities which are keen to proceed with sanitation initiatives to be identified and the major effort should then be devoted to encouragement of that demand. In other communities, where some interest is displayed, it would be

1/ Loan No. 719--NEP: Rural Water Supply Sector Project (\$9.6 million) 11 December 1984.

beneficial for the project to provide latrine facilities at public buildings, schools, health posts, etc., and for those Government staff involved in the project to construct and use their own private units. This would serve for demonstration purposes but it appears doubtful while it would be a sufficient initiative to create community of believers.

175. Selection of project communities for the sanitation inputs can be made with the support of the regional and local Health Ministry personnel. This should help to ensure that all components of the HFA/2000 program are implemented cooperatively and, at least initially, within communities where there is a strong desire for change that is led by the Panchayat leadership.

F. Project Size and Schedule

176. Prior to the Mission communication between the Government and the Bank had indicated that an initial loan in the order of \$10 million would be appropriate. The Mission was requested by DWSS to consider a larger program in view of the urgent need to provide a higher percentage of the population with safe water supplies. However, the Mission informed DWSS that it would recommend that Bank-financed project should cover the complete program of a Regional Office and the size of the project should relate directly to the implementation capability of the Regional Office.

177. The proposed project would provide sector support to the selected Regional Office for a period of several years and would cover water supply systems of all types as well as the other noted possible components of sanitation, drainage and public information. In 1981/82, the Regional Offices of DWSS had the following complement of projects in hand.

Table 19. Number of Projects by DWSS Regional Offices, 1981/82

Region	No. of Water Supply Projects	Annual Budget	
		Rs (million)	\$ (million)
Eastern	21	27.9	2.1
Central	26	41.5	3.2
Western	26	26.4	2.0
Mid-Western	15	22.9	1.7
Far-Western	14	13.8	1.1
Total	120	Rs 132.50	\$ 10.1

Source: DWSS, December 1982.

178. Under the responsibility of the Superintending Engineer in Nepalganj, 1/ four Divisional engineers work out of offices in Dipayal (6 schemes), Mahendra Nagar (5 schemes), Nepalganj (8 schemes) and Tribhuvan Nagar (7 schemes). A maximum of 10 schemes were completed in the fiscal year 1982/83. It was estimated that it should be possible to increase the annual rate to at least 15. 2/ A typical scheme in the Mountains or Hills serves perhaps 5,000 persons at an average cost of about Rs 800 per capita. Thus, 15 projects cost about Rs 60 million annually.

179. Due to lack of time, the Mission was not able to obtain information based on actual studies or experience concerning the Terai tubewell programs. At a recent meeting, the National Group (see para 52) agreed that shallow tubewells with handpumps at a per capita estimated at about Rs 25 (or \$1.9) will be suitable for the smaller communities. About 25 per cent of Terai schemes will be based upon piped pumped supplies at a capital cost in the order of Rs 350 or \$27 per capita. The proposed annual program for DWSS was to provide one community of about 8,000 with a piped supply and four shallow tubewell projects serving perhaps 12,000 persons, for a total annual cost of another Rs 3.1 million (\$0.24 million). Thus, the proposed Project included a nominal three-year construction program for provision of water supply system in the Terai, the total cost being estimated at about 290 million (\$22.3 million) see Table 20. Assuming the Bank was prepared to meet up to 80 per cent of total eligible costs, the loan was estimated to be about \$20 million.

180. During the first few months, before actual construction of sub-projects was to commence, it was proposed that DWSS should work with consultants to be recruited under an advisory and operational technical assistance to set up a Project Office and establish administrative procedures for project implementation acceptable to the Bank (see para 94). 3/ This will be in the Regional Office of DWSS preferably with a full-time liaison representative in Kathmandu. Radio contract between these two towns as well as between the Divisional Offices and the project sites will be arranged by DWSS.

1/ DWSS's Regional Office for Far- and Mid-Western Development Regions.

2/ The Superintendent Engineer told the Mission that, if the problem of materials transportation could be solved, progress could be significantly improved. The preparation of the Project therefore fully investigated the transportation of materials.

3/ On 11 December 1984 the Bank approved an administrative and operational technical assistance (TA NEP-644: Rural Water Supply Sector) for \$200,000.

Table 20. Estimated DWSS Project Costs
(Prices Excluding Duties and Taxes)

	NRs (million)	\$ (million)
45 Mountains/Hills Water Supply projects	180	14
3 Terai piped Water Supply projects	8.4	0.6
12 Terai shallow tubewell projects	0.9	0.1
(Approximately)	190	15
Sanitation, public health education, drainage improvements and manpower training (25%)	47	3.6
Management Information Survey (26 Districts x 30 days each x Rs 300 + 100% supervision cost)	0.5	0.1
Expatriate and local consultant management services (8 man-years at Rs 2 million)	16	1.2
(Approximately)	253.5	4.9
Contingency (15%)	38	2.9
	Rs 290	\$ 22.1

Source: DWSS, December 1982

G. Operation, Maintenance and Tariffs

181. It appears, on the basis of the Mission's findings, that the rural poor of Nepal can not meet the amortized capital costs of water supply development. Hence, Government will have to meet the full capital cost of any project aimed at providing an adequate safe supply of water to a large percentage of rural population. The Mission's view was, however, that the Government can not continue to subsidize the recurrent costs of operating and maintaining water supply systems. It was considered essential that the Government institute a tariff system at the village panchayat level, initially to cover the salary of an operator and maintenance worker (WST) and subsequently also the cost of minor repairs, replacements and, wherever affordable, extensions to the system. It was suggested that the following might constitute a step-by-step approach acceptable to the Bank and the Government with regard to progressive acceptance by the beneficiaries of payment of water charges sufficient to ensure that the operation and maintenance costs are recovered.

- Year 1 - DWSS will retain all responsibility for operation, maintenance, etc. and train a local Water Supply Technician (WST). DWSS will bear all capital costs of the Project.
- Year 2/3 - DWSS will hand over responsibility to the Panchayat which will commence the collection of a water tariff to build up an operating fund. A DWSS overseer will visit the subproject sites routinely to check and train WSTs. DWSS will pay the salary of WSTs from the Project capital fund.
- Year 4 - The Panchayat will take over all responsibility including meeting operation and maintenance costs. DWSS will inspect on a routine basis the systems to ensure that preventive maintenance procedures are being carried out.

LIST OF APPENDIXES

<u>Appendix</u>	<u>Description</u>	<u>Page</u>
1	Terms of Reference	63
2	Persons Met	65
3	Organization Chart DWSS/WSSB	67
4	Criteria for the Design of Semiurban and and Water Supply Systems	68
5	Bibliography	70
6	Water Supply - Detailed Report	73
7	Sanitation - Detailed Report	108

NEPAL - SECTOR PROFILE: PROJECT IDENTIFICATION MISSION

Terms of Reference

- (a) To carry out a comprehensive review of the present water supply and sanitation in Nepal, and the Government's Ten-Year Development Plan;
- (b) To carry out a comprehensive review of the existing institutional arrangements and identify the constraints/problems facing the sector;
- (c) To identify the physical implementation problems encountered in the sector in the past, and assess quantity and quality of raw water sources;
- (d) To assess and review past experience and capabilities as well as potentials of the domestic consultants to perform the sector works in detailed engineering and project implementation;
- (e) To examine and assess the local construction industries with respect to their capacities and capabilities to undertake the sector works;
- (f) To carry out studies on the operation and maintenance of the existing and future sector facilities, as to technical, manpower and logistic and training aspects;
- (g) To examine the manpower requirements on the sector;
- (h) To carry out reviews on the present tariff policy, accounting, billing and collection practices and make recommendations on tariff policy;
- (i) To study the level of capital expenditure on the sector taking into account the Government's 6th and 7th Development Plans. The study will take a realistic approach establishing a clearly defined set of priority projects for the sector;
- (j) To assess the role of external assistance being provided by multinational and bilateral agencies to the sector;

(Reference in text: page 1, para 2)

- (k) To examine the most appropriate way for the Bank to provide assistance to the sector;
- (l) To provide the rational for the selection of a subsector for Bank-financing relating to the country's economic development: and
- (m) To identify the specific areas of projects for which the Bank could be involved in the sector and to examine whether Bank technical assistance will be required for the project preparation to be proposed for Bank financing consideration.

PERSONS MET

NATIONAL.

DWSS

Mr. D. B. Raymayadi	-	Chief Engineer
Mr. P. M. Singh Pradhan	-	Deputy Chief Engineer
Mrs. N. Shakya	-	Assistant Engineer
Mr. R. S. Manander	-	Assistant Engineer
Mr. D. B. Barnet	-	Assistant Engineer
Mr. N. P. Rimal	-	Supt. Eng. Nepalganj (in Kathmandu)

WSSB

Mr. R. K. Siddhi	-	Project-in-Charge
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MOF

Mr. K. D. Adhikary	-	Secretary
Mr. R. B. Shrestha	-	Undersecretary, Foreign Aid Div.

MOH-ESS

Dr. Regmi	-	Engineer
Dr. Joshi	-	Engineer
Mr. Joshi	-	Engineer

Koshi Hills Area Rural Development Program (KHARDEP)

Capt. J. M. Gurung	-	Adm. Officer, Kathmandu
Mr. J. B. Innes	-	Economist (in Nepal under contract to FAO)

Engineering Science, Inc.

Mr. Mathew Managan	-	Resident Manager
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Nepal Consult (P) Ltd.

Mr. S. P. Gautam	-	Director
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NPC

Prof. U. M. Malla	-	Hon. Member for Social Services
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Water and Energy Commission

Mr. B. K. Pradhan	-	Executing Secretary
Dr. C. K. Sharma	-	Executive Director

INTERNATIONAL

U.K. Embassy

Mr. D. C. B. Beaumont - First Secretary (Development)

World Bank

Mr. Grant Slade - Resident Representative, Kathmandu
Mr. R. Panfil - T.A. Coordinator (in Kathmandu)
Mr. R. G. MacWilliam - Sanitary Engineer (by phone)
Mr. R. Middleton - UNDP Global Project
Mr. J. B. De Souza - UNDP Global Project

UNDP

Mr. Moosup So - Dep. Resident Representative
Mr. R. S. Mahat - Programme Officer

Industrial Training Service Ltd. (ITS)

Mr. Trevor Anderson - (Manpower Training Consultant to
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WHO

Mr. Q. Khoshchashm - Sanitary Engineer
Mr. P. Hirono - Sanitary Engineer

UNICEF

Mr. C. Glennie - Sanitary Engineer
Miss V. Tobin - Sanitary Engineer

US Peace Corps

Mr. Ned Aspey - Sanitary Engineer
Mr. John Ballasano - Sanitary Engineer

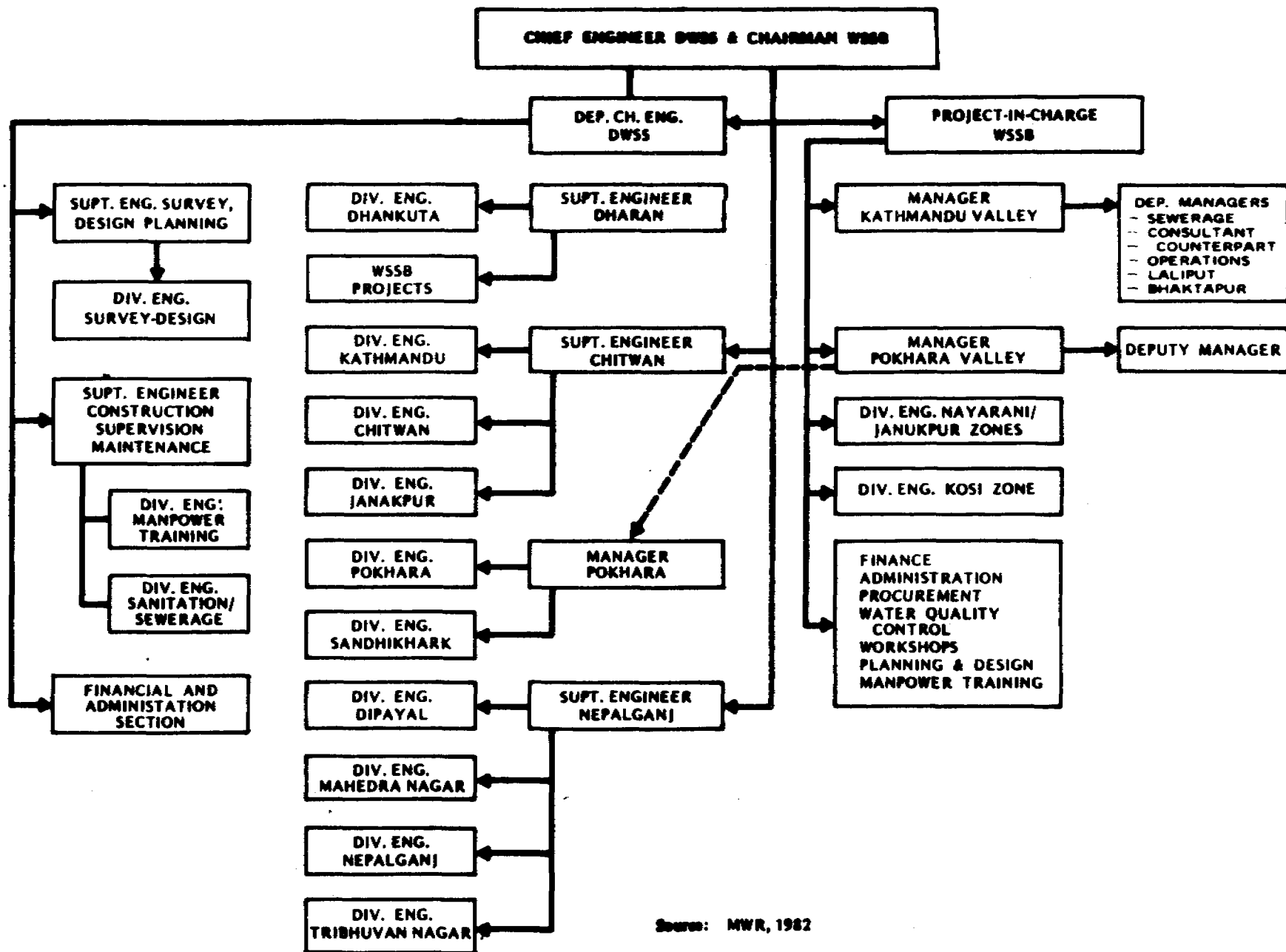
SATA

Mr. Han A. Heijnen - Sanitary Engineer/Pokhara
Mr. Heini Mueller - Sanitary Engineer/Pokra

VSO

Mr. B. Dawes - Field Director/Kathmandu
Mr. A. Gray - Sanitary Engineer
Mr. D. Douglas - Sanitary Engineer

(Reference in text: page 14, para 43)



Source: MWR, 1982

CRITERIA FOR THE DESIGN OF SEMIURBAN AND RURAL WATER SUPPLY SYSTEMS

- | | | | |
|-----|--------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------|
| (a) | Design Period | 5000 | 10-15 years |
| | | 5000 | 15-20 years |
| (b) | Population Growth Rates | defined for each District | |
| (c) | Water Requirements | | |
| | - Domestic | - Standpipes | |
| | | Connections | 65-112 lcd (depending upon the degree of plumbing) |
| | - Non-domestic | - Animals | 25-45 lcd (depending upon species) |
| | - Hospitals/Health Posts | | 500 l/bed |
| | - Schools | - Day | 10-65 l/pupil |
| | - Public Institutions, Offices, etc. | | 500-100 l/day |
| | - Tourist Hotels | | 200 l/bed |
| | - Restaurants | | 500-1000 lx/day |
| | - Others | | to be estimated at site |
| (d) | Wastage/Leakage | 12 to 40 per cent depending on location and per cent of house connections | |
| (e) | Period of Service | Design for 24-hours service even though this may initially be impractical | |
| (f) | Pressure (minimum valves) | Standpipes five m water | |
| | (maximum valves) | Connections 15 m water | |
| | | 40 m Terai | |
| | | 60 m Mountains and Hills | |
| (g) | Service Reservoirs | 25 to 50 per cent of daily demand depending upon source adequacy | |
| (h) | Standpipes | - Location | 150 m maximum distance |
| | | - Persons | 50 m maximum climb/fall based upon one tap per 200 persons |

(i) Treatment	- Springs (protected)	none
	- Streams (protected with low turbidity)	none
	- Streams (protected with turbidity greater than 10 ppm)	infiltration galleries or roughing filter
	- Streams where turbidity very variable	infiltration galleries, sedimentation, roughing filters and chlorination (powder)
	- Rivers with high turbidity and no protection	conventional treatment
(j) Standby-Plant	- Pumped schemes	- 100 per cent capacity
(k) Pumping capacity	- to deliver demand quantity in 12 hours/day minimum	
	- to deliver demand quantity in 20 hours/day maximum	

Source: DWSS, 1982.

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26. 1982	Water & Environmental Sanitation Development	UNICEF
27. 1982	Project Agreement UNICEF/HMG for Central Region	UNICEF

<u>Date</u>	<u>Title</u>	<u>Writer</u>
28. 1982	Project Agreement UNICEF/HMG for Terai tubewell programme (pilot phase)	UNICEF
29. 26 Feb. 1982	Preparation of feasibility studies for future projects and training for WSSB UNDP NEP/79/032/A/01/42	UNDP/HMG (WSSB)
30. 1973	Water Supplies and Sanitation in Nepal, Sector Study	Binie & Partners
31. 2-11 Sept. 1982	Demonstration Project in Low-Cost Water Supply and Sanitation Report on Mission to Nepal	R. S. Singh (UNDP/TAG)
32. December 1981	Sixth Five-Year Plan (1980-85) Water Supply and Sanitation Programme in MPLD	MPLD/HMG
33. July 1981	Sixth Five-Year Plan (1980-85) Water Supply & Sanitation Programme of Activities and Capital Outlay (DWSS)	DWSS/HMG
34. January 1981	The Sixth Plan (1980-85)	HMG Nepal
35. November 1981	Sanitation; Why and How. Recommendation of the National Sanitation Seminar, Kathmandu Nepal, 2-4 September 1981	UNICEF, Kathmandu
36. 1982	Report on Evaluation of the Kirtipur Demonstration Project in Low-Cost Sanitation, prepared for DWSS	DWSS, Development Research and Communication Group
37. June 1982	Community Water Supply and Sanitation, Nepal. Sanitation Handbook	M. Strauss
38. 1981	Integrated Urban Development: Example of Phaktapur	IDC, Heidelberg

WATER SUPPLY - DETAILED REPORT

TABLE OF CONTENTS

	<u>Appendix 6</u> <u>Page No.</u>
1. INTRODUCTION	74
1.1 Terminology	74
1.2 Water Resources	75
1.3 Raw Water Quality	75
1.4 Natural Water Supplies	76
1.5 History of Public Supplies	76
1.6 General Note on Historic Data Used in Report	76
2. WATER SUPPLIES IN THE URBAN SUBSECTOR	77
3. WATER SUPPLIES IN THE RURAL SUBSECTOR	80
3.1 General	80
3.2 DWSS Schemes	80
3.3 MPLD Schemes	80
3.4 UNICEF-Aided Projects	85
3.5 General Description of MPLD Schemes	85
3.6 Terai Tubewell Programme	90
3.7 Other Agencies Operating in the Rural Subsector	92
4. CONCLUSIONS CONCERNING RURAL WATER SUPPLIES	92
Table 1. Urban Water Supply Details	94
Table 2. Schemes Maintained by DWSS	95
Table 3. Schemes Maintained by Panchayat District Office with DWSS Assistance	99
Table 4. DWSS Rural Projects Completed 1975-1982	100
Table 5. DWSS Schemes Which Were Planned for Construction 1982-1983	101
Table 6. DWSS Schemes Due for Completion 1982-1983	102
Table 7. DWSS Projects for which Feasibility Studies are Complete or are in Progress	104
Table 8. MPLD Rural Projects Completed 1971-1981	105
Table 9. Status of UNICEF/MPLD Projects 1981-81 Season	106
Annex A Communities Visited During Mission Field Trips	107

1. INTRODUCTION

1.1 Terminology - Urban, Semiurban and Rural Communities

1. There are very few truly "urban" communities in Nepal in the sense of large, densely populated areas housing in excess of say, 20,000 people. Not all of the 29 currently designated Nagar Panchayats (towns) display truly urban characteristics; some of the more remote ones are relatively low density scattered communities with small urban "core" areas. The use of the term "urban" must therefore be treated with caution. In the context of this report all Nagar Panchayats are defined as urban; it must therefore be appreciated that some "urban" communities display rural characteristics. Equally some "rural" communities may have small dense cores comprising perhaps 200 to 500 houses; these are sometimes referred to in Nepal as "semi-urban" (as, on occasions, are some of the less-dense Nagar Panchayats). This classification has not, however, been used in this report as it is considered to be misleading. Thus, throughout this report all communities are classified either as "urban" (if they are Nagar Panchayats) or "rural".

1.2 Water Resources

2. From the viewpoint of water resources and supplies Nepal can be divided into four areas with characteristics briefly summarized as follows:

- The Mountains: the higher altitude mountainous areas forming the northern strip of the country are typified by perennial rivers flowing at the bottom of deep, steep-sided valleys. Springs and mountain streams are common on the mountain slopes but the smaller ones dry up in the summer if the monsoon is delayed. Communities are typically located on ridges or on slopes well above the valley bottoms.
- The Hills: this area comprises the majority of the country and is typified by hills and valleys of less severe terrain and with greater vegetative cover than in the mountainous areas. Springs and streams are common and, in some of the valley bottoms, ground water is available in exploitable quantities. As in the Mountains, communities are often located on ridges or on slopes well above valley bottoms.
- The Inner Terai: this area lies between the Midlands and the flat plains of the Terai proper. It is often densely forested flat or hilly land forming a strip along the north of the Terai plains and extending into the foothills beyond. Ground water frequently occurs at considerable depth (50-100 m) and can vary in depth seasonally. In addition, the sub-surface is often conglomerate which makes tubewell insertion and even percussion drilling difficult. Few surface

water sources exist and those that do frequently dry up during the months before the monsoon. Traditionally this has been a very inhospitable area to live in. It has however seen settlements develop during the last 10-15 years, particularly along or close to the route of the East-West highway.

The Terai: this area is the flat fertile plain forming the southern strip of the country. Ground water is generally available throughout the area at relatively shallow depth. The area is heavily settled - some 38 per cent of the population of Nepal currently live in the Terai.

1.3 Raw Water Quality

3. Raw water quality is generally acceptable from a chemical viewpoint throughout Nepal. In certain areas of the Terai, however, problems have occurred with high iron and manganese levels leading to an unacceptable taste and colour of supplied water. Water abstracted from rivers and streams can contain a high degree of sediment if drawn off during monsoon or flash floods.

4. From a bacteriological viewpoint many of the water sources are polluted, even in the Mountains and Hills. It has however been accepted that disinfection of water supplies is unrealistic in most rural supply systems; it is necessary therefore to afford as much protection as possible to sources of water in order to minimize the risk of bacterial pollution throughout such systems.

5. Although there is some evidence in specific locations that the water supplied from particular sources has an objectionable taste, (primarily due to high iron or manganese levels), in general the water available to most communities appears to be satisfactory from a public acceptance point of view.

1.4 Natural Water Supplies

6. The vast majority (more than 90 per cent) of the rural population in Nepal is unserved by public water supplies. People living in unserved areas must of course obtain water from somewhere in order to survive; in the Mountains and Hills the usual sources are rivers, streams or springs; in the Terai they are open wells, tubewells with handpumps, rivers and occasionally open ponds. The problems associated with using existing natural supplies can therefore be separated into those peculiar to the different geographical areas, as follows: -

- In the Mountains and Hills: the main problem is one of inconvenience, particularly as many communities are located on ridges which lie above perennial sources of water such as rivers. Although springs may exist locally they are frequently inadequate to meet the needs of the community

and they may fail during the dry season. Larger springs may exist above the level of the community but they may be several kilometers away. Thus a single journey to collect a container full of water may take an hour or more.

In the Inner Terai: the situation regarding the use of natural sources is very serious as very few such sources exist at or near to the ground surface. Long walks are often needed to collect water from the nearest river, particularly during the dry season. The seasonal variation in the depth of groundwater in the area, combined with the difficulty in penetrating the conglomerate subsoil, make the construction of open wells or private tubewells impractical in many places.

- In the Terai itself; there is no serious problem about availability of water at or near every household, provided that some means is found for abstracting the water from below the ground surface. Open wells abound in the area, most of them giving rise to gross pollution of the water. Numerous private handpumps exist also, both in urban and rural areas.

7. Thus it could be argued that the main water supply problem in the Mountains, Hills and Inner Terai is one of inconvenience, whereas in the Terai it is more a problem of contamination of relatively convenient supplies.

1.5 History of Public Water Supplies

8. The first piped water supplies in Nepal were introduced in the Kathmandu valley in about 1895. However a nationwide program for constructing water supply systems throughout Nepal did not start until 1958. Even then it was generally restricted to the urban areas along with district centres and other larger communities. In 1971 a programme for rural water supply installation was inaugurated by the then LDD under a Community Water Supply and Sanitation (CWSS) program. To date some 27 urban and 400 to 500 rural water supply systems have been constructed through the agencies of WSSB, DWSS and MPLD (many with assistance from multilateral or bilateral aid agencies or through NGOs) and about a further 1,500 very small local water supplies have received grant-aid financial assistance from MPLD. The technical aspects of these supply systems are described in the following text.

1.6 General Note on Historic Data Used in Report

9. It should be noted that, whereas figures concerning planned future development in the water supply sector are readily available, consistent reliable data on existing water supply systems, particularly in the rural subsector, do not seem to exist in aggregated form. Frequently it was found that data on the same subject obtained from different sources (both from offices and previous reports) was inconsistent.

10. An attempt was made during the period of the Mission's visit to Nepal to collect data on historic and current water supply activities in a systematic manner by preparing a series of blank tables and requesting DWSS and MPLD to provide the necessary data. This proved to be impossible to achieve in the three weeks of the Mission's visit to Nepal and data received was often incomplete. This appeared to be due to the need to refer to many records or files in order to obtain complete pictures of past and current activities.

11. Thus it must be appreciated that all figures quoted in this report concerning population coverage and numbers of projects are approximate estimates only. One of the urgent needs in both DWSS and MPLD appears to be the setting up of a suitable management information system which would enable such data to be more readily available in the future.

2. WATER SUPPLIES IN THE URBAN SUBSECTOR

12. As at November 1982 the Water Supply and Sewerage Board (WSSB) is responsible for the operation of water supplies in the 12 largest and most densely populated of the 29 Nagar Panchayats, and also Banepa, the remaining 16 Nagar Panchayats being (or about to become) the responsibility of the Department of Water Supplies and Sewerage (see Table 1). It is planned to transfer responsibility of water supplies in a further 10 of the Nagar Panchayats from DWSS to WSSB by 1985 as discussed in the main report.

13. In 1981 approximately 960,000 people lived in the 23 Nagar Panchayats in existence at the time of the census and a minimum of a further 60,000 are assumed to live in the six recently created Nagar Panchayats (for which census figures are not available). Thus, in all, some 6.8 per cent of the population of Nepal lives in the Nagar Panchayats. Of this figure some 75 per cent live in towns currently served by WSSB and 25 per cent live in towns served by DWSS.

14. The extent of available details on the present status of water supplies in each of the Nagar Panchayats varies from one to another. From the data available it appears that the present nominal percentage of urban population served by any one project varies from less than 50 per cent to nearly 100 per cent, with an overall average of 85 per cent of urban population nominally being served. HMGN plans to increase coverage to 100 per cent of urban population by 1995.

15. Typical source works for schemes supplying Nagar Panchayats comprise:

- in the Hills: springs and river or stream intakes using, wherever possible, gravity systems. Pumped systems are however used in four of the Hills Nagar Panchayats and deep tubewells are used in one (Kathmandu); and

- in the Terai: gravity systems from springs or surface water intakes where the towns are situated in the Inner Terai or just south of the Mountains and where suitable sources exist. Otherwise deep tubewells with pumps are used as a source.

16. Implementation of new water supply schemes for the Nagar Panchayats is undertaken as follows:

- WSSB generally uses foreign consultants to undertake feasibility studies and to design and supervise construction of large scale works. The Board uses its own staff to design and supervise construction of street distribution mains, house connections and public standpipes. Foreign contractors are generally used on large or complex projects; and
- DWSS generally uses local consultants to undertake feasibility studies and to design new projects but uses its own departmental staff to check the designs and to supervise construction of the projects. Construction of works is usually undertaken by local contractors. For some projects DWSS undertakes the whole of the design works "in house".

Unit Capital costs for new projects in the Nagar Panchayats are approximately Rs 600 (\$46) per capita for surface water projects and Rs 500 (\$39) per capita for Terai deep tubewell projects.

17. Design parameters and target levels of service for water supplies in the urban subsector are clearly outlined in a DWSS reference document. It is understood that WSSB does not have a similar reference document for projects where foreign consultants are used. In general, WSSB projects aim to provide a treated and/or chlorinated water supply available for 24 hours a day. For the relatively smaller DWSS projects the supply will usually be chlorinated but no other treatment will be applied except in special cases. Projects operated to provide only intermittent supplies are common, particularly with pumped systems.

18. According to recent reports produced in preparation for the Third and Fourth World Bank-financed Water Supply and Sewerage Projects actual levels of water supply service achieved in most of the Nagar Panchayats fall well below design targets and are generally unsatisfactory. This results from one or more of the following:

- age of system;
- inadequacy of source of water;
- insufficient system capacity or storage;
- high system losses through leakage;
- ineffective water treatment;
- restricted coverage of the populated area;
- enforced restrictions on hours of operation due to high operating costs if systems are operated for 24 hours; and
- lack of adequate routine system maintenance.

19. Thus in many Nagar Panchayats the water currently available is inadequate to meet present needs and is of unreliable quality. Low water pressures or irregular supply hours combined with the limited number of public standpipes and house connections in some parts of many Nagar Panchayats means that it is too inconvenient for some of the population to use the public water supply system, particularly for non-potable uses. Hence other more readily available sources such as open ponds, rivers and, where possible, open wells or hand pumps, are sometimes resorted to. Many of these alternative sources are subject to gross contamination and as such are unacceptable.

20. Maintenance of water supplies in Nagar Panchayats operated by WSSB is undertaken by WSSB staff locally resident in each town. For DWSS schemes maintenance is undertaken by either the Nagar Panchayat itself, the local District Office, DWSS or a combination of these.

21. Metering of supplies to private connections is undertaken in all 13 of the Nagar Panchayat systems operated by WSSB and in four of the 16 Nagar Panchayat systems operated (or about to be operated) by DWSS. Not all private connections are metered, particularly in DWSS administered supply systems where meter installation is a relatively new concept and is still in essence in a trial phase. Also, owing to the problems in ensuring accurate meter readings when supplies are intermittent, many private metered connections are not in practice charged on the basis of recorded quantities of water consumed.

22. The Third and Fourth World Bank financed Water Supply and Sewerage Projects will result in an improved supply in 10 of the 16 Nagar Panchayats operated by DWSS and will also result in responsibility for operation of these 10 supplies being handed over to WSSB by 1985. In addition, one Nagar Panchayat, Tansen, has been the recipient of a recently completed Japanese aided water supply project but is not at present scheduled to be transferred from DWSS to WSSB control. DWSS has recently completed schemes to improve supplies in two of the remaining five Nagar Panchayats, has schemes under construction in one more and has plans for an improved supply in the remaining two.

23. In conclusion, the current water supply situation in many of the Nagar Panchayats is far from satisfactory, particularly in those where the systems were constructed some time ago. Major renovation of existing systems, new treatment facilities and extensions to source and distribution capacities are required. In most of the Nagar Panchayats, however, the necessary works are scheduled to be undertaken within the context of the World Bank project referred to in para 29 above. DWSS will be left with the responsibility for maintaining and/or improving supplies in six Nagar Panchayats (plus any new ones which are created).

3. WATER SUPPLIES IN THE RURAL SUBSECTOR

3.1 General

24. Responsibility for practically all rural water supplies is shared between DWSS and MPLD. In theory DWSS is concerned with projects serving District and Zonal headquarters and any communities with populations in excess of 1,500 people and MPLD is responsible for supplying all communities with populations in the range 300 to 1,500. These divisions are not, however, rigidly adhered to in practice; DWSS have implemented projects serving as few as 700 people and MPLD have implemented projects serving from less than 100 to more than 5,000 people. In addition both DWSS and MPLD are responsible for the implementation of the recently inaugurated Terai shallow tubewell/handpump programme (see paras 57 to 65).

25. The present rural population nominally served by piped water supply schemes has been estimated at one million or seven per cent of the country's rural population. HMGN plans to increase this coverage to 21 per cent of the population within the Mountains and Hills (about two million) by 1985 and 46 per cent (about five million) by 1990 by constructing a further 2,700 piped water supply schemes during the International Water Supply and Sanitation Decade (IWSSD). Decade. For the Terai HMGN plans to install piped supply systems, shallow tubewells and hand pumps to cover about 34 per cent of the population by 1985 and 100 per cent by 1990. This will require the installation of some 15 to 20,000 shallow tubewell systems and 200 new piped supply systems.

3.2 DWSS Schemes

26. DWSS currently maintains water supplies in some 62 rural communities (i.e. excluding Nagar Panchayats) and assists in the maintenance of a further 18 rural supplies in association with local District Offices (see Tables 2 and 3). Of these 80 rural supply systems approximately 30 are District Headquarters and the remainder are communities which have been selected for reasons of size or particular need. The population living in the rural communities currently served by DWSS is estimated to be approximately 250,000 or two per cent of Nepal's rural population.

27. The numbers of new rural supply projects completed by DWSS each year from 1975/76 to 1981/82 are given in Table 4. Completion of new schemes over this period averages between five and six per year; this rate of completion has however increased considerably over the last one and a half years.

28. DWSS has currently almost 100 new rural piped water supply projects under construction or due to be started within the year (see Table 5) of which some 29 are due for completion this year (see Table 6). There are also about 110 projects at various stages of feasibility

study or design (see Table 7). An additional 100 possible new schemes have been identified and applications have been received for a further 600 projects. Unfortunately it has not been possible in the time available to break down these last two categories by Development Region. Some of these projects are for relatively widely scattered low-density settlements or for groups of settlements which, only when taken in aggregate, have populations within DWSS nominal range of responsibility.

29. Almost all DWSS rural water supply schemes are located in the Mountains, the Hills or the Inner Terai; only five Terai rural communities are currently served by DWSS projects. The vast majority of the supply schemes thus comprise spring or stream intakes feeding gravity systems with the small number of Terai schemes using pumped tubewells. Storage is provided on most projects and the supply is distributed primarily through public standpipes. Private connections are not, however, uncommon and are becoming increasingly more popular on existing systems. This is in line with current DWSS policy which appears to be to provide private connections wherever possible (in order to increase operating revenue). The water is always untreated in rural systems although, as stated earlier, steps are taken where possible to prevent undue contamination of the water source.

30. Materials for construction are generally random rubble masonry/cement mortar (occasionally reinforced concrete) for intakes, break pressure tanks and storage tanks, galvanized iron for tank roofs and high density polyethylene (HDP), galvanized steel or in some cases cast iron for pipework. Approximately 50 per cent of taps installed on public standpipes are the relatively cheap standard 13 mm brass taps available from India - the more expensive self-closing taps are used for the remaining 50 per cent of public standpipes.

31. In the Terai the deep tubewells are generally 350 mm diameter reducing to 200 mm diameter mild steel slotted casing and typically up to 100 mm deep. Tubewell pumps are electrically driven vertical spindle turbine pumps obtained from India, with capacity suited to the particular needs of the project.

32. In general there are no serious technical problems associated with designing the relatively simple DWSS rural water supply schemes. However high iron and manganese levels in the eastern Terai have occasionally resulted in water of an unpleasant taste and colour being supplied (N.B. a Fe/Mn removal plant has been installed at Rajbiraj).

33. Implementation of DWSS rural water supply projects is undertaken as follows: First a request for a new project is received from the relevant local Panchayat office or the representative in Kathmandu. It is then registered by DWSS and ultimately selected for feasibility study and detailed design on a "priority" basis. The study and design is carried out generally by a local consultant who works closely to published DWSS guidelines on feasibility studies/designs and who uses standard DWSS "type designs" wherever possible, adapting them as necessary to the particular project requirements. The feasibility

study results in the submission of an Interim Report. If this report is accepted the detailed design is undertaken. Draft detailed designs are submitted to DWSS for approval, after which final designs are submitted. Construction contracts are let competitively to local contractors who provide all locally available materials (i.e. excluding imported items such as cement, pipes and fittings). Supervision of construction is undertaken by DWSS staff.

34. Several technical and logistical problems were stated by DWSS officials to occur regularly which constrain the rate of implementation of DWSS projects. These are:

- the need to check and frequently to update or to improve the designs or cost estimates submitted by some local consultants. (These designs are sometimes not site specific, i.e. standard DWSS designs are sometimes used which have not been adapted to the particular topography or location of the specific project site. Also surveys are sometimes inaccurate). In addition, many of the DWSS "type designs" themselves are either outdated or need improvement in the light of site experience - a task which the U.K. VSO volunteers based in DWSS design offices are considering assisting with. (However, they feel that they may not necessarily have sufficient technical knowledge to review some of the more complex component designs). Updating of studies and design cost estimates is often needed due to the long periods which can sometimes elapse between the design of the project and its subsequent implementation. A random check of nine local consultants' designs submitted to the DWSS offices generally confirmed these findings. (DWSS stated that they are gradually refining their list of approved consultants in the light of designs received to date);
- the difficulties associated with transporting materials to some of the more remote sites, particularly in the west of Nepal, some of which can be 20 days walk from the nearest roadhead. The use of air freight has been tried in the Mid and Far West and the East Regions, but to date it has not been successful due to the difficulty in maintaining a reliable regular service from RNAC. Project rates of construction can slow down to a complete halt due to an inability to provide the necessary materials/equipment to the site in time and construction periods of several years are not uncommon even for small projects. (Recent decentralizing of control within DWSS which will result in the Regional Offices being more responsible for their own procurement may help to ease this problem);
- the difficulty in obtaining local skilled labour for contractors, particularly in the more remote areas; and
- the difficulties in overseeing the projects at the construction stage, taking into account the limited numbers of experienced staff available at the DWSS Regional/Divisional Offices and the considerable times needed to travel between sites.

Until these problems are solved it is difficult to envisage a rapid increase in the rate of project implementation undertaken by DWSS, particularly in the more remote regions of the country.

35. Unit capital costs for new piped water supply schemes undertaken by DWSS are approximately as follows (construction costs only):

<u>Location</u>	<u>Type of Scheme</u>	<u>Cost per Capita</u>	
		<u>Rs</u>	<u>\$</u>
Mountains	Gravity	1000	76
Hills/Inner Terai	Gravity	650-850	50-65
Terai	Deep Tubewell	500	39

36. Unlike WSSB and MPLD projects, which have been subjected to recent systematic evaluation (World Bank report for WSSB and reports by "New Era" and outside consultants for MPLD), existing DWSS rural water supply projects have not been subjected to a comprehensive review of their present state and effectiveness. Such a review is urgently needed, particularly in the light of the findings of WSSB and MPLD evaluations. Discussions held at the DWSS offices, in conjunction with observations made on the field trips undertaken by Mission Staff, suggest that many existing systems may well not now be operating wholly satisfactorily. One particular source of concern is the apparently commonly-practiced restriction of supplies to a few hours of each day, particularly but not exclusively on pumped supply systems. This creates problems of access to water supply points during the relatively short periods when water is available, leads to the use of alternative water sources, many of which are likely to be highly polluted and can result in contamination of the distribution system pipework through the ingress of polluted groundwater at times of low system pressure. The problem of restricted supply periods is one which DWSS must address urgently particularly as private house connections are sometimes being approved or installed in communities where supplies are already barely adequate to provide 24-hour coverage.

37. A further cause for concern is lack of suitable drainage facilities associated with many public standpipes. The provision of additional water without the associated provision of means for disposing of the surplus or waste water may, in many circumstances, result in deterioration in overall sanitary conditions. This problem is being tackled in some of the new projects undertaken by DWSS but many of the existing schemes have very poorly drained public standpipe areas which are only contributing to local health hazards. Also the present procedures for feasibility studies and designs by DWSS for rural water supplies do not include considerations of waste water disposal. Clearly there is no simple solution to this problem as none of the rural communities has any form of piped drainage. Open drainage channels are constructed in some communities but unless these are constructed to correct gradients and are kept clear of solid waste they do not assist in removing surplus water but also form an additional health hazard.

38. Maintenance of rural water supplies which have been constructed by DWSS should, in theory, be passed over to the local Panchayat administration on commissioning of the project. In practice however most communities have either been unwilling to take over this maintenance role (and have thus left responsibility for maintenance with the DWSS Regional/Divisional Offices) or, having taken over responsibility, have done nothing and have left the systems to deteriorate.

3.3 MPLD Schemes

39. MPLD currently undertakes three different types of rural water supply project, as follows:

- Grant-aid projects: these are very small village water supply projects typically costing less than Rs 100,000 and comprising between say 0.5 and 4 km of pipework. For these projects MPLD gives funds directly to the District Panchayat for use in purchasing materials and construction of the project. On occasions MPLD also assists by contributing materials and technical assistance. Not all of these projects are for piped water supplies; some have been for open wells. To date some 1,500 of these schemes have received MPLD assistance. The success rate for satisfactory completion of construction is not known.
- Integrated Rural Development (IRD) Projects: these are funded by either bilateral aid or multilateral aid agencies and generally include some rural water supplies within the regions covered by the projects. For these projects MPLD provide assistance in design and site supervision and also in some instances procurement of pipes and materials. There are also a very small number of Resource Conservation and Utilisation Projects (RCUPs) which are concerned solely with water supply and irrigation works; MPLD assist with these in the same manner as for the IRD projects. To date some 150 IRD schemes involving piped water supplies have been constructed.
- UNICEF Assisted Projects: UNICEF provides assistance to MPLD in all five Development Regions of Nepal. In four of the five regions the assistance is in the form of "noted" projects. In the Central Region UNICEF provides some funds directly to MPLD who are themselves responsible for designing and implementing all projects. To date some 150 to 200 UNICEF-assisted schemes have been constructed throughout Nepal.

A fourth type of MPLD project "Remote Area Development Project" was undertaken in the past but appears no longer to be used. It dealt with small projects in remote areas on the same basis as the grant-aid projects referred to above. Less than 40 such projects have been constructed, mostly in the period 1978-79.

40. Thus, in total, MPLD has been directly involved in the construction of some 300 to 400 small rural water supply schemes over the past 10 years (i.e. excluding the 1,500 or so grant-aided projects). Very approximate details of past rates of implementation of these projects (excluding the grant-aided projects) are given in Table 8, from which it can be seen that MPLD is on average completing some 30 to 40 new projects each year.

41. The population living in villages currently served by MPLD projects (including grant-aided schemes) is roughly estimated at 750,000 or five per cent of Nepal's rural population.

3.4 UNICEF-Aided Projects

42. Whilst MPLD is the government agency nominally responsible for all small rural water supplies (i.e., projects serving less than 1,500 people), it is directly assisted in the Mountain and Hill areas of four of the five Development Regions by UNICEF projects as follows:

<u>Region</u>	<u>Funded by</u>	<u>Executed by</u>
Eastern	UNCDF	UNICEF/MPLD
Western	SATA	SATA/MPLD
Mid Western)		
Far Western)	IMCDF	UNICEF/MPLD

Within these four regions almost all small rural water supply projects (other than grant-aid or IRD projects) are executed by MPLD with UNICEF or SATA assistance. UNICEF/SATA operate in about 30 of the 56 districts within these four regions - i.e., all districts except for the mountain areas in the north of the Mid and Far Western Regions, the Terai and those districts where other assisted projects are already established (e.g. Integrated Rural Development Projects, which are themselves established in 23 districts).

43. Although a new project has been drawn up for the Central Region, it has not yet been adopted by any donor agency. The Central Region thus receives no direct assistance in the field from UNICEF. Except for two World Bank funded IRD projects MPLD are working alone in this region implementing at present some 10 to 20 new projects per year. This work is however partially funded by UNICEF under a direct grant aid agreement.

44. Details of the status of UNICEF-aided projects in 1981-82 (so far as the information could be obtained in time) are given in Table 9.

3.5 General Description of MPLD Schemes

45. MPLD schemes constructed to date have been mostly in the Mountains or the Hills, with some in the Inner Terai areas where spring or stream sources are available. Systems are almost always gravity fed

(the exception being the occasional use of hydraulic rams). A typical system will comprise:

- a stream or spring intake;
- 3 to 10 km of HDP pipe (typically 23 to 93 mm diameter);
- break pressure tanks as required;
- a storage tank sized generally for 12 or 24 hours capacity; and
- 6 to 13 public standpipes.

46. The intake, break pressure and storage tanks and the bases to the public standpipes will usually be constructed using random rubble masonry and cement mortar. In exceptional circumstances however concrete is used. Galvanized steel pipe is used only for river crossings, other exposed sites and at reservoir inlets and outlets. Taps are generally standard brass types of Indian manufacture; the use of self closing taps is however under review and new designs are currently being considered by UNICEF.

47. It is not intended that private connections be supplied on MPLD schemes. In practice however such connections are installed on some systems.

48. In view of the extreme simplicity of gravity rural water supply systems there are no serious technical design problems to be overcome. Standard design procedures have been published and are adopted in most regions and, once a site has been surveyed, a scheme can rapidly be designed.

49. For the very small number of systems employing hydraulic rams (thought to be less than ten) the rams themselves have given rise to problems of long term reliability and difficulty in obtaining spare parts. As with taps, several designs of ram are being tried out and an attempt is being made to manufacture a suitable ram locally at the Bhutwal Technical Institute. The scope for use of hydraulic rams in Nepal is not large in relation to the total water supply problem but there are numerous small communities located above perennial flow rivers which could benefit from a reliable, simple pumping device.

50. Implementation of MPLD projects should occur as follows:

- the local Gaun (village) Panchayat submits a formal request for a new project through the District Panchayat. The priority for new schemes within the district is then established at District Assembly level and those schemes assumed to be of highest priority are passed through to the MPLD District, Regional or Kathmandu Office;
- MPLD and/or UNICEF/SATA technical teams will conduct feasibility studies to determine which schemes are feasible and will submit a revised list of feasible projects back to the District Panchayat;

- the District Assembly will choose which schemes will be implemented;
- for the selected schemes the detailed designs will be carried out by MPLD and/or UNICEF/SATA personnel (in the Central Region MPLD have recently started to recruit local consulting firms to undertake the design work to speed up implementation);
- for the construction phase MPLD will arrange and pay for the delivery of materials and the assignment of Water and Sanitation Technicians (WSTs) to the site. MPLD will also employ local artisans and semi-skilled labour as required. The community will provide unskilled labour. The construction of the system will be managed by a Village Construction Committee, with the assistance of the WSTs. The WSTs will be supported and supervised by regular visits from an overseer and engineer from either MPLD (for regular MPLD schemes) or from UNICEF/SATA.

51. Since there is no rigid distinction between DWSS and MPLD projects insofar as population of community served is concerned it is quite possible for the community to apply to MPLD for a project which could more appropriately be undertaken by DWSS. At present DWSS and MPLD work closely together to avoid taking on unsuitable projects. Apart from the theoretical upper limit of population for MPLD projects, projects are in theory passed on to DWSS if their expected cost exceeds Rs500,000 or the length of pipe required exceeds 10 km. This division of projects between the two Ministries can only become more complicated in the future with greater numbers of projects being undertaken (particularly in low-density areas) and continued close liaison between the two concerned Ministries is essential.

52. The main technical and logistical constraints to rapid project implementation are quoted by MPLD, UNICEF and SATA personnel to be as follows:

- difficulties in access to remote project sites with associated problems of transporting materials to the sites and time taken by supervisory staff to visit the sites;
- inadequate logistic support, particularly lack of suitable storage facilities and technically trained store keepers;
- lack of suitably trained technical manpower;
- lack of suitably skilled labour in the remote areas where many of the schemes are installed;

- lack of experienced and motivated overseers which leads to difficulties in ensuring that proper work is carried out unless full time, responsible supervision is provided; and
- lack of job incentive for overseers and engineers to work in the remote areas.

As with DWSS projects, it is probably unrealistic to expect a rapid future increase in the rate of project implementation (without a corresponding reduction in standards of work) until these problems have been solved.

53. Unit capital costs for gravity supply projects executed by MPLD lie in the range Rs 350 (\$26) to Rs 450 (\$34) per head excluding logistical overheads. There is some regional variation, reflecting the difficulties in access to some of the outlying communities. Typically projects executed in remote areas may be expected to be 15 per cent more expensive on average than similar projects executed in areas of easy access.

54. The effectiveness of the past programme of MPLD and UNICEF assisted projects has been closely scrutinized in two series of reports:

- the first to be undertaken was a site survey of all 70 projects constructed by the LDD/UNICEF/WHO community water supply programme between 1973 and 1976. The survey was undertaken in 1977 by New Era ^{1/} and it involved a visit to each of the 70 project sites to assess the current condition of the supply systems, to determine what local arrangements had been made for maintaining the systems and to identify the most urgent problems related to the continued operation of the systems. The findings of the New Era Survey were that nine per cent of all schemes were not working at all, 41 per cent had major faults and the remaining 50 per cent had either minor faults or were working satisfactorily. In addition just over 50 per cent of systems were said to give an adequate supply throughout the year (when working), 30 per cent were seasonally inadequate and 16 per cent were inadequate throughout the year. Less than 10 per cent of the schemes produced water of what was considered to be an acceptable bacteriological standard (less than 50 coliforms per 100 ml). No routine maintenance was undertaken by the local villagers at any of the project sites - indeed the concept of prevention maintenance was not understood (according to the survey).

^{1/} Community Water Supply Status Report LDD/UNICEF, July 1977.

Reasons for schemes failing to operate properly were given as:

- poor initial design and improper construction;
 - natural disasters (primarily landslides, flooding and stream erosion);
 - damage by people; and
 - inadequate preventive maintenance.
- The second set of surveys of existing projects undertaken within MPLD were carried out as a result of the recommendations of the Jhapa conference on the Rural Community Water Supply Programme (September 1980). At this conference it was recommended that each Development Region should review the current state of the systems within the region and come up with feasible proposals for a maintenance and repair programme. The findings of the subsequent surveys in two of the Development Regions may be summarized as follows:
- Western Region: of 45 projects visited 16 per cent were not working at all, 35 per cent had major faults and 49 per cent had either minor faults or were working satisfactorily;
 - Central region: of 31 projects visited 70 per cent were found to have major deficiencies.

Excluding inadequate maintenance on the systems, the major causes for systems not working properly were:

- incorrect design;
- poor construction;
- natural disasters;
- lack of standardization in design (Central Region only where no UNICEF/SATA assistance is provided).

55. Following the publication of these reports the rehabilitation of existing systems has become a significant part of the future MPLD water supply programme in each region. Unfortunately there is little prestige to be gained from rehabilitation works and also any such work does not improve the official statistics as regards achieving target levels of population coverage within the International Water Supply and Sanitation Decade (IDWSSD). There seems to have been a tendency to date to concentrate on the implementation of new projects without much concern being given to the fate of schemes once they have been completed. However, programmes for rehabilitation of existing schemes have not been drawn up for each Development Region even though, as is clearly pointed out in recent SATA/UNICEF reports, this can only be sensibly undertaken using existing resources by taking on proportionately fewer new projects.

56. In addition to recognizing the need to create a rehabilitation programme for existing schemes MPLD has also been forced to consider how best to guarantee that a reasonable level of local maintenance is carried out on systems in the future. This has been tackled by HMGN, WHO, UNICEF and SATA ^{1/} who have insisted that responsibility for maintenance is shared by the community (for routine operation, maintenance and minor repairs), by the District Panchayat (for routine inspection of systems, supervision of minor repairs and maintaining stocks of spares and materials) and HMGN (for budgetary assistance, procurement and technical support). MPLD has however agreed to assume the responsibilities of the District Panchayat until such time as the latter is able to take over. Village level maintenance and repairs will be performed by a Village Maintenance Worker (VMW) who will be trained during project construction by working alongside the water and sanitary technician and will also receive formal training by the Regional Office. A Village Maintenance Committee will take on overall responsibility of village level maintenance and will arrange for remuneration to VMW. As yet it is not possible to assess how successful this attempt to improve the level of local maintenance of MPLD water supply systems will be as hardly any community supplies have yet had VMWs appointed (only about five per cent).

3.6 Terai Tubewell Program

57. In order to provide large-scale coverage of the Terai population with improved water supplies within IDWSSD a massive program of shallow tubewell and handpump construction has been approved which aims to ensure that the whole of the Terai is served by either piped water supplies or approved handpumps by 1990.

58. The philosophy behind the shallow tubewell program is that one shallow well and approved handpump should be provided for every 200 people living in rural areas and that the distance from any household to a handpump should not exceed 150 meters. The estimated unit capital cost of the program is Rs 21 (\$1.6) per head.

59. On this basis the original Decade program planned for more than 30,000 shallow tubewells to be sunk and handpumps installed on suitable concrete aprons. It was originally proposed that the wells be constructed using 1 1/2" G.I. pipes with brass strainers. This however will be reviewed in the light of experience gained during the current "pilot phase" of the project (for example slotted PVC wellscreen is currently under investigation). Similarly, the type of handpump to be used is still under review, although the Bangladesh No. 6 has already been tried out and is at present in favour. Attempts are being made to modify the Bangladesh No. 6 pump in some details and then to manufacture it in Nepal.

^{1/} Water Supply Rehabilitation and Maintenance Policy Proposal
HMGN/WHO/UNICEF/SATA - 1982.

60. Responsibility for installing the shallow tubewells and handpumps has been shared between DWSS and MPLD on a regional basis. DWSS will be responsible for the Central, Mid and Far Western Development Regions, MPLD for the Eastern and Western Regions.

61. Initially the program for shallow tubewell installation is taking the form of UNICEF-assisted pilot projects in selected districts in four of the five development regions although MPLD and DWSS both have small independent tubewell programs. The objectives of the pilot project phase are to develop the technical knowledge and procedures required to sink shallow tubewells and install pumps, and to establish appropriate management procedures, an adequate manpower base and institutional infrastructure to enable the program to be extended to new districts. The pilot project phase is also intended to discover the extent to which the major challenge of community participation in maintenance of handpumps, once installed, can be solved.

62. The initial target for construction of shallow tubewells and handpumps was 200 for DWSS and 200 for MPLD in 1981/82. Owing to difficulties in starting up and in obtaining materials none were actually constructed under the UNICEF Program. MPLD did however install 50 handpumps under a separate HMGN budgetted program. For 1982/83 the targets were 1200 for DWSS (of which 800 UNICEF assisted) and 800 for MPLD (all UNICEF assisted). By end 1982 only 10 handpumps had been completed by DWSS (in the Central region) and none by MPLD.

63. It is too early as yet to comment on the success of the tubewell/handpump program. However, one of the handpumps installed by DWSS was inspected during the Mission visit to Terai; it was tested and found to be working well after five months. It also appeared to be extensively used by the local inhabitants.

64. A recent review of the policy of the shallow tubewell program has resulted in a tentative reconsideration of the degree of coverage which might realistically be achieved by tubewells/handpumps compared with piped water supplies. It is now felt by DWSS that local demand for piped water supply systems in some of the larger or more affluent Terai communities may well result in a significant number of piped water supplies being installed in place of handpumps. These piped supplies would require the use of borehole pumps and elevated water tanks and would be much more expensive than the handpumps to install. Nevertheless, it is felt that it would be unrealistic at this stage to assume a virtual 100 per cent coverage of the rural areas of the Terai with handpumps.

65. For outline planning and discussion purposes therefore the assumption has been made by DWSS that 25 per cent of all served people in the Terai will receive their water from piped systems in 1985 and that this figure will increase to 50 per cent by 1990. This would require the construction of some 15 to 20,000 shallow tubewells/handpumps (compared with the Decade plan figure of 31,000) and

at least 200 pumped well schemes. The implications of this for the planned output of DWSS over the Decade are considerable, as it will be adding a further 20 per cent (approx.) to the number of piped water supply projects to be implemented by 1990.

3.7 Other Agencies Operating in the Rural Water Supply Subsector

66. In addition to DWSS and MPLD a number of bilateral aid agencies and non-Governmental Organizations (NGOs) assist in the implementation of water supplies. Indeed almost all of the 43 NGOs registered in Nepal have a stated interest in rural water supplies. The impact of these agencies on the water supply sector outside of DWSS or MPLD is however modest and the technical aspects of the projects undertaken are in any event similar to those discussed above. They have therefore been omitted from further consideration as they do not affect the technical aspects of this Report.

4. CONCLUSIONS CONCERNING RURAL WATER SUPPLIES

67. There is clearly a need for a massive improvement in the level and quality of coverage in the rural water supply subsector. Both DWSS and MPLD have set themselves very ambitious targets for the Decade and they will need much help to enable them to meet these targets. It is important however that the desire to meet specific targets for new projects does not result in failure to set up and implement equally urgent program for the rehabilitation of existing projects and for maintenance of on-going schemes. It is also vital that the implications of possibly inadequate waste water disposal facilities are considered before embarking on new water supply projects, particularly in communities where waste water disposal is likely to be a problem.

68. Present constraints to implementation suggest that it would be unrealistic to expect to achieve rapidly a massive increase in the rate of project implementation within either DWSS or MPLD without first tackling some of the root causes of these constraints, particularly the difficulties in transportation of materials and equipment to remote sites and the lack of experienced technical and supervisory manpower at many levels. With this in mind, both DWSS and MPLD are already attempting to increase their capacity for implementation above present levels by the introduction of new procedures and by appropriate reorganization.

69. Specific items which can be singled out as priority needs in the rural water supply subsector include:

- assistance to DWSS to implement their program of new piped water supply projects in Far Western, Mid-Western, Western or Central Regions (on the assumption that ODA fund a package project in the Eastern Region). Such assistance should ideally include Terai deep tubewell projects as well as Mountain/Hill gravity schemes;

- assistance to MPLD in the form of a project in the Central Region, to be undertaken in coordination with the current UNICEF Program for the other regions; and
- assistance to either or both DWSS and MPLD in the Terai shallow tubewell/handpump program by starting up the program in additional new locations. However, large scale assistance in this program should perhaps await a review of the effectiveness of the present program and a final policy decision on the scale of coverage to be achieved by handpumps in the Terai.

70. General priority needs in the rural water supply subsector include:

- the establishment and continued operation of a proper management information system both within DWSS and MPLD to enable up to date data on all existing and proposed schemes to be filed accurately, consistently and in a readily accessible manner;
- a review of the "type designs" given by DWSS to local consultants, many of which appear not to have been updated in the light of experience gained on site when the designs are tested in practice;
- consistency of design of MPLD projects, particularly in the Central Region, which does not benefit from the standardized design approach operated by UNICEF/SATA in much of the other regions;
- improved accessibility to remote sites and better local storage facilities;
- increased properly-qualified and experienced technical and supervisory manpower at almost all levels;
- a systematic review of the present state and effectiveness of all DWSS rural water supply projects, similar in scope to the recent MPLD project reviews;
- a program of rehabilitation of existing projects where major faults are found to exist; and
- more effective future maintenance and repair procedures to enable systems once completed (or rehabilitated) to continue to operate satisfactorily.

Table 1

URBAN WATER SUPPLY DETAILS

<u>Nagar Panchayat</u>	<u>Operating Agency</u>	<u>1981 Census Population</u>	<u>Source of Water</u>
Kathmandu	WSSB)	316100	RSW/PG
Lalitpur	WSSB)		
Bhaktapur	WSSB	50500	P/C
Pokhara	WSSB	48600	R/G
Biratnagar	WSSB	93900	W/P
Birganj	WSSB	45900	W/P
Dhankuta	DWSS	13200	S/G
Ilam	DWSS	9300	S/G
Tansen (Palpa)	DWSS	12100	R/P
Bhairawa	WSSB	30100	W/P
Butwal	WSSB	22900	R, S/P, G
Janakpur	WSSB	35200	W/P
Nepalgunj	WSSB	33900	W/P
Dharan	WSSB	42700	S/G
Hetauda	WSSB	32700	S/G
Bhadrapur	DWSS	14900	W/P
Rajbiraj	DWSS	16300	W/P
Tribhuvan Nagar (Ghorahi)	DWSS	19300	S/G
Lahan	DWSS	12900	W/P
Dhangarj	DWSS	26100	W/P
Mahandra Nagar	DWSS	41600	W/P
Bharatpur	DWSS	26700	S/G
Birendra Nagar (Surkhet)	DWSS	13900	R/G
<u>Recently created Nagar Panchayats</u>			
Dipayal	a/	n.a.	a/
Taulihawa	DWSS	n.a.	W/P
Kalaiya	DWSS	n.a.	W/P
Banepa	WSSB	n.a.	S/G
Jaleshwar	DWSS	11700	W/P
Damak	DWSS	6843	W/P

Note: R - River/Stream
S - Spring
W - Well/Borehole
P - Pumped
G - Gravity

a/ water supply not yet taken over/by DWSS

Source: DWSS 1982

Table 2
Page 1SCHEMES MAINTAINED BY DWSS

<u>NAME OF SCHEME</u>		<u>DISTRICT</u>		<u>YEAR COMPLETED</u>	<u>DESIGN POPULATION</u>
I. <u>EASTERN REGION</u>					
1. DH ^{a/} Rajbiraj	(Urban)	Saptari	Terai	1976/77	7,800
2. DH Gaighat		Udayapur		1978/79	7,000
3. DH Dhankuta	(Urban)	Dhankuta		n.a.	4,100
4. Hata Bazar		"		1972/73	2,000
5. Chuli "		"		1978/79	12,000
6. DH Ilam	(Urban)	Ilam		1976/77	7,100
7. DH Taplejung		Taplejung		1979/80	3,300
8. DH Phidim		Panchthar		1979/80	3,200
9. DH Salleri		Solukhumbu		1981/82	2,700
10. Chainpur		Sankhuwasabha		1972/73	3,200
11. Katari		Udayapur		1980/81	2,000
				Sub-total	54,000
II. <u>CENTRAL REGION</u>					
1. Amalekhagunj		Bara	Terai	n.a.	n.a.
2. Tofical		Kathmandu		1964/65	200
3. Indrayani		"		1968/69	4,300
4. Salyantar		Dhading		1968/69	5,800
5. Katunje Dadhikot		Bhaktapur		1977/78	9,300
6. Siddipur		Lalitpur		1973/74	3,800
7. Harishiddhi		"		1971/72	3,300
8. Phalate		Kavre		1975/76	1,500
9. Kusadevi		Kavre		1981/82	2,500
10. Chaughara		Makwanpur		1981/82	4,200
11. Simra		Bara	Terai	1981/82	3,600
12. Dhalkebar		Dhanusha		1981/82	1,900
13. Majhuwa		Rame chhap		1981/82	700
14. DH Chautara I ^{b/}		Sindupalchowk		1964/65	n.a.
15. Chautara II ^{b/}		"		1975/76	4,500
16. SindhuLimadi		Sinduli		1974/75	7,700
17. Dolakha		Dolakha		1963/64	3,300
18. Kalaiya		Bara		1977/78	12,200
				Sub-total	68,800

Table 2
Page 2

<u>NAME OF SCHEME</u>		<u>DISTRICT</u>	<u>YEAR COMPLETED</u>	<u>DESIGN POPULATION</u>
III. WESTERN REGION				
1. Righa		Baglung	1976/77	2,200
2. DH Baglung		Baglung	1977/78	5,200
3. Rakhu		Mustang	1971/72	5,400
4. Mallajh		Parbat	1976/77	4,000
5. Phalebas		Parbat	1974/75	2,000
6. DH Kusma		Parbat	1978/79	6,400
7. Jubhung		Gulmi	1973/74	3,700
8. Deule Archale		Palpa	1970/71	600
9. DH Tansen I ^{b/}	Urban	Palpa	1971/72	6,800
10. Tansen II ^{b/}	Urban	Palpa	1978/79	13,500
11. Balkot		Arghakachi	1978/79	5,400
12. Khudi		Kaski	1970/71	3,400
13. Gejyang		Kaski	1970/71	2,000
14. Bhimad Bazar		Kaski	1955/56	4,000
15. Shataudharu		Shangja	1955/56	600
16. Archale Chour		Tanahu	1970/71	2,000
17. DH Damsuli		Tanahu	1981/82	2,000
18. Bandipur		Tanahu	1955/56	5,300
19. Mankarna		Gorkha	n.a.	8,000
20. Beldiha		Nawalparasi	1978/79	5,400
21. Bungkot		Gorkha	1979/80	3,100
22. Tamghash		Gulmi	1978/79	1,200
23. DH Jomsom		Mustang	1981/82	1,400
24. Ramgha		Lamjung	1981/82	1,700
25. Rupakot		Gulmi	1981/82	8,500
26. Malunga		Syangja	1981/82	800
27. DH Bharatpur	Urban	Chitwan	1977/78	10,000
			Sub-total	<u>114,800</u>
IV. MID WESTERN REGION				
1. DH Birendranagar	Urban	Surkhet	1973/74	3,500
2. DH Dailekh		Dailekh	1978/79	2,600
3. Tirangolwang		Pyuthan	1972/73	900
4. Tulsipur		Dang	1972/73	4,800
5. DH Ghorai	Urban	Dang	1969/70	5,400
6. DH Libang		Rolpa	1981/82	2,300
7. DH Gularia		Bardia	1981/82	8,700
8. DH Jumla		Jumla	1981/82	3,500
			Sub-total	<u>31,800</u>

Table 2
Page 3

<u>NAME OF SCHEME</u>		<u>DISTRICT</u>		<u>YEAR COMPLETED</u>	<u>DESIGN POPULATION</u>
V. FAR EASTERN REGION					
1. DH Mahendranagar	Urban	Kanchanpur	Terai	1973/74	6,300
2. DH Baitada I ^{b/}		Baitada		1967/68	1,500
3. DH Dadeldhura		Dadeldhura		1978/79	4,000
4. Tikapur		Doti		1976/77	2,000
5. DH Dhangadi		Kailali		1974/75	2,400
6. DH Ridikot		Achham		1977/78	3,000
7. DH Darchula		Darchula		1981/82	4,800
8. DH Baitadi II ^{b/}		Baitadi		1981/82	2,300
9. Panchkotte Mudvara		Doti		1981/82	<u>3,000</u>
				Sub-total	<u>29,300</u>

SUMMARY TABLE OF SCHEMES MAINTAINED BY DWSS

<u>REGION</u>	<u>NO. OF SCHEMES a/</u>
1. EASTERN	11
2. CENTRAL	17
3. WESTERN	26
4. MID WESTERN	8
5. FAR WESTERN	<u>8</u>
TOTAL	<u>70</u>

Note: a/ DH - District Headquarter
b/ Phase I and II projects considered as single schemes.

Source: DWSS 1982

SCHEMES MAINTAINED BY DISTRICT PANCHAYAT OFFICE
WITH DWSS ASSISTANCE

<u>NAME OF SCHEME</u>	<u>DISTRICT</u>	<u>YEAR COMPLETED</u>	<u>DESIGN POPULATION</u>
<u>I. EASTERN REGION</u>			
1. Lamdanda	Khotang	1966/67	1,800
2. Okhal Dhunga	Khotang	1967/68	3,100
3. Rumjatar	Khotang	1967/68	2,200
4. DH Bhojpur	Bhojpur	1975/76	4,600
5. Jarayotar	Bhojpur	1963/64	3,000
6. Mugu	Dhankuta	1963/64	4,200
7. Chainpur	Shankhuwasabha	1972/73	3,200
8. DH ^{b/} Terathum	Terathum	1968/69	1,100
9. DH ^{b/} Bhadrapur I ^{a/} Urban	Jhapa Terai	1972/73	8,000
10. Bhadrapur II ^{a/} Urban	Jhapa	1976/77	10,000
11. Katari	Udayapur	1980/81	2,000
<u>II. CENTRAL REGION</u>			
1. DH ^{b/} Bhimphedi	Makwanpur	n.a.	3,700
2. DH ^{b/} Dhunche	Rasuwa	1977/78	800
3. DH ^{b/} Ramechhap	Ramechhap	1975/76	1,000
<u>III. WESTERN REGION</u>			
1. DH ^{b/} Beshi Sahar	Lamjung	1975/76	300
<u>IV. MID-WESTERN REGION</u>			
1. DH ^{b/} Jajarkot	Jajarkot	n.a.	2,400
2. DH ^{b/} Salyan	Salyan	1975/76	3,300
<u>V. FAR-EASTERN REGION</u>			
1. DH ^{b/} Silgadi	Doti	n.a.	3,700
2. Martadi	Bajura	1979/80	2,300

TOTAL NO. OF SCHEMES: 18

SUMMARY TABLE OF SCHEMES MAINTAINED BY
DISTRICT OFFICE WITH DWSS ASSISTANCE

<u>REGION</u>	<u>NO. OF SCHEMES</u> ^{a/}
1. EASTERN	10
2. CENTRAL	3
3. WESTERN	1
4. MID WESTERN	2
5. FAR WESTERN	<u>2</u>
	18

Note: a/ Bhadrapur Phase I and II projects are considered as a single scheme.

b/ DH - District Headquarter

Source: DWSS 1982

Table 4

DWSS RURAL WATER SUPPLY PROJECTS
DETAILS OF PROJECTS COMPLETED 1975 - 1982

<u>YEAR</u>	<u>NO. OF PROJECTS COMPLETED</u>
1975/76	7
1976/77	7
1977/78	3
1978/79	-
1979/80	-
1980/81	3
1981/82	<u>18</u>
	38 <u>a/</u>

Note: a/ An average of 5.4 per year.

Source: DWSS 1982

Table 5

DWSS SCHEMES WHICH WERE PLANNED FOR CONSTRUCTION IN 1982-83

URBAN SCHEMES - PIPED SUPPLIES

EASTERN	1
CENTRAL	1
WESTERN	1
MID WESTERN	2
FAR WESTERN	-
	<u>5</u>

RURA: SCHEMES - PIPED SUPPLIES

EASTERN	20
CENTRAL	24
WESTERN	25
MID WESTERN	12
FAR WESTERN	<u>12</u>
	93

TOTAL - URBAN & RURAL SCHEMES UNDER CONSTRUCTION: 97

ADDITIONAL PROJECTS WHICH
POSSIBLY STARTED IN 1982/83 21

Maximum Total: 118

SHALLOW TUBEWELLS

800	UNICEF assisted (Mahottari, Sarlahi, Dhanusha)
200	DWSS (Bardiya and Banke)
100	DWSS (Kailali)
<u>100</u>	DWSS (Kanchanpur)
Total:	1200

DEEP TUBEWELLS

Total: 5 (all to reinforce existing water supplies)

Source: DWSS 1982

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Table 6
Page 1

DEPARTMENT OF WATER SUPPLY AND SEWERAGE PIPED WATER SUPPLY
PROJECTS WHICH WERE EXPECTED TO BE COMPLETED
IN 1982-83 CONSTRUCTION PERIOD

	<u>EASTERN REGION</u>	<u>DISTRICT</u>	<u>DESIGN POPULATION</u>
A.	<u>URBAN PROJECTS</u>		
1.	Lahan	Siraha	8,300
B.	<u>RURAL PROJECTS</u>		
1.	Siraha	Siraha	7,000
2.	Chandragdhi	Jhapa	11,900
3.	Inerwa	Sunsari	9,800
4.	Khandbari	Sankhuwasabha	3,200
5.	Chattarpokhari	Terathum	3,400
6.	Belhara	Dhankuta	<u>2,800</u>
		Sub Total	<u>38,100</u>
 <u>CENTRAL REGION</u>			
A.	<u>URBAN PROJECTS</u>		
1.	Jaleswor	Mahottari	11,700
B.	<u>RURAL PROJECTS</u>		
1.	Malangwa	Sarlahi	12,200
2.	Gaur	Rauthat	8,300
3.	Bidur	Nuwakot	5,700
4.	Chaparkharka	Lalitpur	21,100
5.	Lele	Lalitpur	8,000
6.	Machhegaon	Kathmandu	7,300
7.	Rakathum	Ramechhap	4,000
8.	Nijgadh	Bara	18,700
9.	Lalgadh	Dhanusha	<u>7,500</u>
		Sub Total	<u>92,800</u>
 <u>WESTERN REGION</u>			
A.	<u>URBAN PROJECTS</u>		

Table 6
Page 2

<u>B. RURAL PROJECTS</u>	<u>DISTRICT</u>	<u>DESIGN POPULATION</u>
1. Krishnagar	Kapilvastu	9,800
2. Dhamelikuwa	Lamjung	2,900
3. Beni	Myagdi	2,900
4. Pali	Arghakhandhi	5,200
5. Gorkha	Gorkha	4,800
6. Muchok	Gorkha	5,300
7. Daraudi Jaladhar	Gorkha	9,400
8. Chilaudi	Palpa	2,600
9. Mahendrakot	Kapilvastu	1,700
10. Pragatinagar	Nawalparasi	13,300
	Sub Total	<u>158,000</u>

MID WESTERN REGION

A. URBAN PROJECTS

1. Ghorahi (Tribhuwa nagar)	Dang	25,400
2. Surkhet (Birendra nagar)	Surkhet	<u>7,700</u>
	Sub Total	<u>33,100</u>

B. RURAL PROJECTS

1. Gamgadhi	Mugu	3,700
2. Simikot	Humla	900
3. Beljhundi	Dang	19,000
4. Okharkot	Pyuthan	<u>4,600</u>
	Sub Total	<u>28,200</u>

SUMMARY:

1. URBAN TOTAL NO. OF PROJECTS: 10
2. URBAN TOTAL DESIGN POPULATION: 112,140
3. RURAL TOTAL NO. OF PROJECTS: 23
4. RURAL TOTAL DESIGN POPULATION: 158,000

Source: DWSS 1982

Table 7

DWSS PROJECTS FOR WHICH FEASIBILITY STUDIES
ARE COMPLETE OR ARE IN PROGRESS

<u>DEVELOPMENT REGION</u>	<u>NO. OF FEASIBILITY STUDIES COMPLETE OR IN PROGRESS (APPROX)</u>
FAR WESTERN	29
MID WESTERN	8
WESTERN	51
CENTRAL	24
EASTERN	<u>9</u>
Total	<u>121</u>

Of this figure about seven projects are now considered as being perhaps too small for DWSS and may be handed over to MPLD for implementation.

Thus number of potential DWSS schemes for which feasibility studies are complete are in progress = 114 (approx).

Source: DWSS 1982

Table 8

MPLD RURAL WATER SUPPLY PROJECTS

ACHIEVEMENT DETAILS 1971-1982

<u>Fiscal Year</u>	<u>Total Projects under construction during year</u>	<u>Completed Projects within year</u>	<u>Un-completed Projects at Year end</u>
1971/72	7	7	-
1972/73	24	23	1
1973/74	55	53	2
1974/75	71	65	6
1975/76	-	-	-
1976/77	15	15	-
1977/78	33	33	-
1978/79	85	70	15
1979/80	52	40	12
1980/81	<u>53</u>	<u>23</u>	<u>30</u>
Total	395	329	66
1981/82	<u>82</u>	<u>1</u>	<u>81</u>
Total	<u>477</u>	<u>330</u>	<u>147</u>

Source: MPLD 1982

Table 9

STATUS OF UNICEF ASSISTED MPLD PROJECTS
1981/82 SEASON

	<u>Central Region</u>	<u>Eastern Region</u>	<u>Western Region</u>	<u>Mid/Far Western Region</u>
Projects completed in year	n.a.	8	13	9
Projects under construction at end of season	n.a.	12	31	17
Survey/design complete but construction not started	n.a.	n.a.	28	n.a.
Feasibility studies complete but detailed survey not started	n.a.	n.a.	56	n.a.
Applications for projects awaiting processing	n.a.	55	n.a.	n.a.

Note: n.a. - not available before Mission left Nepal

Source: UNICEF 1981/82 Annual Reports.

Annex A

COMMUNITIES VISITED DURING MISSION FIELD TRIPS

WSSB Supply Areas (Nagar Panchayats):

Nagar Panchayats

Kathmandu	Central Development Region
Lalipur	Central Development Region
Janakpur	Central Development Region
Hetauda	Central Development Region
Butwal	Western Development Region
Pokhara	Western Development Region

Rural Communities

Kirtipur	Kathmandu Valley
Sankhu	Kathmandu Valley

DWSS Supply Areas

Nagar Panchayats

Bharatpur	Central Region
Tansen	Western Region

Rural Communities
in Central Region

Kumraura	Terai - DWSS shallow well/hand pump project
Dhalkebar	Terai - DWSS piped gravity supply
Lalgadh	Inner Terai - DWSS piped supply
Simara	Terai - DWSS deep tubewell supply

Rural Communities
in Western Region

Beldiha	Inner Terai - DWSS piped gravity supply
Praghari Nagar	Inner Terai - DWSS piped gravity supply
Damauli	Hills - DWSS piped gravity supply

MPID Supply Areas

Rural Communities
in Western Region

Sundari Danda	Hills SATA/MPID gravity system
Tharpu	Hills SATA/MPID gravity system

SANITATION - DETAILED REPORT

TABLE OF CONTENTS

	<u>Page No.</u>
1. INTRODUCTION	110
2. BACKGROUND	110
3. THE CURRENT SITUATION	111
3.1 Government Departments - Sanitation Responsibilities	111
3.2 Sewerage and Sewage and Excreta Disposal in Urban Core Areas	112
3.3 Excreta Disposal other than in Urban Core Areas	113
3.4 Sullage Disposal, Surface Water Collection and Solid Wastes	114
4. PLANNED DEVELOPMENTS	114
4.1 Urban Core Areas	114
4.2 Areas other than Urban Core Areas	114
5. CRITICAL ASSESSMENT	115
5.1 Urban Core Areas	115
5.2 Areas other than Urban Core Areas	116
5.3 Sullage Disposal, Surface Water Collection and Solid Wastes	117
6. PERCEIVED NEEDS	118
6.1 Urban Core Areas	118
6.2 Areas other than Urban Core Areas	118
7. PRIORITIES	119
8. AFFORDABILITY	120
9. CONCLUSIONS	121
10. ACKNOWLEDGEMENTS	120

(Reference in text: page 31, para 98)

	<u>Page</u>
Table 1 Current Status of Sewerage/Sanitation in Nagar Panchayats	122
Table 2 Urban Population Covered by Sewerage at 1980, 1985 and 1990	123
Table 3 HMGN Rural Sanitation Programme	124
Annex 1 Activities of the Expert	125
Annex 2 Evaluation of the Kirtipur Demonstration Project Summary of Findings	127
Annex 3 National Sanitation Seminar, Kathmandu, September 1981 - Recommendations	129

1. INTRODUCTION

1. The Report offers brief background commentary and then discusses the technical aspects of the current situation in Nepal and of the planned developments. A critical assessment is then offered on the basis of which perceived needs are declared. Finally certain priorities are identified and conclusions are drawn. Annexed to the Report is a note of the Expert's activities (Annex 1). The Expert received very considerable assistance from many people during his stay in Nepal.

2. BACKGROUND

2. The Nepali consist of many ethnic groups which tend to live in specific geographical regions. In the high Himalayan regions of the north live the Tibetan speaking people - the Sherpas, Thakalis, Manangba, and others - who are more generally known as the 'Bhotia'. These Mountain people are scattered among the many high river valleys which run east to west and have ways of life and dialects that are often totally unintelligible to their neighbors. The area immediately south of the Himalayas is inhabited by various Tibeto-Burman and Indo-Aryan hill people - Brahman, Chetri, the Newars, Rai, Limbu, Tamang, Magars, Gurung, and other occupational castes. The third specific geographical region, the Terai or lowlands, is inhabited by various Indo-Aryan speaking peoples and some indigenous people generally referred to as Madhise - Brahman Rajput, Tharu, Danuwas Majhi, Musulman, and other occupational castes. Thus, although Nepal is a small country it is inhabited by many different types of people with equally different socio-cultural variations. In the context of this Report attitudes towards defecation and excreta disposal are important.

3. Sanitary habits vary between men, women and children and, to some extent, geographically. Men usually choose open spaces in which to defecate, commonly fields if they are available. Women tend to prefer streets or alleyways nearer to their house. Children conventionally use any convenient site, often in full public view. In general there is a total disregard of the health hazards, caused by deposited excreta because of an almost universal lack of understanding of basic public health factors. Health hazard is aggravated by many of the anal cleansing practices adopted by the Nepali. Thus, although most of the men and women living in the Hills and Terai use water, men and women in the Himalayan regions and children everywhere seldom do - pebbles, leaves, grass and waste paper are all used. Human excreta is therefore widely distributed in the environment, acting as a reservoir of infection for direct human, animal and insect contact and indirectly via vegetables and water courses.

4. In the cities of the Kathmandu Plain and in some other towns, particularly in the Terai, private sanitation facilities are

common - both pit latrines and septic tanks are represented - and sewerage systems exist in parts of Kathmandu and Bhaktapur. Otherwise few private latrines exist in the country. People are not used to, and accept the concept of, open air defecation. Some public latrines exist, but they are all intolerably dirty and are themselves a serious health hazard; even private sanitation facilities are not always kept in a clean condition. Thus, though many sanitation facilities do exist in Nepal they are only in a relatively few communities and most Nepali have no understanding of anything other than open-air, if any, understanding of the health benefits they could offer and they are generally perceived as offering nothing more than convenience and status.

3. THE CURRENT SITUATION

3.1 Government Departments - Sanitation Responsibilities

5. The principal relevant Government Departments (in the sanitation subsector) and their responsibilities 1/ are as follows:

(i) Ministry of Water Resources

a. Department of Water Supply and Sanitation (DWSS)

Responsible for sanitation in those of the Nagar Panchayats (commonly but not necessarily the largest town) where this responsibility has not been handed over to WSSB. In 1980 DWSS had sanitation responsibility in 17 Nagar Panchayats; the number is expected to be reduced to about 11 by 1985. Ultimately WSSB can be expected to be responsible for all Nagar Panchayats. DWSS is also responsible for the sanitation of rural compact communities with populations greater than 1500.

b. Sanitation Division of DWSS

Only formed recently. Eventually will take responsibility for all aspects of sanitation falling within DWSS.

c. Water Supply and Sanitation Board (WSSB)

Responsible for sanitation in the Nagar Panchayat not covered now by DWSS. Ultimately will be responsible for all urban sanitation.

(ii) Ministry of Panchayat and Local Development (MPLD)

Responsible for the sanitation in rural communities in the Hills and Midlands with populations less than 1500. Also responsible for all rural community sanitation in the Terai.

1/ There is some overlap of responsibilities and delineation may be applied with flexibility to local conditions.

(iii) Ministry of Health - Environmental Sanitation Unit (ESU)

Responsible for the development of latrine designs and general promotion and education.

(iv) The National Group

Responsible for the coordination of sanitation activities generally.

3.2 Sewerage and Sewage and Excreta Disposal in Urban Core Areas

6. Sewerage systems and sewage treatment plant only exist in the city of Kathmandu and in Bhaktapur. However, in Kathmandu neither the sewerage system nor the treatment works is in operation and in Bhaktapur the treatment works is grossly overloaded and, in any case, does not receive all the sewage collected into the sewerage system. Thus, whereas some 25,000 people living in the urban core of Kathmandu theoretically have access to an old and fragmentary sewerage system, lack of maintenance has resulted in its failure and the recently completed trunk sewer and oxidation pond treatment plant have not yet been commissioned; commissioning was planned for 1983. At present any collected sewage is discharged without treatment to the Bagmati River. In Bhaktapur there is a new and effective sewage system in part of the town to which 1,100 households of a total of over 6,000 are currently connected. The Bhaktapur sewerage system works well, but little treatment is afforded to the collected sewage. It is evident, therefore, that only some 35,000 people countrywide theoretically have access to a sewerage system and only the 9,000 people living in 1,100 houses in Bhaktapur can actually currently benefit from sewerage - a negligible number in comparison with the total national urban population of over 0.9 million. Furthermore, even in Bhaktapur, the degree of sewage treatment currently achieved is of little or no consequence; indeed, the effective collection of sewage results in increased pollution of the Hanumanti River to which it is discharged. There is no doubt that the Bhaktapur sewerage system is offering considerable benefit to those living in the sewered areas, however, in national terms, the current availability of sewerage and sewage facilities is of little or no significance.

7. At present the urban population mostly relies upon pit latrines, both private and public, and on open places; there are also some private and shared septic tanks among the more affluent of the population. This situation is far from being satisfactory, but it is worthy to note that some sort of private excreta disposal facility is available to over 12 per cent of the urban population (HMGN Ten Year Plan), implying that perhaps some 10,000 excreta disposal units are currently installed in urban areas. Indeed, in some urban areas coverage is much greater; a 1978 survey (Household Budget Survey;

Nepal Rastra Bank) showed that in the sixteen towns surveyed, half had better than a 30 per cent household private latrine coverage. Since these statistics relate to urban areas as a whole, coverage in core areas could be expected to be significantly higher than the average. It is certain that many of the existing latrine facilities are poorly designed, but almost all of those examined during the period of the Mission were well maintained and clean. Thus, even if they are rudimentary, reasonably acceptable private sanitation facilities are available to a significant proportion of the urban population. Additionally, public toilets, are often available, but these are generally in an intolerable state and are unattractive to potential users.

8. It is relevant to note that Master Plans exist for the sewerage of the core areas of six towns and that Feasibility Studies have been carried out in six more. In addition, work will be initiated to prepare Feasibility Studies for a further eight towns and to update two existing Feasibility Studies. Details are given in Table 1.

3.3 Excreta Disposal Other Than in Urban Core Areas

9. It is commonly assumed that there are few sanitation facilities in Nepal. Indeed, in the HMG Sixth Plan it has been stated that sanitary latrines were almost non-existent at the time of publication of the Plan early in 1980. In fact, the current situation is that there are many sanitation units throughout the country. Although most of the existing units are in urban areas, by no means all are in core areas. Historically, there have been relatively few sanitation units in rural areas but, since 1980, there has been considerable activity in the area of rural sanitation - many pilot and demonstration projects have been initiated and some sanitation units have been constructed during the installation of water supply schemes. Consolidated data have not been identified on the level of existing sanitation in non-urban core areas, neither has it been possible to quantify the various types of facility currently installed, but it is evident from reports and discussions that most known systems are represented ranging from poorly designed, crude pit latrines through pour-flush latrines to septic tanks with well designed soakaways.

10. It has also been reported in discussion that simple but effective chute latrines are commonly installed in the Mountains, discharging to the ground floor of the house in an area where animals are kept: accumulated human and animal excreta is removed periodically and used as a fertilizer. Thus, there is considerable experience with low-cost excreta disposal systems in both technical and geographical terms. In ethnic terms it has been demonstrated that low-cost excreta disposal is a practicable concept in the upper mountains, the Hills and the Terai where either the use of excreta as a fertilizer is habitual or where there is a scavenger caste. It is not clear whether the same would apply in areas where excreta is not used as a fertilizer and where there is no scavengers.

3.4 Sullage Disposal, Surface Water Collection and Solid Wastes

11. With few exceptions, an outstanding one being Bhaktapur, sullage is disposed of haphazardly to ground, to surface water channels, or to watercourses; surface water collection is in badly designed and essentially inoperable channels and ditches; and solid wastes are dumped at any convenient spot, often into surface water drains. These practices result in a level of pollution, particularly in the more heavily populated areas, that is both aesthetically objectionable and hazardous to health. It is relevant to note that the high levels of environmental pollution created by sullage disposal, surface water collection and solid wastes does little to motivate people to use sanitation facilities even where they exist. The integrated urban development program at Bhaktapur has resulted in an unusually high level of acceptance of sanitation facilities and there is no doubt that this is because of the considerable overall improvement in the environment due to attention being paid to all environmental aspects. The current situation generally is that sanitation is often considered in isolation, or only as an adjunct to the introduction of a piped water supply. Because of this, acceptability can be poor and public health benefits are much less than potentially they could be. The importance of safe sullage disposal, surface water collection and solid wastes collection cannot be overemphasized in the context of this Report.

4. PLANNED DEVELOPMENTS

4.1 Urban Core Areas

12. The HMGN Sixth Plan (1981-85) states that; ... sewerage will be provided in areas where there is a profuse water supply ... and in the Ten Year Plan it is declared that plans exist for sewerage 12 towns so that 21.71 per cent of the urban population of Nepal will enjoy the benefits of a sewerage system by 1990. In fact, as is stated in the Ten Year Plan, a larger population could well have access to sewerage since feasibility studies are being undertaken in a further thirteen urban areas. The specific sewerage expectations given in the Ten Year Plan are presented in Table 2. It may reasonably be assumed that if the expectations of the Ten Year Plan are met, and if the urban feasibility studies lead to proposals to sewer all urban core areas, then the facilities will exist over the next decade or so to allow an adequate level of sewerage to be introduced in all the heavily populated areas of the country.

4.2 Areas Other Than Urban Core Areas

13. In the HMGN Sixth Plan it is stated that sanitary latrines will be built in rural areas during the terms of the Plan (1981-85) to cover 35 per cent of the population or 0.44 million, plus 1,500 schools. And, in the HMGN Ten Year Plan (1980-90) it is proposed that

13.12 per cent of the rural population will be covered by 1990. In the same time, it is predicted that this level of coverage will the construction of 358,000 latrines. No predictions exist for urban areas other than the core areas of the principal towns. However, it is reasonable to assume that low-cost sanitation units will be introduced progressively to cover a speculated 50 per cent of non-sewered urban areas. Thus, of the total population in 1990 of 17.5⁹ million at least 2.49 million, or 15 per cent, should have sanitary facilities if current plans materialize and this figure could be significantly higher.

14. In technical terms, it is not clear what type of sanitation facility is likely to be introduced. Discussions locally have identified strong individual preferences for either ventilated pit latrines or pour-flush latrines and other types of latrines are also to be introduced on pilot/demonstration levels. It seems likely, however, that the proposal in the HMGN Ten Year Plan that pit latrines will be used with or without water flushing will gain general acceptance and will form the basis of future policy for latrine design.

5. CRITICAL ASSESSMENT

5.1 Urban Core Areas

15. The principle of installing sewerage systems for high density urban core areas is commended. However, intentions are unclear, uncertainty lying in the definition of urban core areas. If urban core areas are defined as pockets or wider areas of high population density within conurbations, then the principle is sound; if sewerage is intended in the central zones of conurbations regardless of population density, then it is not. Thus, where there is a high density of population, it would be possible to provide many if not all households with pit latrines, and many are now installed, but the problems of removing accumulated solids and widespread soakage of polluted effluent to ground would be likely to create problems. The same problems would not exist where population is less dense, even in urban core areas.

16. It is not clear what form of sanitation unit is likely to be installed in association with sewerage. Some householders will want, and be prepared to pay for, flushing toilets; where an adequate water supply is available this should be acceptable. However, even where water is connected to the house, this will usually be unaffordable. The type of pour-flush latrine being installed at Bhaktapur has been proved to be an attractive low-cost solution there. If this type of latrine is used, and it is recommended that it should be wherever possible, then sewers and house connections should be designed to allow flush-toilets to be substituted for the pour-flush latrines at some time in the future. There might be problems in maintaining self-scouring velocities in sewers if pour-flush latrines are used in

flat areas such as the Terai but decisions can and should be made now to ensure that the sewerage systems that will be installed, and the associated sanitary units, are designed in conformity with detailed technical specifications appropriate to local needs and conditions and bearing in mind the possibility of future upgrading.

5.2 Areas Other Than Urban Core Areas

17. The concept generally accepted in Nepal that all except the most densely populated urban core areas should have low-cost excreta disposal facilities is supported. There can be no justification for giving serious consideration to the alternative of a water borne sewerage system. Thus, the only questions for debate are the areas to be given priority and the type or types of low-cost systems to be installed.

18. So far as is known, there has been no official declaration of priority areas for the introduction of non-urban excreta disposal facilities. Indeed, in the HMGN Ten Year Plan it is stated that specific plans can only be formulated for relevant urban areas and "rural compact communities" following the completion of planned pilot projects; and that DWSS and MPLD will evolve a system for the implementation of rural sanitation schemes by a process of trial and evaluation. These attitudes have also been demonstrated during discussions. Policies have, however, been formulated by a number of non-governmental organizations working in the rural areas of the country and where water supply schemes are being installed, or are being planned, it is becoming common practice to introduce some sanitation facilities at the same time; often, and at the lowest level, only at schools and health posts.

19. The question of the type, or types, of low-cost sanitation system to be used is also not established. HMGN has declared the need for an evaluation program and ESU has been charged with the responsibility for initiating appropriate pilot scale work. It is also understood that MPLD are to introduce VIP latrines in some of its programs and that DWSS have demonstration projects planned for Dhulikhel and Damauli in which VIP, ROEC, DVC and pour-flush latrines will be installed. Demonstration pour-flush units are also proposed for Ilam and for the Eight-Town World Bank (TAG) Project, and 268 demonstration pour-flush latrines have already been installed in Kirtipur and their acceptance has been evaluated (Report on Mission, R. S. Singh, TAG, Delhi, September 1982). In addition, there are on-going agency water supply programs as part of which both pit latrines (ventilated and unventilated) and pour-flush latrines are being installed.

20. Thus, many low-cost sanitation units have already been installed in Nepal and many more are planned. In view of the relatively short time since the planned introduction of low-cost sanitation facilities was first considered, no more than about two

years; the achievements to date are impressive. However, it is clear that there has been no coherent or coordinated approach to the introduction of low cost sanitation facilities; some Agencies believe that very low cost pit latrines are the only affordable option, others believe that a pour-flush facility is essential, and Government sees the need for much more experimental work before any judgement can be passed - a view that was essentially endorsed by the National Sanitation Seminar held in Kathmandu in September 1981.

21. There is wide international experience in the field of low-cost sanitation and the World Bank has published a number of expert Reports since 1980 (see Appendix 5). Furthermore, and in spite of contrary local opinion, it is clear that extensive experience of low-cost sanitation units of different types and in different ethnic and geographical areas exists in Nepal now. No purpose is seen in introducing comparative pilot studies which would be costly in terms of community benefit. The need that does exist is for the existing sanitation facilities, or a cross section of them, to be examined and evaluated. Indeed, ESU has within its remit the requirement to follow up on existing schemes in order to evaluate their effectiveness. This type of evaluation study is urgently needed. Where a fair cross-section of existing low cost sanitation units to be examined expertly now it could be established whether there is sufficient information to enable routine recommendations to be made on the suitability of particular systems in particular situations and for model designs to be developed. At least one exists now for pit latrines (SATA-sponsored MPLD Sanitation Handbook, 1982). A suitable survey, well planned and competently undertaken, would obviate the need for, and eliminate the expense of, any further pilot scale experimental installations, hence releasing funds for developing sanitation coverage at a faster rate. Although it is specific, the evaluation of the Kirtipur Demonstration Project prepared for DWSS by the Development, Research and Communication Group in 1982 is relevant as a precedent. Kirtipur is not a typical community, but the findings of the evaluation study are important and emphasize the high level of acceptability of private latrines given the right climate of opinion. The Summary of the Findings of the evaluation study bear upon this Report are appended (Annex 2).

5.3 Sullage Disposal, Surface Water Collection and Solid Wastes

22. The present level of attention to the disposal of sullage and surface water is generally rudimentary and solid waste collection is usually practised only haphazardly, if at all. Whilst being peripheral to this Report it must be emphasized the introduction of effective sanitation is, in itself, of questionable value except in aesthetic terms. Where a serious attempt is to be made to improve the environment significantly, with an attendant reduction in health hazards, equal attention must also be paid to sullage and surface water disposal and to the collection and safe disposal of solid wastes.

6. PERCEIVED NEEDS

6.1 Urban Core Areas

23. All densely populated urban core areas should be sewerred. As many private sanitation units as possible should be installed - the type of pour-flush system installed at Bhaktapur is commended as a good precedent for other urban areas wherever possible. Public toilets should also be provided and well maintained where full private coverage cannot be introduced. The sewerage system may be separate or combined but, again, the Bhaktapur concept of a combined system receiving excreta and road drainage (often with sullage) has many attractions. Collected sewage must be treated: it is unlikely that there will be many situations where anything more sophisticated than oxidation ponds will be shown to be justifiable. Associated with the introduction of a sewerage system attention must also be paid to upgrading the surface water drainage system (perhaps in association with a combined sewerage system) and to introducing a solid waste collection system.

6.2 Areas Other Than Urban Core Areas

24. There is clearly a real need for the widespread introduction of low-cost sanitation in non-core urban areas. Privately installed facilities are surprisingly widespread, particularly in urban cores and peripheral areas, and a number of water supply schemes have sanitation associated with them, albeit often only at a demonstration level. Sufficient experience exists now in Nepal for decisions to be made on what type of unit should be installed and where, but there is a primary need for data collection. Following data collection and evaluation a firm policy is needed - it is probably that this policy would declare a general preference for simple pour-flush latrines wherever some sort of water supply is available. But, it is evident from local and international experience that sanitation units will only be used if the potential users feel a need for such facilities. Thus, the progressive introduction of sanitation from schools and Health Posts through to privately-funded, albeit subsidized, latrines is commended. This planned development of sanitation is less than ideal but is pragmatic and will ensure that sanitation units offer maximum benefit. However, since the outcome must be that many households will not have private latrines in the short or medium term, public latrines must also be installed. Experience has shown that public latrines are not kept clean and, as such, may even offer a negative benefit in that historical defecation practices may become more entrenched. A real need, therefore, is for communities to introduce some effective form of public latrine cleaning service if historical sanitation practices are to be phased out.

7. PRIORITIES

25. Recommendations were made by the National Sanitation Seminar held in Kathmandu in September 1981. These recommendations are important and are supported; they are reproduced in Annex 3 of this Report. Action upon the recommendations is taking place and their full implementation is commended here as a priority. Priority should also be given to meeting the sanitation needs of people living in the most densely populated urban areas where health hazards must be at maximum. A priority should therefore be the introduction of latrines connected to a sewerage system in the densely populated sectors of core urban areas, with appropriate treatment of sewage centrally, probably using oxidation ponds. Of equal priority and associated with the introduction of a sewerage system, suitable steps must be taken to ensure the environmentally acceptable disposal of sullage, surface water and solid wastes.

26. Of second priority is the introduction of a maximum number of private low-cost sanitation units in urban peripheries, supplemented by an adequate number of well maintained public latrines. Whether for private or public latrines pour-flush systems are most suitable.

27. In the rural subsector it is much more important to pay attention to introducing sanitation facilities into larger communities than into the small scattered communities where health hazards are much less. Thus, priority should be given to those rural communities for which DWSS is responsible. Of these communities, those which either have, or are planned shortly to have, a secure water supply should be considered and given priority in the context of sanitation. Sanitation will offer greatest benefit where a water supply offers the potential benefit of its hygienic use.

28. Health education is of paramount importance. No sanitation system will offer anything other than aesthetic advantage unless an understanding exists within the population of the link between excreta and disease. There is clear evidence from the evaluation undertaken at Bhaktapur that, in the absence of this understanding, the introduction of sanitation facilities does not reduce the incidence of excreta-linked infection - the evaluation showed that the incidence of gastro-intestinal diarrhea was marginally, if not statistically, greater amongst those households served by a private water supply and sanitation facilities than amongst those not having the benefit of private services. In the absence of education, sanitation facilities are used, and are kept clean, but only because this is perceived to be aesthetically beneficial: basic hygiene is not practised because its benefits are not understood. Furthermore, if other aspects of environmental pollution are ignored, such as surface water drainage, sullage disposal and solid waste collection then other environmental health hazards ensure that the impact of good sanitation is minimal.

29. It is, therefore, possible to set valid sanitation priorities. In summary, sanitation priorities are:

- First : urban core areas (preferably pour-flush latrines connected to sewerage and sewage treatment)
- Second : urban peripheral areas (pour-flush pit latrines)
- Third : larger rural communities (pour-flush pit latrines)
- Fourth : small and scattered rural communities (pour-flush pit latrines)

But, linked with these priorities, are others of equal or greater importance:

- a secure water supply;
- an effective surface water drainage system;
- efficient solid waste collection and disposal; and
- an understanding by the people of the basic principles of hygiene through public health education.

8. AFFORDABILITY

30. In the HMGN Ten Year Plan a policy of subsidizing low-cost sanitation facilities is declared. The rate of subsidy is given as Rs 50/capita amounting to a total subsidy of, perhaps, Rs300/house. In both Kirtipur and Ilam, HMGN has subsidized, and is subsidizing half the cost of private latrines (excluding labour costs); these subsidies amount to Rs500 to 600 for each installation. In Bhaktapur private water supply and sanitation facilities are integrated and individually cost about Rs1,500 to install; of this cost a subsidy of Rs1,300 is given. The experience at Kirtipur, where the subsidy is not very much greater than that declared to be HMGN policy, suggests that there would be a good demand for a subsidized private latrine in any similar conurbation once its benefits become understood. However, Kirtipur is relatively affluent town with a large proportion of masons in the population who are more able than most to construct their own latrines. And even in Kirtipur it is not expected that all householders will be able to afford their own sanitation facilities. In a more typical community, particularly a poorer rural one, a smaller proportion of the population would be able to afford even the relatively low cost of a subsidized latrine. It is impossible to judge what proportion of residents could, on average, afford the subsidized cost of a latrine, though it is unlikely to exceed perhaps half of the population, particularly in poorer areas. Even if this is so, it does not diminish the importance of introducing sanitation

facilities progressively since the conception of affordability will change as the attraction of good sanitation becomes better appreciated and, in any case partial coverage by sanitation is better than no coverage at all.

9. CONCLUSIONS

31. It is not possible to use sanitation priorities per se to establish which areas of the subsector should or should not be recipients of Bank investment. Indeed, it is necessary to advise that sanitation should not be considered for investment in isolation. There are priority areas, the needs of some of which are planned to be met by other agencies, though these priority areas cannot and must not be considered in the sole context of sanitation needs. The proper approach, and the only one that can be of true benefit to the people, is for all aspects of the environment to be tackled simultaneously and, at the same time, for an appropriate program of public health education to be introduced. Without this, any investment in sanitation would have nothing other than aesthetic benefit. It is concluded, therefore, that, whilst everyone should have access to a reasonable level of sanitation, and that this is a worthy goal, the introduction of sanitation should be an adjunct to the provision of a secure water supply, good surface water and solid waste collection systems and education in personal hygiene at all levels. Even given this, it must be accepted that it will be many years before sanitation facilities are universally used in such a way that they offer no health hazards. In the general context of Nepal, sanitation is not seen as being an end in itself; it is no more than an element, albeit an important element of the infrastructural and educational development of an improved level of public health in the country.

32. In the context of the Nepal Water Supply and Sanitation Sector Profile, any projects identified as being of priority in terms of water supply should, if implemented, have associated with them a possible sanitation component. The extent of this component should be such that those actively seeking private sanitation facilities should have them. Furthermore, as more of the population express a desire for private sanitation, then the ability to meet the demand should be available. Additionally, public latrines should be provided, but only if there is the will and the means to maintain them in an acceptable condition.

10. ACKNOWLEDGEMENTS

33. Thanks are due to all met in Nepal; without exception they are friendly and helpful. Particular acknowledgement is made to WHO Sanitary Engineers A. P. Hirano and Q. K. Khoshchashm who read and commented on the draft Report and to Dr. Hikmat Bista who not only made valuable comments but who also contributed to the Report. Mr. P. M. Singh Pradhan's valuable assistance, particularly in Manila, is also gratefully acknowledged.

TABLE 1: CURRENT STATUS OF SEWERAGE/SANITATION IN NAGAR PANCHAYATS

	EASTERN	CENTRAL	WESTERN	FAR WESTERN
Mountains	-	-	-	-
Hills	Dhankuta ⁽²⁾⁽³⁾ Ilam ⁽³⁾	Kathmandu ⁽¹⁾⁽⁵⁾ Lalitpur ⁽¹⁾⁽⁵⁾ Bhaktapur ⁽¹⁾⁽⁵⁾ Hetauda ⁽²⁾ Bharatpur ⁽³⁾	Pokhara ⁽¹⁾⁽⁵⁾ Tansen ⁽⁴⁾	Birendranagar ⁽²⁾⁽³⁾
Terai	Biratnagar ⁽¹⁾⁽⁵⁾ Dharan ⁽²⁾ Rajbiraj ⁽³⁾ Bhadrapur ⁽³⁾ Lahan ⁽³⁾	Birgunj ⁽¹⁾⁽⁵⁾ Janakpur ⁽²⁾	Bhairawa ⁽²⁾ Butwal ⁽²⁾	Nepalgunj ⁽²⁾ Mahendranagar ⁽³⁾ Tribhuvan Nagar ⁽³⁾ Dhangadhi ⁽³⁾

Legend:

- (1) Master Plans exist
- (2) Feasibility Studies exist
- (3) Proposed Feasibility Studies (UNDP)
- (4) W. S. with bilateral Japanese aid: no sanitation plans.
- (5) Proposed review of existing Master Plans (UNDP).

Source: DWSS 1982

TABLE 2: URBAN POPULATION COVERED BY SEWERAGE AT 1980, 1985 and 1990

TOWN ^{1/}	1980 POPULATION IN '000		1985 POPULATION IN '000		1990 POPULATION IN '000	
	TOTAL	SERVED BY SEWERAGE	TOTAL	SERVED BY SEWERAGE	TOTAL	SERVED BY SEWERAGE
1. Kathmandu ^{2/}	322,400	37,000	373,750	67,000	433,279	104,000
2. Lalitpur ^{2/}						
3. Bahktapur ^{3/}	65,620	10,300	73,163	22,000	81,753	33,000
4. Pokhara	32,000	-	39,309	-	48,287	14,070
5. Biratnagar	63,890	-	74,860	-	87,714	9,920
6. Birgunj	37,000	-	45,016	-	54,769	15,700
7. Dharan	43,050	-	51,130	-	60,726	7,200
8. Janakpur	25,200	-	30,660	-	37,303	6,800
9. Hetauda	35,500	-	49,791	-	69,834	6,330
10. Bhairawa	22,500	-	27,375	-	33,306	4,550
11. Butwal	20,100	-	25,653	-	32,740	6,560
12. Nepalgunj	31,500	-	39,255	-	48,919	6,540
TOTAL:	698,760	47,300	829,962	89,000	988,630	214,670
COVERAGE:	-	6.77%	-	10.72%	-	21.71%

^{1/} Only 12 towns are listed since no plans exist for sewerage in the remaining towns of Nepal.

^{2/} WSSB has negotiated IDA loans for these towns' sewerage. The remaining towns are at present under a feasibility study.

^{3/} Financed with German Government support.

Source: WSSB 1982

TABLE 3: HMCN RURAL SANITATION PROGRAM

Date	ESTIMATED RURAL POPULATION ('000)				PROPOSED POPULATION COVERAGE (%)			
	Terai	Hills	Mountains	Total	Terai	Hills	Mountains	Total
1980	4,979	6,803	1,367	13,149	0	0	0	0
1985	5,662	7,493	1,508	14,663	5	2	0	2.95
1990	6,442	8,266	1,665	16,373	20	10	2	13.12

Source: DWSS 1982

ACTIVITIES OF THE EXPERT ON URBAN/RURAL SANITATIONPROGRAMME

Principal movements only are listed below. No details are given of the many meetings and discussions, of the Expert's analytical and report writing activities, nor of the debriefing sessions in Manila.

7th November	Departed London
9th November	Arrived Kathmandu
13th November	Field trip to Sankhu
14th November	Field trip to Kirtipur
18th - 20th November	Extensive field trip to study typical sanitation facilities in the Terai and Midlands in the Central and Western Regions
22nd November	Field trip to Bhaktapur
26th November	Departed Kathmandu
27th November	Arrived Manila for debriefing
1st December	Departed Manila
2nd December	Arrived London

PEOPLE MET IN KATHMANDUDWSS

D. B. Rahmayaji	Chief Engineer & Chairman of Board
P. M. Singh Pradhan	Deputy Chief Engineer
Poshan Nath Nepal	Superintending Engineer (also WSSB) During Manager, Pokhara Valley)) field
Dinesh Pyakural	Divisional Engineer, Janakpur) trip
Ishwar M. Tamrakar	Divisional Engineer, Bharatpur) 18-20 Nov.

WSSB

R. K. Siddhi	Project-in-Charge
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ESU

R. Regni	Acting Section Chief
Dr. Joshi	Head, Zoonosis Section

WHO

A. P. Hirano	Sanitary Engineer attached to DWSS
Q. K. Khoshchashm	Sanitary Engineer attached to MPLD

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EVALUATION OF THE KIRTIPUR DEMONSTRATION PROJECT

SUMMARY OF FINDINGS

1. The most valuable of our findings is that even a community with negative experience and indifferent attitudes can be turned into enthusiastic supporters of public projects if treated with care, caution and honesty.
2. People's attitudes are influenced by their conditions of life. What is reasonable from the Government's point of view may not necessarily be viewed in the same way by the people.
3. The advantage of owning a private latrine is now clearly recognized by the women whose improved health will in turn affect their life span.
4. The selection of Kirtipur by DWSS as a trial site for private latrine be forthcoming from the beginning. It has given interesting and relevant experience to DWSS.
5. The experience has confirmed that there are many non-health related factors which also induce the people to construct private latrines. Status is one important factor, convenience is another. They make a quicker appeal than placing emphasis on the connection between sanitation and health.
6. Some castes and groups traditionally use human excreta as farm fertilizer. It is easier to get these people to accept the practice of cleaning their own pits than other castes to begin with.
7. Economic levels and education seem to have a strong effect on the level of acceptance of private latrines.
8. Electricity connection in itself is not, apparently, a variable, though it is related with economic level to a certain degree.
9. The modesty of women lead to their personal inconvenience. The proper motivation of women is, therefore, an important factor recognized by Panchayat leaders.
10. Shortages of water is very serious and directly affects the level of acceptance of private latrine construction. However, the convenience offered by private latrines exceeds concern over water. An inter-dependent relationship exists between the two as long as there is a minimum of water available.
11. The availability of space was not itself a determining factor.

12. Strong and committed local leadership is absolutely essential to ensure the success of projects.
13. A certain amount of outside help with finance and technical assistance is essential though local or family involvement in sharing the cost is essential to ensure success.
14. If owning a latrine provides status to a family, keeping it clean adds to it. Almost all latrines were found to be clean except a few which had developed faults.

NATIONAL SANITATION SEMINAR, KATHMANDU, SEPTEMBER 1981

RECOMMENDATIONS

The Seminar made the following recommendations:

1. That a major national awareness campaign be launched to promote sanitation and, in particular, the construction and use of latrines.
2. The Environmental Sanitation Division should be made a highpowered, multi-disciplinary body, should function under one ministry and coordinate with other related sister agencies. It should act immediately -
 - a. to develop a small range of standard latrine designs;
 - b. to develop well-illustrated instructions for the construction of each of these standard latrines and distribute them to householders wishing build their own latrines;
 - c. to promote the major national awareness campaign, utilizing and coordinating the resources of other agencies; and
 - d. to carry out research and development.
3. That a subcommittee of the National Group for the Decade Activities be formed to focus specifically on sanitation.
4. That all water supply projects or programmes that are undertaken by any agency in Nepal must include a significant sanitation component, including the distribution of education materials and the construction of demonstration latrines.
5. That all new and existing integrated rural development projects and programmes must have a sanitation component, particularly for the construction of latrines.
6. That all public buildings in urban and rural areas should have appropriate sanitation facilities.
7. That all HMG staff and teachers should be encouraged to build a latrine for their own personal use.
8. That there should be a strengthening of relevant sanitation in the curricula of all training institutions in Nepal, in particular in the construction and demonstration of each of the standard latrines.

Annex 3
Page 2

9. That there should be a strengthening of the school curricula with respect to sanitation, including the construction and demonstration of latrines.
10. That the National Group should seek greater budgetary allocation for sanitation in all sector agencies.
11. That women be seen as an important target group for sanitation education.
12. That in areas where non-indigenous materials are required to build a latrine (e.g. slabs and/or water seals for urban areas, rings for the Terai, etc.) HMG should set up production and supply centres using either private or public enterprises (The cost of these materials may need to be subsidized in the early years of the campaign).
13. That the Department of Water Supply and Sewerage be renamed the Department of Water Supply and Sanitation and that the Water Supply and Sewerage Board be renamed the Water Supply and Sanitation Board.
14. That the above recommendations should be passed to the appropriate Ministries through the Chairman of the National Group.