

5.6 Farmers' Organizations and Institutional Aspects

5.6.1 Current Water Users Associations in TIP Area

Within the command area of Trishuli Irrigation Project, six water users associations are identified. They are given below;

Name of the System	Irrigation Block	Membership	Activities	Status
1. Majuwa Ko Kulo, Simutar	A	9	Desilting of channel one time a year	low
2. Marengate Ko Kulo, Simutar	A	25	Desilting of channel for paddy cultivation	low
3. Maithali Khola Kulo, Bidur	B	12	O&M once a year	low
4. Khahare Khola Kulo, Battar	C	100	Cleaning of canal for paddy cultivation	low
5. Chandipokhari Ko Kulo, Chandipokhari	E	30	Desilting for flood control and paddy cultivation	low
6. Judhikhola Ko Kulo, Pokhariphant	L	253	WUA organization, O&M regularly, rules and regulations, etc.	high

The ranking of status of irrigation system is based on high, middle and low. The low status is given to the system which becomes active only for paddy cultivation once a year. Middle status is given to a system which has an O&M system as well as water distribution based on determined procedures. The high status is given to the system which has organized efforts for water management of the system all year round.

Except for Judhikhola Kulo at Pokhariphant, other irrigation systems are only seasonal. They are used for paddy cultivation. Some of the irrigation systems serve during winter for vegetable cultivation. The coverage of area is very small (5-15 ha). Except for Judhikhola Kulo, individuals in other systems take initiative for desilting of the canal. Persons who clean the canal get water first in that particular year. No appropriate rules and regulations governing water allocation, water distribution, system maintenance and management have as yet evolved. The details of Judhikhola Kulo are given in the following section.

(1) Judhi Khola Irrigation System, Pokhariphant

The Judhi Khola Irrigation system, a farmer managed irrigation system (FMIS), is located in Pokhariphant of Khadgabhanjyang Village Development Committee (VDC) across Devighat in Nuwakot District.

Up to Devighat, there is a motorable road connecting with the Kathmandu-Trishuli Highway. Pokhariphant is located on the right bank the of the Trishuli river. A suspended bridge connects Devighat to Pokherephant. There is year-round movement of goods and services between Pokhariphant and Devighat.

(2) History of the System

There is no written record of the history of this system. The local people estimate that this system should be over two hundred years old. According to the local people, this system was constructed to irrigate the private land known as Birta of Mr Nathu Ram Padhaya . Only the land of this Barahmin family was entitled to irrigate from this system. Others land was not entitled to get irrigation water. Originally, this irrigation system irrigates only 5.5 ha (460 mato muri land in local measurement term) . The land would be cultivated by the group of cultivators who were appointed for this purpose . They were required to maintain and operate the irrigation canal as well.

(3) Main Canal and Branch Canal

The main canal from the intake to the first plot of irrigation known as Thulo Chautara Dada is about 2 km. After the Thulo Chautara Dada point, the main canal branches out into three canals serving the plots at different elevations.

In most places, the canal comprises Kachhia channels (mud channel). At the landslide zone, the farmers have put pipes to convey water from one point to another. Cement aqueducts are also constructed over the drainage areas. The canal is well maintained. The Rapid Appraisal of the irrigation system was undertaken during the winter season of 1996-97. The report writer has observed cleaned canals. Water from the canal is used for irrigating wheat and in some places for vegetable cultivation.

There is no network of field canals. Irrigation takes place by opening the outlet in the main canal, and allowing water to flow into the field.

Organization for O&M in Judhi Khola irrigation system:

The O&M organization for the irrigation system came into existence from 1992 (Falgun, 2049). There are 9 members in the executive committee. The total number of members in the general assembly is 253 as of January 1997. The number keeps changing due to separation of family members from households. The membership is based on ownership of land with irrigation facilities.

The executive committee meeting takes place once a month. However, the meeting can take place any time by the decision of the chairman.

The secretary keeps records of meetings, official communication. He keeps in his custody the minute book and other records.

The treasurer keeps records of the resource mobilization and takes charge of the resources of the system like cash, etc. The unused charges out of mobilized resources for irrigation are invested in the village itself.

5.6.2 Past Water Users' Associations and their Activities

Deliberate effort was made to form water users association in the command area of the Battar Lift Irrigation System. The system was basically managed and maintained by the DOI staff. The farmers took responsibility only for water distribution to the beneficiaries. The details of water users associations of the Battar Lift Irrigation system is given in the following section.

(I) Battar Lift Irrigation Project Area

The first phase of the Battar Lift Irrigation project was completed in 1974. It started to supply water to Maharanihi which has a 86 ha command area. Water supply was for 24 hours. 6 cusecs of water was pumped regularly in the reservoir and water was conveyed to the fields from the conveyance channel connected in the reservoir. Water distribution was done by the ditch tenders (dhalpa) appointed by the Battar Irrigation Project. Farmers did not have any responsibility in irrigation water management at the initial stage of the project.

By 1975, Phase II activities started. Capacity of the pump was also increased from 12 cusecs to 24 cusecs. New pumps were installed. The command area for irrigation also increased from (Maharanihi) 86 ha to 194 ha (Maharanihi 86 + Majhitar 54 + Battar 54). The availability of 3 lit/sec/ha. in the first phase decreased in Phase II to 1.5 lit/sec/ha. However, the water distribution activity was undertaken by the ditch tenders under the supervision of the Battar Irrigation Project. At the completion of Phase III, the command area increased from 194 ha to 424 ha. Two factors played an important role in promoting the formation of the water user's distribution committee in Maharanihi area; a) there had been difficulty of distribution of water and it resulted in increased number of water related conflicts, and b) the Rasuwa-Nuwakot Integrated Rural Development Project had been pushing the idea that responsibility for operation and maintenance of the infrastructures are to be taken by the users. Around 1979, the Battar Irrigation Project management assisted the formation of the water users distribution committee out of the beneficiaries' representatives in Maharanihi area of ward No.6 and 7 of Bidur Village Panchayat. It appears that WUA formation was based on ward 7 village Panchayats.

The interview with the farmers of the command area reveals that two water users associations were formed in the pilot project command area. Majhitar and Uppolo Pipal tar received water for two years around 1979. It is reported that Tallo Pipaltar received water only for 2-3 days during the whole project period. Hence, no water users committee was formed in the command area of Majhitar and Pipaltar.

(2) Genesis of Water Distribution Committee Formation

At the initial stage of the project implementation, water distribution was done through the Dhalpas employed by the Battar Irrigation Sub-division. In the later period of the project implementation, conflicts on water distribution increased. Beneficiaries complained that the Dhalpas favoured some farmers in distributing water in exchange for material benefits given by the beneficiary farmers.

Around 1980, efforts were made by the Battar Irrigation Sub-Division to form the association of the beneficiary groups. It was reported that two water users' distribution committees were formed to take the responsibility of equitable distribution of water. Out of the representatives of the two user's committees and government representatives including the Chief District Officer, Local Development Officer, representative of Nepal Electricity Authority, Agriculture Development Officer of the District and the In-Charge of Battar Irrigation Sub-Division formed the central committee for Battar irrigation management. Security and agriculture development aspects were combined together in the decisions of the main committee. The District Agricultural Development Office took special interest in vegetable cultivation within the irrigated area. The Agricultural Development Office even liaised with the Irrigation Office on behalf of the farmers in order to have regular supply of irrigation water in the command area. At the same time, the main committee did zoning for cultivation of different crops. Some area was allocated for vegetable growing and other area was not allowed to grow rice, for example Majhitar was not allowed to grow rice using irrigation water.

In 1988, the Bidur Village Panchayat was converted into Bidur Town Panchayat. The arrangement of the old wards was changed. Ward No 6 and 7 got amalgamated into one. Only one water users' distribution committee was formed. This has created adverse impact on the functioning of the water users' distribution committees. The political boundary was made on the basis of water users' distribution committees, not the hydrological boundary, so when the political boundary got changed, the new arrangement rendered the old committees ineffective. Another contributing factor was that the water supply had also become irregular so it became difficult for the committees to be effective in water distribution activities.

Another important point to note in terms of the formation of the water users committees was based on the concept of the farmer leaders and influential farmers. The farmers who actually farmed the land did not have much say in the formation of the water users' distribution committees. This did not accord strength to the functioning of the users' groups. Transparency was not good and accountability of the users committees was not clear.

After cessation of lift pump operation, the water users' associations also disintegrated.

5.6.3 Current Community Groups in TIP Area

There are several community groups within the command area of the Trishuli Irrigation Project. Some of the groups consist only of women and other groups are mixed. However, there are places like Machale, Beltar, Dhansar, Lamabagaicha do not have any community groups at all. A list of current community groups is given in Table 5.6.3-1, 5.6.3-2 and 5.6.3-3.

1) Identification of Community Groups

These community groupings are informal. Except for some cooperative societies, other community groupings are not even registered. Some of the groups are known to many people like the male and female groups in Pokhariphant, whereas the community groupings in Bidur, Battar, Maharaniidi are identified through the interaction of the members of the group. Such groups again led to identification of other groups. Identification of many community groups required special effort. The groups in Simutar are known to many and their activities have been studied by various organizations and institutions. One of the interesting phenomena in the project area is the development of many community groups with the motto of self-help and community development.

(2) Activities of Community Groups

The activities of the groups are;

- a) Saving and credit mobilization
- b) Promotion of income generating activity
- c) Community groupings specially for empowering women and improving their status
- d) Water users association for better utilization of water
- e) forest protection and soil conservation
- f) Improvement of neighbourhood like Battar Tol Sudhar Samiti.

These groups have mobilized saving and provide short term credit to the members. This has, according to them, spared them the hassles of banking bureaucracy in Bidur. Such provision of credit mobilization also helps the members not to be the victim of high interest rates from local money lenders.

(3) Achievements

The members have developed confidence in their own strength and in their own work. The total number of members in all community groups are found to be around 1,762. This is quite an impressive figure. Almost 73% of households within the TIP command area are covered by social groupings.

These groups have mobilized saving and credit of over 2 million rupees. They provide loans for productive activities such as agricultural loans for wheat cultivation, vegetable cultivation, buffalo raising etc. They also offer loans for social and medical activities; i.e. for marriage and other social occasions, for medical help, etc.

Table 5.6.3-1 Community Groups in TIP Areas (1/3)

Irrigation Block	Name of villages	Community Groups	Contact Person and Address	
A	Simutar	Gerkhutar Youth Club	Secretary: Mukunda Nepal	
	Gerkhutar	1.	Suryadaya Social Club	C/O Katak Bahadur
		2.	Indreni Poultry Club, Simutar	C/O Katak Bahadur
		3.	Women's Skill Dev. Group, Pandegoan	C/O Subhadra Thapaliya
		4.	Women's Skill Dev. Group, Simutar	C/O Katak Bahadur
		5.	Kamadhenu Group, Pandeygoan	C/O Katak Bahadur
		6.	Kriyasil Krisak Group, Pandeygoan	C/O Katak Bahadur
		7.	Jagrit Buffalo Raising Group, Pandeygoan	C/O Katak Bahadur
		8.	Forest Protection Group(women) Simutar	Simutar
		9.	Patele Community Forest Users Group	Gerkhutar
		10.	Majuwa Ko Kulo	Simutar
		11.	Maranghate Ko Kulo	Simutar
B	Bidur	1. Shyamaleswor Multipurpose Cooperative Society	Ram Krishna Dhunge	
		2. Bandevi Gai Palan Samuha	C/O Manorath Shrestha	
		3. Bidur Kalyankari Samuha (women)	C/O Subhadra Bidur	
C	Battar Apaghari Sukumbasitol	1. Barahi Saving Mobilization Group (Women). Battar Bazar	C/O Shrestha Photocopy Bidur	
		2. Battar Cooperative Society, Battar Bazar	C/O Krishna Prasad Shrestha, Battar	
		3. United Saving and Cooperative Saving Mobilization Society, Battar Bazar	C/O Krishna Prasad Shrestha, Battar	
		4. Sangam Saving and Saving Mobilization Society, Battar Bazar	C/O Mr. Madhav Shrestha, Treasurer	
		5. Kandevi Women's Group, Battar Bazar	Chairman Mr. Keshav Misra	
		6. Battar Tol Improvement Committee	Chairperson: Bhuban Kumari Chitakar, Battar Bazar	

Table 5.6.3-1 Community Groups in TIP Areas (2/3)

Irrigation Block	Name of villages	Community Groups	Contact Person and Address
D	Inarpati Dihgaun Kajidihi	1. Hasintar Saving Mobilization Group,(M+F) 2. Dukuntar Saving Mobilization Group (Women) 3. Jalpadevi Women Saving Group, Degaun 4. Mahila Milan Samuha, Charghare, Inarpati , (only Kumal members) 5. No Saving or Social Groups Exist	Chairman: Chandra Bahadur Kumal Chairperson: Bishnu Maya Kumal Chairperson: Durga Kumari Malli Chairperson: Chinu Kumal
E	Machale Charigaun Maharanidi	1. Buffalo Farming Group Formed But Dissolved Soon 2. Vegetable Growers Group But Dissolved After Battar Irrigation Failed 3. No Saving Group/Groups Exist 4. Simapakha Forest Users Group, Maharanidi 5. Chandipokhari WUA	Chairman: Bom Bahadur KC, Maharanidi
F	Chandipokhari Lamabagaicha	1. No Social Organization Identified/ No Social Organization Exist	
G	Tallo Pipaltar	1. Patal Forest Protection Group 2. Sukumikhola Soil Erosion Control Community Group (Multi-purpose)	Chairman: Babulal Dongol Treasurer: Gajabir Kumal.
H	Devghat	1. Devighat Big Forest Users Group, Devighat	C/O Man Bahadur Dongol, Devighat Medical Shop
I	Beltar Dbansar Majhitar	1. No Social Organization Identified 2. Forest Protection Group, Majhitar 3. Women's Development Group Saving Mobilization Group (M+F)	Mr. Mohan Bahadur Aryal Mrs. Ela Aryal Mr. Bharat Thapa (near Chautara)

Table 5.6.3-1 Community Groups in TIP Areas (3/3)

Irrigation Block	Name of villages	Community Groups	Contact Person and Address
J & K	Pipaitar	<ol style="list-style-type: none"> 1. Soil Erosion Control Demonstration 2. Saunepakha Forest Protection Group 3. Jhusefil Group 	Chairman: Mr. Surendra Gajurel Chairman: Moti Ram Neupane Chairman: Krishna Prasad Paneru
L	Pokhariphant	<ol style="list-style-type: none"> 1. Majgaun CDG (Men) 	Any Group Member in Devighat or at Majgoan
	Majhigaun	<ol style="list-style-type: none"> 2. Majgoan CDG (Women) 	
	Pokhariphant	<ol style="list-style-type: none"> 3. Pusuntar Community Dev. Group (Men) 	Any Group Member in Devighat or Pokhariphant
	Lower Terrace	<ol style="list-style-type: none"> 4. Pusuntar CDG (Women) 5. Sirkhali CDG (Men) 6. Sirkhali CDG (Women) 7. Kumaltar CDG (Men and Women) 8. Judhikhola WUA (Pokhariphant + Majgoan) 9. Forest Protection Group 	Chairman: Mohan Lal Shrestha Govinda Chitrakar

Table 5.6.3-2 Community Groups Classifications by Activities (1/2)

Types	Saving and Credit Groups	Saving, Credit and Income Generation	Saving and Credit Groups (Women)	WUA	Forest Protection and Soil Conservation, Group and neighbourhood improvement committee
Block 1	1. Kriyasil Krishak Group	1. Indreni Poultry Group 2. Kamadhenu Group 3. Jagant Buffalo Raising Group	1. Women's Skill Development Group A 2. Women's Skill Development Group B 1. Bidur Kalyan Kari Samuha	1. WUA for Marengate Kulo 2. WUA for Majuwa Ko Kulo 1. WUA for Maithali Khola Kulo	1. Forest Protection Group 2. Patele Community Forest Users Groups
2	1. Shyamalaswr Multipurpose Cooperative 2. Ban Devi Gai Palan Samuha				
3	1. Battar Cooperative Society 2. United Saving and Credit Mobilization 3. Sangam Saving and Credit		1. Barahi Saving Group, Battar 2. Kandeivi Women's Group, Battar		Battar Sudhar Samiti
4	1. Hasintar 2. Dukuntar		1. Dukuntar Saving Group 2. Jalpadevi Saving Group 3. Mahila Milan Samuha		
5				1. WUA Formed but Dissolved	1. Simpakha Forest Users Group
6				1. Weak WUA in Khare Khola	
7					
8				1. Weak WUA in Chandipokhari	
9	1. Saving Mobilization Group		1. Women's Development Group		1. Forest Protection Group

Table 5.6.3-2 Community Groups Classifications by Activities (2/2)

Types	Saving and Credit Groups	Saving, Credit and Income Generation	Saving and Credit Groups (Women)	WUA	Forest Protection and Soil Conservation Group and neighbourhood improvement committee
Block					
10		1. Jusitil Group			1. Soil Erosion Control Group 2. Saunepakha Forest Protection Group
11					
12	X	X	X	X	1. Patele Forest Protection Group 2. Sukumikhola Soil Erosion Control Committee Group (Multi-purpose)
13					1. Devighat Big Forest Users Group
14		1. Majgaun Community Development Group	1. Majgaun Community Development Group (Women)		
15		1. Pusuntar Community Development Group 2. Sirkhali Community Development Group 3. Kumaltar Community Development Group	1. Pusuntar Community Development Group 2. Sirkhali Community Development Group	1. Judhikhola WUA (Pokhariphant and Majgaun)	1. Forest Protection Group 2. Majgaun and Pokhariphant

Table 5.6.3-3 Summary of Community Groups Features (1/2)

Block	No of Groups	Activities	Leadership	Accounting Budgeting	Members	Beneficiary of TIP	Possibility of Integration with WUA
A	10	(a) Saving and credit mobilization (b) Income generation activity (c) Forest protection activity (d) Irrigation system management	active leadership	All groups have record of account/budget	482	Only a few are beneficiary of TIP	with guidance, WUA can work
B	4	(a) Saving and credit mobilization (b) Forest protection (c) Irrigation channel maintenance	active	All groups have record of account/budget except Maibali irrigation system.	158	Many members are beneficiary of TIP	could be integrated with WUA
C	6	(a) Saving and credit mobilization activity (b) Women's group on saving and credit (c) Neighbourhood improvement activity	saving groups not active neighbourhood group is active	Accounts are kept properly	315	50% group members are the beneficiary of TIP	could be integrated with WUA of TIP
D	4	Saving and credit mobilization group (3 of women)	not strong leadership	Accounts are kept	56	All are beneficiary of TIP	with guidance, they can work as WUA
E	5	Only forest users group work. Other groups have become inactive. One Irrigation group	not strong leadership	No account keeping, no budgeting	300	Many of them are beneficiary of TIP	need strong guidance and catalyst for WUA formation

Table 5.6.3-3 Summary of Community Groups Features (2/2)

Block	No of Groups	Activities	Leadership	Accounting Budgeting	Members	Beneficiaries of TIP	possibility of integration with WUA
F	X	X	X	X	No social group		need to employ catalyst for WUA formation
G	2	(a) Soil conservation and forest protection (b) Income generating activity	active	Record of account/ budget	87	All members are TIP beneficiaries	could be integrated with WUA
H	1	Forest protection activity	active	Record of account/ budget	64	Many of them are TIP beneficiaries	could be integrated with WUA
I	3	(a) Forest protection (b) Women development activity (c) Saving mobilization: No group in Dhansar, Gharigoan	not active	No record	-	Only a few members are TIP beneficiaries	need to employ catalyst for WUA formation
J & K	3	Forest protection group	active leadership	Record of account/ budget	-	All members are TIP beneficiaries	with guidance, WUA can perform
L	10	(a) Forest protection (b) Saving and credit mobilization (c) Labour contribution for community development (d) Banking activity (e) Dairy development (f) Community awareness creation (g) Irrigation management	active leadership	Good record of accounting in all groups and activities	204 members in groups and 253 members in irrigation		could be easily be integrated with WUA

5.6.4 Degree of Constraints anticipated for WUA formation

The irrigation blocks have different socio-economic characteristics which need careful consideration in assisting the formation of water users' associations.

The ethnic composition would not present a threat in the formation of the WUAs. Four major ethnic groups are identified and one or another of these group comprises a majority in the irrigation blocks. The majority or minor groups are not categorized by caste or class, but rather on the basis of numeric numbers of these groups.

- a) The ethnic composition in the command area would not present a threat in the formation of water users associations. Four major ethnic groups are identified and one or another of these ethnic groups comprises a majority in the different irrigation blocks (see Table 5.6.4-1). The ethnic composition table shows the majority of Brahmin, Chhetri, Newars and Kumals. However, other ethnic groups which do not comprise a majority are categorized as others. They include Magar, Tamang Sarki, Damai, etc. The important point to be taken into consideration during formation of WUAs is to ensure the inclusion of these minor groups in WUA activities.
- b) The occupational groups influence the functioning of the WUAs. Out of 12 irrigation blocks, nine of them have reported that over 90% of the farmers engage in agriculture as the primary occupation. Farmers from irrigation blocks B, C, and H reported pursuits other than agriculture as their primary occupation (see Table 5.6.4-2). These locations happen to fall within the market area of Bidur, Battar and Devighat. Experiences elsewhere also confirm that effective WUA formation around commercial areas and business centers is comparatively difficult.
- c) Landholding patterns in the irrigation blocks are to be taken into consideration in the formation of WUAs. In general, 67% are marginal farmers and 21% are small farmers. The marginal farmers cannot meet all their household requirements out of their farm activities, so they have to work elsewhere. Sometimes the marginal farmers opt for wage earning professions, neglecting farming in marginal size lands which are not economically profitable. In irrigation blocks B, C, D E and I, over 90 % are marginal and small farmers (Table 5.6.4-3), so special care is to be taken in formation of WUAs and the provision of incentives through WUAs to the said farmers in order to keep them active in WUA activities. In such case, the small group of big landholders tend to monopolize the WUA, and such a situation is to be avoided during the early stage of WUA formation.
- d) Land ownership patterns influence the formation and functioning of the WUAs. The TIP command area has different patterns of land ownership. They are: a) land owners who have land ownership certificates, b) land belonging to either a temple trust (Guthi) or to a school, c) other land

belonging to government agencies, and d) women land owners (see Table 5.6.4-4). This table shows the interesting land ownership pattern in TIP area.

Women comprise 19% of landowners. Absentee landowners are 8% in the overall area, but some blocks like D, E, F, J, K, I over 10% are absentee landlords. The cultivation of their land is leased out to sharecroppers on an annual basis. In the meantime, 6% of land in the TIP area comprises institutional ownership such as temple trust, or ownership by a school or government agency.

The landownership pattern has implications on the membership of the WUA. It also has implications on the contribution of cost to be shared by the beneficiaries. Membership in WUAs not only provides the right to get water but it also implies there are obligations to be fulfilled. The members have to contribute for O&M. Hence, this issue has implication on the institutional development of WUAs. In the meantime, members have to adhere to the decisions made by the WUA. These are the obligations of the WUA members.

- e) Literacy rate in TIP irrigation blocks averages 49 %. Out of 12 blocks, five blocks have more than 60% illiteracy. In these blocks, written communications would not be that effective. Special arrangement will have to be made for proper record keeping by WUAs. Illiteracy could be a constraining factor for smooth functioning of WUAs (see Table 5.6.4-5).
- d) The economic status in terms of per capita income based on agricultural activities is also different among different blocks. Some blocks exhibit very low per capita income from agricultural activities (see Table 5.6.4-7).

The summary in Table 5.6.6 gives an indication regarding the aspects which require more attention during WUA formation. The degree of constraining factors is different among irrigation blocks.

Table 5.6.4-1 Ethnic Composition in TIP Command Area

Irrigation Block	Settlement	Ethnic Composition				
		Brahmin	Chhetri	Newar	Kumal	Others
A	Gerkhutar	4%	74%	0%	0%	22%
	Simbutar	71%	21%	7%	0%	1%
B	Dhunge	19%	19%	43%	0%	19%
	Bidur (upland)	6%	53%	36%	0%	5%
	Bidur (low land)	10%	26%	48%	0%	16%
C	Battar (upland)	19%	10%	58%	0%	13%
	Battar (lowland)	28%	6%	43%	6%	17%
	Battar Purano Bazar	11%	14%	67%	3%	5%
	Sangam Chawk	33%	11%	6%	0%	50%
	Danki	17%	22%	39%	0%	22%
	Kumalgaun	0%	0%	0%	83%	17%
D	Inarpati (upland)	0%	11%	6%	83%	0%
	Inarpati (low land)	13%	30%	3%	47%	7%
E	Digaun	0%	0%	11%	89%	0%
	Maharanidi	4%	58%	5%	21%	12%
F&G	Lamabagaicha	48%	2%	11%	32%	7%
	Tallopipaltar					
H	Devighat	21%	21%	29%	21%	8%
I	Majhitar	3%	56%	2%	11%	28%
J	Pipaltar (T)	0%	13%	56%	31%	0%
	Pipaltar (M)	9%	20%	9%	63%	0%
K	Pipaltar	32%	1%	1%	60%	6%
L	Phirkep Devight	35%	12%	48%	0%	5%
	Majhigaun	42%	10%	0%	0%	48%
	Dhodeni	0%	0%	100%	0%	0%
	Sirikhali	62%	12%	10%	0%	16%

Table 5.6.4-2 Occupation Groups in TIP Command Area

Irrigation Block	Settlement	Ethnic Composition				
		Agriculture	Service	Trade	Wage Labour	Others
A	Gerkhutar	100%	0%	0%	0%	0%
	Simbutar	86%	4%	7%	4%	0%
B	Dhunge	1%	4%	81%	13%	0%
	Bidur (upland)	36%	31%	14%	17%	3%
	Bidur (low land)	74%	17%	10%	0%	0%
C	Battar (upland)	48%	6%	35%	10%	2%
	Battar (lowland)	52%	14%	20%	13%	1%
	Battar Purano Bazar	78%	3%	14%	6%	0%
	Sangam Chawk	22%	6%	11%	61%	0%
	Danki	44%	33%	17%	0%	6%
	Kumalgaun	100%	0%	0%	0%	0%
D	Inarpati (upland)	100%	0%	0%	0%	0%
	Inarpati (low land)	99%	0%	1%	0%	0%
E	Digaun	100%	0%	0%	0%	0%
	Maharanidi	99%	0%	1%	0%	0%
F&G	Lamabagaicha	99%	0%	1%	1%	0%
	Tallopipaltar					
H	Devighat	68%	4%	17%	8%	3%
I	Majhitar	99%	1%	0%	0%	0%
J	Pipaltar (T)	100%	0%	0%	0%	0%
	Pipaltar (M)	100%	0%	0%	0%	0%
K	Pipaltar	100%	0%	0%	0%	0%
L	Phirkep Devight	100%	0%	0%	0%	0%
	Majhigaun	100%	0%	0%	0%	0%
	Dhodeni	100%	0%	0%	0%	0%
	Sirikhali	89%	0%	0%	11%	0%

Based on III Survey conducted by DOC, Nuwakot, 1995.

Table 5.6.4-3 Landholding Pattern in TIP Area

Irrigation Block	Marginal (<0.2ha)		Small (0.2-0.5ha) Absentee Owners		Medium (0.5 - 1ha)		Large (1 ha -)		Total Nos.
	No.	%	No.	%	No.	%	No.	%	
A	32	56%	16	28%	4	7%	5	9%	57
B	79	87%	8	9%	2	2%	2	2%	91
C	637	84%	74	10%	30	4%	15	2%	756
D&E	248	76%	60	18%	13	4%	5	2%	326
E	157	64%	55	22%	26	11%	7	3%	245
F	124	54%	68	30%	28	12%	10	4%	230
G&H	154	57%	64	24%	40	15%	14	5%	272
I	30	88%	2	6%	1	3%	1	3%	34
I&D	106	52%	61	50%	27	13%	9	4%	203
J&K	268	62%	110	26%	33	8%	19	4%	430
L	290	55%	163	31%	63	12%	14	3%	530
Total	2125	67%	681	21%	267	8%	101	3%	3174

Source: Landownership survey conducted by CMS, 1996.

Table 5.6.4-4 Land Ownership Pattern in TIP Area

Irrigation Block	Total No. of owners	Female Owners		Absentee Owners		Institution Ownership *			
		No.	%	No.	%	No.	Area	% of area	Total land area
A	57	2	4%	0	0%	5	3.98	19%	21.17
B	91	22	24%	7	8%	4	0.84	7%	11.36
C	756	171	23%	65	9%	6	4.35	4%	100.62
D&I	203	48	24%	9	4%	2	7.67	11%	70.55
E	245	43	18%	25	10%	5	4.05	6%	62.85
E&D	326	69	21%	43	13%	7	14.18	21%	67.86
F	230	45	20%	20	9%	3	6.74	9%	71.52
G&H	272	47	17%	15	6%	6	20.54	19%	105.85
I	34	9	26%	4	12%	1	0.05	1%	4.76
J&K	430	67	16%	57	13%	5	5.27	5%	113.06
L	290	70	13%	0	0%	3	0.68	0%	146.5
Total	2934	593	19%	245	8%	47	68.35	9%	776.08

Source: Landownership survey conducted by CMS, 1996.

* Institutional ownership means land under temple trust or land owned by school or by government agency.

Table 5.6.4-5 Literacy Rate in TIP Command Area

Irrigation Block	H H Surveyed	Literacy	illiteracy	% literacy
A	6	4 (66%)	2 (34%)	66%
B	5	4 (80%)	1 (20%)	80%
C	45	26 (57%)	19 (43%)	57%
D	19	9 (47%)	10 (53%)	47%
E	15	6 (40%)	9 (60%)	40%
F&G	24	12 (50%)	12 (50%)	50%
H	9	3 (34%)	6 (66%)	34%
I	15	11 (73%)	4 (27%)	73%
J	12	4 (33%)	8 (67%)	33%
K	13	3 (23%)	10 (77%)	23%
L	39	17 (43%)	22 (57%)	43%
	202	99 (49%)	103 (51%)	49%(literacy rate)

Source: Sample Survey of H H 1997 (CMS)

Table 5.6.4-6 Present Percapita Income by Irrigation Blocks

(in Rs. 1000)

No.	Irrigation Block	Per Capita Income (only agriculture income)
1	A	2.26
2	B	3.03
3	C	0.93
4	D	2.89
5	E	3.67
6	F	1.36
7	G	1.36
8	H	0.89
9	I	1.21
10	J	3.37
11	K	3.52
12	L	2.48

Table 5.6.4-7 Constraining Factors Requiring Special Attention
for WUA Formation by Irrigation Blocks

Constraining factor Irrigation Blocks	Ethnic Composition	Occupational groups	Land holding Pattern	Absentee Landlords	Institutional ownership	Residential Location	illiteracy	Economic Status
A					*			
B	*	*	*		*			
C		*	*		*			*
D			*	*	**			
E			*	*	**			
F				*	*	*		
G				*	**			*
H		*			**		*	
I	*		*		*			*
J				*	*		*	
K				*	*		*	
L	*							

* Asterisk denotes the requirement of special attention to address the issue
at the time of WUA formation.

5.7 Environment

Field survey was carried out for grasping the present condition on the environment in and around the Study Area. Methodologies used for the field survey are:

- 1) Observation of soil erosion, forest and main canal alignments in the field by using topomap and aerophotos
- 2) Interview and data collection from the related agencies: DSCO, DFO, DADO, DHO, DEO, branch office of DOR, DDWSO, DDC and Bidur municipality in Nuwakot district
- 3) Interview with the chairmen (vice-chairman and / or secretary) and forest users groups at the meetings
- 4) Interview and data collection from the related central agencies: Ministry of Population and Environment, Department of Soil Conservation, Department of Forestry, Department of National Park and Wildlife Conservation and IUCN

Main present conditions of the environment in and around the Study area are given below.

5.7.1 Environmental Conditions

(1) Geology

The Lesser Himalaya of Nepal forms the major geologic and physiographic zone of Nepal Himalaya. The zone is mainly represented by low grade metamorphic rocks like slate, phyllite, schists, quartzites, limestone and dolomites. Structurally this zone consists of number of folds, faults, thrusts and unconformities. In the zone, rocks are deeply weathered, fractured, and extensive soil erosion is also commonly developed with thick soil deposits.

The Lesser Himalaya of Central Nepal is divided into high grade Katmandu Complex and low grade Nawakot Complex by Stocklin and Bhattarai (1977,1980). Nawakot Complex is further subdivided into two groups by an unconformity. The Project area is included in the Kuncha Formation of the Lower Nawakot group. The formation consists of phyllite, quartzites and gritty phyllites. The Kuncha Formation is the lowermost formation of the Lesser Himalaya and Late Precambrian in age.

(2) Soil Erosion

The problematic issues of soil erosion were identified in and around the Study area. Distribution of soil erosion and landslides in and around the Study area is shown in Figure 5.7-1. Mainly water related soil erosion was observed. During the field survey, present status of soil erosion in the Study area was identified by focusing these factors: 1) geological features, 2) slopes and 3) vegetation cover. The survey was focused on the sloping lands that were distributed along the command area. According

to the characteristics of the soil erosion and landslide in the Study area clarified by the field observations, the area is classified into 4 parts as per below:

Soil erosion status	Part I	Part II	Part III	Part IV
Irrigation Block	A	B, C, D, E, F	G, I, J, K	L
Topographical feature	Slope land			
Rainfall Pattern	Of the total annual rainfall of 1990 mm, more than 50% of rainfall occurred during July and August.			
Geological Feature	Alluvial and colluvium deposits with coarse cobbles and occasional boulders.	Alluvial (colluvium) deposits with gravels and cobbles.	Alluvial deposits with gravels and pebbles.	Alluvial (colluvium) deposits with gravels and pebbles.
Slope*	Moderate to strongly sloping.	Strongly to moderate sloping with a few places having too steep slope.	1. South facing edge of terrace toward Tadi river too steep. 2. North facing edge of terrace toward lower terrace moderate to strongly sloping.	Moderately to strongly sloping.
Vegetation Cover around the Command Area	Most of the land vegetation cover >90% and some strongly sloping area is degraded, having <80% natural vegetation cover.	Too steep land of the Trishuli river bank near the Army camp <60% vegetation cover. Pine planted hills near Battar Bazar do not support natural vegetation and artificial vegetation cover <80%.	Vegetation cover <60% with too steep land, <70% with strongly sloping, <85% moderately sloping. Too steep and strongly sloping lands support no natural vegetation and are artificially planted with Pinus.	Most of the land vegetation cover >90% and some area with strong sloping is degraded, having <80% natural vegetation cover.
Erosion (Landslide)	Strongly sloping areas with <80% vegetation cover have small landslide and gully erosions.	Severe landslide on the Trishuli river bank near the Army camp. Pine planted hills near Battar Bazar also have some landslide, rill and small gully erosions.	Except terrace and moderately sloping land, soil erosion and landslide problems are severe especially on the edge of terrace facing towards the Tadi river, where sizable gully and sheet erosion can be seen.	Area strongly sloping with <80% vegetation cover exhibits small landslides and gully erosion.

Note * gently sloping; 1 - 5°, moderately to strongly sloping; 5 - 30°, too steep >30° (LRMP)

(3) Forest

Reforestation represents a major alleviation means to protect against soil erosion in and around the Study area. Distribution and ownership of forests were identified.

1) Present Condition of Forest

All the accessible forests protected and utilized by the beneficiaries in the Study area were surveyed. The Study area includes 1,137 ha. of forest land. There are

mainly two types of forests; (a) broad leafed tree and (b) coniferous tree (Figure 5.7-2). Broad leafed forests cover some 991.5 ha (87.2 %) and are generally distributed near Gerkhutar and Simbutar of Irrigation Block a, Dhunge and Bidur of Block B, Devighat of Block H and Pokhare Phant of Block L. Area of about 145.5 ha (12.8 %) is covered by coniferous forest, distributed near Battar of Irrigation Block C, Majhitar of Block I and Pipaltar of Block J and K (Table 5.7-1).

A summary is shown below.

Forest in and around the Study Area

Kind of Forest	Area (ha)	%	Main Distribution Location
Broad Leafed Forest	991.5	87.2	Block A, B, H, L
Coniferous Forest	145.5	12.8	Block C, I, J, K
Total	1,137.0	100.0	

Both types of forest are described below;

(a) Broad leafed forest: Almost all the broad leafed forests are natural forest and mostly dominated by Sal (*Shorea robusta*), and are referred to as Sal forest. The natural regeneration of Sal is plentiful in *Shorea robusta* areas, under protection against grazing, however the majority derives from coppice and growth of seedling. On the other hand, near the river in cultivated land and degraded shrub land, many species are found to be mixed with Sal. The general composition of Sal forest identified during the Study are given below;

a) Tree species

<u>Local Name</u>	<u>Scientific Name</u>
1) Sal	<i>Shorea robusta</i>
2) Chilaune	<i>Schima wallichii</i>
3) Jamun	<i>Syzygium cumini</i>
4) Karma	<i>Adina cordifolia</i>
5) Bhalayo	<i>Rhus succedanea</i>
6) Mahuwa	<i>Madhuka indica</i>
7) Simal	<i>Bombax ceiba</i>
8) Tanki	<i>Bauhinia purpuria</i>
9) Tooni	<i>Toona ciliata</i>
10) Kutmero	<i>Litsea polyantha</i>
11) Champ	<i>Michelia champaca</i>

b) Shrubs

<u>Local Name</u>	<u>Scientific Name</u>
1) Tite-pati	<i>Artemisia vulgaris</i>
2) Phurke	<i>Arundineria falcata</i>
3) Ainselu	<i>Rubus ellipticus</i>
4) Bayar	<i>Zizyphus species</i>

- 5) Banmara *Eupatorium adenophorum*
- 6) Dhanyero *Woodfordia fruticosa*

c) Herbs and Grasses

<u>Local Name</u>	<u>Scientific Name</u>
1) Tapre	<i>Centella asiatica</i>
2) Dhubo	<i>Cynodon dactylon</i>
3) Babiyo	<i>Eulaliopsis binata</i>
4) Narkat	<i>Arundo donax</i>
5) Kans	<i>Saccharum spontaneum</i>
6) Khar	<i>Cymbopogon microtheca</i>

(b) Coniferous forest: Coniferous forests found in the Study area are artificial forests planted with Pinus species such as the Pinus roxburghii. Most of trees are between 10 -20 years old. The plantation of pine was made on areas which were degraded and difficult for natural regeneration.

Many of these areas are still left degraded with several gully erosions in sloping land along the Tadi river in Majhitar, Pipaltar and Tallo Pipaltar (irrigation blocks G, I, J and K) and also pine planted area of Barahi near Battar where soil erosion and landslide problems were identified.

Contrary to the broad leafed forest, the areas under pine forest are found to be less productive and poor in forest flora and fauna.

2) Management of Forest

District Forest Office (DFO) has a target to hand over the forests to the users' group as community forest in the case that communities are receptive to the idea and can manage them. The 1080.5 ha (95 % of total forest area) forest of the Study area is expected to be managed by 18 users' groups, however, only 173 ha of forest have already been handed over to two users' groups, and another five groups have registered their organizations with DFO. The remaining 11 groups have been organized to manage their forests without registration. Table 5.7-1 and Figure 5.7-2 show forests, corresponding users groups and other related information. A summary is given below.

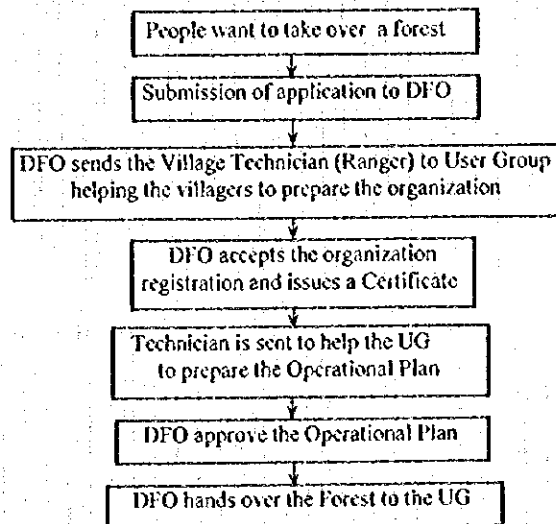
No. of Forest Users Groups in and around the Study Area

Irrigation Block	No. of FUG*	Area (ha)	No. to which Handing Over has Occurred	No. Registered
A	4	302	1	-
B	2	81	-	1
C	1	90	-	1
D	-	-	-	-
E	1	14	-	-
F	1	26	-	-
G	1	29	1	-
H	2	10.5	-	1
I	1	40	-	-
J	1	37	-	1
K	2	41	-	-
L	2	410	-	1
Total	18	1,080.5	2	5

* FUG: Forest Users Group

The above figures show that forest ownership has already been handed over to two users' groups, and that other forest belongs to DFO. However, the forest users of the Study area have been authorized to maintain their forests as community forest, being obliged to protect their forests by themselves. The process of handing over forest to users' groups is indicated below:

Procedure for Handing over a Forest to a Users' Group



DFO: District Forest Office
Source: Forest Act 1993

The above process shows that the forest handed over to a users' group is managed by the registered organization of the said users' group.

Generally, it can be said that users groups manages their forests in a sustainable manner such as limitation of consumptive use only for basic needs of fuelwood, fodder, leaf litter etc.

(4) Fauna

In Nepal, rare and endangered species to be protected have been set out in the National Parks and Wildlife Conservation Act, 1973. Animals cited under this act include 26 species of mammal, 9 species of fowl and 3 species of reptile (see the table below). In principal, this species list applies only to national parks. The Department of Forestry has jurisdiction over wildlife outside such parks; however, there is no specific legislation in this regard concerning animal protection. Nevertheless, with the exception of privately owned land, it is customary to report capture of live or discovery of dead animals to the DOP with jurisdiction over the area.

The Project area comprises mostly existing cultivated land, and there are no large species of wild animal either in or around the area. However, some small species of animal are found in the area including feline, canine, ferret (civet cat), etc.

List of Animal Species Protected by Act in Nepal

S.No.	Scientific Name	English Name	Local Name
Mammals			
1	<i>Macaca assamensis</i>	Assamis rato bandar	Assamese monkey
2	<i>Manis pentadactyla</i>	Indian pangolin	Salak
3	<i>Caprolagus hispidus</i>	Hispid hare	Hispid kharayo
4	<i>Canis lupus</i>	Wolf	Bwanso
5	<i>Ursus arctos</i>	Himalaya Bear	Himali rato bhalu
6	<i>Ailurus fulgens</i>	Red panda	Habre
7	<i>Prionodon pardicolor</i>	Spotted lisang	Sifu
8	<i>Felis bengalensis</i>	Leopard cat	Chari bagh
9	<i>Felis lynx</i>	Lynx	Lynx
10	<i>Neofelis nebulosa</i>	Dwanse chituwa	Clouded leopard
11	<i>Panthera tigris</i>	Tiger	Bagh
12	<i>Panthera uncia</i>	Snow leopard	Hinu chituwa
13	<i>Elephas maximus</i>	Asiatic elephant	Halti
14	<i>Rhinoceros unicornis</i>	Rhinoceros	Gainda
15	<i>Sus salvanius</i>	Pygmy hog	Pudke Bandel
16	<i>Moschus moschiferus</i>	Musk deer	Kasturi mirga
17	<i>Cervus duvauceli</i>	Swamp deer	Barhasingha
18	<i>Bos gaurus</i>	Gaur	Gauri gai
19	<i>Bos grunniens</i>	Wild yak	Yak
20	<i>Bubalus bubalis</i>	Wild buffalo	Arna
21	<i>Ovis ammon</i>	Great Tibetan sheep	Nayan
22	<i>Pantholops hodgsoni</i>	Tibetan antilope	Chiru
23	<i>Antilope cervicapra</i>	Bulak buck	Krisnasar
24	<i>Tetracerus quadricornis</i>	Four horned antilope	Chuka
25	<i>Hyaena hyaena</i>	Striped hynae	Hundar

26 <i>Platanista gangetica</i>	Gangetic dolphin	Shons
Birds		
1 <i>Catreus wallichii</i>	Chir pheasant	Kalij
2 <i>Lophophorus impeyanus</i>	Impeya pheasant	Danfe
3 <i>Tragopan satyra</i>	Crimson horned pheasant	Monal
4 <i>Ciconia ciconia</i>	White stork	Seto sarus
5 <i>Ciconia nigra</i>	Black stork	Kalo sarus
6 <i>Eupodotis bengalensis</i>	Bengal florican	Khar majur
7 <i>Sypheotides indica</i>	Lesser florican	Sano khar majur
8 <i>Grus grus</i>	Sarus crane	Sarus
9 <i>Buceros bicornis</i>	Giant hornbill	Thulo dhanesh
Reptiles		
1 <i>Gavialis gangeticus</i>	Ghariyal	Ghariyal gohi
2 <i>Python spp.</i>	Python	Ajingar
3 <i>Varanus flavescens</i>	Monitor lizard	Sun gohoro

Source: National Park and Wildlife Conservation Act 1973

(5) Water Quality

Water sampling analysis was carried out for checking quality for irrigation water. Water samples were collected at the original intake site and balancing reservoir and measured 3 times (1 time each in January, February, and March). The checked items were pH and EC.

Location of sampling site and results of analysis are given in Figure 5.3.3-1 and the table below.

Date	Time	Original Intake Site				Balancing Reservoir				
		Temperature (C°)		pH	EC (mS)	Time	Temperature (C°)		pH	EC (mS)
		Air	Water				Air	Water		
1st. (1997/1/10)	11:37	11.9	8.9	7.8	0.170	10:10	19.5	8.8	7.6	0.170
2nd. (1997/2/9)	15:40	23.7	11.7	7.7	0.190	16:45	20.0	12.0	7.6	0.170
3rd. (1997/3/1)	12:25	25.8	12.8	8.3	0.180	12:20	24.2	12.7	8.2	0.160

There are no specifically designated water quality standards in Nepal as of the present; however, FAO guidelines are applied in water quality assessment.

As a result of the analysis, the values are found to be within the permissible ranges (according to FAO guideline, table below), and water quality of the original intake site and balancing reservoir are proven to be suitable for cultivation.

FAO Guidelines for Irrigation Water Quality

	Degree of severity		
	None	Increasing	Severe
EC (mm hos/cm)	<0.75	0.75 - 3.0	>3.0
pH	(normal range 6.5 - 8.4)		

(6) Grazing and Browsing

Grazing, browsing and trampling by domestic animals cause considerable damage to young plants, resulting in degradation of forest and soil erosion problems in the Study area. Damage to young trees by cattle is described below:

- Cattle generally prefer grass to tree leaves when foraging; however, they cause considerable damage by trampling on young trees, and heavy grass grazing results in soil compaction and erosion increase.
- Buffalo generally prefer the tops of young plants and seedlings, thereby damaging forest crops as well as promoting soil erosion by trampling.
- Goats prefer browsing on woody plants, and damage caused by them is the worst among the grazing animals.

Grazing and browsing due to cattle and goats are the main problem for natural reforestation in the Study area. Some forest users' groups and soil conservation groups have prohibitory regulations against grazing in their forest areas; however, grazing continues to be the main cause of forest deterioration in Hakuwa, Thulogaun, Chndeshwari along the Tadi river and other degraded forests of Simbutar and Gerkhutar along the Trishuli river.

(7) Agro-chemicals

Ill effects to the beneficiaries by agro-chemicals was not observed during the field survey. However, according to interview with farmers, organophosphates such as Metacid and organochlorines such as BHC are utilized.

Due to its long-term residual and carcinogenic nature, use of BHC has been banned in numerous countries. Under the Pesticides Act and Regulations in Nepal, it is not prohibited at present; however, this is now under government review. BHC is mainly imported from neighboring India, where use of the substance is not legally banned either.

Metacid is a type of parathion methyl, and is toxic. As with BHC, its use in Nepal is not prohibited by law.

The District Agricultural Development Office (DADO) is an executive agency which provides guidance in optimum use of agro-chemicals. DADA is pursuing a campaign program to heighten awareness regarding appropriate agro-chemical use.

(8) Human Health

The major medical facility in the Study area is the Trishuli Hospital across the Trishuli river. The major diseases at the hospital and in Nuwakot district last year are given below;

Top Five Diseases at the Trishuli Hospital

Diseases	No. of Cases	%
Helminthiasis	394	9.9
APD	344	8.6
ARI	343	8.6
Chest infection	301	7.5
Ch. PID	161	4.0
Others	2,457	61.4
Total	4,000	100.0

APD: Acid peptic diseases

ARI: Acute respiratory infection

Ch. PID: Chronic pelvic inflammatory diseases

Source: Trishuli Hospital

Top Ten Diseases/Ailments in Nuwakot District (new cases) 1996

Diseases	Total New Case
Wormin	5,200
Diarrhea	4,727
Skin diseases	4,514
ARI	4,174
Gastritis	2,406
Pyrenia of unknown organism	1,943
Sore eye and eye complaints	1,320
Vitaminose and other nutritional deficiencies	1,254
Toothache and other mouth complaints	1,191
Falls, injuries, fractures	1,178
Total	27,907
Total Patients	43,149

Source: District Health Office

In the case of the above diseases, it is not precisely known whether they are water borne or conveyed by other vectors. Nevertheless, general lack of awareness about sanitation, and poor nutrition are cited as indirect factors (according to the doctor at Trishuli Hospital).

Serious cases are referred to Kathmandu. Besides, there are two medical clinics in Battar and Devighat but the doctor is available only 1 and 2 times a week, respectively.

Malaria: The malaria eradication program began in 1954. In Nuwakot district, DHO (District Health Office) carries out a program of blood slide examination for the target

groups. As a result of examination in the last year, twelve samples were positive out of a total 3,570 samples. However, according to the doctor at the hospital, the source of infection was outside the district in most cases.

(9) Environmental Education

Lessons on the importance of the environment started at the schools in the Study area last year using text books. Content of the lessons include ecology, sanitation and environmental science.

5.7.2 Social Infrastructure

(1) Transportation

Access to the Project area from Kathmandu is relatively good. At present, the road between Trishuli and the capital Kathmandu is being rehabilitated. The Project area includes the district capital of Nuwakot at Bidur, and is also an area of passage on the way to Rantan National Park at the upper reaches of the Trishuli river. Major roads in the district, including the Project area, are indicated below.

Road	Distance (km)	Remarks
Kathmandu - Trishuli	70	All weather
Trishuli - Betrawati	7	"
Bidur - Kuwakot	6	"
Pipaltar - Devighat	1.5	"
Gangate - Dhikure	6	"
Kaulethan - Kakani	6	"
Dhikure - Apra	8	Fair weather
Chaugada - Chhahare	5	"
Devighat - Galchhi	18	"

At present, a road from the Devighat opposite bank along the Trishuli river to the Kathmandu-Pokhara Highway is currently under construction with assistance from the World Bank.

(2) Drinking Water Systems

There are two drinking water supply systems Bidur Municipality. One is the Nalagoun (capacity 1.5 l/sec) water supply system and the other is at Palanku Khola (capacity 14 l/sec). The two systems join near Battar from where water is supplied to various locations (Dhunge, Battar, Bidur, Inarpati, Magigoun, Guagate and Devighat) in Bidur municipality, except Sere of Ward 3, and wards 2 and 9.

At present, there are approximately 150 private and 50 public taps. A public tap is essentially designed for 10 to 15 households. Drinking water from public taps is

supplied two times in a day, for a total of 6 hours (4 hours in the morning, and 2 hours in the evening).

Gerkhu, Simbutar and Phokarephant areas also have access to piped water distribution service as public taps. These systems are utilized from natural springs.

No chemical treatment is done to drinking water except at the Falanku Khola water source, where infiltration gallery is provides a rough filter.

According to interview with beneficiaries, drinking water which is supplied from Nalagaun is contaminated with mud particularly during the rainy season. Also, in the case of natural springs such as Gerkhu, drinking water dries up at times during the dry season.

(3) Human Health Facilities

Public health facilities in Nuwakot district are as shown below. Of these, a full time doctor is available only at the hospital and PHC

Facility	No.	Remarks
Hospital	1	Trishuli Hospital
Primary Health Center	1	Kakani
Health Post	11	
Sub Health Post	20	

Trishuli Hospital, the only hospital in the district, is located adjacent to the Study area. Private clinics are found at Battar and Devighat. A doctor visits these clinics twice a week. Facilities and staff at the Trishuli Hospital are as follows:

Facilities: 40 beds
Tuberculosis and leprosy clinic
Pathological laboratory
X-ray

Staff: 2 doctors
6 nurses
3 assistant health workers
2 x-ray technicians
1 health education technicians
1 laboratory assistant
14 other stuffs

(4) Schools

Schools distributed in the Study area are as follows:

VDC	Name of School	Irrigation Block	No. of Students		
			Female	Male	Total
Gerku	Sundari Kyourini Lower Secondary School	A	94	98	192
Bidur	Indrayani Primary School	A	39	73	112
	Prithibi Primary School	B	102	116	218
	United Primary School	C	100	135	235
	BP Memorial Primary School	I	43	53	96
	Maha Laxmi Primary School	E	75	105	180
	Rakta Kali Primary School	J	30	73	103
	Bhimshen Lower Secondary School	C	65	115	180
	Chwadi Secondary School	D	230	368	598
	Chandra Jyoti Lower Secondary School	H	101	98	199
	SE Boarding School (private)	C	-	-	-
	JD Boarding School (private)	C	-	-	-
SA Boarding School (private)	H	-	-	-	
Khadgabhanjyan	Chhetrapal Primary School	L	20	45	65
	Ranbhuvaneshori Secondary School	L	240	449	689

There are 7 primary and 5 secondary public schools in the area, as well as 3 private boarding schools. In comparison to the public schools, boarding schools emphasis English instruction.

Roughly 40% of pupils are female (public schools only). There are no specifically designated school districts in the case of both public and private schools, and there are pupils who commute into the area from outside.

In addition, there is a private campus at Baltar (Irrigation Block C). There are commerce and law departments at the campus, and degrees are given in affiliation with Tribhuban University in Kathmandu. At Trishuli Bazar adjacent to the Study area, there is the Trishuli Tribhuban Higher Secondary School with grades 1 through 12.

(5) Cultural and Other Important Assets

At Devighat, there are historical remains related to the start of the current royal dynasty. These and there surroundings are protected as park. The branch office of the Department of Archealogy at Nuwakot Palace manages the park, employing park labor from nearby villages.

Religious assets of significance in and around the Study area are as follows:

- 1) A place of prayer to the God of Water at the confluence of the Trishuli and Tadi rivers in Devighat.
- 2) A Buddhist temple on the plateau between Dhunge and Simbutar,

Other small temples and Chautara are located here and there in the villages of the area. Chautara are utilized as public gathering spots for villager meetings, etc.

5.7.3 Related Agencies

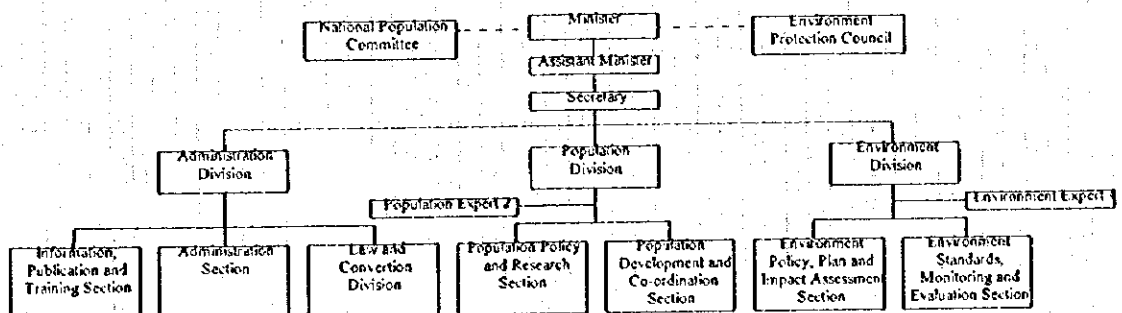
(1) Ministry of Population and Environment

A cabinet decision dated November 29, 1995 established the Ministry of Population and Environment for dealing with multi-sectoral and multi-dimensional problems with regard to population and environment. An organization chart of the ministry is given below. The ministry is mandated to be primarily responsible for:

- 1) Formulation and implementing policies, plans and programs;
- 2) Preparing acts, regulations and guidelines;
- 3) Conducting surveys, studies and research;
- 4) Disseminating information and carrying out publicity;
- 5) Monitoring and evaluating programs;
- 6) Developing human resources, and;
- 7) Acting as a national and international focal point in the domain of population and environment.

The primary functions of the ministry in the area of environment relate to the following:

- 1) Environmental conservation
- 2) Pollution control
- 3) Environmental standards enforcement and monitoring
- 4) Environmental Impact Assessment



Organization Chart of Ministry of Population and Environment

(2) District Soil Conservation Office

The District Soil Conservation Office (DSCO) has two programs, one is a general activity program done directly by DSCO and the other is a program supported by DANIDA (Danish International Development Assistance). The majority of activities are carried out with villager participation.

A. General activities of DSCO

- a) Natural hazard prevention: Under this program, some gully control works and landslide treatment were identified near Guangate, Pipaltar and Pokharephant.
- b) Soil Conservation Demonstration Center: In Pipaltar, there is soil conservation demonstration center. The center was established for demonstration of countermeasures and protection technology against soil erosion and landslide. The demonstration area is about 20 ha.
- c) Infrastructure protection: Trail improvement and check dams were identified near Tallo Pipaltar under corroboration with DPTC.
- d) Land productivity conservation: Under this program, farm conservation, reclamation for deteriorated land, and fruit tree plantation activities were identified particularly in Pipaltar.
- e) Promotion of soil conservation by communities: DSCO promotes formation of forest users' organizations, the main objective of which is soil conservation. In the Study area, the Patal forest users' group at Lambagaicha is supported by DSCO.
- f) Soil conservation together with communities: Water source protection was identified near Gerku, and a 100,000 seedling production program in Bidur started this year. Farmers are allowed to take fodder and fuelwood seedlings for private lands and some beneficiaries participate in conservation training and study conducted by DSCO under this program.

B. Activities supported by DANIDA

The Gerku Khola sub-watershed management Program supported by DANIDA has been launched. This sub-watershed includes wards 1, 2, 3, 5, 6, 7 and 8 of Gerku VDC and Ward 1 of Bidur Municipality which is near the Study area. The main objective of this program is to develop a model Gerku Khola sub-watershed by applying soil and water conservation measures and optimum land management technologies. This program will also aim at establishment of good coordination between the farmers, the district line agencies and local NGOs.

(3) District Forest Office

The main activities of the District Forest Office (DFO) regarding development and management of forest within the district can be divided into two types:

A. Activities done by DFO

- a) Users' organization and forest handing over: DFO has a target to hand over about 20,000 ha of forests to 600 users' organizations by 1988 (source from "5 years plan 1993 - 98, Nuwakot DFO"). However, only about 8,500 ha of forests have already been handed over and 242 users' groups including 2 groups in the Study area which have registered with DFO up to now.
- b) Seedling production: According to DFO annual programs for the last two years, DFO produced 50,000 seedlings per year and distributed these to farmers; however, beneficiaries in the Project area were not able to obtain seedlings because seedlings were produced outside the Study area.
- c) Training, workshops and study tours: A few beneficiaries in the Study area got the opportunity to participate in training, workshops and study tour conducted by DFO for development of community forestry.
- d) Evaluation: The Patle forest users' group in the Study area has been evaluated by DFO as a good management group of community forest. Also, some artificial pine forests were found to have been planted in the Study area by DFO in irrigation blocks such as C, D, J and K.

B. Activities by the Forest Users Groups

According to the Nuwakot DFO annual progress report of last year, users' groups within the district established 2 nurseries where 2,82,520 seedlings were produced and planted in the area of 107 ha of community forests. Although some financial support is available by DFO, these activities could not be identified in the Study area. As of the current fiscal year, DFO has entered into agreements for construction of two new nurseries for production of 1,25,000 seedlings and 50 ha community forest outside the Study area as well.

(4) Department of Road

Ranipowa Road Division has a program for roadside stabilization by introducing bio-engineering, and under this program a nursery was established at Gerkutar in the Study area in 1995. Last year, 0.5 ha of degraded roadside slope area exhibiting severe soil erosion near Ganguate was planted with some species of grass and tree seedlings by this Sub-Division. Varieties planted include Sissoo (*Dalbergia sissoo*), Khayar (*Acacia catechu*), Kans (*Saccharum spontaneum*), Babio (*Eulaliopsis binata*), Khar

(Cymbopogon microtheca), etc. This program is designed for 5 years and is supported by British ODA.

(5) District Technical Group

The District Technical Group is organized by DSCO in collaboration with DANIDA for the sub-watershed program at Gerku Khola. The group consists of members from the following 11 agencies.

- | | | |
|----------------|-----------------------|----------------------|
| 1. DSCO | 5. DDWSO | 9. Soil Testing Lab. |
| 2. DFO | 6. LDO | 10. DIO |
| 3. Livestock | 7. Cottage & Industry | 11. DDC president |
| 4. Agriculture | 8. Horticulture Farm | |

Activities of this group commence have now commenced (a first meeting was held on 26 February 1997).

Table 5.7-1 Forests and Management in and around Project Area (1/2)

No. on the Map (Fig.5.7-2)	Immigration Block	Kinds of Forest	Area (ha)	Planted Area (ha)	Name of Users Group	Handed-over or not from DFO	No. of Users Group (households)	Objectives of the Users Group	Land Tenure	Tree Ownership	Forest Management	Key Rule for Use of Forest Resources and Protection	Use of Leaf Fodder, Wood for Fuel	Relationship with Canal Alignment	
														Closed	Open
1	A (Gerkhitar)	Natural Forest	171	-	Palle Community Forest	Handed-over	144	Forest Protection	Government	Community	Community	Constitution of the Group	Yes	Yes	Yes
3 (2)	A (Simbutar)	Natural Forest	48	-	Simbutar Forest Users Group (Sub-group No.2)	not yet (not registered)	30	Forest and Soil Protection	Government	Government	Community	Decision of the Meeting	Yes	Yes	Yes
3 (3)	A (Simbutar)	Natural Forest	63	-	Ramji Palcha Forest Users Group (Sub-group No.3)	not yet (not registered)	30	Forest Protection	Government	Government	Community	Decision of the Meeting	Yes	No	Yes
3 (4)	B (Chunge)	Natural Forest	30	-	Rimal Danda Forest Users Group (Sub-group No.4)	not yet (not registered)	35	Forest Protection	Government	Government	Community	Decision of the Meeting	Yes	No	Yes
3 (5)	A (Simbutar)	Natural Forest	20	-	Namuna Forest Users Group (Sub-group No.5)	not yet (not registered)	18	Forest Protection	Government	Government	Community	Decision of the Meeting	Yes	No	Yes
4	B (Bidar)	Natural Forest	51	-	Badevi Samudhali Forest Users Group	not yet (registered)	120	Forest Protection	Government	Government	Community	Constitution of the Group	Yes	No	Yes
5	C (Battar)	Planted and Natural Forest	90	27	Barahi Forest Users Group	not yet (registered)	192	Forest and Soil Protection	Government	Government	Community	Constitution of the Group	Yes	No	Yes
6	E-C (Mabarandih)	Natural Forest (some part planted by the group)	14	5	Sauni Phakho, Sim Phakho, Kandeppathero Phakho Forest Users Group	not yet (not registered)	200	Forest and Soil Protection	Government	Government	Community	Decision of the Meeting	Yes	No	No
7	I (Majhitar)	Natural and Planted Forest	40	8	Chande-shwori Forest Users Group	not yet (not registered)	150	Forest and Soil Protection	Government	Government	Community	Decision of the Meeting	Yes	No	No
8	J (Pipatar)	Natural and Planted Forest	37	8	Thulogaun Tadi Phakho Forest Users Group	not yet (registered)	37	Forest and Soil Protection	Government	Government	Community	Constitution of the Group	No (grass during the rainy season)	No	No
9	K (Pipatar)	Planted Forest	15	15	Hakawa Manukamana Community Forest Users Group	not yet (not registered)	250	Forest and Soil Protection	Government	Government	Community	Decision of the Meeting	Yes	Yes (Pipe to Hakuwa)	Yes (Pipe to Hakuwa)
10	K (Pipatar)	Planted and Natural Forest	26	13	(Pipatar) Soil Conservation Demonstration Centar Users Group	-	30	Soil Protection	Government	Government	Government (Community)	Decision of the Meeting	Yes (grass only)	Yes	No

Table S.7-1 Forests and Management in and around Project Area (22)

No. on the Map (Fig. S.7-2)	Name of Irrigation Block	Kinds of Forest	Area (ha)	Planted Area (ha)	Name of Users Group	Handed-over or not from DFO	No. of Users Group (Households)	Objectives of the Users Group	Land Tenure	Tree Ownership	Forest Management	Key Rule for Use of Forest Resources and Protection	Relationship with Canal Alignment	
													Closed	Open
11	F (Pipaltar)	Planted Forest	26	26	Saunephani Forest Community Users Group	not yet (not registered)	400	Forest and Soil Protection	Government	Government	Community	Decision of the Meeting	Yes	No
12	G (Tallo Pipaltar)	Planted Forest	29	29	Sukauri Khola Soil Conservation Community Group	2 ha handed over	48	Forest and Soil Protection	Government	Community	Community	Constitution of the Group	Yes	No
13	H (Devighat)	Natural Forest	8	-	Thula Ban Forest Community Users Group	not yet (registered)	60	Forest and Soil Protection	Government	Community	Community	Constitution of the Group	Yes	No
14	L (Pokharephani)	Natural and Planted Forest	194	-	Judi Khola Forest Community Users Group	not yet (not registered)	200	Forest and Soil Protection	Government	Government	Community	Constitution of the Group	Yes	No
15	L (Pokharephani)	Natural Forest	216	-	Jogi Dande Forest Community Users Group	not yet (registered)	198	Forest Protection	Government	Government	Community	Constitution of the Group	Yes	No
16	I (Dhanur)	Planted Forest	7	7	(Chiwadi Public Secondary School)	-	-	(Soil Protection)	Government	Government	School	-	Selling leaf for fodder	No
18	K (Pipaltar)	Natural and Planted Forest	1	-	(Private Forest)	-	-	-	Private	Private	Owner	-	Yes	No
19	H (Devighat)	Natural Forest	2	-	(Sinarak Park)	-	-	-	Government	Government	Government	-	No	No
20	I (Majhiar)	Planted Forest	1	1	(B.P. Memorial Primary School)	-	-	-	Government	Government	School	-	-	No
21	C (Military)	Natural and Planted Forest	45	4	(Army Camp)	-	-	-	Government	Government	Army	-	-	No
23	H	Natural Forest	0.5	-	(Private Forest)	-	-	-	Private	Private	Private	-	-	No
24	H	Planted Forest	2.5	2.5	Patil Forest Users Group	not yet (not registered)	37	Soil Conservation (Forest Protection)	Government	Government	Group	Instruction of DSCO	No	Yes

LEGEND

○ Sheet Erosion

▨ Gully Erosion

△ Landslide

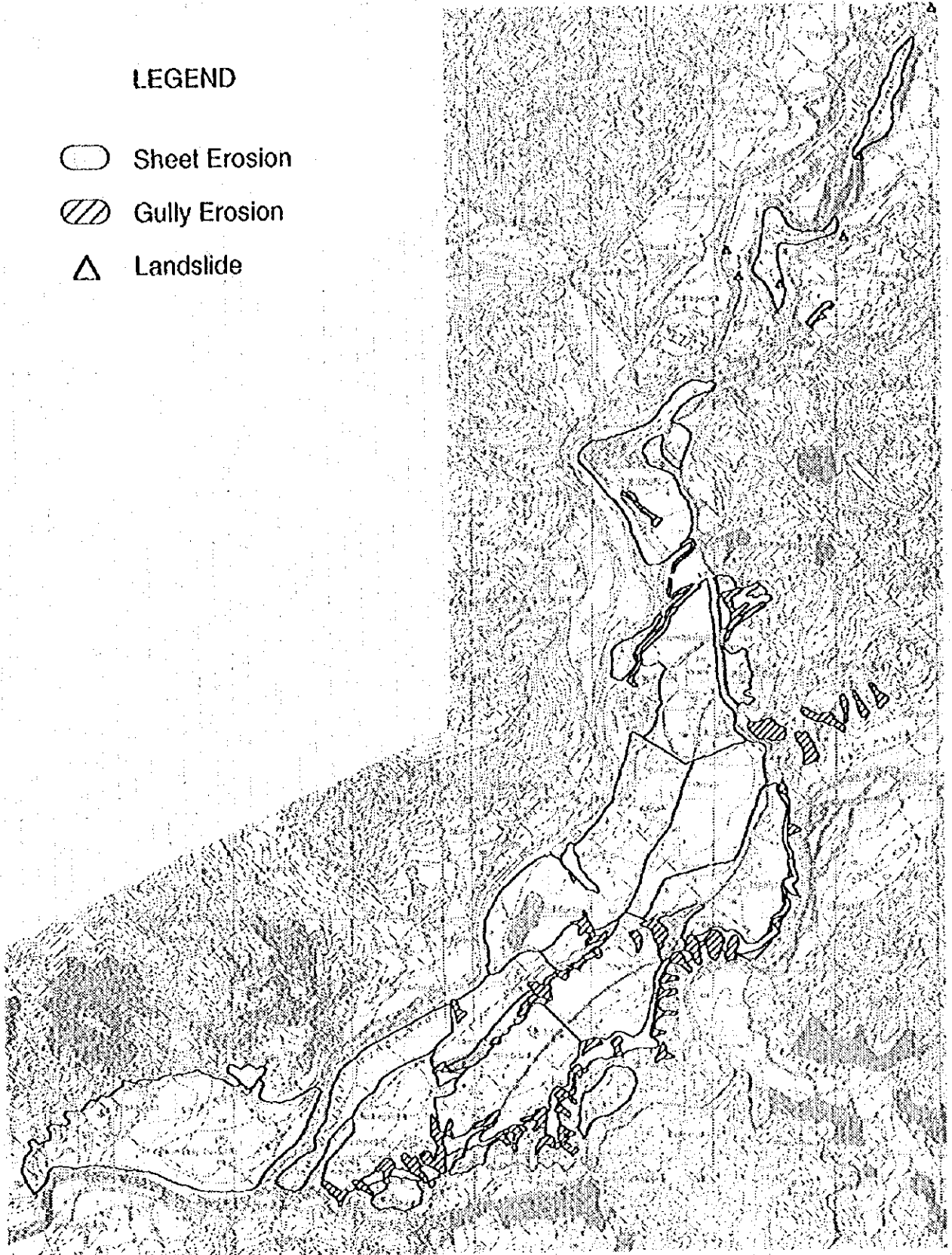


Fig. 5.7-1 Distribution of Soil Erosion and Landslide in and around the Study Area

LEGEND

○ Broad Leaved Forest

▨ Coniferous Forest

1 Forest Users Group
(refer to Table 5.7-1)

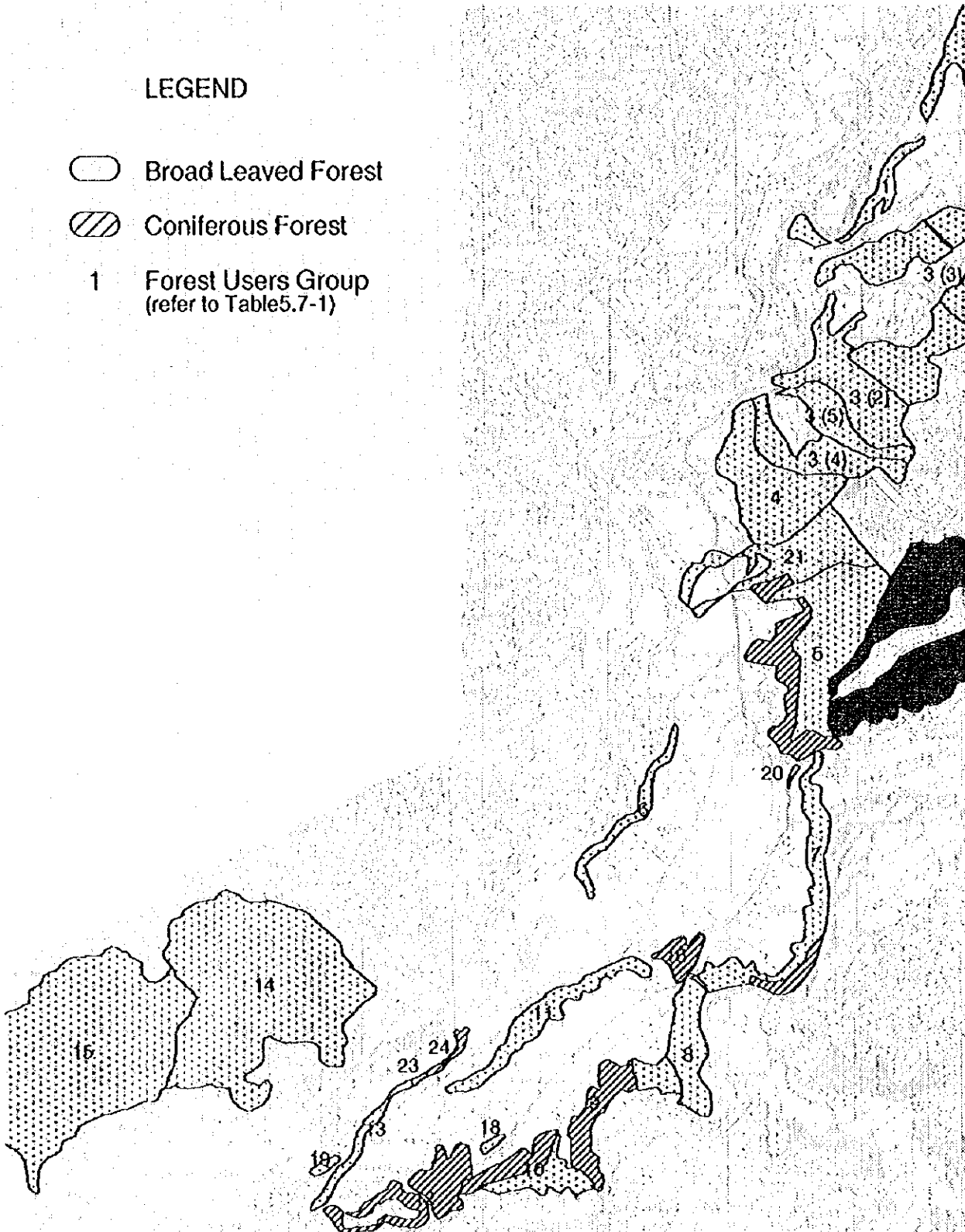


Fig. 5.7-2 Distribution of Forest in and around the Study Area