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REPORT ON
RURAL WATER SUPPLY
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S U M M A R Y

The Kingdom of Nepal is a land-locked, mountainous country with a population recorded in 1971 of 11.56 million, of whom 96% were considered to be rural, i.e., living outside the 16 Nagar Panchayats in some 6 400 Gram Panchayats of which each one consisting of 300 persons or more. Average annual population increase is 1.8%. Filth and water-borne diseases are common throughout the country and cholera has been reported.

The Department of Water Supply and Sewerage (DWSS) in the Ministry of Water and Power is responsible for water supply and sewerage for communities larger than 3 000 population. The Remote Area and Local Development Department (RA & LDD) in the Ministry of Home and Panchayats has responsibility for rural water supply to villages. Co-ordination of development plans and allocation of funds is carried out by the National Planning Commission.

In the current Fourth Five-Year Plan (1970-1975), Government has allocated 59% of the total outlay on water supply and sanitation to rural areas. Although this represents considerable increase over the Third Plan allocation, it is only 0.9% of total development funds. In 1973-1974 the per capita expenditure on rural water supply and sanitation was Re.0.54 and on the urban sector Rs.5.60, i.e., over 10 times as much. The Fifth Five-Year Plan (1975-1980) proposes increased allocation so that by 1980 about 10% of the rural population should have access to safe water compared to 1.3% in 1972, when 63% of urban population were supplied. However, an assessment of the cost, manpower and national resources necessary for implementing the programme is still required so that realistic targets can be set, priorities established and phased development planned.

A national water supply programme was launched in 1958, and by 1973, 16 systems were operating in urban areas serving nearly half a million persons, and 82 in rural areas provided safe water to 160 000. The DWSS will complete 10 more schemes during the remainder of the Fifth Plan to serve an additional 41 000. Small piped water supply schemes are now being constructed by RA & LDD with WHO/UNICEF assistance as a demonstration project and local participation has been forthcoming. In the Terai, the plains area adjoining the mountain ranges, shallow tubewells with hand-pumps are being installed in areas where groundwater is accessible and other areas will be served with piped supplies. All materials such as pipes, pumps, cement, steel, etc., have to be imported mainly from India, but a cement factory will shortly go into production. Costs vary from about Rs.15 per capita for a hand-pump supply to about Rs.50 to 100 for piped supply. On this basis, it would cost some Rs.170 million to provide 25% of the rural population with access to safe water.

In 1970, the GNP of the country was US\$80 per capita, with an estimated growth rate of 0.5% per annum. Local authorities are being asked to meet 20 to 40% of the capital cost of water supply installation in the form of supply of locally available materials and unskilled labour, the remainder coming from Government grants, international and bilateral aid. Operation and maintenance costs are likewise the responsibility of the local authorities, but, although these represent annually only about half a rupee per person, most are subsidized by the Panchayats or the Government.

The DWSS has a Chief Engineer at its head and is an established engineering organization, although a number of technical posts are vacant. Much of the work is carried out by contractors. The RA & LDD, headed by a Director-General, has four regional offices with engineering components taking care of all small engineering works in rural areas. The use of voluntary labour is an essential part of its rural water supply programme. All engineers have had to be trained outside the country as no facilities exist in Nepal, but there are 10 engineers with post-graduate qualifications in sanitary engineering in the country. The Nepal Engineering Institute trains overseers, draftsmen, etc., but the intake is not sufficient to meet the demand for technically trained personnel. A three-year course for civil overseers has been arranged as well as a 15-week training course for sub-overseers. Village level workers are given a month's instruction on maintenance of rural water supply systems. No facilities for training health educators are available and there is a shortage of trained health educators in the country.

International assistance is received from WHO, UNICEF and UNDP in the form of technical assistance, training, materials and equipment. Aid is also received from bilateral sources.

The fact that two agencies are involved in the rural water supply programme acts as a constraint against the most effective use of technical and administrative manpower, supplies and equipment. A single organization would be better able to select priorities and implement the programme. There is at present a need to strengthen the infrastructure of both departments, especially at central and regional levels, by building up the engineering units to enable them to undertake all investigations, planning and designs. The sub-professional cadre needs to be strengthened at the periphery and for this the intake of the Engineering Institute will have to be increased, as has been planned by the RA & LDD.

An assessment of the financial, material, and manpower needs for supplying water to the entire rural community, would enable the problem areas to be identified, the priorities to be fixed, national targets to be established and a phased National Plan to be drawn up. To avoid under-spending of budgeted sums, as has happened in the past because of sufficient schemes not having been prepared, it would be preferable for a large number of schemes to be designed in advance in order to make use of any additional funds which may become available at short notice.

Further development should be given to the hand-pump schemes in the Terai as a means of bringing safe water cheaply and rapidly to the maximum number of persons. In this connection, provision for maintenance on pumps must not be overlooked. The participation of the villagers in the smaller schemes, by providing labour, local materials, etc., is to be encouraged, but the present policy of subsidizing the entire construction cost of water supply systems in the larger villages needs to be re-examined as it leads to unbalanced development. A system of collection of a tax from the beneficiaries should be considered.

The programme requires to have evaluation techniques built into it in order to be able to gauge progress and profit from earlier experiences. Health education and rural sanitation programme should be developed in parallel with the provision of safe water, and efforts must be pursued to make optimum use of local available materials, cheaper construction methods and simplified designs. It may be necessary for reliance to be placed on foreign experts and assistance for some while.

As the programme is now planned, only 10% of the rural population will have access to safe water by 1980. Although in the period 1975 to 1980, water supplies will be provided to an additional 0.7 million persons, the population increase in this period is likely to be twice as much.

RURAL WATER SUPPLY, NEPAL

1. INTRODUCTION

1.1 The Kingdom of Nepal lies on the southern slopes of the Himalayas and is bounded in the north by the Tibetan region of China, to the south and west by India, and to the east by India and Sikkam. The country lies between latitude 26° - 30° North and longitude 80° - 88° East.

1.2 The area of the country is 140 700 square kilometers, extending to 880 kms from east to west and 240 kms from north to south. More than 80% of the country is hilly and mountainous and the remaining 20% are plains and low lands. Three parallel mountain ranges of varying height traverse the country from east to west. The topography of Nepal varies from an altitude of 70 (MSL) in Terai (Plains) to the principal Himalayan peaks, including Mount Everest, the highest peak in the world.

1.3 The mean temperature of the country is 15.5°C, and the average annual rainfall is 1 500 mm. There are four recognisable seasons: a hot season (April-August), a cold season (November-January) and two brief warm periods (February-March and September-October). The seasonal variations become less apparent with increasing altitude. Most of the rainfall is during the hot season, under the influence of the south-east monsoon. Rainfall is less in the west than the east, where the monsoon starts earlier and finishes later.

1.4 The effect of wind is negligible, except cyclonic storms which occur once in a decade in the terai. The southern edge of the terai is subject to flooding, but the damage caused is negligible.

1.5 Historically the principal means of transport in the mountains is by porters, and by bullock cart in the terai. Motorable roads are few. Being a mountainous country, the development of railways is difficult and costly, but there is a small section of narrow gauge railway line in the terai area. Air transport is often the most convenient and effective means of communication. There are thirty operating airfields, of which twelve are served by scheduled flights.

1.6 The present installed hydro-electric capacity is only about 23 000 KW. In addition, a number of diesel generating plants serve the urban areas. There is no rural electrification programme, and there is no plan to undertake it in the immediate future.

2. POPULATION

According to the last census report of 1971, the country had a population of 11.56 millions - urban 0.46 millions (4%) and rural 11.1 millions (96%). From 1961 to 1971, the annual growth rate was 1.84% (Appx.I). The increase in urban population between censuses is partly due to new annexations into the urban category. During the past decade the hill population has increased at an annual average rate of 0.9%, compared to 2.74% in the Terai region¹.

¹Central Bureau of Statistics (1961 and 1971), Population Census of Nepal.

2.1 In the Nepalese Constitution, Communities are classified into Nagar (Urban) or Gram (rural). To qualify for the status of Nagar Panchayat, the population should be 10 000 or more and should have motorable roads and water and electricity supply systems. However, one or more of these facilities may not be available.

2.2 There are at present 16 nagar panchayats, and 3 916 gram panchayats. It is estimated that some 28 000 settlements or villages comprise the gram-panchayats of which only 6 400 (approximately) communities are compact, and identifiable units, with populations of over 300. The total population living in these compact units represents 43% of the population¹. This could be further broken up into 4% in the urban and 39% in the rural areas.

2.3 The population in Terai, midland and hill areas are 4.21, 6.25 and 1.1 millions respectively¹. Details of population and numbers of identifiable communities are given in Appx.I.

3. HEALTH STATUS RELATED TO WATER SUPPLY AND SANITATION

3.1 The incidence of faecal and waterborne and other common diseases are given in Appendix II. Dysentery, gastroenteritis, hookworms and roundworms are common throughout the country. There is noticeable incidence of cholera also. The results given in Appendix II are based on information, collected from hospitals and represent the opinion of the medical officers concerned, and should not be regarded as a statistical representation. A more detailed survey of morbidity rates by the Ministry of Health is now under way, in collaboration with the World Health Organisation.

4. CIVIL AND ADMINISTRATIVE SET UP AND INSTITUTIONAL CHARACTERISTICS OF ORGANISATIONS RESPONSIBLE FOR WATER SUPPLY & SANITATION

4.1 For administrative purposes, the country is divided into 14 zones, which are sub-divided in 75 districts. The districts consists of nagar - panchayats and gram panchayats. There are 16 nagar and 3916 gram panchayats. Members are elected to gram and nagar panchayats, who, in turn, elect members of district panchayats, which eventually elect members of the National Panchayat. The Central Government is composed of a Council of Ministers appointed by the King, from among members of the National Panchayat.

4.2 The Central Government agencies responsible for providing water supply and sewerage are the Ministries of Water and Power, and Home and Panchayats. At the local level, the respective nagar and gram panchayats are responsible for the provision and maintenance of sanitation facilities, under the overall control of the Ministry of Home and Panchayats. The Ministry of Health has a few pilot projects in excreta disposal in the rural areas and it undertakes Health Education activities, but has nothing to do with rural or urban water supply.

¹Water Supplies and Sanitation in Nepal, Sector Study (1972).

4.2.1 The National Planning Commission is responsible for the formulation of overall development plans for the entire country, and for the allocation of funds to the different Ministries for approved programmes.

4.3 Agencies responsible for water supply and sanitation

4.3.1 Seven organizations look after the provision of water supply and sewerage facilities throughout the country. Three of these:

- (1) The Department of Water Supply and Sewerage
- (2) The Water Supply & Sewerage Development Board and
- (3) The Canal and Water Supplies Development Board, function under the Ministry of Water and Power, while four others:

- (i) The Remote Area and Local Development Department.
 - (ii) Nagar Panchayats
 - (iii) District Panchayats and
 - (iv) Gram Panchayats,
- are directly or indirectly responsible to the Ministry of Home and Panchayats.

4.3.2 The nationwide programme of rural and urban water supply and sewerage was, until recently, under the sole charge of the Department of Water Supply and Sewerage, earlier known as the Department of Irrigation and Water Works.

4.3.3 The execution of the rural water supply programme is shared between the Department of Water Supply and Sewerage (DWSS) and the Remote Area and Local Development Department (RA & LDD). DWSS is responsible for providing water supply to all urban, district and zonal centres, and all communities having a population of 3 000 or more. The provision of water supply to all communities of less than 3 000 people is undertaken by RA & LDD. Rural water supply schemes constructed by DWSS are being maintained by the respective panchayats. The rural water supply systems executed by RA & LDD are invariably done with community participation, and these are eventually taken over and maintained by the community.

4.4 Legal Status of the Systems

The present laws which concern the provision of water supply and sanitation facilities are:-

- (1) The Water Tax Act (1966), which lays down the rate and method of collection of charges for water connections from systems owned and operated by the Government.
- (2) The Nagar Panchayat Act (1962) and the Gram Panchayat Act (1962), which define, among other things, the powers and duties of Panchayats as far as the provision of water supply, sewerage and other sanitation facilities & collection of revenues are concerned.
- (3) The Development Board Act (1956) and the Corporation Act (1964), which provide for and regulate the formation and operation of the types of organisation considered suitable for providing water supply and sewerage services.

5. NATIONAL POLICY

5.1 The Government's Policy on water supply and sanitation is enunciated in the Fourth Plan (1970-1975), which states:

"There is a need for the adequate provision of drinking water and the proper management of sewerage systems for the protection of health and sanitation in the community. In the absence of such services, there are possibilities of cholera, typhoid, dysentery and other communicable diseases.

"Since it is the objective of His Majesty's Government to expand these services, as much as resources permit, various drinking water projects have been started since the beginning of planning in our country....

"The Fourth Plan intends to expand the facilities of pure and adequate drinking water and sewerage which are so vital for the creation of a healthy society. The drinking water and sewerage programmes formulated for this plan period have kept in mind the existing transportation facilities, and the level of administrative and technical capabilities. Surveys of the water resources of the country will be conducted and reports on feasible projects will be prepared."

5.1.1 The second plan Document pointed out:- "The need of the villages would be looked after by the village panchayats with the co-operation of local people and financial grants from the Government, they will dig ponds or wells or sink hand pumps, whatever is suited to the local condition. The panchayats will also see to the construction and maintenance of the small reservoirs and pipelines". However, in view of the incapacity of the local authorities and the shortage of funds at their disposal, the Government felt that it would not be proper to expect them to shoulder the responsibility immediately. Nevertheless, Government was keen that a beginning should be made by entrusting greater responsibilities to village panchayats, so far as rural water supply was concerned.

5.2 National development of the country is implemented under successive Five Year Plans. A nationwide programme for constructing water supply systems in Nepal was initiated during the First Plan period in 1958. The current Plan, which is the Fourth, covers the period 1970-1975. The earlier plan periods were from 1956-1961, 1962 - 1965 - 1970; with a gap in 1961-62.

5.2.1 The inclusion of a rural water supply project in the Five Year Plans, and the progressive increase in allocation in successive Plans, underlines the importance that the Government attaches to this programme.

5.3 Provision of safe water and sanitation facilities in the rural areas is the primary responsibility of the respective gram panchayats. They are, however, unable to fulfil this responsibility due to lack of finance, capability organization, and technical knowledge. The Government is aware of the unsatisfactory conditions prevailing in the rural areas due to lack of access to safe water within reasonable distances, and the high incidence of water-borne diseases. In view of this, the former Department of Irrigation and Water Works (now the Department of Water Supply and Sewerage) was asked to plan and construct rural water supply systems, with funds provided entirely by Government.

5.4 Realizing the need for accelerating the rural water supply programme, Government initiated a fresh rural community water supply programme in 1971 in co-operation with WHO and UNICEF. The work of providing similar facilities to smaller communities was specially entrusted to RA & LDD.

5.5 For implementing the programme mentioned in the preceding paragraphs, the beneficiaries supplied locally available materials and voluntary labour for the transport of materials and construction, while UNICEF supplied pipes and fittings.

5.5.1 The small piped water supply systems now being implemented by the RA & LDD, with local participation and assistance of UNICEF/WHO, has made most villagers know that Government Assistance is available for water supply schemes in their villages. This has created a demand from large numbers of villages for the installation of water supply systems. It may be noted that water supply schemes are receiving higher priority than other development projects at the village level. Proposals for water supply are examined in the first instance by village Panchayats, and sent to district panchayats for consideration by the Government.

5.6 A Sector Study on water supply and sanitation¹ and how to extend it, in particular to the rural areas, was completed in 1973 with UNDP assistance. Apart from basic data, the report examined the need for expanding the programme, the constraints, and the suggested level of investment. Government's emphasis on rural water supply has also created interest in IBRD to ascertain whether any IDA assistance could be considered.

5.7 Though, there has been no definite programme for the provision of water supply on the basis of priorities, preference is being given to difficult and remote areas where safe water is not available within a reasonable distance. However, the Government is committed to promote the balanced development of the entire country, and with this objective, the country has been divided into four development regions with headquarters in the eastern, east central, west central and western regions. This is expected to remove the present imbalance, as far as the rural water supply programme is concerned.

5.8 Funds allocated in relation to total plan outlay.

During the current Plan period the rural water supply programme has gained momentum. The draft Fifth Five-Year Plan (1975-1980), provides for a much higher level of investment for the programme. During the Five years between 1969-1970 to 1973-1974, the financial allocation for rural water supply and sanitation averaged 59% of the total amount for both the urban and rural areas (Appendix III); and it varied between 43% to 69% in different years. However, the allocation for water supply and sanitation, both for the urban and rural sectors, was only 1.5% of the total Fourth Plan outlay for the public sectors while 0.9% of the total plan outlay was allocated to rural water supply. Compared to this, it was 1.8% in the Third Plan.

¹Water Supplies and Sanitation in Nepal, Sector Study (1972).

5.9 Expenditure per capita on urban and rural water supply programme

In spite of the fact that there has been an appreciable increase in the outlay on rural water supply during the last few years (Appendix III) the average annual per capita expenditure in 1973-74 on rural water supply was Rs. 0.54 compared to Rs. 5.60 for the urban areas. This disparity is further underlined by the fact that, the per capita expenditure on rural water supply and sanitation varied between Rs. 0.10 to Rs. 0.54 from 1969-70 to 1973-74, with a maximum investment of Rs. 0.58 in 1972-73; the corresponding expenditure for the urban sector was between Rs. 5.10 to Rs. 5.60, with a maximum expenditure of Rs. 8.90 in 1972-73. (Appendix IV.)

5.10 Assessment of rural water supply programme

5.10.1 On the basis of the Sector study on water supply and sanitation already carried out, the Government is assessing the financial, material, manpower and management capabilities needed for executing the water supply programme.

5.10.2 A preliminary survey is, however, necessary to work out the cost of community water supply in areas where water-borne or water-related diseases, such as gastro-enteritis and cholera, are endemic. Such a survey is also necessary where the iron, fluoride, or chloride content in the water is above the acceptable level, or where the water source is not within a reasonable distance. In the absence of this information, it is not possible to fix priorities or targets, as far as the areas to be covered are concerned, not to draw up a phased programme for the entire country.

5.11 National Targets

5.11.1 The target suggested by the World Health Assembly Resolution 25.35, is the provision of access to safe water to 25% of the rural population by 1980. Nepal has not fixed a target on a population basis, but it has been accepted in principle that the provision of safe water supply merits priority and that the country should aim at achieving the target suggested by WHA. An expert Group, which is examining the overall question of health programmes is expected to develop the strategy to be adopted to achieve the target set by WHA.

5.11.2 Only 1.3% of the rural population had access to safe water in 1973¹. This represented the people who had access to piped water systems constructed by different agencies. This percentage is expected to go up to 2.4% by the end of the Fourth Plan (June 1975). There are, however, no reliable statistics to estimate the number of people who had access to safe water on their own or from natural sources and within a reasonable distance. There are also no records of the number of public hand pumps.

5.11.3 According to the draft Fifth Five-Year Plan, another 1 010 000 people in the rural areas will have access to safe water by 1980; bringing the total number of persons covered by the scheme to 1 386 000, or about 10% of the rural population.

¹ Estimated by Remote Area and Local Development Department.

6. WATER RESOURCES AND SCARCITY AREAS

6.1 The Department of Irrigation, Hydrology and Meteorology is conducting studies of surface and ground water resources, in collaboration with USAID. Work has been in progress for some time, and there are well-documented reports on the work done so far.

6.1.1 Surface water flow recordings in the different basins are being made, with the object of undertaking the construction of hydro-electric and irrigation projects. This will not however, be of much help in locating suitable streams as sources for rural water supply programmes in the midland or hill areas.

6.2 For ground water studies, Nepal can be divided into two distinct zones: (a) Hill areas, and (b) Terai region¹. In the hill areas, the topography is very steep. Due to presence of hard rock and lack of porosity, the percolation of water underground is limited to 10%, which is very low. Most of the water comes out in the form of springs, which are generally temporary, but sometimes perennial. In the valleys of Kathmandu, Dang and Surkhet, the rainfall, topography and type of rocks, favour ground water development.

6.2.1 In the Terai region the beds are porous and permeable. The extraordinary thickness of porous and impervious strata makes the terai one of the major sources of ground water¹. The annual precipitation, which is between 1500 to 2000 mm, provides a good re-charge of the ground water aquifer.

6.2.2 Groundwater investigations in the Terai regions of the Lumbini Zone² and Bheri Zones³ have been completed, while in the Seti and Mahakali Zones, these will be completed during the current financial year. Similar investigations in the eastern part of the Terai is expected to be completed during the next Plan period.

6.3 When the necessary information is available by the end of the current financial year, covering a good part of the terai region, it will be possible to initiate a rural water supply programme there from ground water resources. The investigations under way will give the aquifer condition, depth of water table and chemical analysis. An extract of the chemical quality of water, based on these investigations, appears in Appendix V. This shows that water from the artesian and semi-artesian aquifers of Lumbini Terai is good and potable.

6.4 A geological map of Nepal prepared by Dr C.K. Sharma in August, 1969, and published by the Ground Water Section, Department of Irrigation, Hydrology

¹Sharma, C.K. 1970, A Glimpse of the Ground Water Resources of Nepal

²Tibbitts, G.C., Agilbee W. and Sharma C.K. 1973 (Ground Water Resources Investigations in Lumbini Zone)

³Tibbitts, G.C., and Sharma, C.K. 1973

and Meteorology, gives in general the ground water belts - marked "artesian" and "non-artesian" zones. The map and reports in respect of areas where detailed exploratory work has been done provide adequate information, on the basis of which a programme for the construction of wells can be developed.

6.5 Water scarcity areas are generally in the Terai, particularly the western part of the region, during the summer and winter months. The drought due to the late arrival of the monsoon generally lasts 45 days, which mainly affects agricultural activity, but does not cause a shortage of drinking water. Approximately 25% of the Terai area is affected by drought. In the foothills of the Terai region, where the water table is fairly deep, springs dry up during the summer, and people have to go several miles to obtain drinking water from streams. There is no record of the monsoon having completely failed, but there have been years when the arrival of the monsoon has been delayed.

6.5.1 In the mountainous areas, if the monsoon is delayed, the springs dry up by June. When this happens, the villagers have to depend on water from streams, which are far away and are generally polluted. The drought cycle occurs once in 50 years but drought in certain areas can occur as frequently as once in 4 years.

6.6 In view of the scarcity of water in the hill area it is necessary to make a systematic measurement of the discharge from springs during summer, especially in cases where the available water is just marginal. This will have to be done over a period 3 to 4 years in order to prepare a water supply scheme from these sources.

6.7 The inconvenient location of water sources in the Terai and hill areas, results in a considerable amount of time and effort being wasted by the villagers in carrying water to their homes. Because of this, villagers use the minimum quantity of water necessary to support life.

7. DEVELOPMENT OF RURAL WATER SUPPLY

7.1 Historical Review of Water Supply Programme

Up to the beginning of this century, the demand for water supply, in urban and rural areas was met from ponds, streams, wells and springs, which were subject to pollution and contamination by men and animals. The State does not appear to have taken an active part in community water supply programmes, such as water resource development, conservation and distribution. Philanthropic people and community leaders used their own resources for the digging of wells and ponds in the thickly populated area. In some cases this was done by the united efforts of the local people themselves, who either dug wells and ponds or constructed channels with their own money. Irrigation canals, too, served the local people for all their domestic needs; providing water for drinking, washing, cleaning, etc.

7.1.1 It was only in the beginning of this century that the Government began work on a piped water supply system in Kathmandu. This followed by the construction of water supply systems in the adjoining towns of Bhaktapur and Lalitpur. These systems served only selected groups, and only untreated water was supplied. In 1951, the capital city of Kathmandu was supplied with filtered water.

7.2 During the First Five-Year Plan 1956-1961 the emphasis was on the improvement of the water supply system of Kathmandu, and the daily supply was increased to about one million gallons per day. A few projects were undertaken in the rural areas, which included the sinking of about 355 wells with hand-pumps in the Terai area.

7.3 Second Plan

7.3.1 The Second Plan (1962-1965) laid emphasis on the development of water supply in the Kathmandu Valley, the District headquarters, and other places where there was a scarcity of drinking water. The total allocation of Rs. 24 million for the three-year plan period was, clearly, insufficient, (as also mentioned in the Plan Document), to meet the needs of the country.

7.3.2 Up to early 1964 the Department of Irrigation had a section designated as "Drinking Water Works". In early 1964 the Government signed an agreement with WHO for setting up a "Community Water Supply" project. The WHO-assisted pilot project gave considerable impetus to the growth of the Water Works Organization and the development of the programme.

7.3.3 In February 1963 an agreement was concluded between Government and UNICEF, under which some rural water supply projects were to be taken up with the assistance of WHO/UNICEF. Accordingly, a Project called "Chapagaon-Techo-Sunaguthi Water Supply Projects" was taken up for execution under the joint auspicious of Government, WHO and UNICEF.

7.4 Third Five-Year Plan: (1965-1970)

7.4.1 The Third Five-Year Plan laid greater emphasis on rural water supply projects. The allocation of funds (Appendix VI...) for the projects indicates that out of a total allotment of Rs.30.84 million, Rs.8.67 million (about 29%) was for the rural areas.

7.5 Fourth Five-Year Plan: (1970-1975)

In the Fourth Five-Year Plan, a number of water supply projects were proposed (some of which are now under construction) at the 12 zonal and 33 district headquarters, out of a total of 14 and 75 respectively. During the Plan period 37 water supply projects in district and zonal headquarters, and selected villages and panchayats were proposed to be taken up. The sum allocated for providing water supply for the urban and rural sector was Rs. 37 260 000, out of which Government's contribution amounted to Rs. 9 145 000 for the Master Plan studies to be carried with UNDP assistance for Kathmandu. There was no allocation in respect of sanitation, either for the urban or rural sector, between 1969 and 1974.

7.5.2 In 1971 a supplementary programme of piped water to small rural communities was initiated with UNICEF-WHO assistance of US\$758 700. The responsibility for this programme was subsequently transferred to newly-formed Remote Area and Local Development Department. It was also proposed to construct shallow tubewells equipped with hand-pumps in the Terai region where groundwater is suitable. This programme has, however, not been started as suitable schemes have not yet been produced.

7.5.3 At the end of 1973 there were 16 urban towns with piped water supply facilities serving 470 000 people. Out of 82 rural piped water supply systems throughout the country, 51 of these systems were implemented by the DWSS, 13 by RA & LDD and 18 by the Government of India. These systems served a population of 160 000 or about 1.3% of the rural population. During the remaining Plan period, DWSS expects to complete another 10 rural water supply schemes, which will serve an additional population of 41 000. By the end of the Fourth Five-Year Plan (June 1975), 296 000 (2.4%) persons in the rural areas will have access to safe water.

7.5.4 There are a number of shallow tubewells equipped with hand-pumps. The shallow dug wells constructed by individuals or groups of people in the Terai are generally of poor construction and are liable to pollution or functional failure during dry season. People served by these wells as well as hand-pumps have not been taken into account in computing the number of people who have access to safe water.

7.6 Fifth Five-Year Plan

In accordance with the draft proposals for the Fifth Five-Year Plan the additional rural population that will have access to safe water supply by 1980 is 1 010 000 (Appendix VII).

7.7 Cost Per Capita of Water Supply

For the purpose of assessing the rough cost of providing access to safe water to the entire rural population, the following basic assumptions may be made, on the basis of the findings of the Sector Study conducted recently.

- (1) About 70% of the people in the hilly and mountainous areas live in sizable, compact units and can be served by a simple gravity diversion systems, which would cost Rs.50 per capita.
- (2) The rest of the population in the hills and mountains live in isolated houses and cannot be economically served by community schemes.
- (3) The source of supply in the Terai would be groundwater. The groundwater condition in the Terai can be classified under three categories viz., (a) shallow groundwater in the southern part of Terai, (b) deep water under artesian condition in some of the middle parts of Terai, and (c) deep water under non-artesian condition in the northern and middle parts of Terai.

7.7.2 From the available data it is estimated that 40% of the population in the Terai can be served from shallow tubewells with hand-pumps, 20% from tubewells in artesian zones, and the balance of 40% from tubewells equipped with electric or engine driven pumps. It is estimated that the cost of installation of a shallow tubewell with drop pipe and cylinder with platform, will be approximately Rs.2 000. The cost of local labour for installing a tubewell

with hand-pump is estimated at Rs.500. The per capita cost of such a shallow tubewell for a community water supply system would be on an average Rs.15. A tubewell in the artesian zone, where the strata are made up of gravel, sand and silt, is estimated to cost Rs.40 000. A piped water supply system from such a source would cost about Rs.50 per capita. A deep tubewell in the non-artesian zone, where the strata are mainly boulders and gravel, will cost Rs.60 per capita.

7.7.3 There is a great disparity in the per capita cost of rural piped water supply systems constructed by the DWSS and the RA & LDD. The average per capita cost of rural water supply schemes constructed by DWSS is approximately Rs.100. The DWSS have however based their estimate for the Fifth Plan on per capita cost of Rs.500 to cover future price increases. The work is done on contractual basis and this includes customs duty and sales tax on all imported materials. So far, cast iron and galvanized iron pipes have been used. Generally the distribution covers a larger area in these schemes, and transport costs are high. The entire cost of the scheme is met by the Government and this is reflected in the per capita cost. The average per capita cost of minor rural water supply schemes constructed by RA & LDD with UNICEF/WHO assistance and community participation is about Rs.50 and may be broken up as below. The pipes used are either rigid PVC or HDP.

HMG Contribution	---	Rs.10	
UNICEF "	---	Rs.30	
Community "	---	<u>Rs.10</u>	Rs.50

7.7.4 The direct construction cost for supply systems serving 70% of the people living in compact units in the hills and midlands and the entire population of the Terai is Rs.405 million, and is made up as follows. This programme would cover approximately 80% of the rural population. The establishment cost may be another Rs.40 to 50 million, raising the total cost to about Rs.450 million.

- (a) 70% of the population living in the hills, midlands and rural areas, is estimated at about 5 million, and the cost of providing water supply systems is placed at Rs.250 million.
- (b) 40% of population in the Terai which can be served by shallow tubewell is 1.6 million, and the cost will be approximately Rs.19 million.
- (c) 20% of the population of the Terai that can be served by tubewells in the artesian zones is 0.8 million, and the cost is approximately Rs.40 million.
- (d) 40% of the population of the Terai, living in the non-artesian zones which is 1.6 million can be served by deep tubewells, at a cost of approximately Rs.96 million.

7.7.5 The cost of providing water supply to 25% of the projected rural population which will be approximately 3.3 million in 1980, is estimated at about Rs.170 million.

7.8 Budget Provision and Actual Expenditure

The budgetary allocation for water supply and expenditure in the financial years from 1969-1970 to 1970-1974 (Appendix VIII), show that it has

not been possible to spend the funds allocated for urban and rural water supply in any of the years. Almost 25% of the funds allocated for rural water supply could not be utilized. This obviously indicates that there is need to increase technical manpower as well as to improve the supply of materials so that at least the limited amount which is allocated for the rural water supply programme, can be spent every year. It may also be necessary to examine the present system of working in order to handle bigger programmes envisaged in the Fifth Plan to cover 10% of the rural population by the end of 1980.

8. FINANCIAL POLICIES AND RESOURCES

8.1 The per capita G.N.P. of Nepal for the year 1970 was US \$80* and the growth rate of GNP per capita per annum was 0.5%. The fiscal year is from 1st July to 30th June. In the Nepalese economy agriculture plays a dominant role and almost ninety-two per cent of the population depend on it for their living.

8.1.1 The broad objectives of the Fifth Plan are to invest in programmes which, it is hoped, will remove impediments to development, strengthen the governmental machinery, and lead to the active participation of the people through the Panchayats.

8.2 Until 1971 the entire cost of installation of water supply systems in the rural areas was met from Government grants. An agreement between the Nepal Government and UNICEF in 1963, provided for the supply of certain equipment and transport by UNICEF. In turn, the Government undertook to make available technical and other supporting staff, local expenses, and materials and equipment except those provided by WHO and UNICEF. With the availability in 1971 of UNICEF/WHO assistance for minor rural water supply installations, the local authorities have been made responsible for the supply of locally (village level) available materials and unskilled labour for transport and construction. Their contribution is of the order of 20 per cent of the cost of the scheme. UNICEF contribution, which includes imported pipes, fittings, accessories and transport up to the Regional Office amounts to approximately 60%. The contribution by the Central Government (20%) is in the form of construction materials, such as cement, corrugated roofing material, timber, and locally available tools and fittings and local transport costs, if the distances are great and involve walking exceeding two days. In case of rural water systems installed through the DWSS the Government is meeting the entire cost.

8.3 The Panchayat Act provides for the collection of taxes and/or water charges to meet the maintenance cost, but this is not directly related to the actual cost of service. Since water supply systems are not constructed with loan finance, the general tax does not include an element for loan repayment or interest on capital. Generally the water charges levied are not even adequate to meet the operation and maintenance cost.

8.4 In addition to the cost of maintenance expenses on minor improvements and repairs are met from contributions, by the more affluent members of the community. Based on this it seems that the per capita operation and maintenance cost of such systems is about 50 paise per annum or about Rs. 3/-

*Trends in Developing Countries "by the World Bank (1973)"

per average household per year. The operation and maintenance is simple, and the cost is low as these are gravity systems. However, there are no reliable figures for the maintenance of a hand-pump operated at the community level.

8.5 In the absence of any reliable data regarding water supply systems operated by Panchayats, the analysis of eight rural water supply schemes operated by DWSS was made and the maintenance cost per 1 000 gallons was Rs.0.70 (= US\$0.07).

8.6 A realistic assessment of the financial situation of the water supply systems is not possible as separate accounts for revenue and expenditure are not maintained. However, the indications are that the operation of most of the water supply systems is either subsidized from the general revenues of the village panchayats or district panchayats or the Central Government.

8.7 Duty charged on some materials imported from India is at a lower rate than those from other countries. This is particularly significant in the case of cement, electric motors, and PVC pipes.

9. ORGANIZATION AND MANAGEMENT

9.1 The DWSS is headed by a Chief Engineer. The Department has three sections, each headed by a sectional head (Appendix IX). These are:

- (1) Survey, Planning Design, Construction and Maintenance (Technical Section) headed by a Deputy Chief Engineer.
- (2) Accounts section, which includes Internal Audit and Budget Expenditure Procurement and Stores, under a Senior Accountant.
- (3) Administration under an Administrative Officer.

9.2 RA & LDD is headed by a Director General. The functions of the Department can be broadly classified under five sections (Appendix X) and each section is headed by a sectional head as follows:

- (1) Planning, Implementation, Co-ordination and Progress Section headed by a Deputy Director (Administrator);
- (2) Administration, Procurement, Audit and Accounts Section headed by a Deputy Director (Administrator);
- (3) Technical Assistance and Construction Section under a Senior Engineer;
- (4) Statistics, Evaluation and Research Section under a Research Officer (Administrator), and
- (5) Remote Area Section, headed by a Senior Engineer. The 18 Area Engineers are attached to the 18 Remote Districts and they are attached to the Chief District Officers in the remote area.

The department is responsible for all development work. The work of the engineering staff is not restricted to water supply and sanitation work, but to all other engineering works such as roads, buildings, irrigation, etc. However, rural water supply forms one of the major items among the development schemes. It involved 16% of the allocation on development work in 1973-74 and about 18% in 1972-1973.

9.2.1 The RA & LDD functions through its regional offices. Under the regional development programme of the Government it is proposed that DWSS should also have regional offices in the four development regions. The strengthening of the technical staff is required, both in the professional and the sub-professional level, with training in planning, design, execution, operation and maintenance as well as management of rural water supply.

9.3 DWSS has two sets of cadres, namely regular and development. The regular cadre comprises the permanent staff of the department, while the development cadre is intended to supplement the permanent staff to meet additional requirements. There are 34 posts of engineers in the DWSS out of which 5 are vacant. Of the sanctioned strength of 74 overseers, 42 posts are unfilled. The DWSS needs to be reorganized, with special reference to the following:

- (a) Setting up of an investigation and design section for the development of standard designs and design procedures;
- (b) Provision of engineering design experience to the junior graduate engineers by providing in-service training;
- (c) Introduction of better financial and management procedures and training of personnel, and
- (d) Introduction of better stores management (including stores procurement), methods and training of personnel.

These deficiencies are more pronounced in case of RA & LDD, where there is lack of experienced personnel in the field of water supply and sanitation.

9.4 Maintenance and Operation

The Panchayats are required to take over and operate and maintain water supply systems after completion, and levy water charges to meet the maintenance cost. The maintenance of the system is carried out by a resident of the village, trained in water supply maintenance, who is employed by the village Panchayat on a part-time basis. Being a resident of the village he is available at a lesser wage, than would have to be paid to an outsider. It is understood that some villages pay an allowance of Rs.20 to Rs.30 per month to this worker.

9.5 Design Criteria and Specifications

9.5.1 Basic design criteria for water supply are given in Appendix XI. Specifications for hand-pumps, and other materials used for rural water supply are yet to be prepared. It is considered that about 150 to 200 persons can be served by a hand-pump, while about 200 persons could be catered for from a standpost of a piped water supply system.

9.5.2 Generally, house connections are not provided in rural water supply systems. However, a limited number of house connections are being provided from some of the water supply systems installed by DWSS, depending upon the availability of water.

9.6 The engineering cost is of the order of 8% of the scheme and approximately made up of (1) preliminary survey and estimate, 1-1/2%; (2) investigation and design, 2-1/2%, and (3) supervision of construction, 4%.

10. EDUCATION, TRAINING AND RESEARCH

10.1 There are no facilities in the country for training engineers to the degree level. Most of the engineers take their Bachelors degree at Indian Universities, and higher degrees either in India, USA, USSR or the United Kingdom. At present, there are six campuses under the jurisdiction of the Institute of Engineering, where sub-professionals are trained.

10.2 Appendix XII gives the requirements of the various categories of technical personnel needed for water supply programme. According to the estimates of the Manpower Division, the requirement of civil engineering overseers for the entire country, at the end of 1980 will be, 1668 as against 1992 persons who will be available. The country will need 258 draftsmen, against 222 that would be available.

10.3 The Health Education Division of the Department of Health Services is at Kathmandu, with a few health educators attached to some of the Zonal Health Offices. There is a shortage of qualified health educators, and there are no facilities for training them in the country.

10.4 It will be seen from the training programmes developed so far that sub-professional and tradesman categories of staff should be adequately met by the end of 1980. However, the shortage in some of these categories will be felt during the intervening period. In order to overcome this the RA & LDD has arranged to train 200 civil overseers and 114 sub-overseers under a 3-year course for the former and a 15-week training course for the latter at the Nepal Engineering Institute.

10.5 The RA & LDD has, through its own efforts, begun to train village level maintenance workers (mistries), and 47 persons were trained in 1973. There is a proposal to train a number of such personnel every year. Training is to be given by engineers of the RA & LDD, with the assistance of WHO personnel and volunteers. The duration of the course is one month.

10.6 RA & LDD, recognising the need for refresher and short training courses, initiated a programme in 1973. The courses conducted in 1973 were:-

- (1) One month refresher course for overseers at the Institute of Engineering, attended by 22 participants.
- (2) Ten days' seminar for engineers at the Institute of Engineering.

Refresher and short courses are planned to be held annually.

10.7 There are, at present, ten engineers who have had post-graduate training in Public Health Engineering abroad, and another has to complete his course. There are no facilities for research on rural water supply and sanitation programmes in any of the institutions in the country. At present no investigation is being carried out to assist the rural water supply and sanitation programme.

10.8 The present staff at the campuses is not adequate to undertake the training programme envisaged during the Fifth Five-Year Plan period. In order to overcome this situation it is proposed to establish an Instructor Training/

Teaching Materials Section at the Nepal Engineering Institute. For the efficient implementation of the expanded training programme external assistance to provide equipment, fellowships and expert personnel would be helpful.

11. MATERIALS AND EQUIPMENT

11.1 With the exception of bricks, aggregate, sand and timber, no other construction materials are produced in Nepal. A cement factory with an annual out put of 60 000 tons is expected to go into production in 1974, while a proposal to construct a second factory of 100 000 tons capacity is being studied.

11.2 Most materials, such as pipes, fittings, pumps, cement, steel and other manufactured goods used in construction works, are imported from abroad, chiefly from India. The requirements of material up to 1980 appear in Appendix XIII. Drilling rigs and less sophisticated drilling machinery will need to be imported. Government are considering the installation of a plant to manufacture plastic pipes in the country. Apart from this there are no immediate plans to set up industries to produce materials or equipment used in water works construction. It is however, possible to fabricate handpumps for deep tubewells. Another area in which import substitution is possible is in respect of tools and some pipe fittings and accessories.

12. WATER QUALITY STANDARDS

12.1 The Government has neither drafted nor adopted national standards for drinking water. There is however, a proposal to prepare a national standard based on the standards recommended by WHO DWSS has laboratory facilities to carry out chemical analysis of water at Kathmandu, but the department has not been able to expand its activities as yet. The RA & LDD has no laboratory facilities. Both Departments have some field kits provided by UNICEF/WHO for carrying out bacteriological analysis and facilities are also available in the Health Department Laboratory to carry out standard bacteriological analyses. In some of the major urban water supply systems routine tests for residual chlorine are carried out.

12.2 There is no monitoring programme for water quality control, nor has the Government specifically assigned this responsibility to any single authority. It is the responsibility of several agencies operating water supplies to maintain satisfactory standards of water quality. The Department of Health Services is also not concerned with it.

13. INTERNATIONAL AND BILATERAL ASSISTANCE

13.1 The agencies which have assisted in the rural water supply programme are:-

(a) International

- United Nations Development Programme (UNDP)
- World Health Organization (WHO)
- United Nations Children's Fund (UNICEF)

(b) Bilateral

- Indian Co-operation Mission
- Indian Gurkha Resettlement Programme
- British Gurkha Resettlement Programme.

13.2 UNDP has provided assistance in carrying out sector studies and in the preparation of typical estimates for rural water supply and sanitation schemes. WHO has made available sanitary engineers and sanitarians, and has given fellowships and equipment; while UNICEF has provided engineering hardware, such as pipes and fittings.

13.3 Assistance provided by the bilateral agencies has been mostly in the forms of engineering hardware and technical assistance. Appendix XIV gives the names of the agencies, the period of their operation, name of the project, and the value of the grant or loan for the period since 1960.

14. DRAINAGE AND SANITATION

14.1 Sanitation is of a low order in the rural areas. With the almost total absence of sanitary facilities, it is the common practice to defecate on open ground or compost faecal matter, with domestic and agricultural waste for use as fertiliser. In accordance with the Gram Panchayat Act, the responsibility for the provision of sanitation facilities in the rural areas rests with the concerned panchayat. The Government has not formulated any definite assistance or promotional programme in this aspect.

14.2 There has been no specific allocation of funds nor any programme for rural drainage or sanitation. A small number of pilot projects have been carried out to determine the acceptability of pit latrines by the rural population. The only ones which have demonstrated any success are those operated by the School of Auxiliary Health Workers at Mahankal village near Kathmandu. The pit latrines are not readily acceptable to rural communities.

14.3 No programme or financing policy has been established to develop rural sanitation. Gram Panchayats do not have the financial resources to undertake rural sanitation programmes at the village level and nothing has been done in this direction. No official organization has been made responsible for this task. In the absence of waste water drainage facilities, especially in areas where piped water supply has been introduced, serious insanitary conditions have been created at some places where they have become a health hazard. In some places drains have been constructed to lead away the waste water for use in the fields. The RA & LDD is considering a proposal to initiate a rural latrines programme with the assistance from WHO/UNICEF in the Fifth Five-Year Plan period.

14.4 No research or investigation appears to have been undertaken on rural drainage and sanitation. It has been estimated* that a concrete squatting slab, with water seal arrangement would cost about Rs. 200/-. If the slab is supplied free, it will cost a family about Rs. 50/- to have a latrine in the house, provided that voluntary labour is available. Design criteria for rural drainage and sanitation have not been established.

*Water Supplies & Sanitation in Nepal, Sector Study (1972).

15. CONSTRAINTS

15.1 The order of priority of different constraints considered by the two Departments is mentioned below:-

Constraints	DWSS	RA & LDD
1. Manpower	1	1
2. Finance	9	8
3. Management	3	3
4. Institutional structure	8	2
5. Planning	4	4
6. Execution of projects	5	6
7. Operation	6	9
8. Maintenance	7	7
9. Materials	2	5

Management, Institutional structure, Planning, Execution of projects, Operation and Maintenance are all related to Manpower, which is undoubtedly, the greatest constraint in both departments.

15.2 Manpower

15.2.1 Shortage of trained technical manpower is the most important inhibiting factor with both the organizations, in the development of the rural water supply programme. While RA & LDD has not been able to set up a suitable organizational structure for this programme, the position is comparatively better with DWSS. However, in order to look after the rural water supply adequately, it will be necessary for the DWSS to make its regional offices more effective.

15.2.2 Though maintenance and operation ranks lowest in the context of constraints according to the observations of both RA & LDD and DWSS, as more schemes are completed this will prove to be more important as has been the experience in other countries.

15.2.3 Generally logistic difficulties are experienced in the execution of projects at rural level due to inaccessibility of a greater part of the country. Both departments have been finding it difficult to assign suitable professional and sub-professional staff to construction sites in remote areas. DWSS is also experiencing difficulty in finding contractors to undertake work in these areas.

15.2.4 Both Departments, being relatively new, have not been able to create the needed cadre in the permanent category, and have therefore, been unable to attract the personnel needed. This shortage is felt mostly in the sub-professional grades. This appears to be one of the most serious constraints affecting the performance of the two departments.

15.3 Finance

15.3.1 In the last few years the departments were able to obtain the allocation asked for, but were unable to spend the amount fully due to other major constraints. However, this is not likely to happen in the case of future programmes because, as more technical personnel become available and the departments get fully organized, the situation will undoubtedly change. Moreover, the assistance received from UNICEF will be limited and hence additional funds will have to be diverted from national resources. The availability of foreign exchange has not been a problem as most of the materials needed are imported from India without any currency restrictions.

15.3.2 The policy of getting the entire work done as well as maintaining it at Government cost without taxing the beneficiaries, as is the present practice, is a drain on public finances. This reduces the expansion of the programme since the country is deprived of surplus funds which could be used for reinvestment.

15.4 Materials

15.4.1 DWSS imports practically all construction materials from India. Materials such as pipes, reinforcing steel, cement, etc., are subject to a quota, which has proved to be a cumbersome procedure and accounts for long delays in the execution of projects.

15.4.2 Fortunately, RA & LDD is not faced with this problem because pipes are being supplied by UNICEF. There is, however, some difficulty in obtaining cement, which is arranged by the Government. UNICEF may not be able to meet the future requirements of pipes with large scale development of the programme.

15.4.3 As a direct result of the fuel crisis there has been a sharp increase in the cost of construction materials, such as pipes, cement, reinforcement steel, etc. This is reflected in the higher costs of water supply projects. Scarcity of fuel, and its high cost has made transportation of construction materials difficult and costly. This may necessitate curtailment of the programme.

16. CONCLUSIONS

16.1 The most significant feature of the rural water supply system in Nepal is that two agencies are involved in the implementation of the programme. There is no doubt that the amalgamation of these two agencies would ensure better utilization of technical and administrative manpower, supplies and equipment. It would also enable the single organization to be better able to select priorities and implement the programme without having to contend with competing interests of two departments. It is however important that any proposed amalgamation of the two agencies be formulated in such a way as to enable the new agency to organize community participation at least as effectively as RA & LDD is now able to do.

16.2 It seems that there is urgent need to strengthen the organizational infrastructure in both the departments, specially at the central and regional levels, by providing well-staffed engineering units for planning, design and investigation. These units would prepare simple and economic designs, collect

data, establish an information and retrieval system, and carry out periodical technical inspections in order to improve the maintenance of works already completed with the help of the local authorities. The units at headquarters will be able to exchange ideas with the regional offices and feed them with innovative ideas, and prepare manuals, standards and typical drawings for rural water supply systems. The strengthening of the regional offices will ensure better and speedier implementation of projects.

16.3 A rural water supply programme generally does not require very high engineering skills. It would therefore be desirable to strengthen the sub-professional cadre in order to guide the villagers in undertaking construction works. In addition, this will reduce establishment costs. To this end it will be necessary to increase the intake of the Engineering Institute, as has been planned by the RA & LDD.

16.4 An assessment of the financial, material, and manpower needs for supplying water to the entire rural community and identifying the problem areas, has still to be prepared. This will help in (i) drawing up a phased National Plan for rural water supply, (ii) fixing priorities, and (iii) laying down a national target for different periods.

16.5 A large number of well-designed schemes should be drawn up in advance, in order to make the optimum use of any additional funds and resources that may be available at short notice.

16.6 Though it has not been possible to utilize the entire amount budgeted in the Fourth Plan due to manpower shortage, yet as the organization is strengthened, increased allocation will be needed to develop the programme considerably to have an impact on the community.

16.7 In view of the limited financial resources, it would be desirable to explore the groundwater potential in the terai region to ascertain the possibility of initiating handpump schemes to achieve larger coverage than is possible with a piped water supply system. An adequate organization for maintenance, however, needs to be established. A systematic measurement of the discharge of springs in scarcity areas of the mountains should also be carried out for future reference.

16.8 The present policy of subsidizing the entire construction cost of water supply systems in the larger villages, needs to be reconsidered, since this results in unbalanced development, depriving smaller communities of this facility. It is also preferable to raise the entire cost of operation by taxing the beneficiaries. The funds thus saved could be used for reinvestment for expansion of the programme.

16.9 Periodical evaluation of the works carried out is necessary in order to avoid past mistakes and to bring about improvements in the programme.

16.10 Machinery for monitoring water quality, a national health education programme and rural sanitation including waste water drainage which are almost non-existent, are some of the other steps necessary for the overall success of the rural water supply programme.

16.11 At present, locally manufactured materials are limited. In view of the continuing demand for these materials as the programme gathers momentum, it is worthwhile to give serious thought to the urgent need to develop capability in this direction. Studies should also be undertaken to locate less expensive and substitute materials to reduce construction costs.

16.12 Foreign expertise will continue to be necessary to provide guidance and direction for the implementation of the rural water supply programme.

16.13 Only 10% of the rural population is expected to have access to safe water by 1980. Although it is proposed to cover an additional 0.7 million people in the rural areas in the Fifth Plan period (1975-80) this will be offset by the increase in population which is expected to be double this amount by 1980.

SUMMARY OF COUNTRY DATA

1. Population and GNP

(a) Population

	<u>1970</u>	<u>1980</u>
(i) Rural	10 854 (x1 000)	13 420 (x1 000)
(ii) Urban	532 (x1 000)	879 (x1 000)
Total	11 386 (x1 000)	14 299 (x1 000)

(b) Average growth of population per year: 1.8%

(c) Rural population : 96%

(d) Number of villages : 28 000 (approximately)

(e) Number of compact communities with a population of 300 or over suitable for community water supply : 6 400

(f) GNP per capita (US\$) : 80.-

(g) Growth rate of GNP per capita per year : 0.5%

2. Health Status*

(a) Expectation of life at birth : 40.6 (1965-1970)

(b) Crude death rate per 1 000 : 27 (1969)

(c) Infant mortality rate per 1 000 : 150 (1969)

(d) Common water-borne and water-related diseases : Dysentery, gastro-enteritis, hookworm, round worms, cholera (noticeable incidence)

3. Institutional Structure(a) Responsible Ministry : Ministry of Water & Power
Ministry of Home & Panchayat

- (b) Department in charge : (i) Department of Water Supply and Sewerage (for population 3 000 and above).
 (ii) Department of Remote Area and Local Development (for population below 3 000).
- (c) Other connected authorities: The Panchayats, The National Planning Commission, Water Supply and Sewerage Development Board.

Department of Irrigation, Hydrology and Meteorology.

4. Duration of the Current Fourth Five-Year Plan

July 1970 to June 1975.

5. Financial Year

1 July to 30 June.

6. Status of Rural Water Supply

- (a) Population with access to safe water:
 (excluding hand-pump supply)

	1973	1975 (anticipated)	1980 (anticipated)
(i) Population benefited	0.16 m	0.30 m	0.01 m
(ii) Percentage of population benefited	1.30	2.40	10.00
(iii) Increase in rural population between 1975-1980			1.34 m

- (b) Allocation on water supply

	<u>Third Plan (1965-1970)</u>	<u>Fourth Plan (1970-1975)</u>
(i) Rural	Rs. 8.7 million	Rs.22.9 million
(ii) Urban	Rs.22.1 million	Rs.15.8 million
(iii) Allocation on Rural Water Supply as percentage of total outlay on CWSS	29	59

	<u>Third Plan</u>	<u>Fourth Plan</u>
(iv) Allocation on water supply as percentage of the total plan outlay - Rural	0.54	0.90
- Urban	1.26	0.60
(c) Per capita expenditure on		
(i) Rural population	-	Rs.0.54
(ii) Urban population	-	Rs.5.60
(d) Per capita cost		
(i) Hand-pump supplies		Rs.15.00
(ii) Piped water supplies		Rs.50 to 100
(e) Outlay needed in excess of current proposals		
(i) To achieve 25% target by 1980		Rs.170 million
(ii) To cover, by 1980, the compact rural population feasible for community water supply (80% of the total)		Rs.450 million
(f) Percentage of contribution by different agencies		
(i) Central Government (Grant)		20
(ii) Local authorities responsible for supply of voluntary labour etc.		20
(iii) UNICEF		60
(g) Cost of maintenance		
(i) Per capita per annum		Rs. 0.50
(ii) Per 1 000 gallon of water		Rs. 0.70
(h) Maintenance cost borne by		
(i) Local Panchayat		
(ii) District Panchayat		
(iii) Central Government		
(i) External Assistance		
(i) UNICEF (1971-1975)		US\$758 700
(ii) WHO		Supplies and equipment
(iii) Indian Co-operation Mission (1971-1975)		Rs.2.34 million

- (j) Provision of house connections exists.
- (k) Persons served by a stand-post - 150 to 200
- (l) Engineering cost in relation to cost of scheme

(i) Preliminary survey and estimate	1-1/2%
(ii) Investigation and design	2-1/2%
(iii) Supervision of construction	<u>4%</u>
Total	<u>8%</u>

- 7. Facility is only available for technical training of sub-professionals.
- 8. Bricks, stone aggregate, lime and wood are only produced in the country required for the programme.
- 9. There is no monitoring programme for water quality control. WHO Water Quality Standards are adopted when needed. Laboratory facilities are available at Kathmandu.

POPULATION GROWTH IN PAST DECADES

Year	Total population	Average Annual Growth Rate	Urban	Rural
1952/1954	8 257 000	1.65%	230 000	8 027 000
1961	9 413 000	1.84%	311 000	9 102 000
1971	11 556 000	1.84%	461 000	11 095 000
1981(projected)	13 777 000		620 000	13 157 000

Source: (a) Population Census (1952/54, 1961 & 1971) of Nepal,
 (b) Statistical Pocket Book (1974)
 (c) Central Bureau of Statistics, Kathmandu.

POPULATION DISTRIBUTION IN URBAN & RURAL AREAS

Area	Population	Identifiable compact communities with population greater than				
		7 000 to 3 500	7 000 to 2 500	3 500 to 2 500	2 500 to 1 500	1 500 to 300
Terai	4 211 000	9	12	14	14	5 130
Midlands	6 246 000	7	14	33	45	530
Hills	1 099 000	nil	1	8	36	582
	11 556 000	16	27	55	95	6 242

Source: Water Supply and Sanitation in Nepal, Sector Study (1972).

ESTIMATED POPULATION, 1970-1980*

Year	END-YEAR POPULATION		(IN THOUSANDS)
	URBAN	RURAL	TOTAL
1970	532	10854	11386
1971	560	11087	11647
1972	588	11325	11913
1973	619	11569	12188
1974	650	11818	12468
1975	684	12071	12755
1976	719	12330	13049
1977	756	12594	13350
1978	795	12864	13659
1979	836	13139	13975
1980	879	13420	14299

*Source: UN Population Statistics.

HEALTH PROBLEMS

	Kathmandu Bagmati Zone	Biratnagar Koshi Zone	Dharan Koshi Zone	Pokhara Gandaki Zone	Nepalganj Bheri Zone	Janakpur Janakpur Zone	Gorkha Gandaki Zone	Remarks
Typhoid Fever	2	2	1	2	2	2	2	
Amoebic Dysentery	1	1	1	1	1	1	1	Almost universal in some areas
Bacillary Dysentery	2	1	1	2	1	1	1	
Giardia Dysentery	2	2	N.D.	1	N.D.	N.D.	N.D.	
Hookworm	1	2	4	2	3	1	1	
Roundworm	1	2	1	2	1	1	1	
Cholera	3	5	5	5	5	5	5	
Malaria	5	4	5	4	5	5	5	
Infectious Hepatitis	3	4	5	4	4	3	5	Frequently contracted by foreigners but rarely by Nepalese
Typhus	5	N.D.	5	5	5	N.D.	5	
Schistosomiasis	5	5	5	5	5	5	5	
Filariasis	3	2	3	5	2	2	5	
Gastro-enteritis	1	1	1	2	2	1	1	
Tuberculosis	1	1	1	2	1	1	2	Tuberculosis is generally reported to be the most serious health problem in all areas

1. Very common 2. Common 3. Some incidence 4. Rare 5. No recent cases recorded N.D. Not diagnosed

PLAN ALLOCATION ON URBAN AND RURAL
WATER SUPPLY AND SANITATION

Year	Total	URBAN		RURAL		% of Urban
		Allocation	% of Total	Allocation	% of Total	
1969/70	5 873 000	3 380 000	57.0%	2 493 000	43.0%	73%
1970/71	3 947 000	1 830 000	46.5%	2 117 000	53.5%	108%
1971/72	7 234 000	2 867 000	39.5%	4 417 000	53.5%	154%
1972/73	12 817 000	5 040 000	40.5%	7 777 000	59.5%	154%
1973/74	8 763 000	2 700 000	31.0%	6 063 000	69.0%	235%

Over the 5 years' period under review the total allocation to the rural sector is 59% of the total allocation for water supplies.

Source: Development provisions of HMG, Nepal, and information collected from DWSS and RA and LDD.

EXPENDITURE PER CAPITA ON URBAN AND
RURAL POPULATION (1969 to 1974)

Year	RURAL		URBAN	
	Population in millions	Per capita Expenditure in Rs.	Population in millions	Per capita Expenditure in Rs.
1969/70	10.7	0.10	.44	5.10
1970/71	10.9	0.12	.45	2.75
1971/72	11.1	0.30	.46	5.70
1972/73	11.3	0.58	.47	8.90
1973/74	11.5	0.54	.48	5.60

Source: Information collected from DWSS, and RA and LDD.

CHEMICAL ANALYSIS OF SOME WATER SOURCES

	WHO International Standards		Biratnagar		Dharan	Birgunj	Bhairawa	Butwal	Janakpur	
	Max. Acceptable	Max. Allowable	Tubewell	Shallow well	Stream	Tubewell	Tubewell	Stream	ICM Tubewell	New Tubewell
	pH (units)	7.8-8.5	6.5-9.2	7.3	6.5	6.9	7.4	7.5	8.0	6.9
Turbidity (J.T.U.)	5	25	1.5	1.5	1.0	2.0	2.0	2.1	10.0	2.0
Colour (Colour units)	5	50	1.0	2.0	1.0	10.0	5.0	5.0	10.0	5.0
Alkalinity (as CaCO ₃)										
Methyl Orange (mg/l)	-	-	250.0	70.0	20.0	200.0	280.0	165.0	180.0	105.0
Total Hardness as CaCO ₃ (mg/l)	390	855	-	-	-	-	-	-	-	-
Carbonate Hardness (mg/l)	-	-	250.0	70.0	20.0	200.0	280.0	165.0	180.0	105.0
Chlorides (mg/l)	200	600	2.5	30.0	5.0	2.5	2.5	2.5	2.5	2.5
Non Carbonate Hardness (mg/l)	-	-	70.0	130.0	60.0	50.0	20.0	95.0	20.0	45.0
Sulphates (mg/l)	200	400	4.0	6.0	2.0	2.0	2.0	2.0	6.0	5.0
Fluorides (mg/l)	-	1.5	0.9	0.8	0.6	0.7	0.45	0.5	0.7	0.7
Nitrates (mg/l)	-	45	3.0	8.0	2.0	2.0	5.0	4.0	1.0	1.0
Nitrites (mg/l)	-	-	0.002	0.01	0.002	0.002	0.006	0.	0.001	0.001
Phosphates (ortho) (mg/l)	-	-	2.5	3.6	2.0	0.2	0.1	0.3	0.2	0.1
Calcium Hardness (mg/l)	-	-	165.0	75.0	10.0	130.0	250.0	100.0	110.0	60.0
Magnesium Hardness (mg/l)	-	-	155.0	125.0	70.0	120.0	5.0	160.0	90.0	90.0
Iron (mg/l)	0.3	1.0	0.04	0.08	0.02	0.08	0.03	0.02	0.08	0.04
Manganese (mg/l)	0.1	0.5	0.8	0.2	0.2	0.1	0.2	0.1	0.3	0.1
Silica (mg/l)	-	-	40.0	27.5	10.0	32.5	35.0	25.0	32.5	47.5
Copper (mg/l)	1.0	1.5	0.3	0.2	0.12	0.2	0.05	0.6	0.03	0.02
Chromium	-	0.05	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01
Carbon Dioxide	-	-	24.0	4.0	4.0	18.0	4.0	-	28.0	8.0
Dissolved Oxygen	-	-	11.0	10.0	10.0	8.0	10.0	9.0	9.0	12.0

Source: Water Supplies and Sanitation in Nepal, Sector Study (1972),
by Binnie and Partners.

THIRD PLAN OUTLAY OF RURAL AND URBAN WATER SUPPLY

S.No.	Year	Budget for Water Supply Scheme	Rural Water Supply allocation out of W/S Budget
1.	1965-1966	Rs. 9.10 Million	Rs. 1.50 Million
2.	1966-1967	Rs. 5.00 Million	Rs. 1.89 Million
3.	1967-1968	Rs. 6.37 Million	Rs. 2.00 Million
4.	1968-1969	Rs. 3.00 Million	Rs. 1.50 Million
5.	1969-1970	Rs. 6.87 Million	Rs. 1.78 Million
Total:		Rs.30.84 Million	Rs. 8.67 Million

Source:- Rural Community Water Supply SEA/Sem.RCWS.1/4, 10.2.1974.

FIFTH FIVE-YEAR PLAN 1975-1980

In accordance with the draft proposals for the Fifth Five-Year Plan, the additional rural population that will have access to safe water supply by 1980 is 1 010 000:

(1) DWSS by providing 180 systems expect to serve	550 000
(2) RA & LDD by providing 375 minor gravity system expect to serve	260 000
(3) RA & LDD by providing shallow tubewells and deep tubewells in the artesian zones expect to serve between, 1976 and 1980	<u>200 000</u>
	1 010 000
	=====

Source: Draft proposals for the Fifth Five-Year Plan,
National Planning Commission, Nepal.

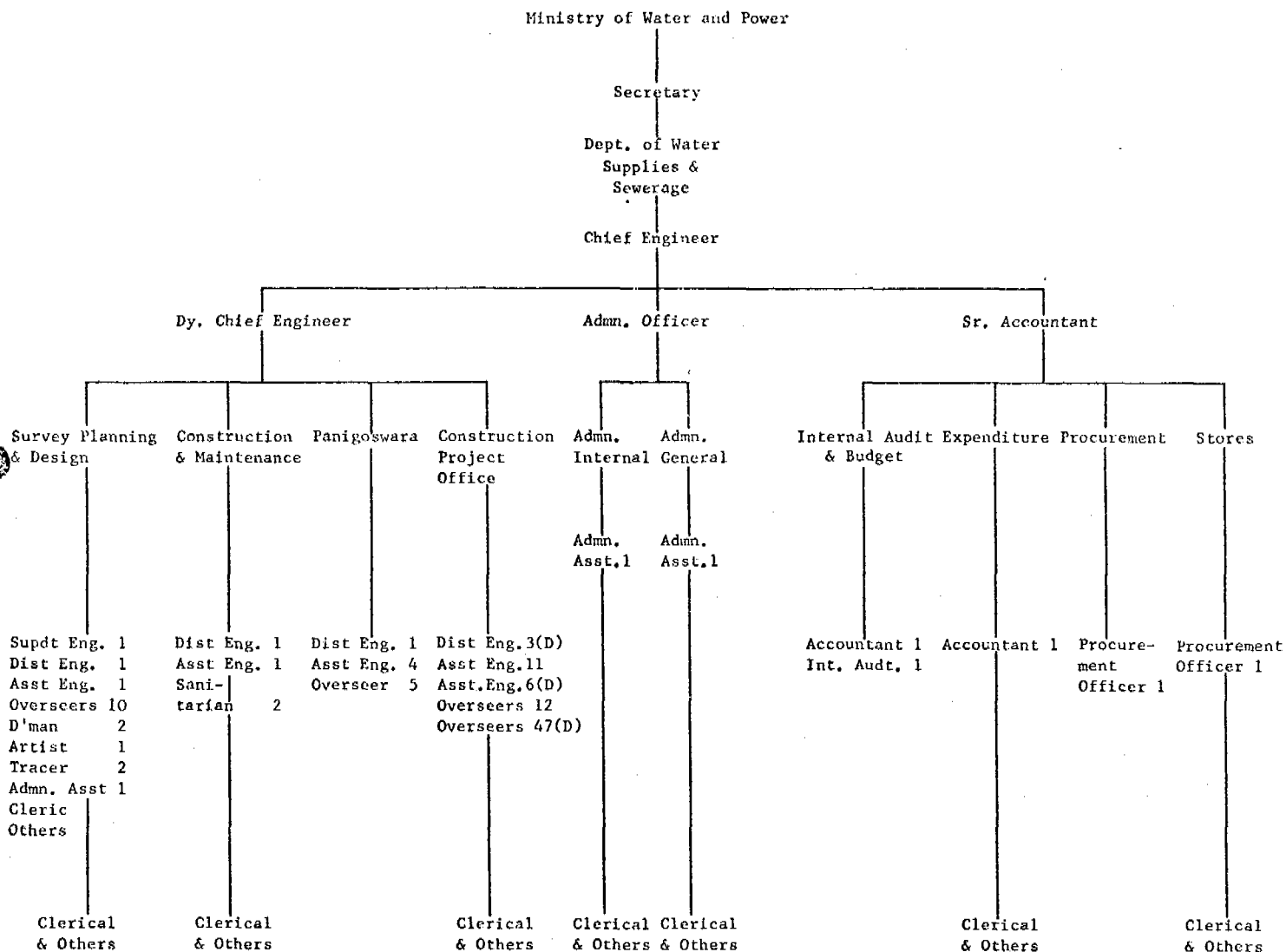
BUDGET PROVISION AND ACTUAL EXPENDITURE

Fiscal Year	Department	Allocation		Expenditure	
		Urban	Rural	Urban	Rural
		Rs.	Rs.	Rs.	Rs.
1969/70	DWSS	3 380 000	2 493 000	2 239 000	1 020 000
1970/71	DWSS	1 830 000	2 117 000	1 230 000	1 268 000
1971/72	DWSS	2 867 000	3 910 000	2 625 000	3 112 000
	RA & LDD	-	507 000	-	195 000
1972/73	DWSS	5 040 000	5 352 000	4 155 000	4 531 000
	RA & LDD	-	2 525 000	-	1 897 000
1973/74	DWSS	2 700 000	3 538 000	-	-
		<hr/>	<hr/>	<hr/>	<hr/>
		15 817 000	19 329 000	10 248 000	12 023 000

There was no allocation in respect of sanitation in either urban or rural sectors between the years 1969 to 1974.

Source: Development provisions of HMG, Nepal, and information collected from DWSS and RA & LDD.

ORGANIZATIONAL CHART OF DEPARTMENT OF
WATER SUPPLY AND SEWERAGE

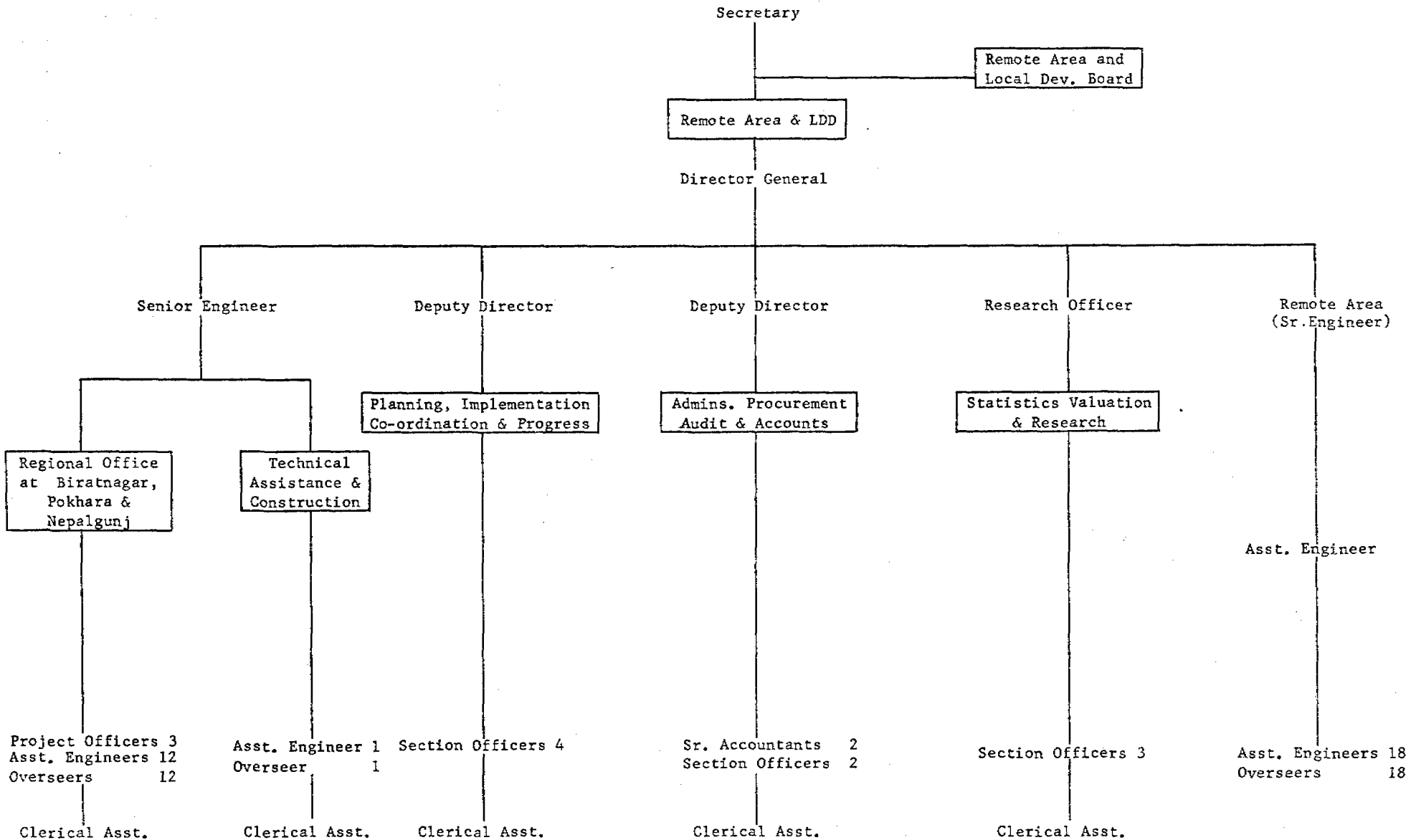


Note: (D) Development Cadre

Source: Information collected from DWSS

ORGANIZATIONAL CHART OF REMOTE AREA AND LOCAL
DEVELOPMENT DEPARTMENT

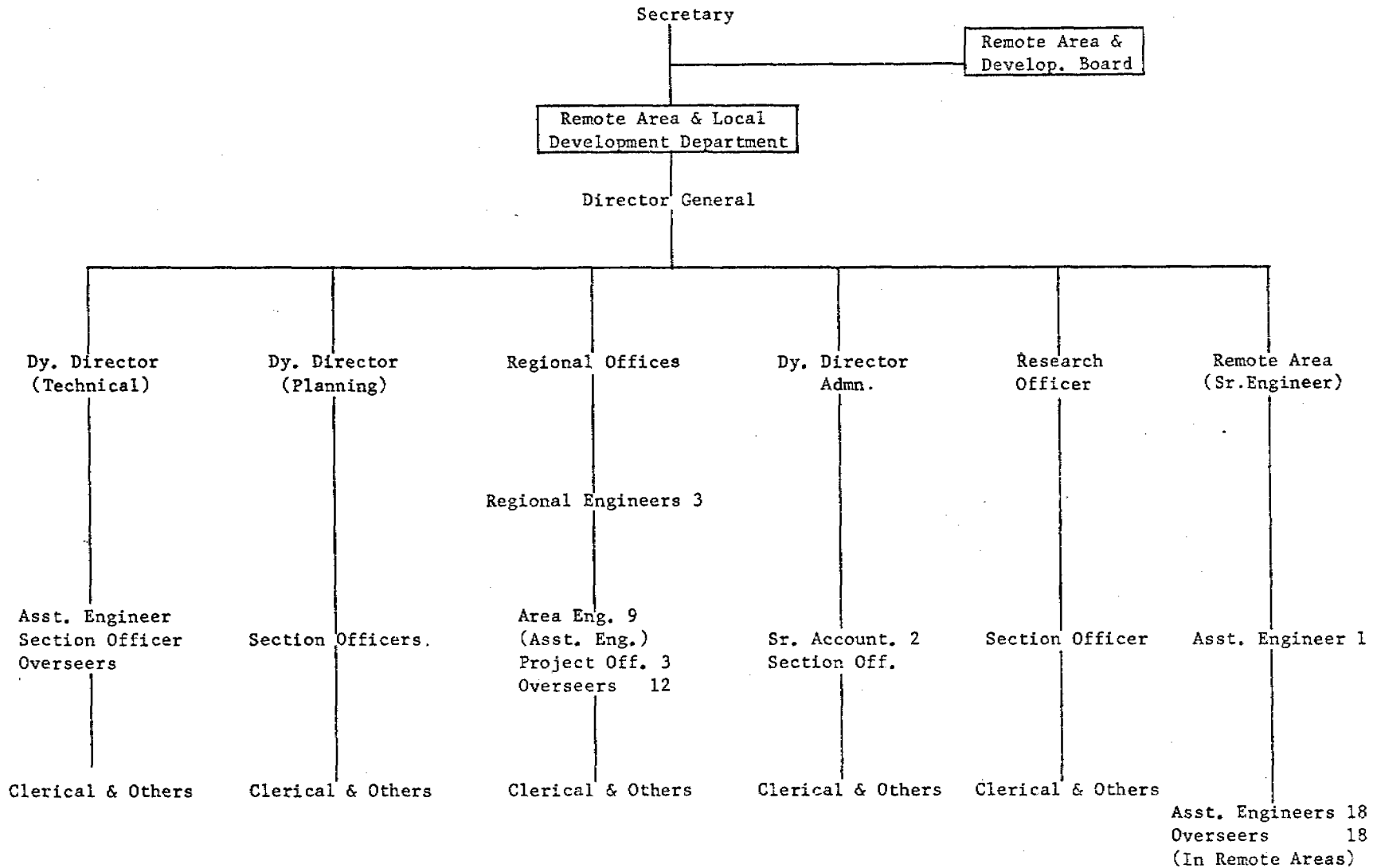
Ministry of Home & Panchayt



Source: Information collected from RA & LDD.

ORGANIZATIONAL CHART OF REMOTE AREA AND LOCAL
DEVELOPMENT DEPARTMENT

Ministry of Home & Panchayat



DESIGN CRITERIA

- (a) Period of design, 10 to 15 years
- (b) Growth rate to be based on district growth rate, maximum 50% of the present population
- (c) Consumption - 45 litres per capita per day and where source yield is minimal to work on 225 litres per house unit per day.
- (d) Distribution via standpipes only - to be located so that carrying distance is not over 150 metres. Maximum number of people per tap 200.
- (e) Storage to be provided based on rate of inflow and assumed habit curve.
- (f) Distribution system to be designed for a flow of 13.5 litres (3 gls) per minute from each one of the taps up to 6 taps. However if there are a larger number of taps, principle of probability could be applied say -

<u>Upto 6 taps</u>	<u>All taps open</u>	<u>Rate of flow 3 gpm</u>	
7-9 taps	85% open	Rate of flow to be taken as	2 1/2 gpm
10-12 taps	75% open	" " "	2 1/4 gpm
Over 12 taps	66% open	" " "	2 gpm

- (g) Minimum residual head at tap 3 metres
- (h) Hand pumps to serve 150/200 people

Source: Records kept in RA & LDD on the recommendations of the WHO short-term consultant, Mr Sarananapananthan

REQUIREMENT OF TECHNICAL PERSONNEL

<u>Campus and Course</u>		<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>Total</u>
(1) <u>Nepal Engineering Institute</u>						
<u>Campus</u>						
Civil Engineering Overseers	Intake	120	144	144	144	552
	Output	45	78	80	130	333
Draftsmen/Arch/CE	Intake	-	18	-	24	42
	Output	-	-	10	-	10
Plumber/Pipe Fitter	Intake	-	16	16	16	48
	Output	-	-	14	14	28
Brick layer	Intake	14	10	32	32	88
	Output	10	8	28	28	74
Carpenter	Intake	16	16	32	32	96
	Output	12	14	28	28	82
(2) <u>Thapathali Campus</u>	(Mainly Electrical & Mechanical)					
(3) <u>Balaju Centre</u>	(Mainly General Mechanics)					
(4) <u>Biratnagar Centre</u>	(Mainly Mechanics - Semi Skilled)					
(5) <u>Cottage Industry Centre</u>	(General Mechanics, electricians and furniture makers)					
(6) <u>Butwal Centre</u>						
Brick layers	Intake	3	3	3	3	12
	Output	3	3	3	3	12
	(others include electricians, mechanics, etc.)					

Source: Fifth Development Plan - Outline Proposals.

ESTIMATED REQUIREMENTS AS ESTIMATED
BY HUMAN RESOURCES DIVISION

		<u>Fourth Plan</u> <u>Period</u>	<u>Fifth Plan</u> <u>Period</u>	<u>Total</u>
<u>Sub-Professionals</u>				
1.	CE Overseer	926	742	1 668
2.	CE Draughtsmen	100	158	258
<u>Tradesmen</u>				
1.	Plumber/Pipe Fitter	1 000		

OUTPUT IN FOURTH PLAN

<u>Category</u>	<u>Output for Nepal</u> <u>Institutions</u>				<u>Total trained</u> <u>in India</u>	<u>Total</u>	
	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>			
1.	CE Overseer	107	169	203	156	64	700
2.	Draughtsmen	Nil	Nil	Nil	Nil	42	42

Source: Estimates for Fourth and Fifth Plan Periods, National Planning Commission (Human Resources Division), Nepal

OUTPUT IN FIFTH PLAN

	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	Nos. trained in India	<u>Total</u>
<u>Sub-Professionals</u>							
1. CE Overseer	120	120	220	220	412	200	1 292
2. Draughtsmen	20	40	40	40	40	-	180
3. Quantity Surveyors	20	20	20	20	20	-	100
<u>Tradesmen</u>							
1. Plumber/Pipe Fitter	32	32	224	224	224	-	736
<u>Additional Sub-Professional Categories</u>							
1. Civil Sub-Overseer	48	48	48	192	192	-	528
2. Diploma in Civil Engineering	-	-	-	-	48	-	48

Source: Fifth Development Plan Outline Proposals, Institute of Engineering
Tribhuvan University, Nepal

ALSO

Verbal Communication with Institute of Engineering

ALSO

Information collected from Institute of Engineering.

ASSESSMENT OF MATERIALS FOR NATIONAL RURAL WATER SUPPLY PROGRAMME
FOR THE PERIOD 1974 - 1980 (THE QUANTITIES AND PRICES FILLED-IN
IN THIS QUESTIONNAIRE MAY BE VERY APPROXIMATE)

1. Construction Materials/Equipment

(A) Cement

- | | | |
|-------|--|-------------------------------|
| (i) | Quantity required for VWS programme | 7000 M. tons*, 11000 M.tons** |
| (ii) | Quantity readily available | Nil |
| (iii) | Annual manufacturing capacity in the country | Nil |

(B) Steel (reinforcement bars)

- | | | |
|-------|--|-----|
| (i) | Quantity required for VWS programme | 190 |
| (ii) | Quantity readily available | Nil |
| (iii) | Annual manufacturing capacity in the country | Nil |

(C) Pipes

	Quantity in tons				Cement concrete	
	CI	AC	GI	PVC		
(i)	Quantity required for VWS Programme	8000	Nil	3000	750	Nil
(ii)	Total quantity available:					
	(a) Indigenously manufactured	Nil	Nil	Nil	Nil	Nil
	(b) Imported	Nil	Nil	Nil	Nil	Nil

Source: Information collected from offices concerned.

*Based on proposals for Fifth Five-Year Plan (1974-79)

**Based on country health Programme.

	Yes	No	
Asbestos cement	<input type="checkbox"/>	<input type="checkbox"/>	} Not applicable; pipes not manufactured in Nepal.
PVC	<input type="checkbox"/>	<input type="checkbox"/>	
HDP	<input type="checkbox"/>	<input type="checkbox"/>	
CI/GP	<input type="checkbox"/>	<input type="checkbox"/>	
Cement concrete	<input type="checkbox"/>	<input type="checkbox"/>	

Pipe Specials

i) Indigenously manufactured:

	Quantity in tons					Cement concrete
	CI	AC	GI	PVC	HDP	
(a) Adequate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	} Pipe special not manufactured in Nepal
(b) Inadequate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

(D) Pumps

	Presently indigenously manufactured	Future indigenously manufactured	Imported
	Yes/No	Yes/No	Yes/No
(i) Shallow-well hand pumps	Yes	Yes	Yes
(ii) Deep-well hand pumps	No	No	Yes
(iii) Surface centrifugal pumps	No	No	Yes
(iv) Hydro-ejector pumps	No	No	Yes
(v) Electro submersible pumps	No	No	No
(vi) Turbine pumps	No	No	Yes
(vii) Electric motors	No	No	Yes

2. Chlorinators

(A) Solution Feeders

	<u>Presently indigenously manufactured</u> Yes/No	<u>Future indigenously manufactured</u> Yes/No	<u>Imported</u> Yes/No
(i) Gravity type, non-automatic	No	No	Yes
(ii) Suction feed type, non-automatic	No	No	Yes
(iii) Gravity feed type, automatic control	No	No	No
(iv) Suction feed type, automatic control	No	No	No

(B) Gas Solutioners

(i) Gravity feed type	No	No	Yes
(ii) Injection type	No	No	No

(C) Chemicals

(i) Liquid chlorine in cylinders	No	No	Yes
(ii) Bleaching powder	No	No	Yes

3. Comparative Costs (Indigenous versus Imported)

	<u>Indigenous</u>	<u>Imported</u>
(A) <u>Cement per ton</u>	Not manufactured	US\$49.00 (cif)
(B) <u>Reinforcement rods, per ton</u>	Not manufactured	US\$38.00 (cif)
(C) <u>Pumps</u>		
Shallow-well hand pump	US\$7.00	US\$11.00 (cif)
Deep-well hand pumps	Not manufactured	Not imported
Electric hydro-ejector pump, 3 HP	-do-	US\$1 000.00 (cif)
Electric submersible pump, 25 HP	-do-	Not imported
Single stage centrifugal, 3 HP	-do-	US\$380.00 (cif)

D. Pipes

OD sizes in mm (cost in US\$ equivalent per metre)

	16		25		40		50		75		100	
	L	I	L	I	L	I	L	I	L	I	L	I
(a) GI (Supplier's cif prices, 1974)	N.A.	1.04	N.A.	1.79	N.A.	2.33	N.A.	2.00	N.A.	4.60	N.A.	12.70
(b) AC	Not manufactured		locally;		not		imported					
(c) PVC (UNICEF 1973)	N.A.	0.13	N.A.	0.24	N.A.	0.40	N.A.	0.53	N.A.	0.94	N.A.	1.32
(d) HDP (Supplier's I & F prices, 1974) (UNICEF prices, 1973)	N.A.	0.40	N.A.	0.65	N.A.	1.00	N.A.	2.00	N.A.	3.50	N.A.	6.00
(e) CI (as applicable) (Supplier's cif prices)	Not	0.12	manufactured	0.21	locally;	0.25	0.76	1.20	N.A.	2.80	N.A.	3.00
			not	imported								

NOTE: L: Local I: Imported N.A.: Not applicable; item not manufactured locally.

E. Chlorinators*Locally manufactured

- | | | |
|--|------------------|--------------------------------|
| (i) Solution feeders, non-automatic | Not manufactured | <u>Imported</u>
US\$ 250.00 |
| (ii) Solution feeders, automatic control | -do- | Not imported |
| (iii) Gas solutionizers | -do- | US\$ 1 100.00 |

*Of comparable type and capacity.

INTERNATIONAL AND BILATERAL ASSISTANCE

Development Aid to Water Supply & Sewerage Sector

<u>Agency</u>	<u>Period of Operation</u>	<u>Name of Project</u>	<u>Aid (Grant/Loan) Nep. Rs./US\$</u>
ICM	1961/70	20 Water Supply Scheme investigated designed & constructed	Nep Rs.8 320 000
		Investigation of 3 schemes	1 700
		Installation of hand pump in terrai	399 000
United Kingdom	1967/70	Dharan Water Supply Scheme	1 320 000
WHO	1964/70	Community Water Supply WHO Project Nepal 0014	Technical assistance including supply of equipment and Fellowships
ICM	1971/75	3 Water Supply Schemes of which 2 remain to be completed	Nep Rs.2 340 000
WHO/ UNICEF	1971/75	National Community Water Supply & Sanitation WHO Project Nepal 0029	Supply of equipment and Fellowships UNICEF-Material and financial assistance US\$539 800
UNDP(SF)/ WHO	1970/74	Water Supply & Sewerage Project for Greater Kathmandu & Bhaktapur	UNDP (SF) US \$758 700 (approx)
		WHO Project Nepal 0025	WHO Executing Agency
IDA(World Bank)	1974/78	Construction of Kathmandu Lalitpur, Thimi & Pokhara Water Supplies & Kathmandu Sewerage	US\$7.8 million (loan)

As stated earlier the assistance provided by all the agencies listed above except for the IDA (World Bank) has been grants.

Source: Water Supply and Sanitation in Nepal, Sector Study (1972).

NATIONAL DATA ON COMMUNITY WATER SUPPLY

BASIC DATA

- (in thousands)
1. Estimated total population of country as of 31 December 1970
 2. Estimated annual rate of population increase (as %)
 3. Population supplied with water as of 31 December 1970
 - (a) Urban population supplied by house connections
 - (b) Urban population without house connections but with reasonable access to public supplies
 - (c) Rural population having reasonable access to safe water
 - (d) Estimated percentage of the supplied urban population $\frac{3(a) + 3(b)}{3(a) + 3(b)}$ that receive only intermittent supply
 4. Additional population supplied with water annually
 Give figures for latest full year for which records are available, stating the year here
 - (a) Additional urban population supplied by house connections
 - (b) Additional urban population without house connections but with reasonable access to public supplies
 - (c) Additional rural population having reasonable access to safe water
 5. Water Quality Control
 - (a) Name of authority responsible for surveillance of drinking water quality on a national scale:
 Department of Irrigation and Water Works.
 - (b) Have national standards for drinking water quality been adopted by Government? Yes No
 - (c) If answer to Question 5(b) is "No", WHO standards adapted to omit this question. If "Yes", what part did WHO International or European Standards for Drinking Water play in the preparation of national standards?

WHO standards adapted to suit national needs	<input type="text"/>
WHO standards adapted in toto as national standards	<input type="text"/>
National standards prepared prior to WHO standards	<input type="text"/>
Other (explain in space below)	<input type="text"/>

- (d) If answer to Question 5(b) is "No" what are plans to prepare them?
- No plans at the moment
- Standards contemplated in near future
- Standards under preparation
- (e) Extent and frequency of bacteriological examination of urban supplies
(Check one or more boxes)
- Every water supply is examined regularly
- Some water supplies are examined regularly
- Every water supply is examined occasionally
- Some water supplies are examined occasionally
- No examination at all
- (f) Extent and frequency of bacteriological examination of Rural Water Supplies
(Check one or more boxes)
- Every water supply is examined regularly
- Some water supplies are examined regularly
- Every water supply is examined occasionally
- Some water supplies are examined occasionally
- No examination at all

6. Planning, Construction and extension of water supplies

- (a) Names of national authorities responsible for planning, construction and extension of

	<u>Planning</u>	<u>Construction & extensions</u>
Urban supplies } Rural supplies }	Department of Irrigation and Water Works	

- (b) Total annual investment including external, national and local capital, materials and labour for construction and improvements of water supplies for latest year records available, stating year here
- | | |
|----------------|------------------------------------|
| | (in thousands) |
| | US\$ |
| Urban supplies | <input type="text" value="1 000"/> |
| Rural supplies | <input type="text" value="100"/> |

Express amount in equivalent thousands US\$

7. Maintenance and Operation of Water Supplies

Authority responsible for maintenance and operation of

- (a) Urban Supplies }
(b) Rural supplies } Department of Irrigation and Water Works

- (c) What part of the maintenance, operation and capital repayment costs do the consumers pay for Urban Water Supplies (Check one or more boxes)
- | | |
|---|-------------------------------------|
| Maintenance, operation and capital repayment costs | <input type="checkbox"/> |
| Maintenance and operation and part of capital repayment | <input type="checkbox"/> |
| Maintenance and operation costs only | <input type="checkbox"/> |
| A part of the maintenance and operation costs only | <input checked="" type="checkbox"/> |
| None at all | <input type="checkbox"/> |
- (d) What part of the maintenance, operation and capital repayment costs do the consumers pay for Rural Water Supplies (Check one or more boxes)
- | | |
|---|-------------------------------------|
| Maintenance and operation and capital repayment costs | <input type="checkbox"/> |
| Maintenance and operation and part of capital repayment | <input type="checkbox"/> |
| Maintenance and operation costs only | <input type="checkbox"/> |
| A part of the maintenance and operation costs only | <input type="checkbox"/> |
| None at all | <input checked="" type="checkbox"/> |

8. Reports

From conception to operation, reports on works are essential for providing best services at least cost: yet data collection and reporting are in a rudimentary state in a number of countries. Please cross appropriate boxes to indicate present position in your country.

	<u>Planning and feasibility reports</u>	<u>Construction reports</u>
(a) Project reports are: prepared for every water supply project	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prepared only for major works	<input type="checkbox"/>	<input type="checkbox"/>
not formally prepared	<input type="checkbox"/>	<input type="checkbox"/>

(b) Annual reports on operation and maintenance are prepared (Check one or more boxes)	For every water supply regularly	<input type="checkbox"/>
	For only the major works regularly	<input checked="" type="checkbox"/>
	For every water supply occasionally	<input type="checkbox"/>
	For only the major works occasionally	<input type="checkbox"/>
	Are not prepared	<input type="checkbox"/>
(c) What aspects do these reports cover? (Check one or more boxes)	Technical (engineering)	<input checked="" type="checkbox"/>
	Technical (water quality)	<input checked="" type="checkbox"/>
	Management	<input checked="" type="checkbox"/>
	Financial	<input checked="" type="checkbox"/>
	Other (specify)	<input checked="" type="checkbox"/>

9. External assistance received for community water supply

Please express below the total assistance received (in equivalent thousands of US Dollars) by your country over the five years 1966-1970 for community water supply, from various international, multilateral and bilateral sources as loans, grants, material or other forms.

Assistance expressed in equivalent thousands of US Dollars over the five years, 1966 - 1970.

Loans	<input type="text"/>
Grants	<input type="text"/>
Material	<input type="text" value="25"/>
Other (specify below)	<input type="text"/>

10. Unit Data

(a) Present consumption

Considering existing supplies, how much water does a person receive per day? If specific studies have been carried out, results should be given. If not, best calculated estimates (allowing for leaks and waste) will suffice. It is realized that there may be a range of figures depending on size and type of community. Please give the minimum and maximum of the

range for each category in the first two boxes and the unit (e.g., litres, Imp. gallons, US gallons) in the last box.

	(min.)		(max.)	(units)	
Urban water supplies, house connections	from	<input type="text" value="15"/>	to	<input type="text" value="25"/>	<input type="text" value="GPCD"/>
Urban water supplies, street fountains	from	<input type="text" value="10"/>	to	<input type="text" value="15"/>	<input type="text" value="GPCD"/>
Rural supplies	from	<input type="text" value="10"/>	to	<input type="text" value="15"/>	<input type="text" value="GPCD"/>

(b) Future consumption

What are design provisions? The same-type of information as in Question 10(a) is required, except that this question relates to design figures adopted for new water supplies.

	(min.)		(max.)	(units)	
Urban water supplies, house connections	from	<input type="text" value="25"/>	to	<input type="text" value="50"/>	<input type="text" value="GPCD"/>
Urban water supplies, street fountains	from	<input type="text" value="15"/>	to	<input type="text" value="25"/>	<input type="text" value="GPCD"/>
Rural supplies	from	<input type="text" value="15"/>	to	<input type="text" value="25"/>	<input type="text" value="GPCD"/>

(c) Estimating on a national scale, what is the approximate cost (in equivalent US Dollars) per person supplied of constructing

Urban water supplies, house connections (not including cost of house connection itself)	<input type="text" value="\$ 10"/>
Urban water supplies, street fountains	<input type="text" value="\$ 10"/>
Rural supplies	<input type="text" value="\$ 15"/>

(d) Approximately what proportion of cost of construction represents cost of materials which have to be imported?	Urban supplies	<input type="text" value="30"/>	<input style="width: 20px;" type="text" value="%"/>
	Rural supplies	<input type="text" value="25"/>	<input style="width: 20px;" type="text" value="%"/>
	Countrywide, urban and rural taken together	<input type="text" value="25"/>	<input style="width: 20px;" type="text" value="%"/>

11. Long-term programme

(a) Does your country have a long-term programme for community water supplies Yes

No

(b) If answer to 11(a) is "Yes", over how many years does it extend? Years

(c) What is the target time schedule for urban and rural supplies in terms of numbers of additional people to be supplied during "Plan Period" indicated in table.

Plan Period		Planned Targets (Additional people to be supplied)	
from (date)	to (date)	urban supplies	rural supplies

(d) Please attach a copy of the Long-term programme if possible Yes

Copy attached No

(e) What are the criteria for priorities in providing new supplies?

Health, Economics

12. Training

To carry out the national programme of water supplies, what are the additional numbers of trained staff that will be required over the next five years to undertake planning, design, construction, maintenance, operation and management in the various classes? Indicate also whether present national training facilities are adequate for training the numbers required in each category of staff.

	Col. 1	Col. 2	Col. 3	
	Categories of personnel by function	Additional numbers required over the five years 1972-76	Existing training facilities adequate to train the numbers indicated in Col. 2	
			Yes	No
(a)	Managers	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(b)	Financial personnel	4	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(c)	Engineers	20	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(d)	Chemists/Biologists	5	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Col.1		Col.2	Col.3	
			Yes	No
(e)	Other professionals	10	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(f)	Sub-professionals	10	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(g)	Drillers	20	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(h)	Supervisors	75	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(i)	Specialized artisans	100	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(j)	Special clerical	100	<input type="checkbox"/>	<input checked="" type="checkbox"/>

13. Research and Development

(a) List, in order of priority, not more than five items on which basic or applied research is needed to speed up progress in community water supplies in your country.

(i) Drilling

(ii) Treatment

(iii) Construction methods

(iv) Materials

(v) Social financing

(b) What is your country's capacity to undertake such research? must depend entirely on external help for the moment

can undertake, with some external help

can undertake entirely by ourselves

can manage ourselves; can also assist other countries

14. Constraints

Please arrange the constraints given below in descending order of importance by giving numbers 1, 2, 3, in the box opposite each, considering the influence of each constraint in attaining the national community water supply objectives. For constraint factors not mentioned, please write into additional space provided at the bottom.

internal finance insufficient	1
external assistance insufficient	4
insufficient local production of materials	3
inappropriate administrative framework	5
inappropriate financial framework	6
inadequate or outmoded legal framework	7
lack of trained personnel	2
others (specify)	

Source: Submitted by Government.

ANNUAL NATIONAL DATA
COMMUNITY WATER SUPPLY AND SEWAGE DISPOSAL

Reporting Year::1971 and 1972

Date of report
February 1974(all population in thousands)
31 Dec. 1971 31 Dec. 1972

1.	<u>Estimated country population</u>		
	Urban	434	444
	Rural	10 899	11 111
	Total	11 333	11 555
2.	<u>Additional population supplied with water</u>		
	(a) Additional urban population supplied by house connexions	X	X
	(b) Additional urban population without house connexions but with reasonable access to public supplies	8	13
	(c) Additional rural population having reasonable access to safe water	18	32
3.	<u>Population supplied with water</u>		
	(a) Urban population supplied by house connexions	120	120
	(b) Urban population without house connexions but with reasonable access to public supplies	235	248
	(c) Rural population having reasonable access to safe water	285	317
4.	<u>Additional population served with sewerage disposal facilities</u>		
	(a) Additional urban population connected to public sewerage systems	X	X
	(b) Additional urban population connected to household systems such as septic tanks, seepage pits or using pit privies	3	3

(all population in thousands)

31 Dec. 1971 31 Dec. 1972

(c) Additional urban population using conservancy (bucket) system	X	X
(d) Additional rural population with adequate disposal such as pit privies or to septic tanks	X	X
5. <u>Population served by sewerage disposal facilities</u>		
(a) Urban population connected to public sewerage systems	50	50
(b) Urban population connected to household systems such as septic tanks, seepage pits or using pit privies	8	11
(c) Urban population using conservancy (bucket) system	10	10
(d) Rural population with adequate disposal facilities such as pit privies or to septic tanks	X	X

6. Total annual investment including external and national capital, material and labour for construction, extension and improvement of community water supply and sewage disposal facilities in:

1971

Type of investment	Investment (in thousands of US dollars)					
	Community water supply			Sewerage disposal		
	Urban	Rural	Total	Urban	Rural	Total
(a) External assistance:						
loans	X	X	X	X	X	X
grants	130	10	140	X	X	X
materials	X	7	7	X	X	X
other (specify below under "Note")						
(b) National capital:						
matching	X	831	831	X	X	X
other						
Total	130	938	978	X	X	X

1972

Type of investment	Investment (in thousands of US dollars)					
	Community water supply			Sewerage disposal		
	Urban	Rural	Total	Urban	Rural	Total
(a) External assistance:						
loans	X	X	X	X	X	X
grants	X	X	X	X	X	X
materials	X	25	25	X	X	X
other (specify below under "Note")						
(b) National capital:						
matching	202	227	429	X	X	X
Other						
Total	202	252	454	X	X	X

Source: Submitted by Government.