(5) Administration and Organization of Water Supply

In Nepal, administration for public water supply sector is carried out by the three agencies.

They are:

1) WSSC:Water Supply and Sewerage Corporation,
Ministry of Housing and Physical Planning.

2) DWSS: Department of Water Supply and Sewerage,
Ministry of Housing and Physical Planning.

3) MPLD: Ministry of Panchayat and Local Development.

Among the aboves, WSSC presently manages water supply systems of Town Panchayat which have a population of more than 10,000 people. Its operating objectives include full cost recovery.

DWSS normally assumes the responsibility for the implementation of water supply and sanitation projects in communities having a population greater than 1,500. The basic policy is to turn over these schemes to the local village operator trained for this purpose. For various reason, however, this policy is frequently not followed, but will be given further emphasis under the provisions of the Decentralization Act (1982) and the Decentralization Rules (1984). (See Fig. F.5)

MPLD implements schemes in small communities of less than 1,500 population and in close consultation with the District/Village Panchayats. The basic policy is that schemes are implemented with beneficiary labor contribution during construction and that the beneficiaries assume responsibility for operation and maintenance.

1.2 Necessity of Development

Naturally, water for domestic purpose is essential for human daily life. The public water supply system has two major functions. The first one is for human health and the second for convenience on daily life. The Government of Nepal recognizes that water supply is one of basic human needs and plans that the public water supply systems cover all over the country by the year 2000. At present, leaving urban area out of the question, public water

supply systems in the rural area covers a comparatively low rate of 30%-40% of rural population. It seems relatively hard to develop the water supply systems all over the country completely in a short period; however, it is necessary to strive for further development of the public water supply systems step by step and steadily.

It is a matter of common knowledge that completion of public water supply systems contributes remarkably to disease control, especially, decrease of water-borne diseases. Besides, in the hill area in Nepal (Gulmi District and Arghakhanchi District in the project area), the distance from water source is very far in most cases and drawing water (water drawers are mainly women and children) requires considerable labor force and time. The development of water supply systems brings improvement in health and releases burden of drawing water and so on: great convenience for inhabitants.

In the project area, a rate of water supply coverage at Kapilvastu District is very low at 9% in 1989, therefore, further development of public water supply systems is urgently required. This area has groundwater and the water source is deep groundwater to be taken through deep wells; and it is to be pumped up to overhead tanks by submersible pumps. As to water distribution, pipeline system is considered suitable in this area, since topography is so flat that technical difficulty for water supply is few. In hill areas of Gulmi District and Arghakhanchi District, the water source is spring water or small stream that is hardly polluted with inhabitants and livestock. In the master plan, development of the above systems will be programmed in areas where the systems have not been existing. However, it seems in such areas that there are disadvantages in distance from water sources, the yield from water sources, and population density. It will result in higher costs for construction and maintenance. Nevertheless, construction of new water supply systems is urgently needed in villages which have no existing systems.

Note:

As a result of the field reconnaissance at Marchawar Area in Rupandehi District, the drinking water supply facilities using semi-deep wells (60 m - 30 m) have been constructed at many places in Marchawar by the Nepal Red Cross Society. Though they have no pipeline systems, it can be recognized that facilities useful to supply safe water. The population covered by the well is around 100-200 per well. To date, 212 numbers of wells were constructed. For future, the Nepal Red Cross Society plans to proceed well construction in this area under approval of the local agencies of DWSS and MPLD. Accordingly, the future development plan of water supply in Marchawar Area could be left to the Nepal Red Cross Society as well as current situation, and could be excluded from this

project. The year-end charity drive with the support of the Japan Broadcasting Corporation (NHK) has contributed construction costs of wells to the Nepal Red Cross Society through the Japan Red Cross Society.

1.3 Constraints for Development

In rural areas in Nepal, including the project area, development of public water supply systems has not been progressed well. Main reasons for it are considered as follows:

- Lack of sufficient technical manpower for implementing the projects.
- Lack of financial resources including construction costs and operation and maintenance cost.
- Lack of construction material resources.
- Problem of transportation of materials and machines to the hill areas due to lack of access roads.

Other constraints prior to project implementation are:

- Insufficiency of basic data for planning such as fundamental Panchayat data, location of available water sources, population distribution, topographical maps, etc..
- Insufficiency of basic planning on yield and quality of water sources, field reconnaissance, topographical survey, etc., due to lack of engineers.

In order to resolve above constraints and problems, the Government of Nepal will take the following countermeasures:

- Provision of project cost including construction costs (ex. from international lending agencies).
- Strengthening of collection of water charge (ex. collection from consumers using public water taps).
- Rehabilitation or construction of access roads.
- Strengthening of staffs and their roles.
- Promotion of beneficiaries' contribution to construction work.
- Completeness of field investigation and analysis on villages and wards, population, livestock, present water use, water demand, topography, land area, ground elevations, distances, water sources and their yield and quality, geology, public utilities, roads, pipelines' routes, etc..

- Preparation of villages' base maps with scale of 1/25,000 - 1/10,000 as well as 1/50,000.

2. DEVELOPMENT PLAN OF WATER SUPPLY SYSTEMS

2.1 Target

The final goal of the public water supply sector is to develop fully piped water supply systems to all over Nepal. The government has a plan to materialize it by the year 2000. In 1990, the final year of the Seventh Plan, the rate of water supply coverage is to become 67%. In 1988/89 in the project area, however, the actual rates were relatively low at 35% in Gulmi, 35% in Arghakhanchi and 9% in Kapilvastu; 23% in average. Hence, the target rate in the project area by the year 2005 shall be practically planned taking into the following consideration:

- Increase rate of the development will be 2-4% per annum.
- Population to be additionally supplied by public water systems will be around 10 thousands per annum in each district.
- For the time being, new construction of the systems will be emphasized on villages which have no existing systems.
- The systems should meet future water demand to be increased in proportion to population increase.
- The rate of the coverage in Kapilvastu District showing the lowest rate presently should be increased to same rates as other districts by the year 2005.

Considering aboves, the target of the master plan for the water supply will be planned at 80% of the water supply coverage by 2005.

2.2 General Planing

(1) Water Source

As well as the current situation, water sources in the future will be small streams and springs in the hill area and groundwater in the Terai area.

Additional development of surface water such as streams and springs will be physically difficult in the project area; hence natural water, as it is, will be taken. Accordingly it will become more important to certainly keep water sources and water rights and to conserve natural environment of the sources.

In the case of groundwater, deeply-confined groundwater is preferably recommended from viewpoints both of quality and quantity; and deep tubewells will be constructed for the groundwater collection.

(2) Water Quality

Water quality is to be complied with the Drinking Water Standards of WHO in principle. Water to be proposed by the project, however, will not necessarily meet the above standards, but will be of good quality locally available.

Currently in rural areas in the country, even surface water is supplied to consumers without particular treatment. Chlorination has also not been practiced. Such situation is reluctantly recognized taking into consideration present local conditions of technology, facilities and maintenance cost. This will be continued even in the near future. The master plan, therefore, will also propose no treatment method. In such case, water should be boiled before drinking from a viewpoint of human health.

The conclusion is that the first consideration for planning of new water supply systems is to be placed on selection of location and verification of water sources in the hill area, even if they are located distantly.

(3) Population to be Served and Water Demand

In the frame of the master plan study, water supply systems, either new or existing, will be planned or expanded in order to accommodate the water demand in year 2005, which will increase according to population increase.

Regarding per capita consumption, the followings will be employed based on the guideline of DWSS.

- For public taps : 45 liter/day
- For private taps : 65 "

Number of private taps installed is very small at present, except in the case of large towns, and most of people are using public taps. Private taps will be increased in number according to raise of the living standard of people; final status will be installation of private taps in all houses. In the master plan, 25% of houses is planned to be supplied by private taps, and 75% by public taps.

In addition to the above domestic use, water for livestock (20-30 liter per head), for schools (10 liter per pupil), for health post (2,500 liter each), and for buildings of office and tea houses (500 liter each) will be counted. Furthermore, loss of wastage and leakage will be added by about 20% of total demand.

2.3 System of Water Supply

The system of water supply for the master plan will be similar to the current practice. However, number of water taps will be increased to large extent. The current design criteria of DWSS suggest that population to use a public tap be about 200; however, it has been giving consumers inconvenience. Population will become 50-80 per public tap in the future in order to provide more convenience. Private taps will also be increased in number.

The water supply systems for the near future in the project area will be summarized as follows, by classification of gravity flow and groundwater pumping-up system.

Water Supply Systems for the Master Plan

Area	Hill Area	Terai Area
District	Gulmi and Arghakhanchi	Kapilvastu
Water source	Small streams and springs	Deep ground-water
Intake facility	Intake chamber	Deep well and pump
Supply system	Gravity flow (Power not needed)	Pumping up (Power required)
Population served	Several hundreds to several thousands	Several thousands to ten thousands
Transmission	Long pipeline by gravity	Short pipelines pressurized
Storage	Ground-level reservoir	Overhead tank
Distribution	Pipelines	Pipelines
Service	Public taps and private taps	Public taps and private taps

2.4 Master Plan

The master plan for water supply, the target year of which is 2005, is summarized in the following table.

Summary of Master Plan for Water Supply

	District	Gulmi	Arghakhanchi	Kapilvastu	Total
Present Status (Year:1988/1989)					
(1)	Number of village	79	41	79	199
(2)	Total population	267,900	177,000	379,800	824,700
(3)	Served population	94,800	62,300	34,900	192,000
(4)	Rate of coverage	35.4 %	35.2 %	9.2 %	23.3 %
(5)	Quantity (m^3/day)	5,690	3,740	2,090	11,520
(6)	Water source	Spring and stream	Spring and stream	Deep ground water	
Master Plan (Year:2005)					
(7)	Total population	284,100	207,700	438,000	929,800
(8)	Rate of coverage	80 %	80 %	80 %	80 %
(9)	Population to be served	27,300	166,200	350,400	743,900
(10)	Quantity (m^3/day)	17,050	12,470	26,280	55,800
(11)	Additional population to be served	132,500	103,000	315,500	551,900
(12)	Additional development quantity (m^3/day)	11,360	8,730	24,190	44,280
(13)	New facilities	Piped public system	Piped public system	Piped public system	
(14)	Water source	Spring and stream	Spring and stream	Deep ground water	
(15)	Intake facility	Chamber	Chamber	Deep well	
(16)	Water transmission	Gravity flow	Gravity flow	By pumping	
(17)	Reservoir	Ground-level tank	Ground-level tank	Overhead tank	
(18)	Distribution	Pipelines	Pipelines	Pipelines	
(19)	Water taps	Public and private taps	Public and private taps	Public and private taps	
(20)	Development cost	Rs. 186 mil.	Rs. 125 mil.	Rs. 284 mil.	Rs. 595 mil.
(21)	Per capita cost	Rs. 1,400	Rs. 1,200	Rs. 900	Rs. 1,080

Note: (4) = (3) / (2), (5) = (3) x 60 liter/day, (9) = (7) x (8), (10) = (9) x 75 liter/day, (11) = (9) - (3), (12) = (10) - (5), (20) = (11) x (21)

Its outline is as follows:

1) Development and extension of water supply systems in villages in the project area should be promoted, targeting 80% of a rate of the coverage.

2) Water sources will be small streams and springs in the hill area, and deep groundwater in the Terai area.

3) Total present population in the three districts is 824,700. Among them, 192,000 people (23.3%) have been supplied. In the future (year 2005), total population will be 929,800 and 80% (743,900) of it will be supplied.

4) Accordingly, population to be additionally supplied will be 551,900 by the year 2005. This will be about three times of the present served population.

5) Water quantity to be newly developed will be about 44,000 m^3/day.

2.5 Cost Estimate and Implementation Schedule

(1) Construction Cost

Construction cost for the above master plan for water supply systems was estimated based on the data of per capita cost, the basic index of water supply sector in Nepal. It is variable from place to place, taking into consideration of topography of the place (hill or flat land), accessibility of the place from main roads, easiness of water source availability, etc.. The per capita cost employed in the estimation was Rs. 1,400- at the highest in Gulmi District and Rs. 900- at the lowest in Kapilvastu District. Total project cost is summarized in the following table.

Project Cost of Water Supply Systems
(By the year: 2005)

District	Per capita cost	Additional population to be served	Construction cost
1) Gulmi	Rs. 1,400-	132,500	Rs. 186 mil.
2) Arghakhanchi	Rs. 1,200-	103,000	Rs. 125 mil.
3) Kapilvastu	Rs. 900-	315,500	Rs. 284 mil.
Total	Rs. 1,080-	551,900	Rs. 595 mil.

The construction cost of the water supply systems (target year: 2005) will be Rs. 595 millions (Rs. 1,080- per capita).

(2) Implementation Schedule

The water supply systems planned in the above are to be constructed or expanded every year continuously till year 2005 with constant annual budget to be distributed to all districts in the project area.

The executing agency of the project will be DWSS, the Ministry of Housing and Physical Planning (See Fig. F.5). It has District Engineer Offices in the headquarters of each district. The offices will be in charge of the implementation of the project under direction of the Ministry. Almost all of the construction materials are locally available, and the budget for construction work of the systems, including supply of materials will be prepared by DWSS, with the Nepal's national budget. In addition to the national budget, however, it is advisable to borrow some portion of the budget from the international lending agencies, in order to promote the stable project implementation.

Operation and maintenance, after completion of the systems, will be carried out by DWSS through the District Engineers Office, in the case of groundwater pumping-up systems in Kapilvastu District, Terai. In the case of gravity flow systems in Gulmi and Arghakhanchi Districts, the hill area, water supply systems will be maintained by "Users Committee" of village peoples, under assistance and direction of DWSS.

Although construction cost of the water supply facilities will be borne by the national budget, it is recommended that costs for operation and maintenance will be paid by beneficiaries in the future, by collection of water tariff from beneficiaries.

(3) Operation and Maintenance Cost

Operation and maintenance cost for the systems to be newly constructed, in the whole project area is calculated in the following table.

As shown in the table, the cost of operation and maintenance consists of personnel cost, repair cost and power cost. At the final year 2005, total operation and maintenance cost will be Rs. 31.7 million annually, to be recovered from beneficiaries.

Operation and Maintenance Cost
(at 1989 price level)

Item \ Year	1990	1991	1992	1993	1994
(1) Personnel cost(*1)					
Number of additional staff	15	20	25	30	45
Personnel cost (Rs.x1,000)	324	432	540	648	756
(2) Repair cost(*2)					
Investment cost accumulated (Rs. million)	36.5	84.0	120.5	157.0	193.5
Repair cost (Rs.x1,000)	730	1,680	2,410	3,140	3,870
(3) Power cost(*3)					
Groundwater quantity (m3/day)	1,450	2,350	3,910	5,470	7,030
" (1,000m3/year)	529	858	1,427	1,997	2,565
Power cost (Rs.x1,000)	794	1,287	2,141	2,996	3,848
Total cost (Rs.x1,000)	1,848	3,399	5,091	6,784	8,474

Item \ Year	1995	1996	1997	1998	1999
(1) Personnel cost(*1)					
Number of additional staff	40	45	50	55	60
Personnel cost (Rs.x1,000)	864	972	1,080	1,188	1,296
(2) Repair cost(*2)					
Investment cost accumulated (Rs. million)	230.	266.5	303.0	339.5	376.0
Repair cost (Rs.x1,000)	4,600	5,330	6,060	6,790	7,520
(3) Power cost(*3)					
Groundwater quantity (m3/day)	8,590	10,150	11,710	13,270	14,830
" (1,000m3/year)	3,135	3,704	4,274	4,844	5,413
Power cost (Rs.x1,000)	4,703	5,556	6,411	7,266	8,120
Total cost (Rs.x1,000)	10,167	11,858	13,551	15,244	16,936

Item \ Year	2000	2001	2002	2003	2004
(1) Personnel cost(*1)					
Number of additional staff	65	70	75	80	85
Personnel cost (Rs.x1,000)	1,404	1,512	1,620	1,728	1,836
(2) Repair cost(*2)					
Investment cost accumulated (Rs. million)	449.0	485.5	522.0	558.5	595.0
Repair cost (Rs.x1,000)	8,250	8,980	9,710	10,440	11,170
(3) Power cost(*3)					
Groundwaterquantity (m3/day)	16,390	17,950	19,510	21,070	22,630
" (1,000m3/year)	5,982	6,552	7,121	7,691	8,260
Power cost (Rs.x1,000)	8,973	9,828	10,682	11,537	16,755
Total cost (Rs.x1,000)	18,627	20,320	22,012	23,705	29,761

Item	Year	2005	Total(1990-2005)
(1) Personnel cost(*1)			
Number of additional staff		90	90
Personnel cost (Rs.x1,000)		1,944	18,144
(2) Repair cost(*2)			
Investment cost accumulated(Rs. million)		595.0	595.0
Repair cost (Rs.x1,000)		11,900	102,580
(3) Power cost(*3)			
Groundwater quantity(m3/day)		24,190	
"	(1,000m3/year)	8,829	73,181
Power cost (Rs.x1,000)		17,850	118,747
Total cost (Rs.x1,000)		31,694	239,471

Note: (*1): Personnel cost = Rs. 1,800-/month/capita = Rs,21,600-/year/capita
(*2): Repair cost = 2 % per annum of investment cost
(*3): Power cost = Rs. 1.50/m3

3. PRE-FEASIBILITY STUDY

3.1 Criteria for Selection

As a result of the field survey and from an exchange of views with officials in charge, the water supply projects described hereinafter were identified with these of a higher priority to be immediately implemented.

In order to identify the priority projects, the following criteria were used:

- The project area should be densely populated and have currently little or no supply of safe water.
- A water source should already be available or have a higher potential for development.
- The project should be implemented and operated by the responsibility of DWSS (The Department of Water Supply and Sewerage, under the Ministry of Housing and Physical Planning). (See Fig. F.5)

3.2 Banganga Water Supply Project

This was proposed to be taken up as the first priority project to be immediately implemented. The outline of the project is given hereinafter:

(1) Subject of the Project

The project aims to construct a new public piped water supply system in Banganga Village which does not have an existing system.

(2) Location

Location of the project is in Banganga Village Panchayat and Gajeda Village Panchayat in Kapilvastu District, vicinity of a crossing point of the Banganga River and the East-West Highway; the left bank side of the Banganga River. (See Fig. F.1)

The proposed project area has the following justification in addition to the above-mentioned criteria for selection for immediate implementation:

- The area is easily accessible by vehicles throughout the year by way of the East-West Highway; it will facilitate transportation of materials and construction work.
- The area is topographically almost flat and land has gentle gradients from north toward south, making the condition for water supply simple.
- According to the hydrogeological survey results, this area has high potential for deep groundwater development.
- The area has an emergency source of the River Banganga from which water can be supplied by gravity flow in case of pumps/power failure, though its water is not always potable.
- The area is located in Kapilvastu District which has the lowest percentage of water supply coverage in the Lumbini Zone. The project will contribute to increase the rate of the water supply coverage in the district.
- Electrification in the area is expected in the near future, to facilitate operation of pumps.

(3) Population to be Served

Total population in the project area, the whole of Banganga Panchayat and a part of Gajeda Panchayat, is 8,600 in 1988, and it is forecasted to be about 11,900 in 2005, target year. All of them are to be planned for supply.

Population Forecast
(Banganga Water Supply)

No.	Name of Ward	Survey 1988	Estimation 1990	Estimation 2005
1	(1) Pipara	1,157	1,210	1,600
2	(2) Baijarpur & Gobadia	890	930	1,230
3	(3) Bisanpura	385	400	530
4	(4) Tenua	620	650	860
5	(5) Lakhanpara & Kaktaiya	390	410	540
6	(6) Rajpur & Nandanagar	825	860	1,140
7	(7) Jitpur & Bunchi	666	700	930
8	(8) Nibuwa & Banpur	1,123	1,180	1,570
9	(9) Bairiya & Uktaha	1,052	1,100	1,460
10	Dhankauli, Jhunga,	1,500	1,560	2,040
	Total	8,608	9,000	11,900

Note: Population growth rate = 2.3% per annum till year 1990, and 1.9% thereafter.

(4) Water Demand

The water demand in 2005 will be 900 m^3/day, totaling demands for domestic use, livestock, institutions and of leakage.

Total Water Demand (Year:2005)

(Banganga Water Supply)

Category	Water Demand
- Domestic	596 m^3/day
- Livestock	75 m^3/day
- Institutions	42 m^3/day
Sub total	713 m^3/day
- Leakage and wastage (25%)	178 m^3/day
Total demand	891 m^3/day → 900 m^3/day

Water Demand for Domestic Use

(Banganga Water Supply)

(1)	Population to be served (in 2005)	=	11,900
(2)	Population served by public taps	=	(1) x 75% = 8,925
(3)	Per capita consumption of public taps	=	45 liter/d
(4)	Water demand for public taps	=	(2) x (3) = 402 m^3/day
(5)	Population served by private taps	=	(1) x 25% = 2,925
(6)	Per capita consumption of private taps	=	65 liter/d
(7)	Water demand for private taps = (5) x (6)	=	194 m^3/day
(8)	Total demand for domestic use = (4) + (7)	=	596 m^3/day

Water Demand for Livestock

(Banganga Water Supply)

	Livestock	Cattle	Goat	Poultry
(1)	Number (in 1988)	6,160	4,599	7,500
(2)	Dependent on public water supply system	20%	20%	100%
(3)	Specific water demand (lpcd)	45 liter	20 liter	0.2 liter
(4)	Water demand = (1) x (2) x (3)	55 m^3/d	18 m^3/d	2 m^3/d
	Total demand for livestock = 75 m^3/day			

Note: To suppose that number of livestock would not be increased in the future.

Water Demand for Institutions

(Banganga Water Supply)

(1)	Primary school	=	(200 + 450 + 400) pupils x 10 liter/d
		=	11 m^3/d
(2)	High school	=	900 students x 10 liter/d
		=	9 m^3/d
(3)	"	=	90 boarders x 65 liter/d
		=	6 m^3/d
(4)	Police station, post office, forest office and Panchayat office		
		=	4 m^3/d
(5)	Total demand (in 1988)	=	30 m^3/day
(6)	Total demand in 2005	=	42 m^3/day (*)

Note: (*) = To be increased in proportion to population increase.

(5) *Water Source*

According to the hydrogeological survey, this area has high potential for development of groundwater deeply confined. The water will be taken by way of deep tubewells, about 200 m in depth, with power-driven submersible pumps.

Two deep wells are proposed to be constructed (one for routine operation and another for standby in a water station yard, equipped with one submersible pump each).

Capacity of the pump is as below:

- Number of the pump : Two (one for each well)
- Type : Submersible pump
- Operation hours : 16 hours a day
- Discharge : Q = 900 m^3/16 hrs. = 0.94 m^3/min = 15.6 liter/sec
- Diameter : 100 mm
- Velocity : 2.0 m/sec
- Head : H = 80 m
- Power required : Pm = 0.163 x (QH/e) x alpha
  = 0.163 x 0.94 x 80 x (1/0.67) x 1.30
  = 23.8 kw → 25 kw
- Power source : Generator (50 KVA)

(6) Distribution System

The groundwater will be first pumped up to an overhead tank (25 m high from the ground level) to be located nearby the deep tubewells; and then distributed to consumers through distribution pipelines.

Diameters of the distribution pipelines were designed based on hydraulic calculation (Refer to Table F.3, for detail), and summarized in the following table with distances.

List of Distribution Pipelines

(Banganga Water Supply)

Diameter (I.D.)	Total Distance
250 mm	100 m
200 mm	850 m
150 mm	10,700 m
100 mm	4,960 m
75 mm	5,070 m
50 mm	2,980 m
40 mm	3,440 m
Sub Total	28,100 m
30 mm	2,000 m
25 mm	2,000 m
Total	32,100 m

Conditions given for the hydraulic calculation are as follows:

- Supply reservoir : Overhead tank (H = 25 m),
  High water level (HWL) = +176.52 m
  Low water level (LWL) = +173.52 m
  Effective depth = 3.00 m
- Daily supply capacity = 900 m^3/day (10.4 l/sec)
- Number of service taps = 88 places x 2 taps each = 176 taps
- Design flow = 0.225 l/sec/tap
- Total peak flow = 0.225 x 176 = 39.6 l/sec
- Peak factor = 39.6/10.4 = 3.8 (380%)
- Residual head = more than 10 meters on pipelines
- Formula applied : Hazen-Williams' formula
  (Coefficient of velocity : C = 110)

(7) Main Facilities

Main facilities to be constructed for the Banganga Water Supply Project are summarized below:

List of Main Facilities
(Banganga Water Supply)

Facility	Capacity	Nos.
- Deep well	200 m deep	2 (one standby)
- Submersible pump	0.94 m^3/min x 80 m	2 (one standby)
- Generator	50 kVA	1
- Overhead tank	V=450 m^3, H=25 m	1
- Pipelines	250 mm - 25 mm	32,100 m
- Water taps	Public/private	188 Nos.
- Emergency water source (River intake)		1

(8) Executing Agency

The executing agency of the project will be DWSS, the Ministry of Housing and Physical Planning (See Fig. F.5). It has a District Engineer Office in Krishnanagar, Kapilvastu District. The office will be in charge of the implementation of the project under direction of the Ministry. The office is to organize a project team for project implementation; some of the team members are to be assigned from the Ministry. Operation and maintenance of the project, after completion, will be carried out by DWSS through the District Engineer Office together with the O & M of the existing water supply systems in other areas.

3.3 Hill Area Scheme

The second priority projects will be distributed in the hill area. The components for the project are proposed as following:

- Supply of pipe materials for Gulmi District, and
- Supply of pipe materials for Arghakhanchi District.

The pipe length totaled 42,000 m is preliminarily proposed by each diameter as given below:

List of Pipes to be Supplied

(for the hill area)

Diameter (O.D.)	Proposed Length
160 mm	1,680 m
140 mm	2,100 m
110 mm	2,100 m
90 mm	3,360 m
75 mm	4,200 m
63 mm	4,200 m
50 mm	5,460 m
40 mm	5,880 m
32 mm	6,720 m
25 mm	4,200 m
20 mm	2,100 m
Total	42,000 m

3.4 Project Cost and Implementation Schedule

(1) Project Cost

The project cost for the priority projects is estimated in total at Rs. 47.5 millions, equivalent to US$. 1,695,000-. It consists of construction cost for Banganga Water Supply Project and procurement cost of pipe materials for the hill area. (For detail, see Table F.4).

Project Cost

(Priority Projects, Water Supply)

Project		Implementation Cost
1) Banganga water supply	:	Rs. 40,768,000- (=US$ 1,456,000-)
2) Hill area scheme	:	Rs. 6,705,000- (US$ 239,000-)
Total Project Cost	:	Rs. 47,473,000- (US$ 1,695,000-)
Broken-down into:		
- Foreign currency portion	:	Rs. 28.5 millions (=US$ 1,017,000-)
and		
- Local currency portion	:	Rs. 19.0 millions (=US$ 678,000-)

(2) Implementation Schedule

The above project will be implemented in the following schedule:

1)	Field reconnaissance and topographical survey	: 1 months
2)	Detail design and preparation of tender documents	: 3 months
3)	Appraisal of the governments and tender call	: 2 months
4)	Tender evaluation and contract of construction work	: 1 month
5)	Manufacturing and shipping of materials	: 5 months
6)	Construction work	: 7 months
7)	Test run	: 1 month
	Total	: 20 months

It will require 20 months in total, including design period. (For detail, see Fig. F.4).

(3) Operation and Maintenance Cost

In the case of Banganga Water Supply System, groundwater pumping-up system, cost for operation and maintenance is tentatively calculated as given below:

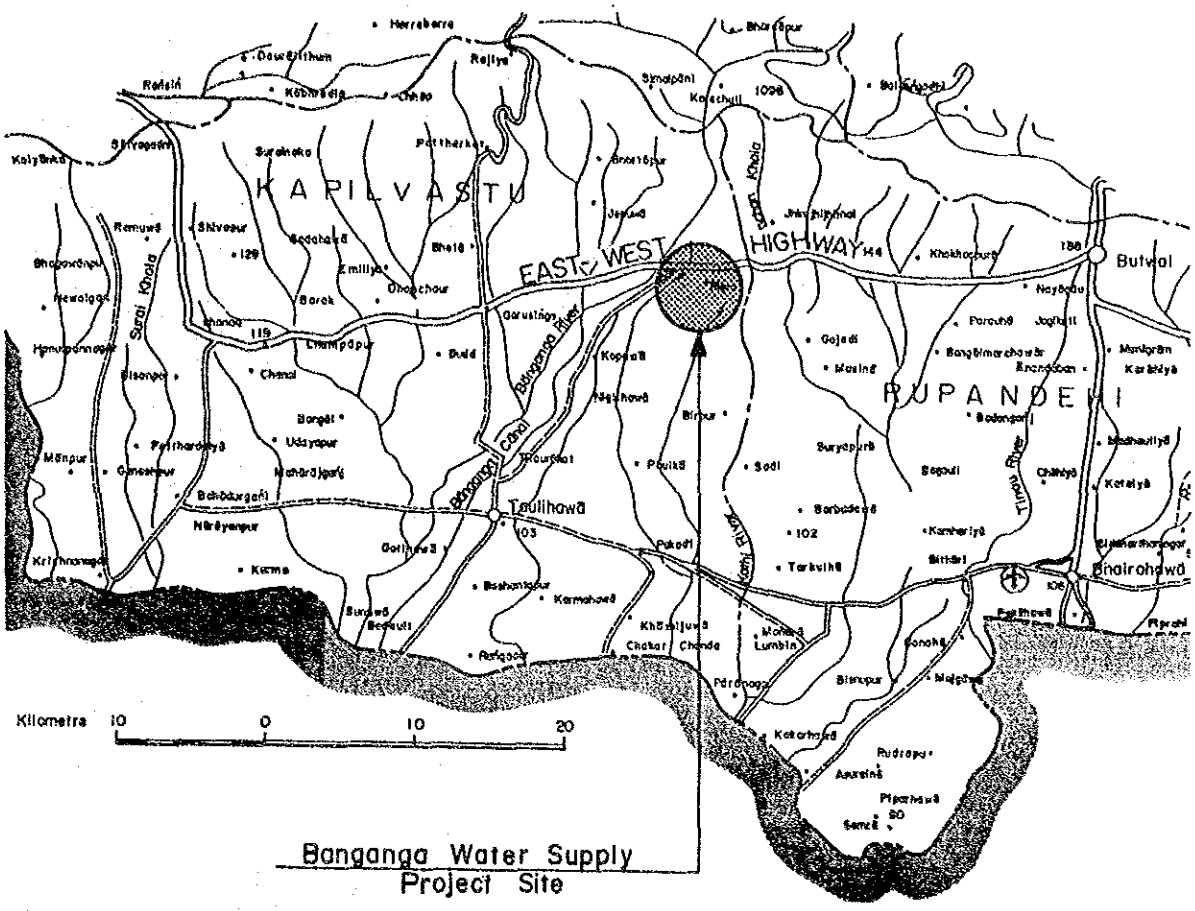
Annual Cost for Operation and Maintenance
(Banganga Water Supply System)

(1) Personnel cost(*1)	
Number of additional staff	2
Personnel cost (Rs.x1,000)	43.2
(2) Repair cost(*2)	
Investment cost (Rs.x1,000)	40,768
Repair cost (Rs.x1,000)	815
(3) Power cost(*3)	
Groundwater quantity (m3/day)	900
" (1,000m3/year)	328.5
Power cost (Rs.x1,000)	493
Total cost (Rs.x1,000)	1,351.2
Water cost of 1 m3 = 1,351.2/328.5 = Rs. 4.10-	

Note: (*1): Personnel cost = Rs. 1,800-/month/capita
= Rs, 21,600-/year/capita
(*2): Repair cost = 2 % per annum of investment cost
(*3): Power cost = Rs. 1.50/m3

The cost for operation and maintenance will be Rs. 1,351,200- annually; and cost of water to be supplied will be Rs. 4.10 per cubic meter.

FIGURES



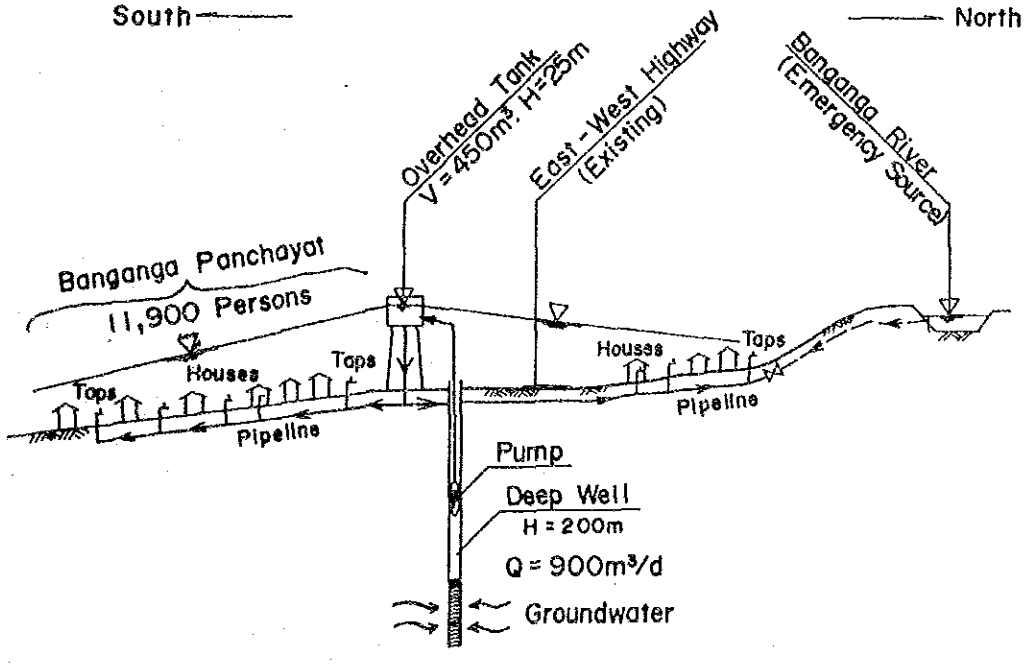


Fig. F.1 Banganga Water Supply System Schematic

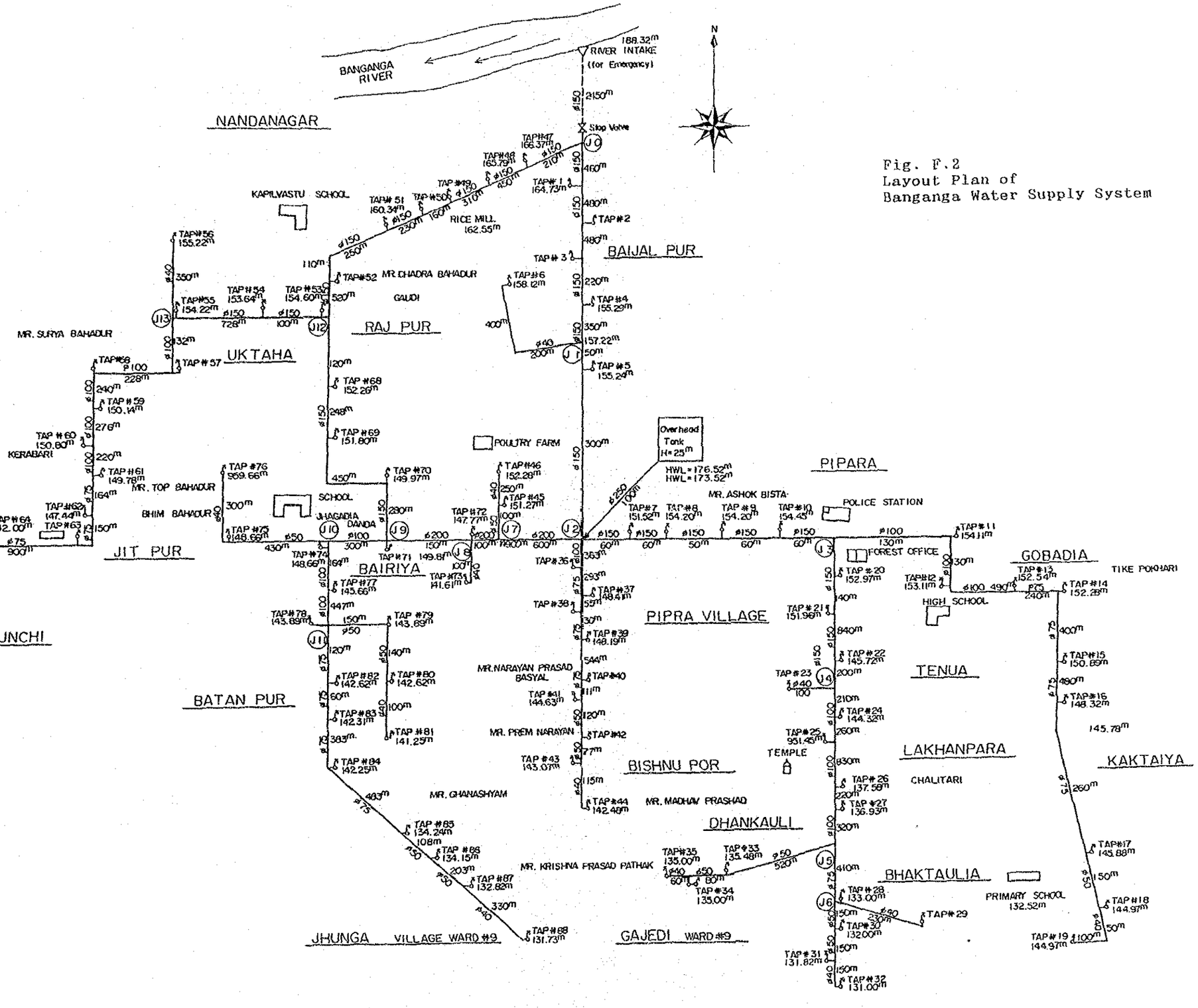


Fig. F.2
Layout Plan of
Banganga Water Supply System

Fig. F.3 Proposed Well Structure
(Banganga Water Supply)

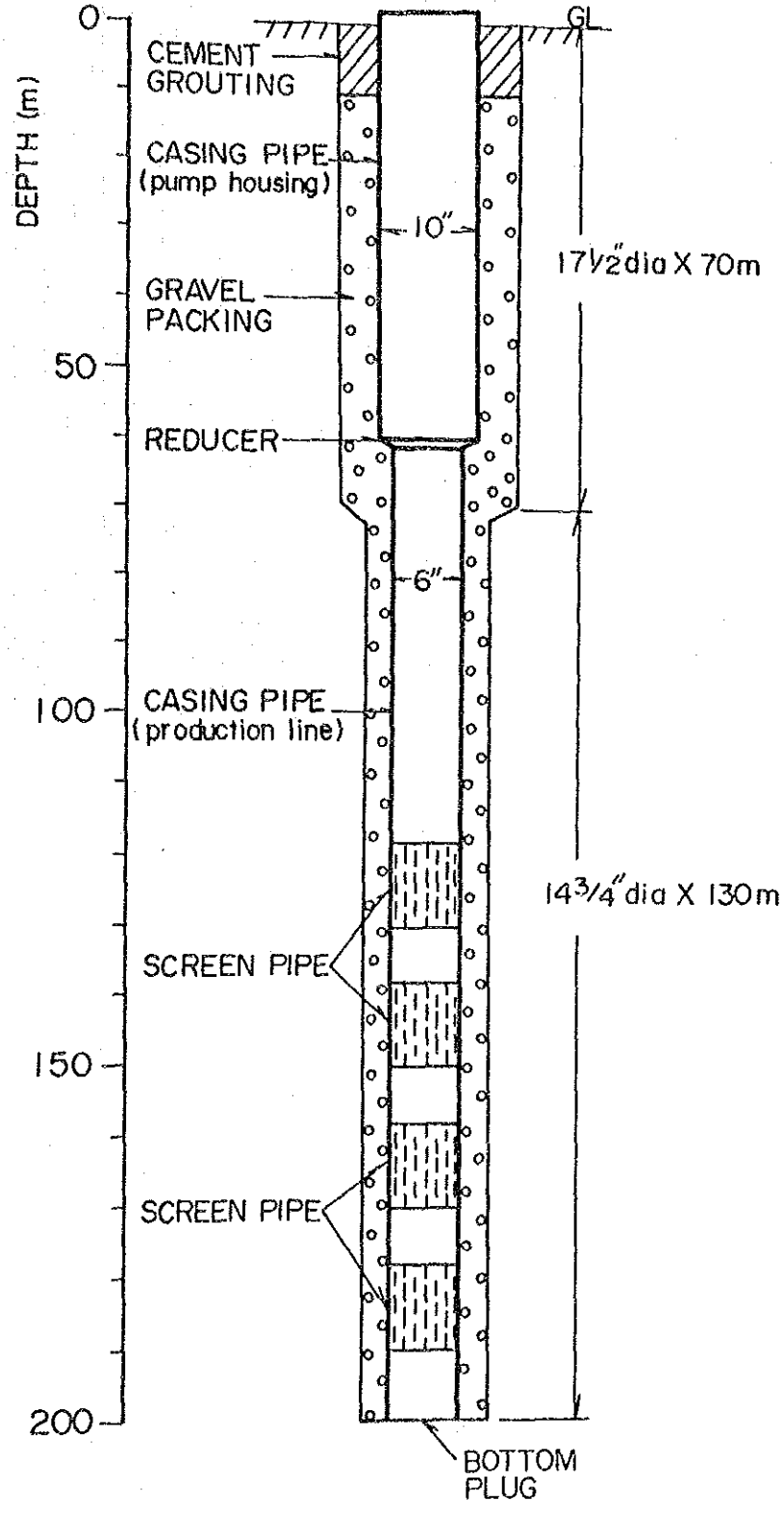


Fig. F.4 Implementation Schedule
(Banganga Water Supply)

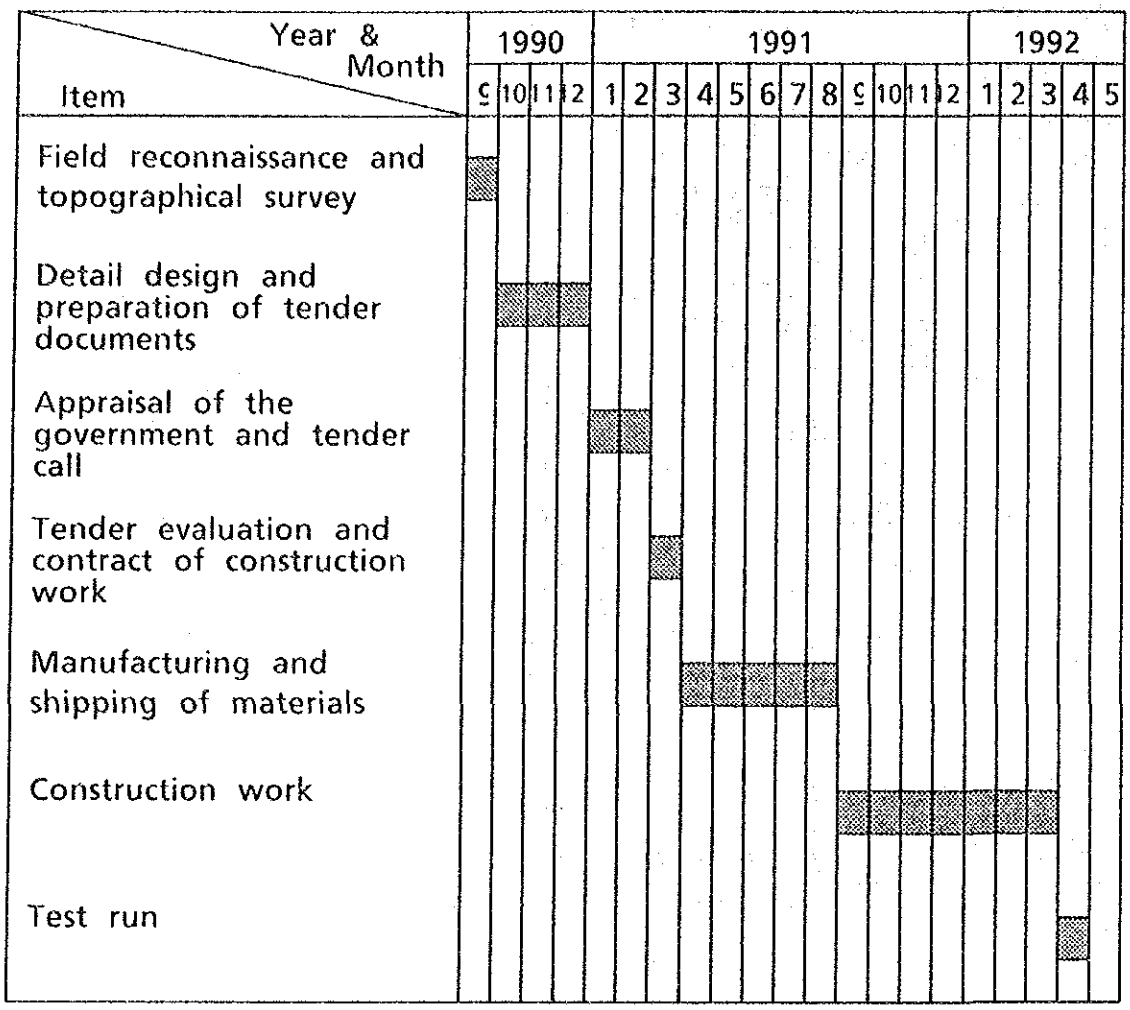


Fig. F.5 Organization Chart of DWSS (1)

MINISTRY OF HOUSING & PHYSICAL PLANNING

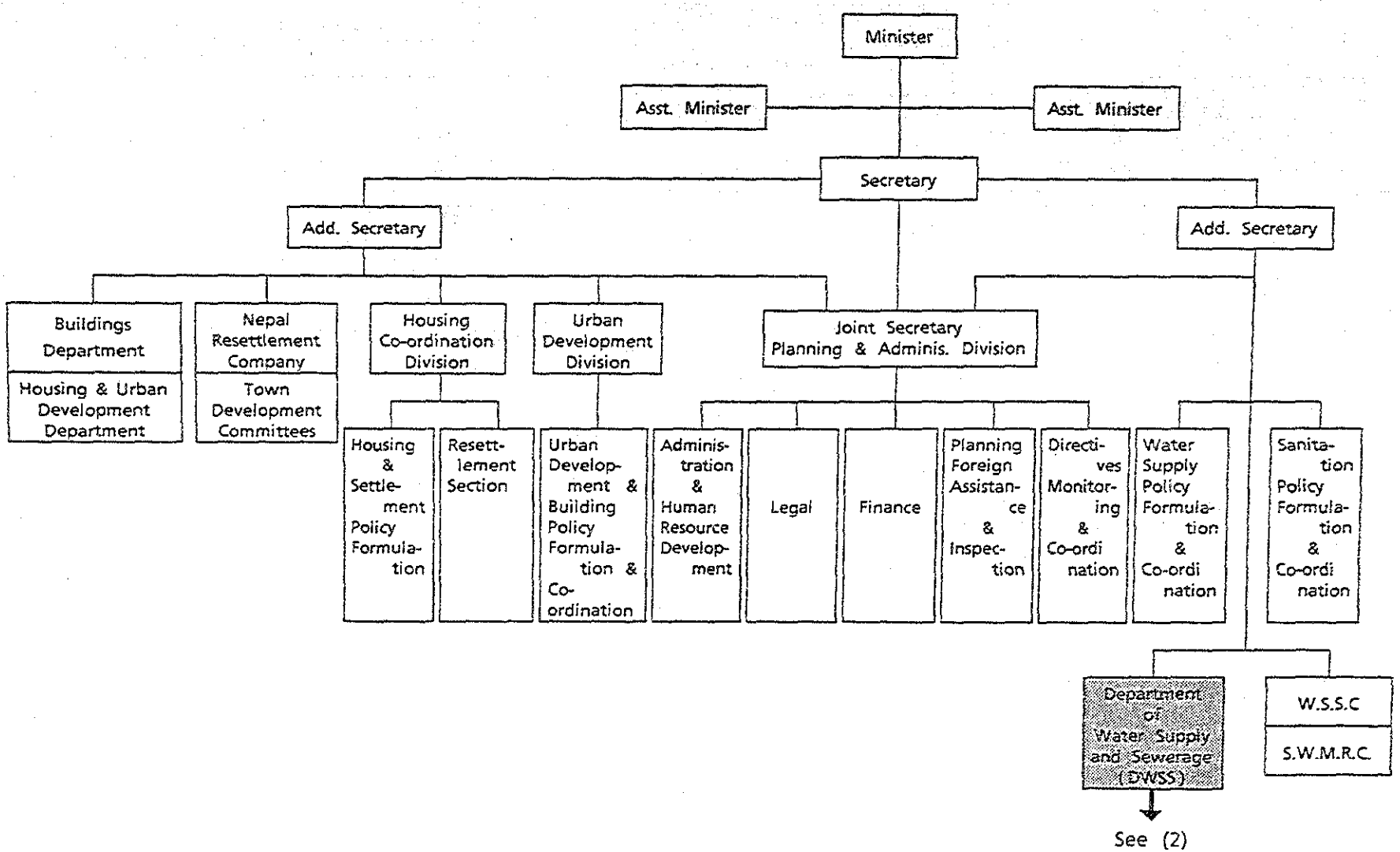


Fig. F.5 Organization Chart of DWSS (2)
DEPARTMENT OF WATER SUPPLY & SEWERAGE

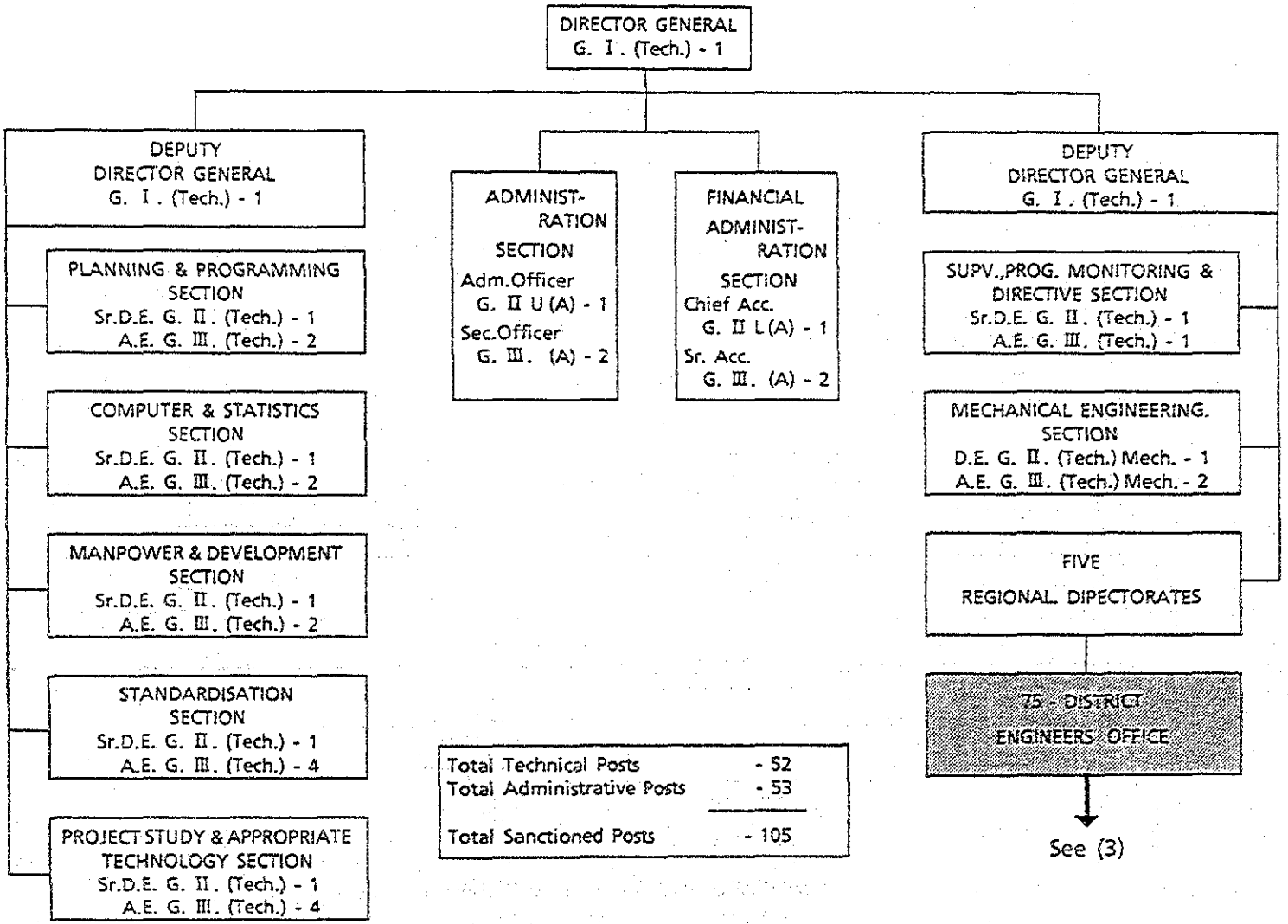
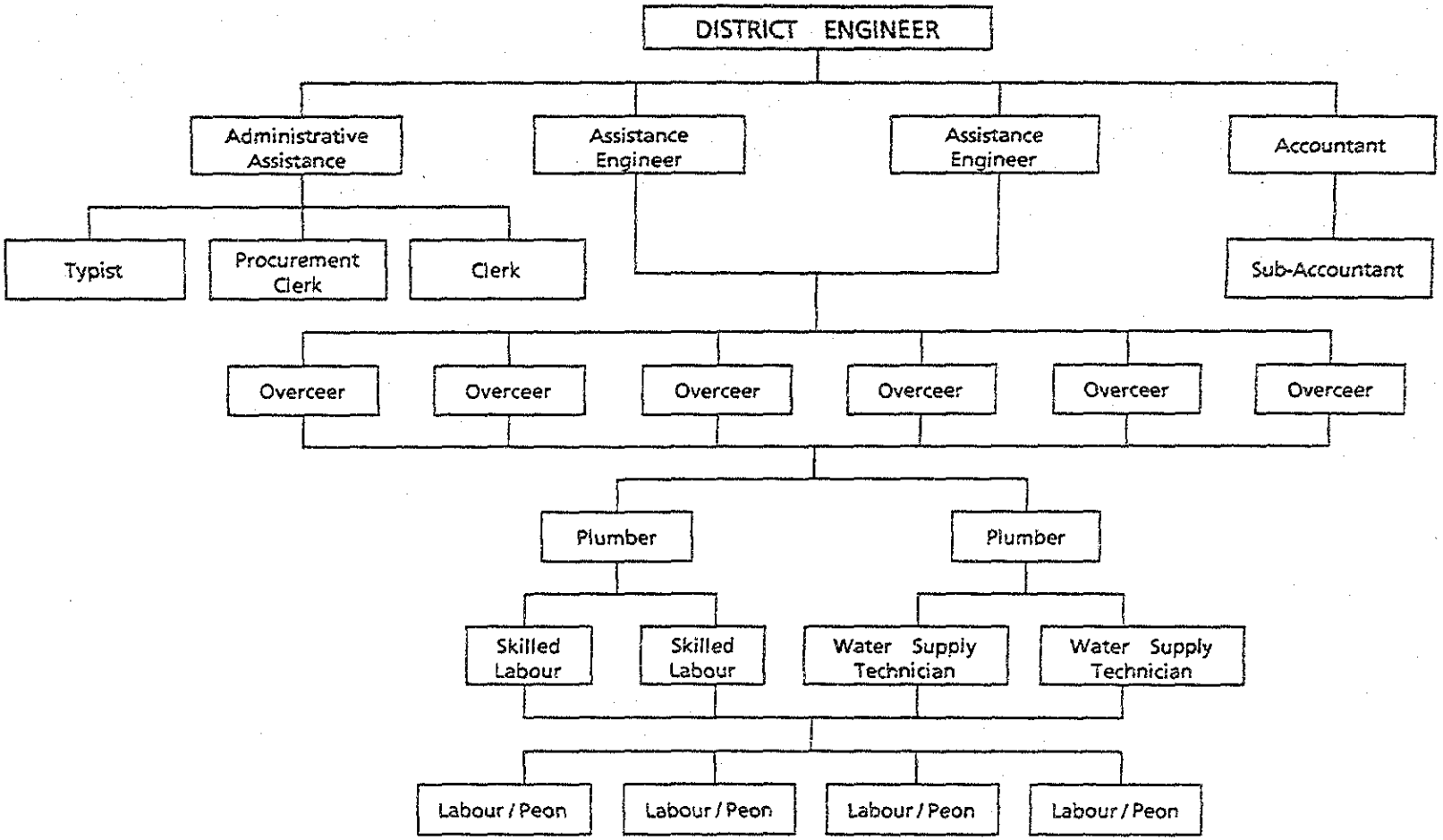


Fig. F.5 Organization Chart of DWSS (3)
DISTRICT ENGINEER OFFICE



TABLES

Table F.1 Present Status of Water Supply (1)

Gulmi District

No.	Name of Village	Total Population in 1988	Population Benefited by Water Supply System	Rate of Coverage (%)
1.	Tamghas	6,434	1,335	20
2.	Juhang	4,718	1,973	41
3.	Harewa	2,992	2,000	66
4.	Purkot Daha	3,046	610	20
5.	Bakleraksar	5,374	794	14
6.	Pallikor	2,596	999	38
7.	Harmichaur	2,488	200	8
8.	Gwadi	3,295	1,611	48
9.	Arkhawang	3,780	170	4
10.	Bastu	3,614	1,087	30
11.	Musikor	3,885	350	9
12.	Wagla	3,998	318	7
13.	Hardineta	7,095	2,185	30
14.	Ammapour	3,349	136	4
15.	Arlangkot	3,211	145	4
16.	Hadhade	4,152	1,350	32
17.	Rupakot	3,821	3,646	95
18.	Shantipur	2,253	1,866	82
19.	Arkhale	6,694	1,686	25
20.	Dhamir	3,280	984	30
21.	Birbas	5,140	1,865	36
22.	Harrachaur	2,065	950	46
23.	Balithum	4,252	2,134	50
24.	Bharse	3,958	1,302	32
25.	Paundiamarai	4,801	2,602	54
26.	Darlamchaur	3,143	1,865	59
27.	Bishukharka	3,204	1,360	42
28.	Myalpokhari	2,233	360	16
29.	Hastichaur	7,584	880	11
30.	Dubichaur	2,538	2,535	100
31.	Turang	5,984	3,277	54
32.	Dhurkot Rajasthal	3,566	620	17
33.	Kurgha	3,444	1,759	51
34.	Phoksing	3,962	2,497	63
35.	Thanpati	3,778	1,760	46
36.	Linwa	4,300	1,000	23
37.	Wami	6,950	5,572	80
38.	Rimuwa	3,046	1,180	38
39.	Dohali	4,126	2,333	56
40.	Bhandhane	3,515	390	11
41.	Juniya	3,873	2,585	66
42.	Jayekhaui	2,092	1,131	54
43.	Anpachaur	5,425	1,914	35
44.	Hasara	3,097	2,175	70
45.	Darling	2,948	246	8

Table F.1 Present Status of Water Supply (2)

Gulmi District (Continued)

No.	Name of Village	Total Population in 1988	Population Benefited by Water Supply System	Rate of Coverage (%)
46.	Malayagiri	1,739	330	18
47.	Hwangdi	2,099	450	21
48.	Esma Rajasthal	3,264	2,715	83
49.	Daudha	3,295	-	0
50.	Arbeni	3,900	1,100	28
51.	Purtighat	2,990	1,200	40
52.	Khadgakor	5,576	610	10
53.	Bhurtung	4,305	800	18
54.	Gwadha	3,270	760	23
55.	Thulo Limpek	3,830	240	6
56.	Aslewa	4,560	1,800	39
57.	Wangba	2,760	200	7
58.	Ruru	5,660	3,000	53
59.	Digam	5,240	3,171	60
60.	Hunga	4,805	3,000	62
61.	Darbardevisthan	6,450	1,150	17
62.	Amaragathor	3,540	700	19
63.	Kharjyang	5,780	580	10
64.	Dibrung	3,950	1,150	29
65.	Jubhung	6,500	5,000	76
66.	Gaundakot	4,320	899	20
67.	Simichaur	5,230	1,560	29
68.	Paralmi	3,215	1,500	46
69.	Nayagaon	2,890	940	32
70.	Pipaldhara	3,700	650	17
71.	Jaisithok	4,500	500	11
72.	Badagaon	4,320	800	18
73.	Arjai	4,060	910	22
74.	Neta	2,580	460	17
75.	Chhapahile	3,595	1,010	28
76.	Marbhung	4,895	850	17
77.	Sirseni	4,500	500	11
78.	Banjhkaterai	2,887	108	3
79.	Aglung	3,500	940	26
	Total	316,804	107,320	34

Table F.1 Present Status of Water Supply (3)

Arghakhanchi District

No.	Name of Village	Total Population in 1988	Population Benefited by Water Supply System	Rate of Coverage (%)
1.	Argha	10,951	5,390	49
2.	Arghatos	6,600	1,290	20
3.	Adguri	4,539	2,530	56
4.	Asurkot	2,414	350	15
5.	Kimdanda	6,858	5,923	86
6.	Kerung	5,467	3,866	71
7.	Khan	4,335	2,106	49
8.	Khandaha	3,538	1,228	35
9.	Khachikot	5,543	1,609	29
10.	Khidim	3,791	3,023	80
11.	Khilji	3,140	1,650	53
12.	Gokhunga	2,885	533	18
13.	Chidika	4,133	749	18
14.	Chhatraganj	3,605	3,244	90
15.	Jaluke	4,079	800	20
16.	Jukena	6,082	400	7
17.	Thada	7,458	1,344	18
18.	Thula Pokhara	3,465	150	4
19.	Divarna	4,725	3,465	73
20.	Thadawang	7,059	6,655	94
21.	Dhikura	4,768	4,671	98
22.	Dhanchaur	4,385	2,867	65
23.	Dhatiwang	2,432	2,071	85
24.	Dharapani	7,200	3,826	53
25.	Narapani	5,639	2,380	42
26.	Nuwakot	7,580	1,577	21
27.	Patauti	3,550	1,200	34
28.	Patena	2,976	250	8
29.	Pali	4,086	2,833	69
30.	Polhara Thok	4,902	2,834	58
31.	Balkot	4,474	1,450	32
32.	Wangi	4,584	850	19
33.	Bhagabati	5,103	1,884	37
34.	Marengh	4,448	804	18
35.	Maidan	5,605	400	7
36.	Wangla	5,470	3,530	65
37.	Siddara	6,100	-	0
38.	Sitapur	4,383	805	18
39.	Simal Pani	5,142	300	6
40.	Subarnakhal	3,327	170	5
41.	Hansapur	7,766	2,600	33
	Total	204,587	83,607	41

Table F.1 Present Status of Water Supply (4)

Kapilvastu District

Name of Project	Completed Year	Benefited Population	Capacity of Tank	Length of Pipeline
Krishnanagar WSP	1982/83	8,600	450 m^3	10 km
Mahendrakot WSP	1981/82	3,100	50 m^3	5.5 km
Maharajgunj WSP	1986/87	4,700	-	5.5 km
Taulihawa WSP	1980/81	9,700	450 m^3	6 km
Bahadurgunj WSP	1989/90	11,623	450 m^3	5.5 km
Chandrauta WSP		12,875	225 m^3	20 km

Marchawar Area

No.	Name of Village	Population (Jan. 1989)	Handpump (Point source) Dist. Panch.	Red Cross	Pri-vate	Pub-lic	Dug Well	Boring
1.	Semari	4,506	5	-	76	10	-	-
2.	Barsauli	4,378	-	-	100	7	-	1
3.	Gonaha	3,812	-	15	70	6	-	-
4.	Sakroon	4,390	-	-	60	4	-	-
5.	Mujgama	3,809	-	-	70	6	-	-
6.	Marayadpur	3,834	-	18	52	10	-	-
7.	Bairghat	3,742	-	18	44	10	-	-
8.	Kataiya	3,282	8	-	40	10	-	-
9.	Bogadi	3,092	-	12	40	6	-	-
10.	Odbaliya	2,960	2	20	36	8	1	-
11.	Tharki	3,402	-	-	48	10	-	-
12.	Silitiya	2,604	-	-	63	10	-	-
13.	Bagauli	3,298	-	-	95	12	28	-
14.	Raipur	3,963	91	-	90	12	1	-
15.	Amawa	2,990	1	-	70	11	-	-
16.	Asuraina	4,834	-	24	165	-	42	97
17.	Farena	2,695	-	24	63	12	-	-
18.	Bethkiya	3,488	10	32	80	12	-	-
19.	Rohinihawa	2,887	-	18	67	12	-	-
20.	Thema Pepa.	2,948	-	14	67	12	-	-
21.	Bangai	3,374	-	12	80	10	-	-
22.	Karuta	3,959	1	-	42	15	13	-
23.	Semera	4,436	-	-	103	15	-	-
Total		82,683	118	207	1,621	220	85	98

Table F.2 Water Quality Analysis

Results expressed as mg/liter

(Analyzed by WSSC)

Sample No.		No.1	No.2	No.3	No.4	No.5	No.6
Date of Sampling (1989)		Sep.3	Sep.4	Sep.5	Sep.5	Sep.7	Sep.8
Water Source and Place		Handpump-tubewell (private) Bethari, Barsauli, North Marchawar	Red Cross tubewell (H=60 m) Bangai, Marchawar	Deepwell of DWSS (H=180 m) Bahadur Ganj, Kapilvastu	Banganga River water, Kapil-vastu	Deepwell of DWSS (H=120 m) Tauli-hawa, Kapilvastu	Hill stream near Tansen
Date of Analysis (1989)		Sep.13	Sep.13	Sep.13	Sep.13	Sep.13	Sep.13
Appearance		Clear	Clear	Clear	Clear	Clear	Clear
Temperature	^{o}C	25	24.8	24.8	25	24.9	24.9
pH		6.8	7.7	7.7	7.5	7.7	5.5
Color	^{o}Hazen	<5	<5	<5	<5	<5	<5
Turbidity	NTU	<5	<5	<5	<5	<5	<5
Total Alkali	$CaCO_3$	366.3	225.72	485.1	188.1	253.44	1.98
P.P.H.Alkali	"	Nill	Nill	Nill	Nill	Nill	Nill
pH4.5 Alkali	"	366.3	225.72	485.1	188.1	253.44	1.98
Total Hardness	"	363.12	214.2	148.92	183.6	132.6	10.20
Ca Hardness	"	234.6	104.04	67.32	71.4	57.12	6.12
Ma Hardness	"	128.52	110.16	81.6	112.2	75.48	4.08
Calcium	Ca	93.93	41.66	26.95	28.58	22.87	2.45
Magnesium	Mg	31.32	26.76	19.82	27.25	18.33	0.99
Iron	Fe	0.01	0.01	0.01	0.01	0.01	0.01
Manganese	Mn	0.175	0.005	0.005	0.005	0.005	0.005
Silica	SiO_2	12.0	20.0	32.0	12.0	32.0	8.0
Chloride	Cl^{-}	117.6	5.88	9.8	9.8	7.84	11.76
Phosphate(Or)	P	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia Total	N	0.24	0.02	0.02	0.02	0.02	0.02

Comments : For No.1 to 5 : Water is chemically under permissible limit recommended by WHO.

For No.6 : Water is acidic and soft for drinking purpose, according to the standards recommended by WHO.

Table F.3 Hydraulic Calculation of Distribution Pipelines (1)
(Banganga Water Supply)

Pipeline	Distance	Flow	Diameter (ID)	Velocity	Friction Factor	Loss of Head	Total Loss of Head	Ground Elevation	Maximum Head	Residual Head
	m	ℓ/sec	φ mm	m/sec	‰	m	m	+ m	m	m
West-Main										
Tank→J_2	100	39.60	250	0.81	3.8	0.38	0.38	151.52	25.00	21.62
J_2 →J_7	600	17.10	200	0.54	2.38	1.43	1.81	149.00	27.52	22.71
J_7 →J_8	100	16.20	200	0.52	2.16	0.22	2.03	148.77	27.75	23.72
J_8 →J_9	150	15.30	200	0.49	1.92	0.29	2.32	149.81	26.71	21.39
J_9 →#70	280	8.10	150	0.46	2.45	0.69	3.01	149.97	26.55	20.54
#70 →#69	450	7.65	150	0.43	2.20	0.99	4.00	151.80	24.72	17.72
#69 →#68	250	7.20	150	0.41	1.96	0.49	4.49	152.26	24.26	16.77
#68 →J_{12}	120	6.75	150	0.38	1.73	0.21	4.70	154.60	21.92	14.22
J_{12} →#53	20	6.75	150	0.38	1.73	0.03	4.73	154.60	21.92	14.19
#53 →#54	80	6.30	150	0.36	1.52	0.12	4.85	153.64	22.88	15.03
#54 →#55	710	5.85	150	0.33	1.34	0.95	5.80	154.21	22.31	13.51
#55 →J_{13}	20	5.40	150	0.31	1.14	0.02	5.82	154.21	22.31	13.49
J_{13} →#57	130	4.95	100	0.63	7.1	0.92	6.74	152.76	23.76	14.02
#57 →#58	230	4.50	100	0.57	5.9	1.36	8.10	152.76	23.76	12.66
#58 →#59	240	4.05	100	0.52	4.8	1.15	9.25	150.14	26.38	14.13
#59 →#60	280	3.60	100	0.46	3.9	1.09	10.34	150.80	25.72	12.38
#60 →#61	220	3.15	100	0.40	3.05	0.67	11.01	149.78	26.74	12.73
#61 →#62	160	2.70	75	0.61	9.3	1.49	12.50	147.44	29.08	13.58
#62 →#63	150	2.25	75	0.51	6.7	1.01	13.51	142.75	33.77	17.26
#63 →#64	900	1.80	75	0.41	4.4	3.96	17.47	142.00	34.52	14.05
#64 →#65	300	1.35	50	0.69	18.5	5.55	23.02	137.60	38.92	12.90
#65 →#66	300	0.90	50	0.46	8.8	2.64	25.66	132.00	44.52	15.68
#66 →#67	600	0.45	40	0.36	7.2	4.32	29.98	132.00	44.52	11.54

Table F.3 Hydraulic Calculation of Distribution Pipelines (2)
(Banganga Water Supply)

Pipeline	Distance	Flow	Diameter (ID)	Velocity	Friction Factor	Loss of Head	Total Loss of Head	Ground Elevation	Maximum Head	Residual Head
	m	ℓ/sec	φ mm	m/sec	‰	m	m	+m	m	m
West-Branch										
J_9							2.32	149.81	26.71	21.39
J_9 → J_{10}	300	6.75	100	0.86	12.5	3.75	6.07	148.66	27.86	18.79
J_{10} → #74	20	5.85	100	0.75	9.5	0.19	6.26	148.66	27.86	18.60
#74 → #77	140	5.40	100	0.69	8.3	1.16	7.42	145.66	30.86	20.44
#77 → J_{11}	450	4.95	100	0.63	7.1	3.20	10.62	143.89	32.63	19.01
J_{11} → #82	120	3.15	75	0.71	12.3	1.48	12.10	142.62	33.90	18.80
#82 → #83	60	2.70	75	0.61	9.3	0.56	12.66	142.31	34.21	18.55
#83 → #84	380	2.25	75	0.51	6.7	2.55	15.21	142.25	34.27	16.06
#84 → #85	480	1.80	75	0.41	4.4	2.11	17.32	134.24	42.28	21.96
#85 → #86	110	1.35	50	0.69	18.5	2.04	19.36	134.15	42.37	20.01
#86 → #87	200	0.90	50	0.46	8.8	1.76	21.12	132.87	43.65	22.53
#87 → #88	330	0.45	40	0.36	7.2	2.38	23.50	131.73	44.79	21.29
J_{10}							6.07	148.66	27.86	18.79
J_{10} → #75	430	0.90	50	0.46	8.8	3.78	9.85	148.66	27.86	15.01
#75 → #76	300	0.45	40	0.36	7.2	2.16	12.01	149.66	26.86	11.85
J_{11}							10.62	143.89	32.63	19.01
J_{11} → #79	150	1.35	50	0.69	18.5	2.78	13.40	143.89	32.63	16.23
#79 → #80	140	0.90	50	0.46	8.8	1.23	14.63	142.62	33.90	16.27
#80 → #81	100	0.45	40	0.36	7.2	0.72	15.35	141.25	35.27	16.92
J_7							1.81	149.00	27.52	22.71
J_7 → #45	100	0.90	50	0.46	8.8	0.88	2.69	151.27	25.25	19.56
#45 → #46	250	0.45	40	0.36	7.2	1.80	4.49	152.28	24.24	16.75

Table F.3 Hydraulic Calculation of Distribution Pipelines (3)
(Banganga Water Supply)

Pipeline	Distance	Flow	Diameter (ID)	Velocity	Friction Factor	Loss of Head	Total Loss of Head	Ground Elevation	Maximum Head	Residual Head
	m	ℓ/sec	φ mm	m/sec	‰	m	m	+ m	m	m
J_8							2.03	148.77	27.75	23.72
J_8 → #73	100	0.45	40	0.36	7.2	0.72	2.75	141.61	34.91	29.16
J_{13}							5.82	154.21	22.31	13.49
J_{13} → #56	350	0.45	40	0.36	7.2	2.52	8.34	155.22	21.30	9.96
East-Main										
J_2							0.38	151.52	25.00	21.62
J_2 → #7	60	13.05	150	0.74	5.9	0.35	0.73	151.52	25.00	21.27
#7 → #8	60	12.60	150	0.71	5.6	0.34	1.07	154.20	22.32	18.25
#8 → #9	50	12.15	150	0.69	5.2	0.26	1.33	154.20	22.32	17.99
#9 → #10	60	11.70	150	0.66	4.8	0.29	1.62	154.45	22.07	17.45
#10 → J_3	60	11.25	150	0.64	4.5	0.27	1.89	154.45	22.07	17.18
J_3 → #20	210	7.20	150	0.41	1.96	0.41	2.30	152.97	23.55	18.25
#20 → #21	140	6.75	150	0.38	1.73	0.24	2.54	151.96	24.56	29.02
#21 → #22	840	6.30	150	0.36	1.52	1.28	3.82	145.72	30.80	23.98
#22 → J_4	200	5.85	150	0.33	1.34	0.27	4.09	145.72	30.80	23.71
J_4 → #24	210	5.40	100	0.69	8.3	1.74	5.83	144.31	32.21	23.38
#24 → #25	260	4.95	100	0.63	7.1	1.85	7.68	141.45	35.07	24.39
#25 → #26	830	4.50	100	0.57	5.9	4.90	12.58	137.58	38.94	23.36
#26 → #27	220	4.05	100	0.52	4.8	1.06	13.64	136.93	39.59	22.95
#27 → J_5	320	3.60	100	0.46	3.9	1.25	14.89	135.20	41.32	23.43
J_5 → J_6	410	2.25	75	0.51	6.7	2.75	17.64	133.00	43.52	22.88
J_6 → #30	150	1.35	50	0.69	18.5	2.78	20.48	132.00	44.52	21.04
#30 → #31	150	0.90	50	0.46	8.8	1.32	21.74	131.82	44.70	19.96
#31 → #32	150	0.45	40	0.36	7.2	1.08	22.82	131.00	45.52	19.70

Table F.3 Hydraulic Calculation of Distribution Pipelines (4)
(Banganga Water Supply)

Pipeline	Distance	Flow	Diameter (ID)	Velocity	Friction Factor	Loss of Head	Total Loss of Head	Ground Elevation	Maximum Head	Residual Head
	m	ℓ/sec	φ mm	m/sec	‰	m	m	+ m	m	m
East-Branch										
J_3							1.89	154.45	22.07	17.18
J_3 → #11	130	4.05	100	0.52	4.8	0.62	2.51	154.11	22.41	16.90
#11 → #12	130	3.60	100	0.46	3.9	0.51	3.02	153.11	23.41	17.39
#12 → #13	490	3.15	100	0.40	3.05	1.49	4.51	152.54	23.98	16.47
#13 → #14	240	2.70	75	0.61	9.3	2.23	6.74	152.28	24.24	14.50
#14 → #15	400	2.25	75	0.51	6.7	2.68	9.42	150.89	25.63	13.21
#15 → #16	480	1.80	75	0.41	4.4	2.11	11.53	148.32	28.20	13.67
#16 → #17	260	1.35	75	0.31	2.6	0.08	12.21	145.88	30.64	15.43
#17 → #18	150	0.90	50	0.46	8.8	1.32	13.53	144.97	31.55	15.02
#18 → #19	150	0.45	40	0.36	7.2	1.08	14.61	144.97	31.55	13.94
J_4							4.09	145.72	30.80	23.71
J_4 → #23	100	0.45	40	0.36	7.2	0.72	4.81	145.72	30.80	22.99
J_5							14.89	135.20	41.32	23.43
J_5 → #33	520	1.35	50	0.69	18.5	9.62	24.51	135.48	41.04	13.53
#33 → #34	80	0.90	50	0.46	8.8	0.70	25.21	135.00	41.52	13.31
#34 → #35	60	0.45	40	0.36	7.2	0.43	25.64	135.00	41.52	12.88
J_6							17.64	133.00	43.52	22.88
J_6 → #28	50	0.90	40	0.71	26.2	1.31	18.95	133.00	43.52	21.57
#28 → #29	180	0.45	40	0.36	7.2	1.30	20.25	132.52	44.00	20.75

Table F.3 Hydraulic Calculation of Distribution Pipelines (5)
(Banganga Water Supply)

Pipeline	Distance	Flow	Diameter (ID)	Velocity	Friction Factor	Loss of Head	Total Loss of Head	Ground Elevation	Maximum Head	Residual Head
	m	ℓ/sec	φ mm	m/sec	‰	m	m	+ m	m	m
South-Main										
J_2							0.38	151.52	25.00	21.62
J_2 → #36	360	4.05	100	0.52	4.8	1.73	2.11	149.80	26.72	21.61
#36 → #37	290	3.60	75	0.81	15.8	4.58	6.69	148.41	28.11	18.42
#37 → #38	60	3.15	75	0.71	12.3	0.74	7.43	148.30	28.22	17.79
#38 → #39	30	2.70	75	0.61	9.3	0.28	7.71	148.19	28.33	17.62
#39 → #40	540	2.25	75	0.51	6.7	3.62	11.33	144.90	31.62	17.29
#40 → #41	110	1.80	75	0.41	4.4	0.48	11.81	144.63	31.89	17.08
#41 → #42	120	1.35	50	0.69	18.5	2.22	14.03	143.85	32.67	15.64
#42 → #43	80	0.90	50	0.46	8.8	0.70	14.73	143.07	33.45	15.72
#43 → #44	120	0.45	40	0.36	7.2	0.86	15.59	142.17	34.05	15.46
North-Main										
J_2							0.38	151.52	25.00	21.62
J_2 → #5	300	5.40	150	0.31	1.14	0.34	0.72	155.24	21.28	17.56
# 5 → J_1	50	4.95	150	0.28	0.98	0.05	0.77	157.22	19.30	15.53
J_1 → #4	350	4.50	150	0.25	0.82	0.29	1.06	155.29	21.23	17.17
#4 → #3	220	4.05	150	0.23	0.68	0.15	1.21	157.05	19.47	15.26
#3 → #2	480	3.60	150	0.20	0.54	0.26	1.47	160.89	15.93	11.16
#2 → #1	480	3.15	150	0.18	0.42	0.20	1.67	164.73	11.79	7.12
#1 → #47	670	2.70	150	0.15	0.32	0.22	1.89	166.37	10.15	5.16
#47 → #48	450	2.25	150	0.13	0.23	0.10	1.99	165.79	10.73	5.74
#48 → #49	310	1.80	150	0.10	0.15	0.05	2.04	162.55	13.97	8.93
#49 → #50	160	1.35	150	0.08	0.088	0.02	2.06	162.55	13.97	8.91

Table F.3 Hydraulic Calculation of Distribution Pipelines (6)
(Banganga Water Supply)

Pipeline	Distance	Flow	Diameter (ID)	Velocity	Friction Factor	Loss of Head	Total Loss of Head	Ground Elevation	Maximum Head	Residual Head
	m	ℓ/sec	φ mm	m/sec	‰	m	m	+ m	m	m
#50 → #51	290	0.90	150	0.05	0.042	0.01	2.07	160.34	16.18	11.11
#51 → #52	360	0.45	150	0.03	0.012	0.01	2.08	158.48	18.04	12.96
#52 → #53	520	—	150	—	—	—	2.08	154.60	21.92	16.54
North-Branch										
J_1							0.77	157.22	19.30	15.53
J_1 → #6	600	0.45	40		7.2	4.32	5.09	158.12	18.40	10.21
Emergency Transmission Main										
River → Jo	2,450	—	150							

Table F.4 Breakdown of Project Cost (1)

(Priority Projects: Banganga Water Supply)

Item	Quantity	Unit Price(Rs.)	Amount (Rs.)
(1) Supply of deep well material (for Banganga)			
1.1 10" casing pipe	60 m x 2	2,900-	348,000-
1.2 6" "	92 m x 2	1,450-	266,800-
1.3 6" screen pipe	48 m x 2	2,200-	211,200-
1.4 Fittings	L.S.		23,500-
Sub Total (1)			849,500-
(2) Well construction (for Banganga)			
2.1 Mobilization and demobilization	L.S.		60,000-
2.2 Drilling work (17-1/2" dia, borehole)	70 m x 2	5,800-	812,000-
2.3 Drilling Work (14-3/4"dia, borehole)	130 m x 2	5,500-	1,430,000-
2.4 Electrical logging	L.S.		30,000-
2.5 Installation of casing pipe	200 m x 2	300-	120,000-
2.6 Gravel packing	20 m^3 x 2	2,500-	100,000-
2.7 Cement grouting	10 m x 2	3,000-	60,000-
2.8 Development work	72 hrs x 2	800-	115,200-
2.9 Pumping test	120 hrs x 2	700-	168,000-
Sub Total (2)			2,895,200-
(3) Water source and tank (for Banganga)			
3.1 Submersible pump (100 mm x 0.94 m^3/min x 80 m x 25 kw)	2 units	790,000-	1,580,000-
3.2 Operation panel	2 units	170,000-	340,000-
3.3 Valves (125 mm)	2 "	29,000-	58,000-
3.4 Pump house	2 houses	185,000-	370,000-
3.5 Overhead tank (v = 450 m^3, H = 25 m)	1		3,000,000-
3.6 River intake	L.S.		179,000-
Sub Total (3)			5,527,000-
(4) Supply of pipes and fittings (for Banganga)			
4.1 250 mm DCIP	100 m	2,270-	227,000-
4.2 200 mm "	850 m	1,750-	1,487,500-
4.3 150 mm HDPE (180 mm - IV)	10,700 m	667-	7,136,900-
4.4 100 mm " (125 mm - IV)	4,960 m	323-	1,602,080-
4.5 75 mm " (90 mm - IV)	5,070 m	168-	851,760-
4.6 50 mm " (63 mm - IV)	2,980 m	83-	247,340-
4.7 40 mm " (50 mm - IV)	3,440 m	53-	182,320-
4.8 30 mm " (32 mm - IV)	2,000 m	22-	44,000-
4.9 25 mm " (25 mm - V)	2,000 m	20-	40,000-
4.10 Fittings and valves (15%)			1,772,100-
Sub Total (4)			13,591,000-
(5) Pipe laying work (for Banganga)			
5.1 250 mm	100 m	394-	39,400-

-Continued-

5.2 200 mm	850 m	366-	311,100-
5.3 150 mm	10,700 m	264-	2,824,800-
5.4 100 mm	4,960 m	259-	1,284,640-
5.5 75 mm	5,070 m	127-	643,890-
5.6 50 mm	2,980 m	127-	378,460-
5.7 40 mm	3,440 m	122-	419,680-
5,8 30 mm	2,000 m	120-	240,000-
5.9 25 mm	2,000 m	119-	238,000-
5.10 Stand post (water tap)	188 Nos.	2,400-	451,200-
Sub Total (5)			6,831,170-
(6) Power facilities (for Banganga)			
6.1 Generator (50 KVA)	1 unit		600,000-
6.2 Generator house	1 house		185,000-
6.3 Panel	L.S.		406,000-
Sub Total(6)			1,191,000-
Total (1)+(2)+(3)+(4)+(5)+(6)			30,884,000-
Engineering cost (10%)			3,089,000-
Overhead cost (10%)			3,089,000-
Contingencies (10%)			3,706,000-
Grand Total			Rs. 40,768,000- (US$ 1,456,000-)

Table F.4 Breakdown of Project Cost (2)
(Priority Project: Hill Area Scheme)

Item	Quantity	Unit Price(Rs.)	Amount (Rs.)
(1) Supply of pipes and fittings (for the hill area)			
1.1 160 mm HDPE, IV	1,680 m	526-	883,680-
1.2 140 mm " "	2,100 m	408-	856,800-
1.3 110 mm " "	2,100 m	250-	525,000-
1.4 90 mm " "	3,360 m	168-	564,480-
1.5 75 mm " "	4,200 m	117-	491,400-
1.6 63 mm " "	4,200 m	83-	348,600-
1.7 50 mm " "	5,460 m	53-	289,380-
1.8 40 mm " "	5,880 m	34-	199,920-
1.9 32 mm " "	6,720 m	22-	147,840-
1.10 25 mm " V	4,200 m	20-	84,000-
1.11 20 mm " "	2,100 m	13-	27,300-
1.12 Fittings and valves (15%)			662,600-
Sub Total			5,081,000-
Engineering cost (10%)			508,000-
Overhead cost (10%)			508,000-
Contingencies (10%)			608,000-
Grand Total			Rs. 6,705,000- (=US$ 239,000-)

ANNEX G

PLAN IMPLEMENTATION CAPACITY REINFORCEMENT

THE MASTER PLAN STUDY
ON
THE INTEGRATED RURAL DEVELOPMENT PROJECT
IN
THE LUMBINI ZONE

ANNEX G PLAN IMPLEMENTATION CAPACITY REINFORCEMENT

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1. INSTITUTIONAL ARRANGEMENT

1.1 Organizations and Functions

1.1.1 National and Regional Level

At the national level, a National Coordination Committee, under the Chairmanship of the Secretary of the MPLD is held. The members of the committee are the representatives of the Ministry of Agriculture, Works and Transport, Water Resources, Housing and Physical Planning, MPLD and National Planning Commission, as well as the Project Management.

The roles of the committee are:

1. To coordinate relevant parties at the national level for smooth implementation of the IRDP,
2. To discuss important policy matters for the IRDP implementation.

The committee meets at least once a year.

The Regional Center, where the Western Regional Directorate exists, will be the actual command center of the project. A Regional Coordination Committee, which consists of the Director General of the Western Region, the Directors of MPLD, Dept. of Agriculture, Dept. of Irrigation, Dept. of Road, Dept. of Water Supply and Sewerage, and the Chairman of the Panchayat Regional Training Center as well as the Project Management.

The Regional Coordination Committee has the following roles:

1. To discuss and approve the general work plans (for 5 years) and the annual work plans (1 year) prepared by the Project Management, and to proceed the financial arrangement for project implementation.
2. To assess the progress and the impacts of the IRDP, and to provide necessary advice and support.

The committee meets at least every quarterly base.

The Project Management Office, which consists of one project manager, one advisor, one monitoring and evaluation expert, one public relations expert, and several junior staff, will be located at the Regional Center.

The Project Management Office has the following roles:

1. To formulate general work plan (for 5 years) and annual work plan, based on the corresponding district work plans,
2. To disburse fund to each district according to the annual work plan, and prepare financial statement,
3. To supervise overall implementation of the projects and provide advice and support,
4. To conduct periodical monitoring, evaluation and impact studies,
5. To promote public relation activities, including training and PR material production
6. To arrange trainings at the Regional and National level, as well as overseas trainings.

1.1.2 District and Illaka Level

At each of the districts, on close consultation with the district panchayat and Plan Formulation Committees, a District Planning Meeting will contribute to formulate general district work plan and annual district work plan. The District Planning Meeting consists of the District Panchayat Chairman, the Chief District Officer, the Local Development Officer, and concerning line agencies' District Officers as well as the District Project Management.

The District Project Management is a joint group of the key staff of the District Planning Unit and the experts. The experts consist of one planning advisor, one agricultural expert, one civil engineering expert and several junior agricultural and civil engineering experts. The District Planning Unit is explained in the next section in more details.

The District Project Management is responsible for planning, execution, management, and evaluation of the development projects in the district. Disbursement of funds, preparation and calling tender, preparation of financial statements, supervising and providing district level training are the tasks of the DPM.

There are two types of funds which the DPM has to handle, namely, the sectoral projects fund and the MPLD grant projects fund. Although both funds are subjects of approval at the District Plan Formulation Committee, clear classification of the two and identification of the responsible bodies are important.

The sectoral projects will be mainly under the responsibility of the sectoral offices in their planning and implementation process, based on the village and lower level needs, while the MPLD grant projects will be planned and implemented mainly by the leadership and the responsibility of the village and the lower level. Thus, the role of the sectoral offices in the latter cases is providing necessary technical advices.

The Illaka Center will act an important role not only as the distribution center but also as the node for the bottom up development plan formulation process. A Planning Unit branch is located at a Illaka Center, where one planning staff is assigned in addition to the existing sector staff, and keep collecting development relating information, such as basic geographical information, population, natural and socio-economic conditions, resource potentials, village needs, progressive farmers identification, etc.

The village panchayat representatives periodically meet at the Illaka center to discuss for the projects at the village level and below, and receive trainings for the village development plan formulation from the expert staff, who visit round the Illaka centers within the district.

1.1.3 Village and Ward Level

As seen above, a village handles two types of development projects, i.e. the sectoral projects and the grant projects. In the former case, the village has roles of project identification and of preliminary study for village level appraisal as well as for further study by the Illaka and the district level, whereas in the latter case, the village has to be responsible for all the process of project identification, feasibility study, appraisal, supervision of implementation and operation & maintenance.

In order to practice the process at the village level on the development activities, a Village Planning Meeting, which is responsible for formulating and implementing the Village Development Plans, needs to be formed in each village panchayat.

The ward is the lowest level of the panchayat system, and almost equivalent to the traditional community unit which has direct contact with the local people. Since the grant

projects fund, especially of the donor contribution part, is expected to open up the ward level development potentials by providing finance to the ward projects, each ward will gives the Ward Committee a clearer role, in which development projects will be discussed and chosen.

The Ward Committee will be expected to act as the communal development center where natural and human potentials information of the ward is accumulated and utilized. In other words, the Ward Committee will be the command center for the community based participatory development, and the grant projects fund will provides the financial guarantee for its activities.

Initially, the ward projects can be mainly living environment improvement projects, such as the areas seen in Section 4.7, in other words, welfare oriented projects. However, it is expected that their activities will gradually shift, according to the accumulation of the project experiences, to more productive projects, such as irrigation, agro-processing, handicrafts, etc., which are more suitable to be financed by loans and credits.

The systems of the loan/credit finance to the community level exists in the form of Small Farmers Development Program (SFDP) of the Agricultural Development Bank of Nepal (ADBN) or other banks' loans. A suitable form of the productive projects finance for the community level will be explored at the early stage of the IRDP.

1.2 Plan Implementation Capacity Reinforcement

1.2.1 District Planning Process Clarification

There is a standard planning process shown in details in the Decentralization Act and the By-laws, which is briefed in Fig. G.1. However, each actual practice of the districts in the Seventh Plan was not satisfactory. What is needed is a careful re-assessment of the standard planning precess and the formulation of realistic planning procedure to suite each district's unique conditions.

Particularly, the districts within the Lumbini IRDP should take into account the existence of the Project Management and available fund, thus the planning process should be different form other districts for at least 15 years of the project period.

A special assessment team, which consists of a MPLD central staff, a representative of the Western Regional Directorate, the LDOs, District Planning Officers, and

advisors as well as a donor representative, will be formed in order to propose a practical planning process for each concerning district.

1.2.2 Standardization of the District Planning Process

At the Regional and the district level, based on the special assessment team's recommendation, a common standard process for the district development planning for the concerning districts will be established and manuals for effective planning management will be prepared by the project management. The following areas will be covered by the standardization and manual preparation works.

1) Long-term vision, mid-term plan (5 year plan), and annual plan formulation.

2) Development project preparation, feasibility study, design, project finance arrangement, and appraisal.

3) Project implementation, operation and management, maintenance, monitoring and evaluation.

4) Administrative procedures, such as budgeting, accounting, and auditing.

5) Illaka, village, ward level administration and development project management procedures.

The established standard process and implementation manuals will be distributed, understood and practiced through the training and PR activities by the concerning responsible persons within the project area as well as the central and regional level.

1.2.3 Need for Establishing a Planning Unit System

In order to put the standardized planning and implementation process into action, a Planning Unit System, which goes through the district level down to the ward level and is responsible to manage and coordinate the concerning sectoral offices, is needed to be established.

It consists of the District Planning Unit (DPU) at the district level, which has close contact with the District Project Management of the IRDP. It will be directed by the LDO,

assisted by the Planning Officer, and responsible to develop the District Development Plan with the help of prepared standard manuals.

In order to provide the necessary information to the DPU, especially regarding the village and lower level needs and potentials, a branch of DPU will be located at each Illaka Center, and keeps monitoring the concerning village conditions.

At the village level, a Village Planning Unit (VPU) will be formed in order to assist in formulating the Village Development Plans, by providing necessary information to the Village Planning Committee.

At the lowest level of the Planning Unit System, a Ward Planning Unit, which is responsible to the Ward Committee with providing development project idea, will be formed.

Through the planning capacity reinforcement with the creation of Planning Unit System, together with the Project Management system arrangement, the development administration is expected to be enormously strengthened, so that the bottom-up process of planning, in a real sense, will be materialized.

2. HUMAN RESOURCES DEVELOPMENT

2.1 Manpower Requirement

2.1.1 Staff of Experts

At the National and Regional level, one advisor, who will reside at the Regional Center, will be appointed. The advisor will assist the Project Manager with overall supervision of the project management activities, including annual reporting to the National Coordination Committee, and quarterly reporting to the Regional Coordination Committee.

At the Regional level, there are two more senior experts and three junior experts working with project management staff. One senior expert, who has social or anthropological background, will handle the monitoring and evaluation function together with a counterpart. The other senior expert is an advisor of public relations affairs, including PR planning, implementation, and PR material production. He is also responsible for the arrangement of outside district training, including overseas training.

At the district level, each district project management office has three senior experts and six junior experts. There are altogether 9 senior experts and 18 junior experts at the district level, since the Marchawar Area of the Rupandehi district will be covered by the Kapilvastu district experts group.

The senior experts of each district consist of one planning expert, who provides advice to the LDO and the Planning Officer on overall district level planning practice. Another expert has specialities of either agriculture or livestock or horticulture. He normally stations at one district center but takes care of all the project area. In the same manner, the third senior expert of the district level specializes in civil engineering of either irrigation or road or drinking water, and he takes care of the entire project area.

The junior experts of the district level consist of three agriculturalists and three civil engineers, and assist senior experts with their close contact to the lower cadre of local administration system, such as Illaka, village, and ward. One pair of Junior experts, one agriculturalist and one civil engineer, will cover three Illaka centers, about 20 villages, and about 180 wards on average.

Besides above mentioned experts, short term consultants services will be provided as and when difficult problems arise or special studies are needed.

2.1.2 Local Staff

Roughly classified, two groups of Local staff are needed in order to pursue the Lumbini IRDP. One is the administrative group, including project management, planning staff, financial control staff, and monitoring and evaluation staff. The other one is the operational group, including project implementation staff, and operation and maintenance staff.

(1) Administrative Group

At the National and Regional level, a project manager with sufficient supporting staff will be assigned for representing the Lumbini IRDP and practically coordinating three districts' development activities with the help of experts. He stations at the Regional Center and keeps close contact with the Regional Directors who are directly supervising the sectoral as well as overall project performance through the Regional Coordination Committee.

Under the Project Manager, there are three main sub-sections, namely Planning Section, Monitoring & Evaluation Section, and Public Relations & Training Section. Each section has a senior officer together with a couple of junior staff, except the Planning Section, of which senior officer will be served concurrently by the project manager.

At the district level, the District Planning Unit (DPU) have the LDO as the head as well as the District Project Manager. The Planning Officer assists the LDO with the help of experts, to coordinate sectoral officers and to absorb the village and lower level needs through Illaka Unit Branches. There will be at least a couple of additional technical staff, preferably an architect or civil engineer and an economist or sociologist, who can conduct extensive surveys and basic data collection for general work plan (5 years) and annual work plan formulation at the district level.

Each Illaka will have a branch office of the DPU, and at least one staff will be assigned to keep close contact with their covering villages. Through contact with the Village Panchayat Secretary, the Illaka staff absorb the village needs and monitor local condition changes, and report them to the district level.

At the village level, a Village Planning Unit (VPU) formed under the Village Panchayat Secretary manages the village level development planning with their locally assigned staff, composed of a civil engineering technician, an agricultural leader, an accounting staff, and several surveyors. These staff are, at the initial stage, partially paid by the overhead charge of the project expenses at the village and the ward level, but are expected to be covered by the village's own fund, supposedly by the project revenue.

At the ward level, a Ward Planning Unit (WPU) will be formed as the branch of VPU, and acts as the bottom unit of the planning administration system. AT the WPU, at least one person will be assigned within the ward, who is responsible to identify and formulate suitable projects with the help of VPU, reports them to the Ward Committee, and to monitor the users committee's activities, once it is formed, on implementation, and operation & maintenance. They will be initially paid by the overhead charge of the project expenses, but are also expected to be covered by the ward's own revenue.

(2) Operational Group

There are six sub-sectors identified, from the operational manpower point of view, namely Agriculture, Livestock, Marketing, Road, Irrigation, and Water supply. The staff number required under each category is schematically shown in Charts 1 to 6.

Necessary staff, tabulated according to the sector-district and level, are shown in Table G.1 together with existing staff numbers. Table G.2 shows the same data with district-sector and level classification.

Table G.3 and Table G.4 shows the necessary and existing staff number according to the administrative class. And Table G.5 is the staff development need (Table G.3 - Table G.4) for the total sectoral projects of IRDP according to the administrative class.

In order to promote the sectoral projects, about 50 gazetted class extra officers and about 400 non-gazetted class staff are needed to be trained at the district level and over. Meanwhile, at the village level, about 500 skilled manpower have to be trained for mainly implementation and maintenance. The unskilled farmers receive certain basic technical training in the cases of agriculture or livestock sector, but are basically unpaid. But workers receive labour wages in the cases of civil work project, such as road, irrigation or water supply system construction.

Table G.4 is the salary scale of HMG officials (1989/90). By multiplying Table G.5 and Table G.6, the monthly cost for extra manpower retaining, which is shown in Table G.7, is obtained. According to the calculation result, approximately 10 million rupees per year is needed to keep trained manpower for the implementation and maintenance of the IRDP sectoral projects.

2.2 Manpower Supply

2.2.1 Change of Manpower Composition

(1) Size and Quality of the Local Public Officers/Staff

As seen in the previous section, the absolute numbers of the district and lower level officers/staff, both in the administration and operation, are in shortage in many sectors. Thus, it is imperative to increase the local staff in order to implement various component projects successfully, although it requires several arrangements, such as proper recruitment system creation, securing sufficient recurrent expenditure budget, etc., which is not easy at the present local conditions as seen later.

The quality of the local staff is also necessary to be improved for satisfactory implementation of the project. Both in administration and operation, it is needed not only expanding the existing training capacity but also introducing new training courses suited to the local conditions, at the village level, the Illaka level, the district level, the regional/national level, and even overseas.

The required quality or qualification according to the level of the officer/staff is not specified here, but an important point here is that practical skills and experiences will be put more emphasis in the source of staff quality improvement, i.e. training program.

(2) Composition of the Public Officials

At present, a majority of the district level public officials are centrally appointed, and few are recruited locally. This situation creates two major drawbacks, i.e. firstly, inflexibility of number increase in accordance with the district demand increase, due to the nationwide budgetary constraints and complicated administrative procedure. Secondly, they are transferred quite frequently, almost every 2-3 years in the case of officers, thus knowledge and experience, which are valuable for advancing further development of the district are not accumulated within the district.

An examination of the appropriate composition of centrally appointed staff and locally hired staff is needed. However, under the present constraints of hiring new staff by the district, one of the few means of overcoming the problem may be a gradual replacement of centrally assigned staff by locally recruited staff without changing the payment scale.

2.2.2 Training

Training is one of the key project components, especially at the early stage of the IRDP, for it determines the future success of the project particularly of its sustainability.

There are two types of trainings needed according to the human resources requirement:

(1) Planning/administration training for planning, programming, budgeting, management, monitoring and evaluation,

(2) Engineering/technology training for project finding, design, implementation, operation and maintenance.

Meanwhile, there are four majora means of training opportunities:

a) Overseas trainings provided by foreign donors or international organizations,

b) Outside the region trainings provided by the central level,

c) Within the region trainings provided by the district or lower level with possible assistance by the project or sectoral offices,

d) General information dissemination to the local people.

(1) Planning/Administration Training

1) Participants

- Central level : MPLD officers in Kathmandu, Pokhara Regional Directors, PPRTS staff,

- District level : district Chairman, LDO,Planning Officer, Planning Unit staff, all the main sector officers, control officer, treasury officer, Plan Formulation Committee members, Class representatives,
- Illaka level : Planning Unit Illaka staff, sector officers in the Ilalka center,
- Village level : Pradhan Panchas, Uppa P.P., village panchayat secretary,
- Ward level : Ward Chairmen, progressive farmers.

2) Means

- Overseas training
- Outside regain training
- District/Illaka level training

(2) Engineering/Technology Training

1) Participants

- District level : district sector officers/staff
- Illaka level : Illaka sector officers/staff,
- Village level : village O & M staff
- Ward level : ward O & M staff, users committee members

2) Means

- Outside region training
- District/Illaka level training
- Village/ward level training

(3) Popularization/Dissemination of Project Information

It is important firstly to let people know the existence of Lumbini IRDP. The second stage is to let them interested in the activities of IRDP. Then, third stage is to let them think it something useful for their better off. A careful arrangement of public relations and full utilization of medias are essential to make people stay at our side in a long run.

Thus, the project needs a group of staff, which consists of both central and local staff, to conduct PR activities in the project area effectively.

* Usable medias
  - Pamphlets
  - Notice boards
  - Photographs
  - School explanatory meetings
  - Field demonstrations and sample distribution
  - Exhibitions
  - Movies/slides/videos (traveling show)
  - Radio (national, local/community broadcasting)
  - T.V.broadcasting

(4) Training/PR Materials Production

In order to make the above training/PR activities effective, appropriate material preparation is imperative. A small production group which consists of project level staff and local staff together with necessary equipments is needed.

3. FINANCIAL STRENGTHENING

3.1 District Financial Management Re-assessment

Presently, the district finance is largely dependent on the grant provided by the central government. This is far from the local autonomy in terms of the financial situation. If the spirit of the Decentralization Policy is to be realized at the district level, some measures have to be taken to improve the district financial situation, together with the promotion of actual development projects/programs.

There could be two ways of improving the district financial situation by the district effort, i.e. (1) tax increase or at recast improvement of present tax collection system, and (2) starting district businesses. Probably, both measures have to be taken in order to see the significant improvement in a short run.

It is strongly advised that as town panchayat practiced their financial assessment with the support of UNDP/WB under MSTP project, the district panchayat should start from the assessment of their financial management at the early stage of the IRDP.

3.2 Development Project/Program Finance

The main purpose of the above stated financial assessment is to secure their own financial resources to promote their local development in a long run. "Supporting the district development by the district own power" is the basic principle of the Decentralization Policy.

However, in reality, the district power, particularly its financial power is weak mainly because of its weak economic base. Nevertheless, it can be said that partly because of the lack of proper support to encourage and enhance the local potentials, the district has remained under heavy dependence on the central grant particularly in their development activities.

Thus, initially it is needed to start providing development grant to the district, but in a manner that the grant(including foreign donors grant) leads to increase the district's financial income, as the result, the grant would be gradually shifted to the subsidy, and accordingly counter matching fund would be raised by the district.

At the later stage, it is expected that the district level development would be mainly financed by either its own fund or loans which would be provided by the government banks, commercial banks and even International banks. The Agricultural Development Bank of Nepal(ADBN) activities(especially in their SFDP) show a good potential existing even at the bottom level of the rural areas.

3.3 Personnel Reinforcement Finance

It is stressed, in the previous section, the importance of the well trained manpower to be retained at the district level in order to promote the expected level of development activities. The present situation of heavy manpower dependence on the central level does not help, in a long run, to create a self-propelling development system at the district level, which is the main point of the Decentralization Policy.

However, it is not easy to create a system to accumulate needed human resources at the district level, mainly because of the financial problem. Since the donor can provide training but cannot provide personnel salary and allowances according to the recent regulation(this is reasonable from the sustainability point of view), only presently possible financial source to retain the trained manpower at the district level is the central government grant.

Thus practically, it is suggested that the recruitment and the promotion system of the staff presently assigned to the district level by the central government should be altered. The local recruitment should be encouraged to the posts which are desirable to be managed by the district. The replacement of the existing centrally controlled posts by the locally recruited thus not being transferred persons may bring significant positive impact to the district level development movement.

In order to reinforce the district level trained manpower, substantial increase of the central grants in both training and retaining is essential, especially at the early stage of the IRDP. The training part can be covered by the donor fund, yet trained manpower retaining costs has to be supported by the central level until the district can support their own needed manpower costs.

TABLES

Table G.1 Necessary Human Resources by Sector and Level

		CENTRAL plan	LEVEL (present)	DISTRICT plan	LEVEL (present)	ILLAKA plan	LEVEL (present)	VILLAGE plan	LEVEL (present)	WARD plan	LEVEL (present)	plan	TOTAL (present)
AGRI	Gulmi	0	0	18	9	54	26	95	75	1777	0	1944	110
	Arghakhan	0	0	18	9	54	26	49	40	923	0	1044	75
	Kapilvast	0	0	18	9	54	27	95	75	1777	0	1944	111
	National	2	0	0	0	0	0	0	0	0	0	2	0
	Sub-total	2	0	54	27	162	79	239	190	4477	0	4934	296
LIVE	Gulmi	0	0	20	5	18	7	0	0	711	0	749	12
	Arghakhan	0	0	20	4	18	7	0	0	369	0	407	11
	Kapilvast	0	0	21	5	18	7	0	0	711	0	750	12
	National	9	0	0	0	0	0	0	0	0	0	9	0
	Sub-total	9	0	61	14	54	21	0	0	1791	0	1915	35
MARKET	Gulmi	10	10	10	4	27	18	3	0	0	0	50	32
	Arghakhan	10	10	10	4	27	12	3	0	0	0	50	26
	Kapilvast	10	10	10	4	57	57	3	3	0	0	80	74
	National	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	30	30	30	12	111	87	9	3	0	0	180	132
ROAD	Gulmi	0	0	14	9	27	0	0	0	2000	0	2041	9
	Arghakhan	0	0	14	9	27	0	0	0	2000	0	2041	9
	Kapilvast	0	0	14	9	27	0	0	0	2000	0	2041	9
	National	2	0	0	0	0	0	0	0	0	0	2	0
	Sub-total	2	0	42	27	81	0	0	0	6000	0	6125	27
IRRI	Gulmi	0	0	6	3	0	0	8	0	24	0	38	3
	Arghakhan	0	0	6	3	0	0	4	0	12	0	22	3
	Kapilvast	0	0	11	3	0	0	100	0	300	0	411	3
	National	1	0	0	0	0	0	0	0	0	0	1	0
	Sub-total	1	0	23	9	0	0	112	0	336	0	472	9
WATER	Gulmi	0	0	52	25	0	0	237	0	1580	0	1869	25
	Arghakhan	0	0	49	25	0	0	123	0	820	0	992	25
	Kapilvast	0	0	79	40	0	0	0	0	0	0	79	40
	National	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	0	180	90	0	0	360	0	2400	0	2940	90
TOTAL	Gulmi	10	10	120	55	126	51	343	75	6092	0	6691	191
	Arghakhan	10	10	117	54	126	45	179	40	4124	0	4556	149
	Kapilvast	10	10	153	70	156	91	198	78	4788	0	5305	249
	National	14	0	0	0	0	0	0	0	0	0	14	0
	Grd-total	44	30	390	179	408	187	720	193	15004	0	16566	589

Table G.2 Necessary Human Resources by District and Level

	CENTRAL plan	LEVEL (present)	DISTRICT plan	LEVEL (present)	ILLAKA plan	LEVEL (present)	VILLAGE plan	LEVEL (present)	WARD plan	LEVEL (present)	plan	TOTAL (present)
Agricultu	0	0	18	9	54	26	95	75	1777	0	1944	110
Livestock	0	0	20	5	18	7	0	0	711	0	749	12
Marketing	10	10	10	4	27	18	3	0	0	0	50	32
Gulmi Road	0	0	14	9	27	0	0	0	2000	0	2041	9
Irrigatio	0	0	6	3	0	0	8	0	24	0	38	3
Water sup	0	0	52	25	0	0	237	0	1580	0	1869	25
Sub-total	10	10	120	55	126	51	343	75	6092	0	6691	191
Agricultu	0	0	18	9	54	26	49	40	923	0	1044	75
Livestock	0	0	20	4	18	7	0	0	369	0	407	11
Marketing	10	10	10	4	27	12	3	0	0	0	50	26
ArghakRoad	0	0	14	9	27	0	0	0	2000	0	2041	9
Irrigatio	0	0	6	3	0	0	4	0	12	0	22	3
Water sup	0	0	49	25	0	0	123	0	820	0	992	25
Sub-total	10	10	117	54	126	45	179	40	4124	0	4556	149
Agricultu	0	0	18	9	54	27	95	75	1777	0	1944	111
Livestock	0	0	21	5	18	7	0	0	711	0	750	12
Marketing	10	10	10	4	57	57	3	3	0	0	80	74
KapilvRoad	0	0	14	9	27	0	0	0	2000	0	2041	9
Irrigatio	0	0	11	3	0	0	100	0	300	0	411	3
Water sup	0	0	79	40	0	0	0	0	0	0	79	40
Sub-total	10	10	153	70	156	91	198	78	4788	0	5305	249
Agricultu	2	0	0	0	0	0	0	0	0	0	2	0
Livestock	9	0	0	0	0	0	0	0	0	0	9	0
Marketing	0	0	0	0	0	0	0	0	0	0	0	0
NationRoad	2	0	0	0	0	0	0	0	0	0	2	0
Irrigatio	1	0	0	0	0	0	0	0	0	0	1	0
Water sup	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	14	0	0	0	0	0	0	0	0	0	14	0
Agricultu	2	0	54	27	162	79	239	190	4477	0	4934	296
Livestock	9	0	61	14	54	21	0	0	1791	0	1915	35
Marketing	30	30	30	12	111	87	9	3	0	0	180	132
Total Road	2	0	42	27	81	0	0	0	6000	0	6125	27
Irrigatio	1	0	23	9	0	0	112	0	336	0	472	9
Water sup	0	0	180	90	0	0	360	0	2400	0	2940	90
Grd-total	44	30	390	179	408	187	720	193	15004	0	16566	589

Table G.3 Necessary Human Resources by Sector and Class

		DISTRICT/ILLAKA LEVEL						VILLAGE/WARD LEVEL				
		GAZET.2	GAZET.3	NONGAZ.1	NONGAZ.2	NONGAZ.3	SUBTOTAL	CENTAL	SKILLED	UNSKILLED	SUBTOTAL	TOTAL
AGRI	Gulmi	1	5	22	44	0	72	0	95	1777	1872	1944
	Arghakhan	1	5	22	44	0	72	0	49	923	972	1044
	Kapilvast	1	5	22	44	0	72	0	95	1777	1872	1944
	National	1	1	0	0	0	2	0	0	0	0	2
	Sub-total	4	16	66	132	0	218	0	239	4477	4716	4934
LIVE	Gulmi	1	2	16	19	0	38	0	0	711	711	749
	Arghakhan	1	2	16	19	0	38	0	0	369	369	407
	Kapilvast	1	2	17	19	0	39	0	0	711	711	750
	National	1	2	2	4	0	9	0	0	0	0	9
	Sub-total	4	8	51	61	0	124	0	0	1791	1791	1915
MARKET	Gulmi	4	4	13	13	13	47	3	0	0	3	50
	Arghakhan	4	4	13	13	13	47	3	0	0	3	50
	Kapilvast	4	4	23	23	23	77	3	0	0	3	80
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	12	12	49	49	49	171	9	0	0	9	180
ROAD	Gulmi	1	4	1	14	21	41	0	0	2000	2000	2041
	Arghakhan	1	4	1	14	21	41	0	0	2000	2000	2041
	Kapilvast	1	4	1	14	21	41	0	0	2000	2000	2041
	National	1	1	0	0	0	2	0	0	0	0	2
	Sub-total	4	13	3	42	63	125	0	0	6000	6000	6125
IRRI	Gulmi	1	1	2	2	0	6	0	8	24	32	38
	Arghakhan	1	1	2	2	0	6	0	4	12	16	22
	Kapilvast	1	2	3	5	0	11	0	100	300	400	411
	National	1	0	0	0	0	1	0	0	0	0	1
	Sub-total	4	4	7	9	0	24	0	112	336	448	472
WATER	Gulmi	1	4	6	16	25	52	0	237	1580	1817	1869
	Arghakhan	1	4	6	16	22	49	0	123	820	943	992
	Kapilvast	1	6	10	24	38	79	0	0	0	0	79
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	3	14	22	56	85	180	0	360	2400	2760	2940
TOTAL	Gulmi	9	20	60	108	59	256	3	340	6092	6435	6691
	Arghakhan	9	20	60	108	56	253	3	176	4124	4303	4556
	Kapilvast	9	23	76	129	82	319	3	195	4788	4986	5305
	National	4	4	2	4	0	14	0	0	48	0	14
	Grd-total	31	67	198	349	197	842	9	711	15004	15724	16566

Table G.4 Existing Human Resources by Sector and Class

		DISTRICT/ILLAKA LEVEL						VILLAGE/WARD LEVEL				
		GAZET.2	GAZET.3	NONGAZ.1	NONGAZ.2	NONGAZ.3	SUBTOTAL	CENTAL	SKILLED	UNSKILLED	SUBTOTAL	TOTAL
AGRI	Gulmi	1	2	11	26	0	40	0	70	0	70	110
	Arghakhan	1	1	10	17	0	29	0	41	0	41	70
	Kapilvast	1	2	12	22	0	37	0	79	0	79	116
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	3	5	33	65	0	106	0	190	0	190	296
LIVE	Gulmi	0	1	0	9	0	10	0	0	0	0	10
	Arghakhan	0	1	0	9	0	10	0	0	0	0	10
	Kapilvast	1	1	1	12	0	15	0	0	0	0	15
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	1	3	1	30	0	35	0	0	0	0	35
MARKET	Gulmi	2	3	9	9	9	32	0	0	0	0	32
	Arghakhan	2	3	7	7	7	26	0	0	0	0	26
	Kapilvast	2	3	22	22	22	71	3	0	0	3	74
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	6	9	38	38	38	129	3	0	0	3	132
ROAD	Gulmi	1	2	1	2	3	9	0	0	0	0	9
	Arghakhan	1	2	1	2	3	9	0	0	0	0	9
	Kapilvast	1	2	1	2	3	9	0	0	0	0	9
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	3	6	3	6	9	27	0	0	0	0	27
IRRI	Gulmi	0	1	2	0	0	3	0	0	0	0	3
	Arghakhan	0	1	2	0	0	3	0	0	0	0	3
	Kapilvast	0	1	2	0	0	3	0	0	0	0	3
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	3	6	0	0	9	0	0	0	0	9
WATER	Gulmi	1	2	3	12	11	29	0	0	0	0	29
	Arghakhan	1	2	3	10	11	27	0	0	0	0	27
	Kapilvast	1	3	5	12	13	34	0	0	0	0	34
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	3	7	11	34	35	90	0	0	0	0	90
TOTAL	Gulmi	5	11	26	58	23	123	0	70	0	70	193
	Arghakhan	5	10	23	45	21	104	0	41	0	41	145
	Kapilvast	6	12	43	70	38	169	3	79	0	82	251
	National	0	0	0	0	0	0	0	0	0	0	0
	Grd-total	16	33	92	173	82	396	3	190	0	193	589

Table G.5 Development Need of Human Resources by Sector and Class

		DISTRICT/ILLAKA LEVEL						VILLAGE/WARD LEVEL				
		GAZET.2	GAZET.3	NONGAZ.1	NONGAZ.2	NONGAZ.3	SUBTOTAL	CENTAL	SKILLED	UNSKILLED	SUBTOTAL	TOTAL
AGRI	Gulmi	0	3	11	18	0	32	0	25	1777	1802	1834
	Arghakhan	0	4	12	27	0	43	0	8	923	931	974
	Kapilvast	0	3	10	22	0	35	0	16	1777	1793	1828
	National	1	1	0	0	0	2	0	0	0	0	2
	Sub-total	1	11	33	67	0	112	0	49	4477	4526	4638
LIVE	Gulmi	1	1	16	10	0	28	0	0	711	711	739
	Arghakhan	1	1	16	10	0	28	0	0	369	369	397
	Kapilvast	0	1	16	7	0	24	0	0	711	711	735
	National	1	2	2	4	0	9	0	0	0	0	9
	Sub-total	3	5	50	31	0	89	0	0	1791	1791	1880
MARKET	Gulmi	2	1	4	4	4	15	3	0	0	3	18
	Arghakhan	2	1	6	6	6	21	3	0	0	3	24
	Kapilvast	2	1	1	1	1	6	0	0	0	0	6
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	6	3	11	11	11	42	6	0	0	6	48
ROAD	Gulmi	0	2	0	12	18	32	0	0	2000	2000	2032
	Arghakhan	0	2	0	12	18	32	0	0	2000	2000	2032
	Kapilvast	0	2	0	12	18	32	0	0	2000	2000	2032
	National	1	1	0	0	0	2	0	0	0	0	2
	Sub-total	1	7	0	36	54	98	0	0	6000	6000	6098
IRRI	Gulmi	1	0	0	2	0	3	0	8	24	32	35
	Arghakhan	1	0	0	2	0	3	0	4	12	16	19
	Kapilvast	1	1	1	5	0	8	0	100	300	400	408
	National	1	0	0	0	0	1	0	0	0	0	1
	Sub-total	4	1	1	9	0	15	0	112	336	448	463
WATER	Gulmi	0	2	3	4	14	23	0	237	1580	1817	1840
	Arghakhan	0	2	3	6	11	22	0	123	820	943	965
	Kapilvast	0	3	5	12	25	45	0	0	0	0	45
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	7	11	22	50	90	0	360	2400	2760	2850
TOTAL	Gulmi	4	9	34	50	36	133	3	270	6092	6365	6498
	Arghakhan	4	10	37	63	35	149	3	135	4124	4262	4411
	Kapilvast	3	11	33	59	44	150	0	116	4788	4904	5054
	National	4	4	2	4	0	14	0	0	48	0	14
	Grd-total	15	34	106	176	115	446	6	521	15004	15531	15977

Table G.6 Salary Scale of HMG of Nepal (Per Month : Rs.)

		DISTRICT/ILLAKA LEVEL					VILLAGE/WARD LEVEL		
		GAZET.2	GAZET.3	NONGAZ.1	NONGAZ.2	NONGAZ.3-SUBTOTAL	CENTAL	SKILLED	UNSKILLEDSUBTOTAL TOTAL
	Gulmi	2700	2200	1200	1000	900	1000	500	
	Arghakhan	2700	2200	1200	1000	900	1000	500	
AGRI	Kapilvast	2700	2200	1200	1000	900	1000	500	
	National	2700	2200	1200	1000	900	1000	500	
	Sub-total	2700	2200	1200	1000	900	1000	500	
	Gulmi	2700	2200	1200	1000	900	1000	500	
	Arghakhan	2700	2200	1200	1000	900	1000	500	
LIVE	Kapilvast	2700	2200	1200	1000	900	1000	500	
	National	2700	2200	1200	1000	900	1000	500	
	Sub-total	2700	2200	1200	1000	900	1000	500	
	Gulmi	2700	2200	1200	1000	900	1000	500	
	Arghakhan	2700	2200	1200	1000	900	1000	500	
MARKET	Kapilvast	2700	2200	1200	1000	900	1000	500	
	National	2700	2200	1200	1000	900	1000	500	
	Sub-total	2700	2200	1200	1000	900	1000	500	
	Gulmi	2700	2200	1200	1000	900	1000	500	
	Arghakhan	2700	2200	1200	1000	900	1000	500	
ROAD	Kapilvast	2700	2200	1200	1000	900	1000	500	
	National	2700	2200	1200	1000	900	1000	500	
	Sub-total	2700	2200	1200	1000	900	1000	500	
	Gulmi	2700	2200	1200	1000	900	1000	500	
	Arghakhan	2700	2200	1200	1000	900	1000	500	
IRRI	Kapilvast	2700	2200	1200	1000	900	1000	500	
	National	2700	2200	1200	1000	900	1000	500	
	Sub-total	2700	2200	1200	1000	900	1000	500	
	Gulmi	2700	2200	1200	1000	900	1000	500	
	Arghakhan	2700	2200	1200	1000	900	1000	500	
WATER	Kapilvast	2700	2200	1200	1000	900	1000	500	
	National	2700	2200	1200	1000	900	1000	500	
	Sub-total	2700	2200	1200	1000	900	1000	500	
	Gulmi	2700	2200	1200	1000	900	1000	500	
	Arghakhan	2700	2200	1200	1000	900	1000	500	
TOTAL	Kapilvast	2700	2200	1200	1000	900	1000	500	
	National	2700	2200	1200	1000	900	1000	500	
	Grd-total	2700	2200	1200	1000	900	1000	500	

Table G.7 Monthly Expenditure for Extra Human Resources

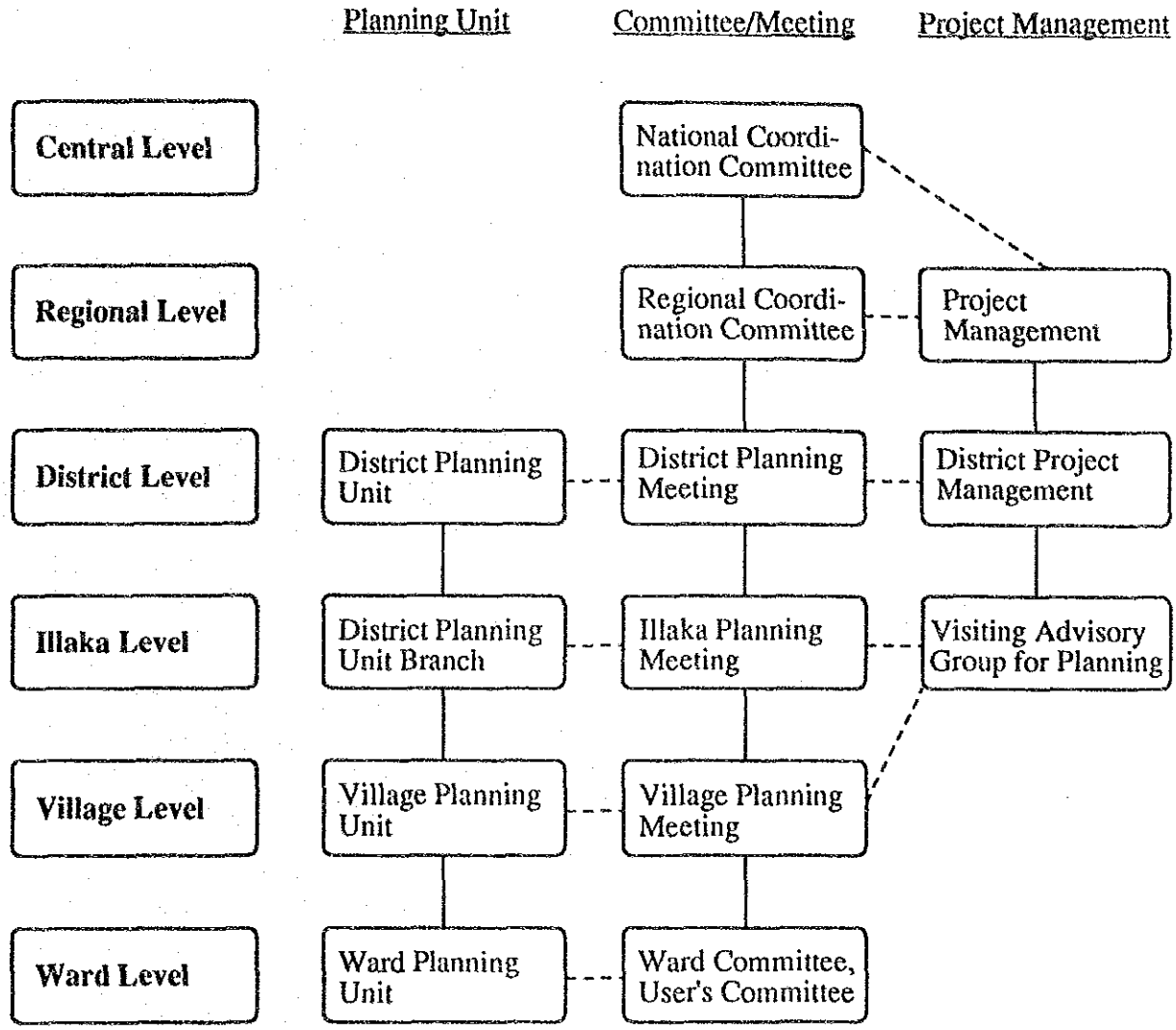
		DISTRICT/ILLAKA LEVEL						VILLAGE/WARD LEVEL				
		GAZET.2	GAZET.3	NONGAZ.1	NONGAZ.2	NONGAZ.3	SUBTOTAL	CENTAL	SKILLED	UNSKILLED	SUBTOTAL	TOTAL
	Gulmi	0	6600	13200	18000	0	37800	0	12500	0	12500	50300
	Arghakhan	0	8800	14400	27000	0	50200	0	4000	0	4000	54200
AGRI	Kapilvast	0	6600	12000	22000	0	40600	0	8000	0	8000	48600
	National	2700	2200	0	0	0	4900	0	0	0	0	4900
	Sub-total	2700	24200	39600	67000	0	133500	0	24500	0	24500	158000
	Gulmi	2700	2200	19200	10000	0	34100	0	0	0	0	34100
	Arghakhan	2700	2200	19200	10000	0	34100	0	0	0	0	34100
LIVE	Kapilvast	0	2200	19200	7000	0	28400	0	0	0	0	28400
	National	2700	4400	2400	4000	0	13500	0	0	0	0	13500
	Sub-total	8100	11000	60000	31000	0	110100	0	0	0	0	110100
	Gulmi	5400	2200	4800	4000	3600	20000	3000	0	0	3000	23000
	Arghakhan	5400	2200	7200	6000	5400	26200	3000	0	0	3000	29200
MARKET	Kapilvast	5400	2200	1200	1000	900	10700	0	0	0	0	10700
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	16200	6600	13200	11000	9900	56900	6000	0	0	6000	62900
	Gulmi	0	4400	0	12000	16200	32600	0	0	0	0	32600
	Arghakhan	0	4400	0	12000	16200	32600	0	0	0	0	32600
ROAD	Kapilvast	0	4400	0	12000	16200	32600	0	0	0	0	32600
	National	2700	2200	0	0	0	4900	0	0	0	0	4900
	Sub-total	2700	15400	0	36000	48600	102700	0	0	0	0	102700
	Gulmi	2700	0	0	2000	0	4700	0	4000	0	4000	8700
	Arghakhan	2700	0	0	2000	0	4700	0	2000	0	2000	6700
IRRI	Kapilvast	2700	2200	1200	5000	0	11100	0	50000	0	50000	61100
	National	2700	0	0	0	0	2700	0	0	0	0	2700
	Sub-total	10800	2200	1200	9000	0	23200	0	56000	0	56000	79200
	Gulmi	0	4400	3600	4000	12600	24600	0	118500	0	118500	143100
	Arghakhan	0	4400	3600	6000	9900	23900	0	61500	0	61500	85400
WATER	Kapilvast	0	6600	6000	12000	22500	47100	0	0	0	0	47100
	National	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	15400	13200	22000	45000	95600	0	180000	0	180000	275600
	Gulmi	10800	19800	40800	50000	32400	153800	3000	135000	0	138000	291800
	Arghakhan	10800	22000	44400	63000	31500	171700	3000	67500	0	70500	242200
TOTAL	Kapilvast	8100	24200	39600	59000	39600	170500	0	58000	0	58000	228500
	National	10800	8800	2400	4000	0	26000	0	0	0	0	26000
	Grd-total	40500	74800	127200	176000	103500	522000	6000	260500	0	266500	788500

TOTAL MONTHLY SALARY 788500 X 12 MONTHs = NRs. 9462000 PER YEAR

9.46 million X 15 yrs = NRs.141.9 million

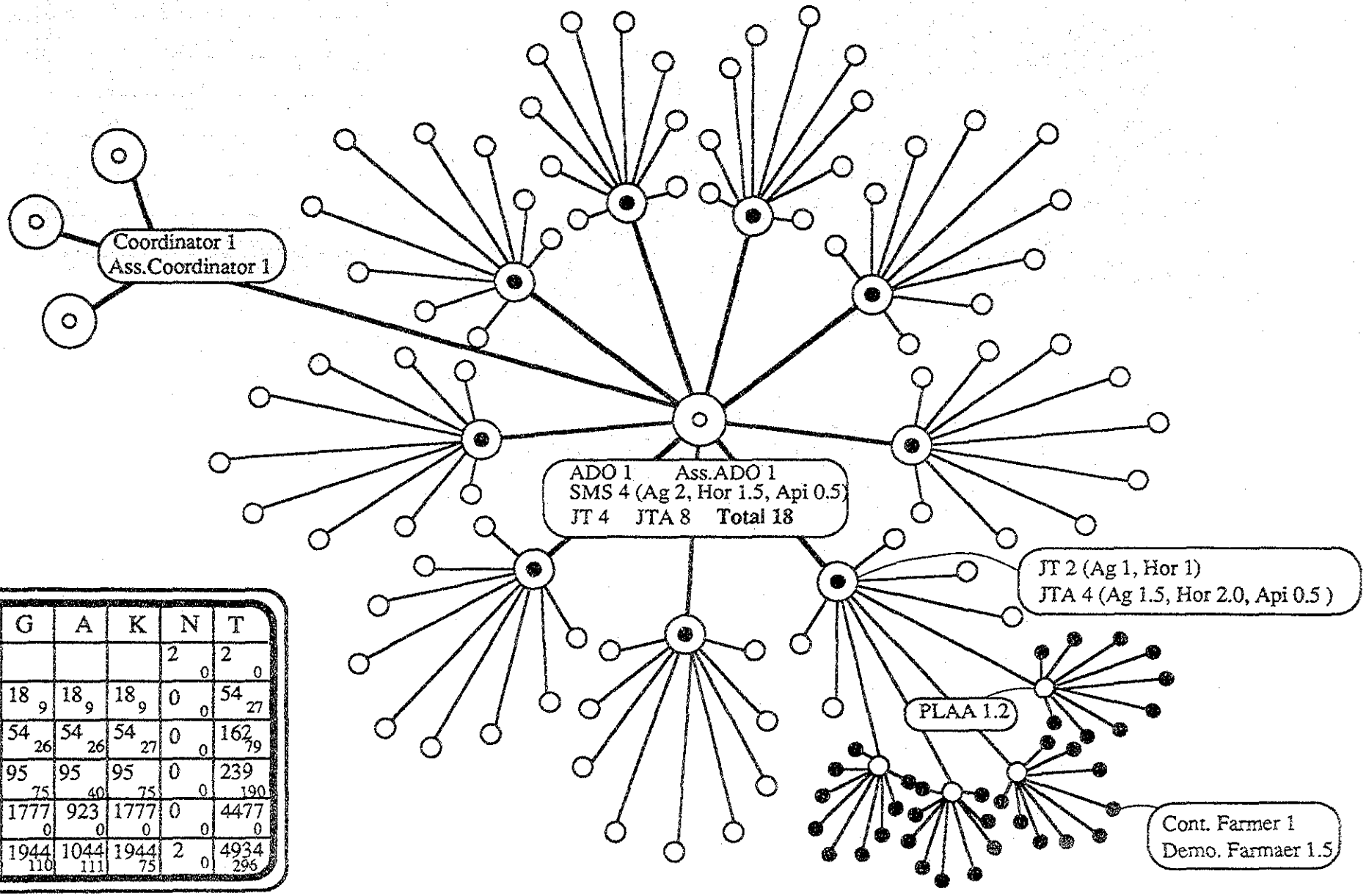
FIGURES

Fig. G. 1 Organization Chart of Lumbini IRDP



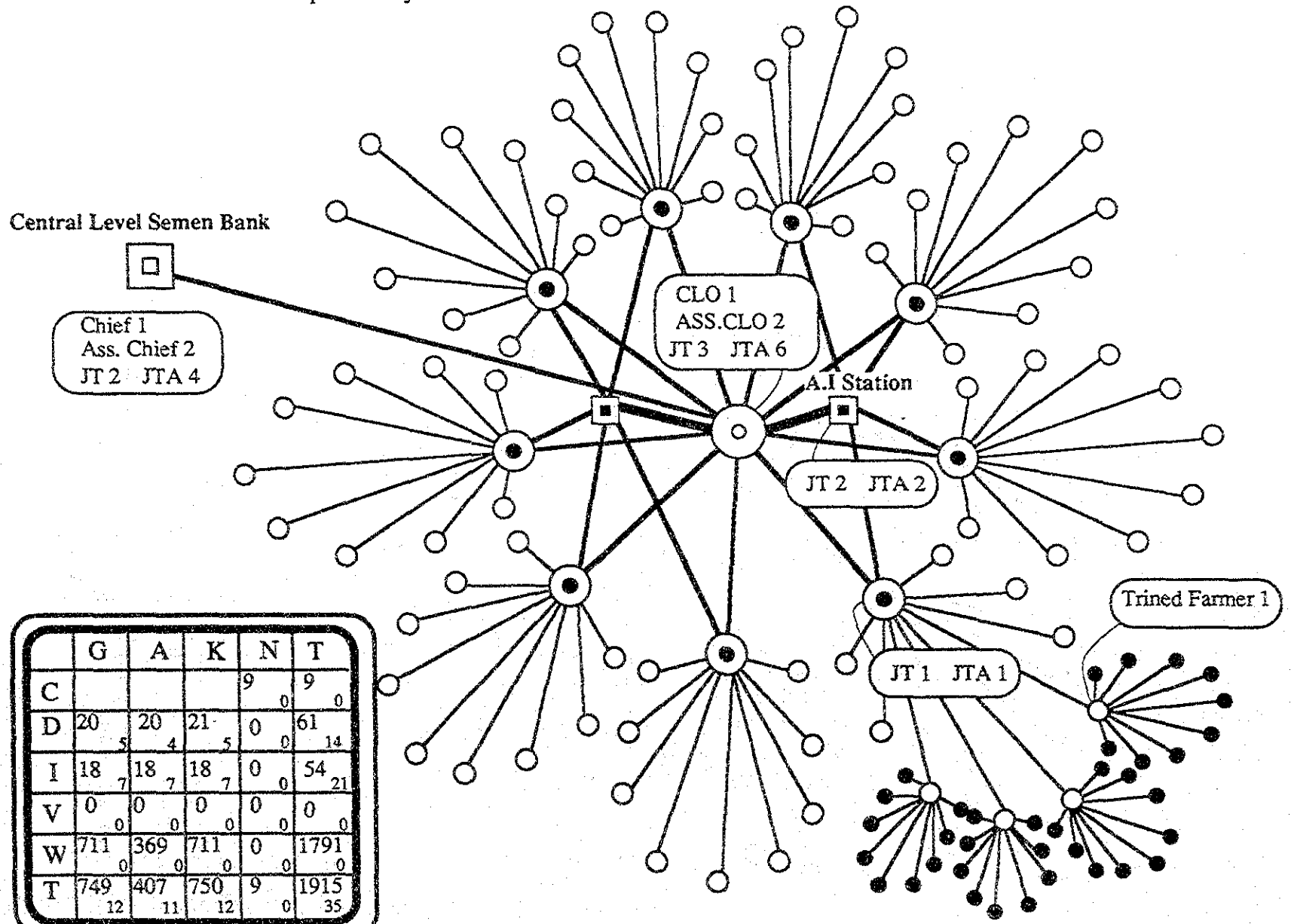
CHARTS

Chart : 1 Agricultural Extension System in the District Level



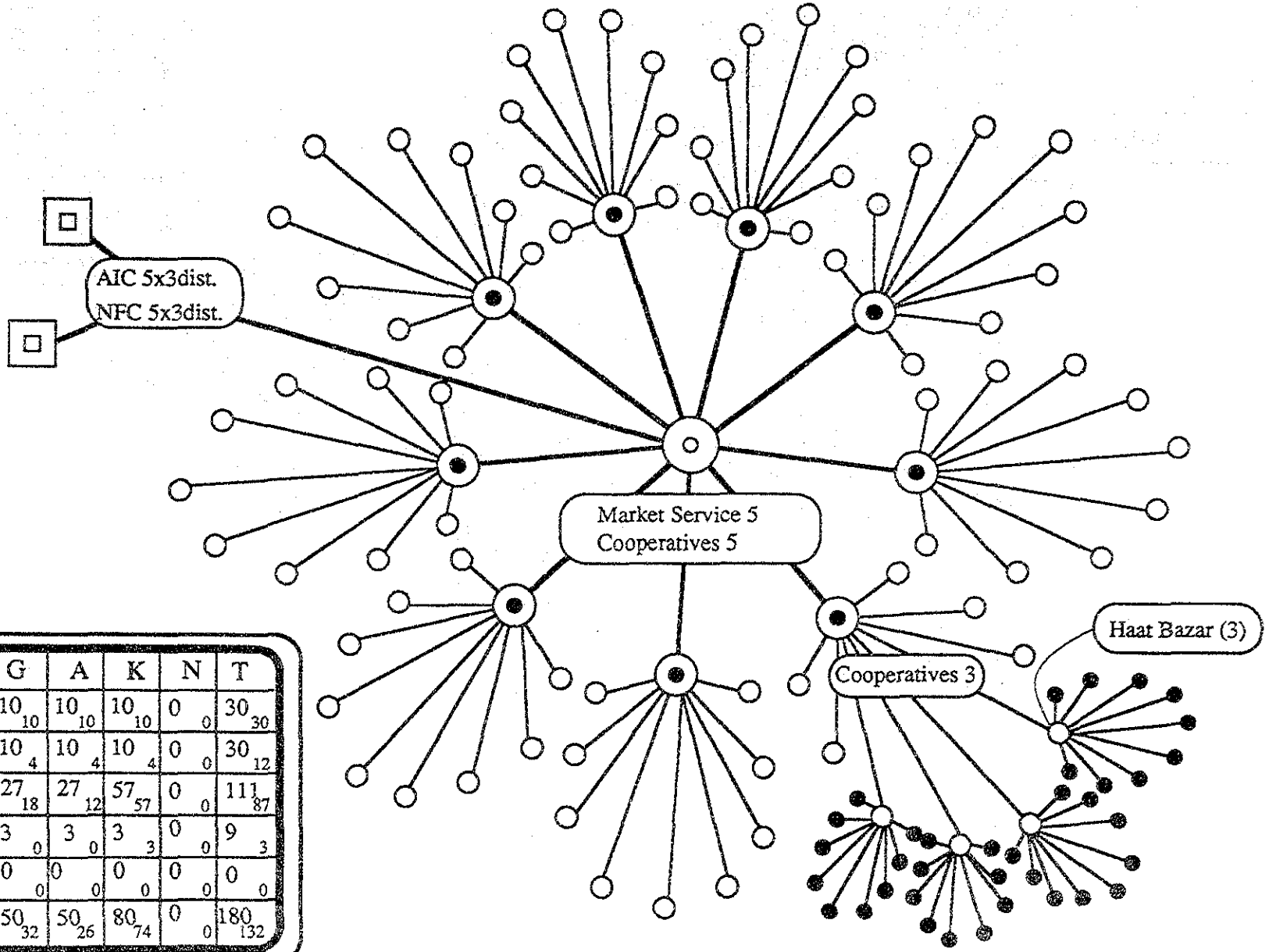
	G	A	K	N	T
C				2 (0)	2 (0)
D	18 (9)	18 (9)	18 (9)	0 (0)	54 (27)
I	54 (26)	54 (26)	54 (27)	0 (0)	162 (79)
V	95 (75)	95 (40)	95 (75)	0 (0)	239 (190)
W	1777 (0)	923 (0)	1777 (0)	0 (0)	4477 (0)
T	1944 (110)	1044 (111)	1944 (75)	2 (0)	4934 (296)

Chart : 2 Livestock Development System in the District Level



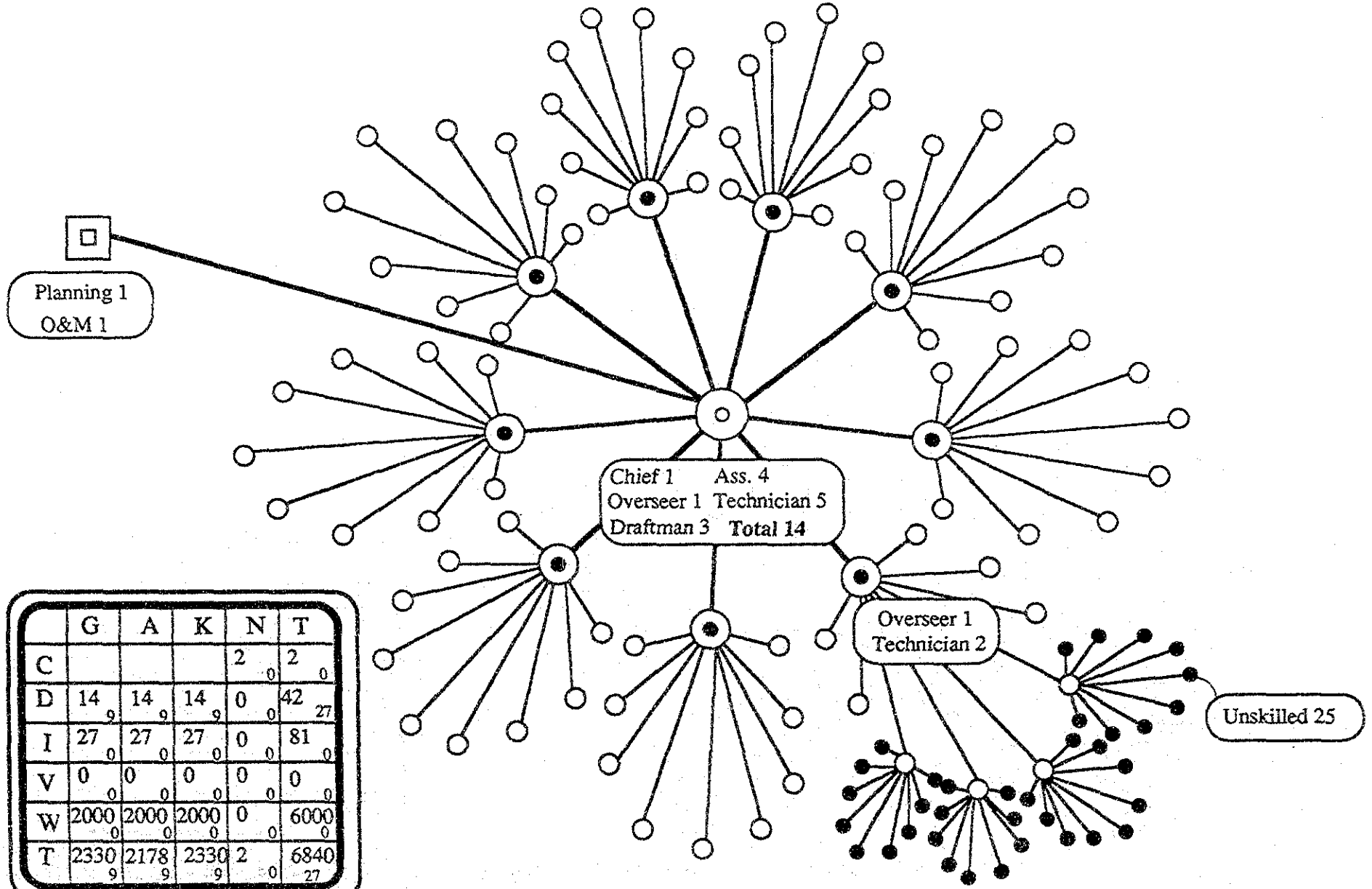
	G	A	K	N	T
C				9 0	9 0
D	20 5	20 4	21 5	0 0	61 14
I	18 7	18 7	18 7	0 0	54 21
V	0 0	0 0	0 0	0 0	0 0
W	711 0	369 0	711 0	0 0	1791 0
T	749 12	407 11	750 12	9 0	1915 35

Chart : 3 Marketing System of Agricultural Inputs and Products in the District Level



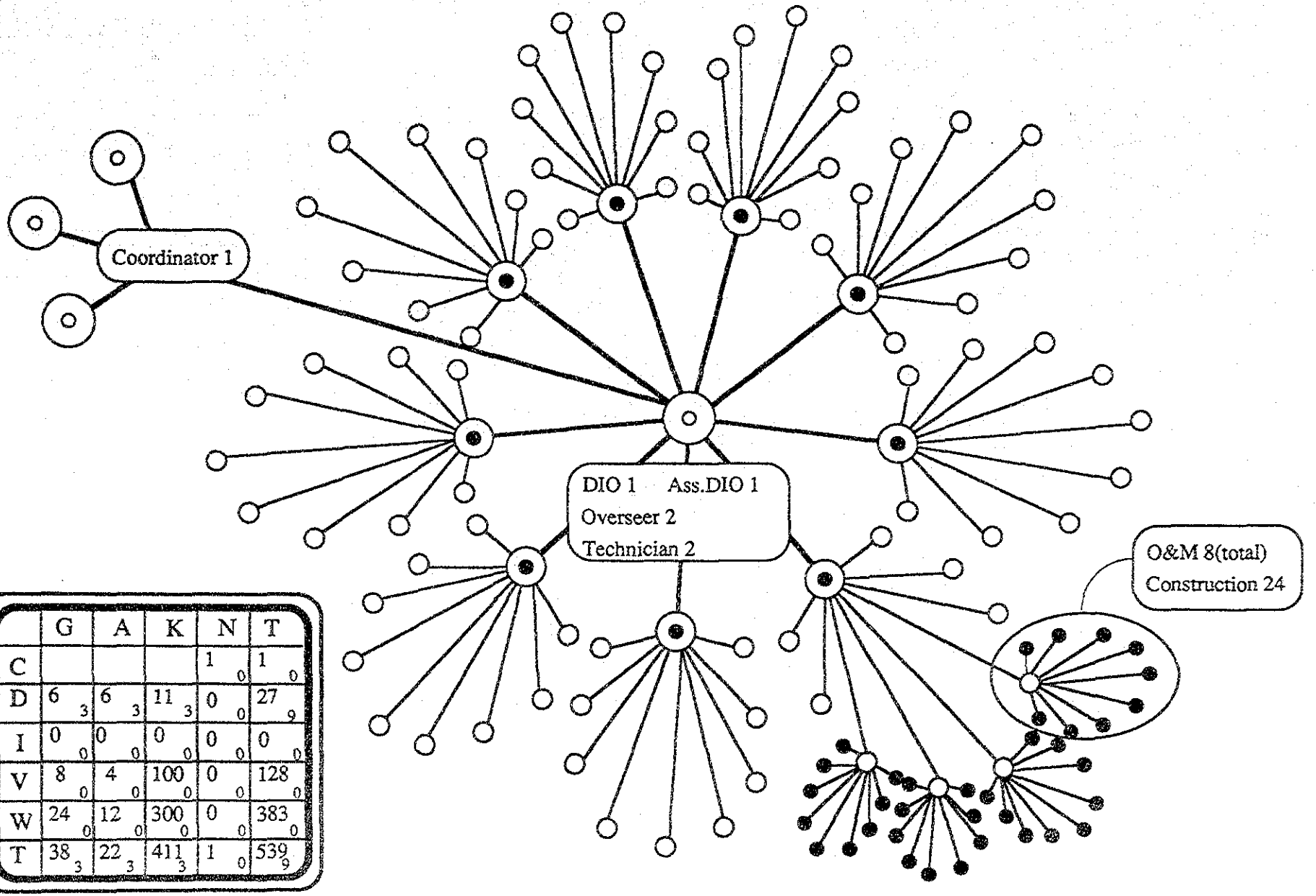
	G	A	K	N	T
C	10_{10}	10_{10}	10_{10}	0_{0}	30_{30}
D	10_{4}	10_{4}	10_{4}	0_{0}	30_{12}
I	27_{18}	27_{12}	57_{57}	0_{0}	111_{87}
V	3_{0}	3_{0}	3_{3}	0_{0}	9_{3}
W	0_{0}	0_{0}	0_{0}	0_{0}	0_{0}
T	50_{32}	50_{26}	80_{74}	0_{0}	180_{132}

Chart : 4 Rural Road Development System in the District Level



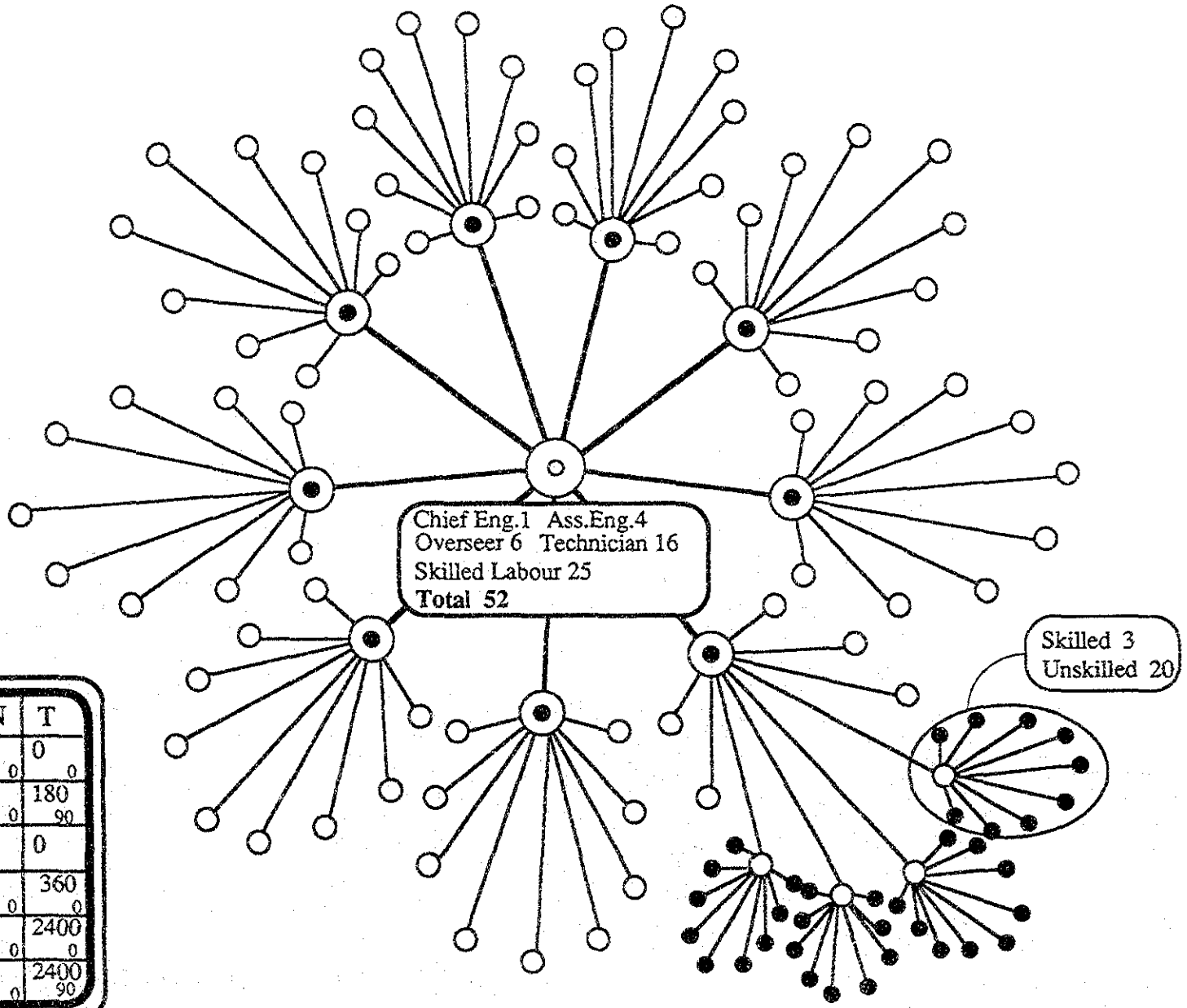
	G	A	K	N	T
C				2 0	2 0
D	14 9	14 9	14 9	0 0	42 27
I	27 0	27 0	27 0	0 0	81 0
V	0 0	0 0	0 0	0 0	0 0
W	2000 0	2000 0	2000 0	0 0	6000 0
T	2330 9	2178 9	2330 9	2 0	6840 27

Chart : 5 Irrigation Development System in the District Level



	G	A	K	N	T
C				1 0	1 0
D	6 3	6 3	11 3	0 0	27 9
I	0 0	0 0	0 0	0 0	0 0
V	8 0	4 0	100 0	0 0	128 0
W	24 0	12 0	300 0	0 0	383 0
T	38 3	22 3	411 3	1 0	539 9

Chart : 6 Rural Water Supply in the District Level



	G	A	K	N	T
C				0 0	0 0
D	52 25	49 25	79 40	0 0	180 90
I	0	0	0	0	0
V	237 0	123 0	0 0	0 0	360 0
W	1580 0	820 0	0 0	0 0	2400 0
T	1869 25	992 25	79 40	0 0	2400 90

ANNEX H

LIST OF PANCHYAT

THE MASTER PLAN STUDY
ON
THE INTEGRATED RURAL DEVELOPMENT PROJECT
IN
THE LUMBINI ZONE

ANNEX H LIST 0F PANCHAYAT

LIST OF TABLES

LIST OF FIGURES

TABLES

Table H.1 District Data

	District	Number of Panchayat	Area (km^2)	Population		
				1981 Census	Estimation 1990	Estimation 2005
a)	Gulmi	79	1,079	238,100	257,500	284,100
b)	Arahakhanchi	41	1,233	157,300	178,300	207,700
c)	Kapilbastu	79	1,757	270,000	331,800	438,000
d)	Marchawar (Rupandehi)	23	144	69,390	96,200	149,900
	Total	222	4,213	734,790	863,800	1,079,700

Table H.2 List of Panchayat in Gulmi District (1/2)

No.	Ilaka No.	Name of Village	Area (ha)	Population 1981 Census	Population Estimation 1990	Population Estimation 2005
1	1-1	Musikot	1,260	5,998	6,502	7,220
2	-2	Badagaon	1,297	5,585	6,054	6,722
3	-3	Hastichaur	2,789	2,732	2,962	3,289
4	-4	Arkhale	2,227	4,713	5,109	5,673
5	-5	Tamghas*, **	1,040	4,199	4,552	5,054
6	-6	Paralmi	1,101	2,176	2,359	2,620
7	-7	Jubhung	1,517	3,703	4,013	4,456
8	-8	Balithum	1,578	3,138	3,402	3,778
9	2-1	Bhanbhane	1,529	2,738	2,968	3,295
10	-2	Hadhade	1,639	2,966	3,215	3,570
11	-3	Pipaldhara	1,162	2,642	2,864	3,180
12	-4	Nayagaon	1,835	3,926	4,256	4,726
13	-5	Dhurkot Rajasthal*	1,113	2,467	2,674	2,969
14	-6	Wagla	1,150	2,903	3,147	3,495
15	-7	Bastu	1,113	6,119	6,633	7,364
16	-8	Jaisithok	734	-	-	-
17	3-1	Aglung**	2,006	2,755	2,987	3,317
18	-2	Banjh Kateri	1,676	4,497	4,875	5,413
19	-3	Myal Pokhari	820	-	-	-
20	-4	Malayagiri	991	-	-	-
21	-5	Daha Purkot	2,019	3,881	4,207	4,671
22	-6	Sirsen	1,541	2,747	2,978	3,307
23	-7	Mayvung	1,468	3,226	3,497	3,883
24	-8	Arkhawang	612	-	-	-
25	-9	Hwangdi	1,272	2,502	2,712	3,012
26	4-1	Darling	587	n.a.	-	-
27	-2	Neta	1,431	-	-	-
28	-3	Chhapile	1,321	-	-	-
29	-4	Dhamir	905	-	-	-
30	-5	Arjai	551	4,504	4,882	5,451
31	-6	Amarpur	1,957	-	-	-
32	-7	Jasma Rajashal	612	4,526	4,958	5,505
33	-8	Dohali	1,737	2,508	2,719	3,019
34	-9	Paudiamarai**	1,762	4,063	4,404	4,890
35	-10	Darlamchaur	1,101	-	-	-
36	5-1	Arlangkot	1,921	n.a.	-	-
37	-2	Wamitaksar	2,483	4,596	4,982	5,532
38	-3	Kurgha	758	2,330	2,526	3,892
39	-4	Anpchaur*	1,285	3,602	3,905	4,336
40	-5	Dibrung	1,468	n.a.	-	-
41	-6	Bisukharka	893	3,737	4,551	5,053
42	-7	Harrachaur	1,101	-	-	-
43	-8	Turang	2,116	4,769	5,170	5,741
44	-9	Shantipur**	636	3,571	3,871	4,298
45	-10	Harewa	918	-	-	-

Note: *: sample panchayats for the Socio-economic Survey.
**: sample panchayats selected by HMG/N.

Table H.2 List of Panchayat in Gulmi District (2/2)

No.	Ilaka No.	Name of Village	Area (ha)	Population 1981 Census	Population Estimation 1990	Population Estimation 2005
46	6-1	Thulo Limpek	2,801	6,267	6,793	7,542
47	-2	Aslewa	1,003	2,847	3,086	3,427
48	-3	Linwa	1,297	3,233	3,505	3,892
49	-4	Hasara*, **	1,248	2,649	2,872	3,189
50	-5	Juhang	1,015	n.a.	-	-
51	-6	Juniya	905	2,430	2,634	2,925
52	-7	Bharse	2,116	3,112	3,373	3,745
53	-8	Rupakot	1,150	3,319	3,598	3,995
54	7-1	Gwadha	1,444	5,481	5,941	6,597
55	-2	Bhutung**	1,664	3,804	4,124	4,579
56	-3	Khadagkot	1,835	4,379	4,747	5,271
57	-4	Foksingkot	1,174	2,855	3,095	3,437
58	-5	Purtighat	1,223	n.a.	-	-
59	-6	Jayakhani	1,346	-	-	-
60	-7	Arbeni	1,223	2,702	2,929	3,252
61	-8	Harmichaur	1,713	1,931	2,093	2,324
62	8-1	Pallikot	758	-	-	-
63	-2	Hunga	1,456	3,720	4,033	4,476
64	-3	Digam*, **	1,370	3,878	4,204	4,668
65	-4	Wamgha	1,285	-	-	-
66	-5	Rimuwa	832	2,210	2,396	2,661
67	-6	Gwadi	1,468	2,893	3,136	3,482
68	-7	Ruru	1,236	3,859	4,183	4,645
69	-8	Baletaksar	1,236	3,531	3,828	4,251
70	-9	Thanpati	832	3,645	3,951	4,387
71	9-1	Simichaur	1,688	3,873	4,198	4,661
72	-2	Dubichaur	856	2,103	2,280	2,532
73	-3	Gaidakot	1,028	2,488	2,697	2,995
74	-4	Darbar Devisthan	1,652	n.a.	-	-
75	-5	Birbas	1,578	5,172	5,606	6,225
76	-6	Amararghathok**	612	-	-	-
77	-7	Kharjyang	1,248	5,271	5,714	6,345
78	-8	Hardineta	1,908	5,203	5,640	6,262
79	-9	Daudha	1,407	2,213	2,399	2,664
Unidentified				29,184	30,511	30,934
Total			107,939	238,100	257,500	284,100

Note: *: sample panchayats for the Socio-economic Survey.
**: sample panchayats selected by HMG/N.

Table H.3 List of Panchayat in Arghakhanchi District

No.	Ilaka No.	Name of Village	Area (ha)	Population 1981 Census	Population Estimation 1990	Population Estimation 2005
1	1-1	Kerunga	889	3,479	3,943	4,578
2	-2	Belkot*, **	1,926	5,040	5,712	6,631
3	-3	Chidika	1,178	2,962	3,357	3,898
4	-4	Wangla	1,276	4,281	4,852	5,633
5	2-1	Pali	1,301	3,573	4,049	4,701
6	-2	Adguri	3,000	4,490	5,089	5,908
7	-3	Narpani	2,443	3,899	4,419	5,130
8	-4	Khanchikot	2,299	3,695	4,188	4,862
9	-5	Dhikura	3,253	3,426	3,885	4,508
10	3-1	Khidim	1,590	3,386	3,838	4,456
11	-2	Panena	1,301	3,181	3,605	4,186
12	-3	Pokharathok**	2,685	3,390	3,842	4,461
13	-4	Patati	1,529	3,365	3,815	4,428
14	4-1	Maidan	4,372	4,543	5,149	5,978
15	-2	Dhatibang	2,747	-	-	-
16	-3	Subarnawal	3,130	4,750	5,383	6,250
17	-4	Sitapur	3,300	3,358	3,806	4,419
18	-5	Simalpani	4,576	2,884	3,269	3,795
19	5-1	Thada*, **	4,482	5,394	6,113	7,097
20	-2	Sidhara	21,913	4,360	4,941	5,736
21	-3	Jukena	6,795	4,525	5,128	5,953
22	-4	Banchaur	2,866	2,792	3,164	3,673
23	-5	Jaluke	8,804	3,297	3,737	4,339
24	6-1	Argha	1,963	6,011	6,812	7,908
25	-2	Kimdada*, **	1,901	4,342	4,887	5,674
26	-3	Nuwakot	2,877	5,666	6,421	7,455
27	-4	Khilji	1,782	3,281	3,718	4,317
28	-5	Asurkot	1,229	2,163	2,452	2,847
29	7-1	Dharapani	5,096	4,389	4,974	5,775
30	-2	Dhakawang	3,325	5,374	6,090	7,070
31	-3	Gokuhunga	2,263	2,599	2,946	3,420
32	-4	Hansapur*, **	2,349	7,373	8,355	9,700
33	8-1	Khandaba	1,410	2,829	3,209	3,722
34	-2	Wangi	1,312	4,249	4,815	5,590
35	-3	Khona	1,276	3,554	4,028	4,677
36	-4	Dibharna	1,359	4,309	4,883	5,669
37	9-1	Mareng	3,022	3,380	3,831	4,448
38	-2	Arghatosh	1,937	3,916	4,438	5,152
39	-3	Bhagbati	961	3,998	4,531	5,260
40	-4	Thula Pokhara	723	n.a.	-	-
41	-5	Chhatragunuj	817	5,801	6,574	7,632
Total			123,257	157,304	178,242	207,736

Note: *: sample panchayats for the Socio-economic Survey.
**: sample panchayats selected by HMG/N.

Table H.4 List of Panchayat in Kaplvastu District (1/2)

No.	Ilaka No.	Name of Village	Area (ha)	Population 1981 Census	Population Estimation 1990	Population Estimation 2005
1	1-1	Taulihawa*, **	2,245	8,198	10,060	13,342
2	-2	Tilaurakot	1,796	10,329	12,675	16,809
3	-3	Ramghat	1,197	n.a.	-	-
4	-4	Sauraha*	715	n.a.	-	-
5	-5	Gotihawa	1,131	n.a.	-	-
6	-6	Basantapur	881	3,845	4,719	6,259
7	-7	Gauri	748	n.a.	-	-
8	-8	Pirpa	416	n.a.	-	-
9	2-1	Rangapur	1,330	7,221	8,861	11,752
10	-2	Parsohiya	1,330	n.a.	-	-
11	-3	Bedauli	1,912	n.a.	n.a.	-
12	-4	Sinhokhor	948	n.a.	-	-
13	-5	Somdhiya*, **	881	n.a.	-	-
14	-6	Hardona	1,264	n.a.	-	-
15	-7	Kajarhawa	898	5,593	6,864	9,103
16	-8	Siswa	1,463	3,856	4,732	6,276
17	-9	Bhilmi	765	n.a.	-	-
18	-10	Kushahawa	1,430	n.a.	-	-
19	3-1	Maharajgunj	1,862	8,331	10,223	13,558
20	-2	Bangai	964	5,198	6,379	8,460
21	-3	Balrampur	1,197	n.a.	-	-
22	-4	Thunhiya	1,862	n.a.	-	-
23	-5	Udaypur	1,280	3,669	4,503	5,972
24	-6	Shivpur Palta	1,297	n.a.	-	-
25	-7	Lalpur	2,062	4,555	5,590	7,414
26	-8	Bhalwari	1,613	n.a.	-	-
27	-9	Ajigara	1,397	n.a.	-	-
28	4-1	Shivpur	20,734	n.a.	-	-
29	-2	Chanai	1,962	706	867	1,150
30	-3	Bishunpur	2,993	7,521	9,229	12,240
31	-4	Birpur*, **	1,796	5,983	7,341	9,736
32	-5	Jawabhari*, **	1,746	n.a.	-	-
33	-6	Bahadurgunj	2,461	6,334	7,773	10,309
34	-7	Shivanagar	881	6,095	7,480	9,920
35	-8	Purshottampur	881	n.a.	-	-
36	-9	Pathardahiya	1,230	7,376	9,051	12,004
37	5-1	Krishnanagar	1,330	808	992	1,316
38	-2	Sirsihawa	1,563	925	1,135	1,506
39	-3	Geneshpur	1,547	6,927	8,501	11,275
40	-4	Ramnagar	1,197	n.a.	-	-
41	-5	Bhagwanpur	1,762	6,684	8,202	10,878
42	-6	Vidyanagar	482	n.a.	-	-
43	-7	Khurkhuriya	3,126	n.a.	-	-
44	-8	Gugauli	2,644	n.a.	-	-
45	-9	Shivagadi	13,568	n.a.	-	-

Note: *: sample panchayats for the Socio-economic Survey.
**: sample panchayats selected by HMG/N.

Table H.4 List of Panchayat in Kaplvastu District (2/2)

No.	Ilaka No.	Name of Village	Area (ha)	Population 1981 Census	Population Estimation 1990	Population Estimation 2005
46	6-1	Dhankauli	5,770	8,275	10,155	13,468
47	-2	Mahuwa	2,394	n.a.	-	-
48	-3	Hariharpur	1,812	n.a.	-	-
49	-4	Rajpur	1,962	5,359	6,576	8,721
50	-5	Buddhi*, **	2,311	n.a.	-	-
51	-6	Barkulpur	2,627	3,499	4,293	5,694
52	-7	Dubiya*, **	5,021	n.a.	-	-
53	-8	Mahendrakot	7,898	n.a.	-	-
54	7-1	Bhalwad	3,691	n.a.	-	-
55	-2	Motipur	1,580	7,870	9,658	12,809
56	-3	Banganga	1,962	n.a.	-	-
57	-4	Gajehada	1,796	n.a.	-	-
58	-5	Hathausa	3,625	n.a.	-	-
59	-6	Nighihawa	1,945	n.a.	-	-
60	-7	Phulika	2,128	5,336	6,548	8,684
61	-8	Jahadi	3,259	n.a.	-	-
62	-9	Kopowa	2,976	n.a.	-	-
63	8-1	Patna	2,760	8,125	9,971	13,224
64	-2	Patariya	1,912	n.a.	-	-
65	-3	Nandannagar**	2,078	7,927	9,728	12,902
66	-4	Lawani	1,513	n.a.	-	-
67	-5	Bithuwa	1,264	n.a.	-	-
68	-6	Hathihawa	1,746	n.a.	-	-
69	-7	Baskhor*	1,729	n.a.	-	-
70	-8	Pakadi	915	7,969	9,779	12,969
71	9-1	Bijuwa**	1,230	n.a.	-	-
72	-2	Abhirawa	1,181	n.a.	-	-
73	-3	Pipra	1,081	n.a.	-	-
74	-4	Baluhawa	1,397	n.a.	-	-
75	-5	Titirasi	1,746	n.a.	-	-
76	-6	Harnampur	1,762	6,364	7,810	10,358
77	-7	Dohani	964	n.a.	-	-
78	-8	Dharmapaniya	2,211	4,316	5,297	7,025
79	-9	Dumara	665	n.a.	-	-
Unidentified				11,072	14,051	16,613
Total			175,697	270,000	331,800	438,000

Note: *: sample panchayats for the Socio-economic Survey.
**: sample panchayats selected by HMG/N.

Table H.5 List of Panchayat in Marchawar Area

No.	Ilaka No.	Name of Village	Area (ha)	Population 1981 Census	Population Estimation 1990	Population Estimation 2005
1	2-1	Semari	865	n.a.	-	-
2	-2	Barsauli	476	6,545	9,076	14,140
3	-3	Gonaha	735	n.a.	-	-
4	-4	Pakdi Sakron	800	n.a.	-	-
5	-5	Majhagawa*, **	843	6,563	9,101	14,179
6	-6	Maryadpur	562	5,950	8,251	12,855
7	-7	Birghat	778	n.a.	-	-
8	-8	Kataya	432	6,042	8,379	13,054
9	-9	Bogdi	670	n.a.	-	-
10	-10	Udbaliya	476	n.a.	-	-
11	-11	Tharki	584	6,302	8,739	13,615
12	3-1	Silitiya	346	n.a.	-	-
13	-2	Bargauli	346	5,610	7,780	12,121
14	-3	Rayapur	670	6,134	8,506	13,252
15	-4	Amuwa	454	n.a.	-	-
16	-5	Asurena*, **	887	9,363	12,984	20,227
17	-6	Pharena	865	6,027	8,358	13,021
18	-7	Betkudya	260	n.a.	-	-
19	-8	Rohinihawa	541	n.a.	-	-
20	-9	Piprahawa	303	n.a.	-	-
21	-10	Bangai Marchawar	1,146	4,511	6,256	9,747
22	-11	Karauta	800	n.a.	-	-
23	-12	Semara	562	6,338	8,789	13,693
Total			14,401	69,385	96,219	149,904

Note: *: sample panchayats for the Socio-economic Survey.
**: sample panchayats selected by HMG/N.

FIGURES

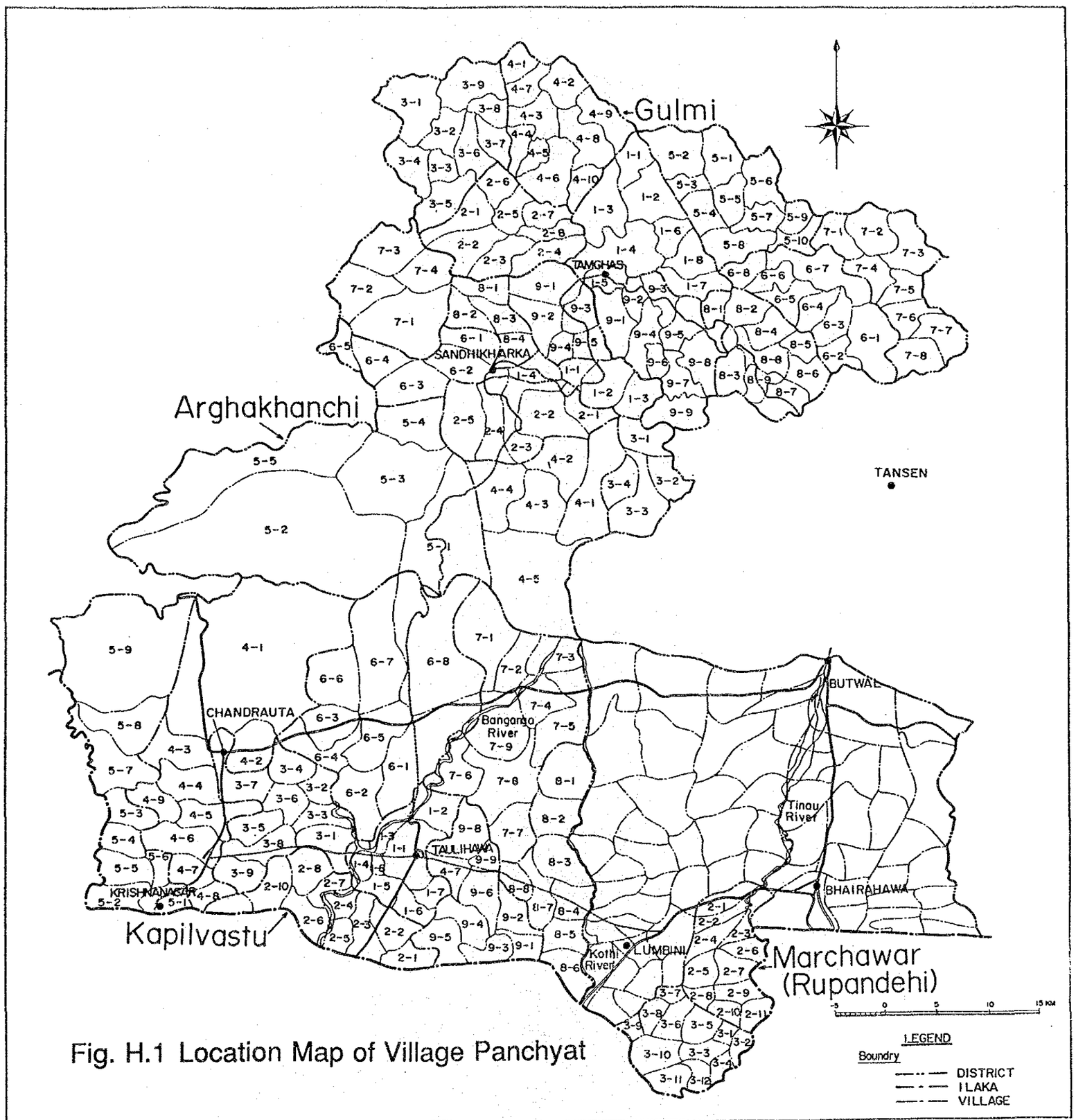


Fig. H.1 Location Map of Village Panchyat

THE MASTER PLAN STUDY ON THE INTEGRATED RURAL DEVELOPMENT PROJECT IN THE LUMBINI ZONE

ANNEXES

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