Evaluation of varied approaches for enabling sustainable and equitable access to drinking water in uttaranchal

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GOVERNMENT OF INDIA

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ACKNOWLEDGEMENT

We acknowledge with gratitude the sponsorship by the Planning Commission extended to us for undertaking the study. We also thank the State government of Uttaranchal, particularly the Planning Department and the Uttaranchal Jal Sansthan for their assistance and cooperation. It has been very kind of the people from the villages of Kumaon and Garhwal region with whom we interacted during the course of this study, for they patiently agreed to discuss the issues involved. The understanding of the complex nature of water regime has been possible after sharing of views.

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09 September, 2003

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EXECUTIVE SUMMARY

1.0

This evaluation study addresses the issue of the prevailing acute water scarcity in Uttaranchal State, a region from which emerge the great and perennial rivers, life support systems of the vast Gangetic plain below. Water shortages in these Himalayan mountain ranges comprising Kumaon and Garhwal regions have been progressively increasing over the last fifty years. There have been a range of management approaches for water resources in this region, from its ancient past to the present. The objectives of the present study is to evaluate these various approaches on the basis of selected parameters, and to suggest appropriate conceptual, legal and institutional framework for governance of water resources in Uttaranchal, with particular emphasis on drinking water.

The parameters chosen for the study are Resource Valuation, Equity – Rights to Water, Resource Assessment, Technology, Institutional Mechanisms and Processes, Dispute Resolving Mechanisms, Role of Women, Inter-sectoral adjustments and Ecological Sustainability.

The study has adopted the methodology of case study to examine the five varied approaches to water resources management in Uttaranchal – the community management approach; two varied approaches adopted by the State Government – one with the LSGED [Local Self Government Engineering Department] as the main implementing agency and the other with the Jal Sansthan and Jal Nigam as the implementing agencies; the NGO approach and the World Bank funded SWAJAL approach.

2.0

The water resources regime in the hilly state of Uttaranchal is a product of its specific environmental /ecological conditions. The region is characterized by distinct ecological zones. Major river systems , lakes, innumerable streams and springs constitute the water yield of the specific climatic, topographical, geological and vegetative characteristics of the region. The significant feature of the water and natural resources regime in these hills is the great variation that occurs across the several ranges and valleys. The economic and social life of the population of the hills is intrinsically bound to the natural resource base, and variations in the latter are reflected in the former as well. The management of water and other natural resources in the hill areas are logically thus dependent on location specific social and economic cultures. Anthropogenic changes therefore exert a direct impact on the water and other natural resources regime. Significant changes that have occurred over the last couple of centuries in the land and vegetative features have had a deleterious impact on water resources. Significant reduction and change in the extent and nature of forest cover occurred during the British period. Since Independence, as well, actual forest cover has become reduced by 40 % in the region. Correspondingly, the water resource base has been reduced to critical levels, resulting in water crisis in the

State. These environmental phenomena are the outcome of institutional changes in the management of water resources. Colonial rule transformed an essentially decentralized, community–controlled management regime to centralized control and administration of water resources. Community and individual rights to water were however, recognized in order to encourage private investment in the development and management of water resources. Dis-integrated management of land, forest and water resources through separate institutional and legal frameworks commenced with colonial rule. Post-Independence, the same policy was followed. However, the welfare orientation of State policy encouraged State investment for the provision of drinking water through technical wings of district governments. The rights framework was not changed. As a result, community management of water systems continued, as they were handed over to local communities after construction. In the mid-70's, international conventions and agreements prompted change in Government policy to intervene in a massive way in the provision of drinking water. In Uttaranchal, the water rights regime was altered fundamentally, to bring in centralized control of all water resources. The supply and management of water resources for drinking purposes became centralized. Community participation was excluded. The divisive legal and administrative structures for land, forest and water resources continue, preventing integrated management of natural resources, which is essential for the conservation and development of water resources.

3.0

The case studies conducted represent the varied responses of society and State to the issue of drinking water needs in the hill State. Chantoli Village in Chamoli District is a surviving example of community management of water before the intervention of the State. Being a 'scheduled caste' village, it has been overlooked entirely in development intervention. As a result, the village had to fall back on its own institutional resources to manage the single water source that was providing drinking water to the entire population – both human and cattle. The case study shows that the village community has utilized its traditional socio-cultural values and institutional mechanisms to manage the water sustainably, for the use of the whole community. Naurakh Gram Sabha in Peepalkoti Block, District Chamoli is a village in which an old drinking water supply system constructed by the LSGED almost forty years ago, co-exists with State systems constructed after 1975 under the aegis of the Jal Sansthan and Jal Nigam. The case study shows that community participation is more in the management of this system than other State systems, as the system was handed over to the village community after construction. While more sustainable than later systems, the LSGED scheme suffers from the infirmities of centralized planning and implementation. An analysis of the State agencies established in 1975- the Jal Sansthan and Jal Nigam – reveals that as agencies with monopoly powers and responsibilities to provide drinking water, they have reportedly achieved drinking water supply coverage to almost 100 % of the identified "problem villages" , which by themselves constitute about 76 % of the total number of villages. The actual performance of these agencies in terms of supplying the prescribed quantity of water sustainably and equitably leaves much to be desired. This becomes evident from a survey of 30 villages conducted in Kumaun region. Evaluated in terms of the chosen parameters, the functioning of these institutions fails on most counts. This

explains the drinking water crisis that has prevailed in the State for the last couple of decades. The next case study is of an NGO approach to fulfilling the water needs of a rural community. The Kassar Trust has been working in this field in Kumaun region since the last nearly two decades. Typically of the NGO method, the Trust has worked closely with local communities, using participatory methods, and introducing new technologies to suit different locales and needs. It has also introduced measures for inculcating financial and managerial accountability of the local beneficiaries. The shortcoming in this approach is in terms of achieving equity and replicability. The World Bank approach as encapsulated in the SWAJAL programme is an example of a high cost, high profile experiment in rural water supply and sanitation. Case studies of three selected villages- Narkota, Bhimlitalli and Saur Gajeli - combined with information from the field evaluation reports of SWAJAL show that on all the parameters used, the programme fares no better than State agencies, inspite of provisions for the participation of villagers and NGOs as implementation agencies.

4.0

A comparative analysis of the performance of five varied approaches to meeting the drinking water needs of the rural areas, on the basis of nine selected parameters, shows that the traditional community management approach scores the highest, followed by the LSGED, Kassar Trust, State Government agencies, and the SWAJAL programme. All five approaches fail in the matter of achieving equity in access to drinking water. On the issue of sustainability, the community management approach and the Kassar Trust approach provide better examples. A combination of the positive features of traditional community management, the old LSGED approach, and the Kassar Trust approach may prove to be the best solution to the provision of sustainable drinking water supply in the rural areas of Uttaranchal. On the matter of equity however, norms and mechanisms need to be evolved through wide debate across the States, involving all stakeholders.

5.0

The study recommends that the issue of drinking water supply – whether in rural or urban areas – must be part of an integrated water resources management paradigm. Water resources management itself- for whatever purpose, must be part of an integrated natural resource management, based on a watershed development approach. The control and management of water, land and forest resources should be devolved on Panchayat Raj Institutions, to the Gram Sabha in particular, with elected bodies as implementing agencies. The State Government must adopt a technical advisory and regulatory role. A State-level Watershed Development and Regulatory Authority should be set up to replace all agencies and departments that are directly or indirectly related to water resources, which must be abolished. Rights to water must be redefined in consonance with the above principles. Rights to drinking water of socially and economically disadvantaged groups and mechanisms for protecting these rights must be provided for in law.

CHAPTER 1

1.0 INTRODUCTION.

1.1 Status of Drinking Water in Uttaranchal - Official and Non-Official Response.

This evaluation study addresses the issue of the prevailing acute water scarcity in Uttaranchal State. It is an irony that water scarcity prevails in a region from which emerge the great and perennial rivers, life support systems of the vast Gangetic plain below. Water shortages in these Himalayan mountain ranges comprising Kumaon and Garhwal regions have been progressively increasing over the last fifty years.

An official survey of the eight mountain districts of the former U.P. State, conducted in 1971-72, identified 7771 "problem villages" out of a total 15,166 villages in the region, i.e. 51.2%. Of these, 452 villages were "No Source" villages[1]. By 1985, the number problem villages had increased to 11642 - i.e. 76.7%[2]

Despite 5817 Problem Villages being covered in the Fourth and Fifth Five Year Plans, a survey report (1985) prepared for the Seventh Plan revealed 4323 Problem Villages. During the International Decade of Water Supply and Sanitation (1981-90), Rs. 327cr were spent on supplying water to about 11,000 villages. Yet, in 1991 a survey conducted by the Rajiv Gandhi National Drinking Water Mission found 4980 (33%) Problem Villages and 871 (6%) Not Covered.[3]

Over its history, Uttaranchal State has witnessed varied approaches to the issue of enabling access to drinking water for its population. These range from:

- Traditional self-management through intra-and inter-village arrangements by local communities.

- After Independence, occasional investment was made by district agencies to construct drinking water schemes, which were handed back to village community for management.

- After 1975, construction and management of piped water supply schemes were the prerogative of Government, with no participation of local institutions in their implementation. In a few cases, completed systems were handed over to Gram Panchayats for management. Traditional drinking water and irrigation systems (guls) and gharats or water mills continued to be managed by villagers themselves, through their own formal or informal institutions.

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[1] Bisht. P & Upadhayay.A (2000): Uttarakhand Mein Jal Prabandhan: Ek Sinhavlokan, Nainital 2000 (in Hindi) cited in Sisyphean Labours: Domestic Water Supply in the Central Western Himalayas, People's Science Institute, Dehra Dun, Uttaranchal, 2003.

[2] Report of Seminar of Kumaon Jal Sansthan, 6-7th November 1995, Government of Uttaranchal.

[3] Supra note 1.

- Non-Government Organizations have, within the last two decades, assisted village communities to enhance water availability, repair and maintain traditional sources, or introduce new technology such as hand pumps in certain conducive areas. These efforts were few and far between, but significant in their approaches. NGOs were also instrumental in promoting a District-level Task Force for Drinking Water in Almora District in the early nineties.

- The Wor1d Bank SWAJAL Project was a major exercise in terms of financial investment, experimenting on a different programme approach in 600 villages in the State, by-passing State agencies initially and setting up a Wor1d Bank/Project Management Unit-NGO-Village Committee partnership. In the second phase, State Agencies are again in the picture.

- Most recently a new programme called the Water-sector reform project has been initiated with a pilot in the Haridwar district supposedly aimed at the peripheral villages on the Shivaliks.

In all these efforts, the central concern is the enabling of sustainable and equitable access to drinking water for local populations in this hilly State. The results have been as varied as the approaches.

Given such a range of implementation mechanisms, an analysis of the efficacy of the systems with respect to its financial and social viability needs to be assessed before the new State embarks on any programme that will enable the State to meaningfully address the problems of people who still lack access to clean drinking water.

The 10^{th} Five Year plan allocations and thrust nation-wide and in the new State accords a very high priority for drinking water and sanitation. The 10^{th} Plan for Uttaranchal has earmarked nearly 14 percent of the total outlay of Rs 7630 crores for this purpose.

As such, a review of the varied approaches to ensuring adequate and safe drinking water to the people of Uttaranchal assumes importance.

1.2 Objectives of the Present Project.

The goal of this study is to explore the conceptual basis, components, mechanisms and processes that will enable the fulfillment of the priority need of drinking water, and that are most suitable for the governance of water resources in the particular environmental/ecological context of Uttaranchal State.

The Objectives of the study therefore are:

- To critically evaluate the various approaches to access, control and management of water resources for drinking and domestic purposes by village communities, Government agencies, Non-Government Organizations and External funding Agencies in Uttaranchal.

- To suggest an appropriate conceptual, legal and institutional framework for governance of water resources in Uttaranchal, with particular emphasis on drinking water.

1.3 Scope of the Study

The evaluation explored the following parameters.

1. Resource Valuation

The issue of valuation of resource is fundamental to the nature of legal-administrative regimes that are adopted for its management. Depending upon its context of use, the value of water as a resource may vary economically from worthless to priceless.[4] Water has both user and non-user benefits. User benefits may be derived from drinking and domestic uses of water or for irrigation, animal husbandry, industry, etc. Non-User benefit is in climate benefit, such as cool air over water bodies or river beds, or scenic beauty. [5] Value of water is distinct from price. Some types of water use are priced whereas others are not. In sum, the types of values associated with the resource include utility value, exchange value, and ecological value.[6]

The issues explored are the distinctions in perception of values, and the role of ecological, economic and social conditions in determining value of water in the different approaches to management adopted in the region.

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[4] Gopal K.Kadekodi, K.S.R.Murthy and Kireet Kumar, Eds., Water in Kumaon, Gyanodaya Prakashan, Nainital, India, 2000, p. 5

[5] Ibid.

[6] Ibid.

2. Equity – Rights to Water

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Enabling equity in access to water by all is a social and political goal. Several factors are involved in the determination of equity – ownership status of the source, the socio-economic stratification of users, availability of water, allocative principles, pricing, urban-rural interrelationships, inter- sectoral allocations etc. The achievement of equity is also dependent on the extent of representativeness of all stakeholders in management institutions and in its decision-making processes.

The project investigated the concepts, mechanisms and processes enshrined in each of the approaches for the achievement of equity in access to drinking water.

3. Resource Assessment.

A critical input to sustainable management of water resources is the proper assessment of the availability of the resource. The management of water resources in Uttaranchal at the State level is, similar to many States, concentrated in the hands of the State. The State has never taken efforts to conduct a scientific, comprehensive and accurate assessment of the resource. The available official data has been found to be inappropriate, or inaccurate and unreliable. For instance, regarding drinking water, there is no regional assessment at State, district, tehsil level of the availability of water. Assessment is done at individual project level, which is often the subject of dispute, as measurement is done at single periods of time [mostly post-monsoon] without assessing seasonal variations. Secondly, when a single source is used for multiple purposes, such as irrigation, water mills, etc as well as for drinking, a separate assessment for drinking and domestic purposes is not made. Since the management of water is distributed among several different departments sectorally, data regarding water sources is prepared by each independent of one other, leading to duplication and inaccuracy. Secondly, since there is no policy on water conservation, water availability is assessed merely in terms of supply, without taking into account the dynamics of recharge.

Another aspect of resource assessment that has gained current importance is with regard to the participatory processes adopted for the purpose.

The project enquired into the nature and scope of resource assessment adopted in the several management paradigms promoted in the State.

4. Technology.

The nature of technology utilized for accessing water is a determinant of its environmental, financial and social sustainability. It raises the questions of whether the technology is appropriate for the specific environmental conditions it is located in, whether they would stand the test of time, and whether they are economically viable in relation to the economic status of its users. Social sustainability includes concerns of equity and social participation in the use and management of the resource.

The project enquired into the various technological options utilized in the various approaches, and assessed these options in terms of their environmental, economic and social sustainability.

5. Institutional Mechanisms and Processes.

The nature of institutional mechanisms and processes utilized in the management of a resource indicates the politico-economic framework of governance in relation to society as a whole and to the resource in particular. With regard to water resources of this region, there have been significant differences over the different historical periods that have prevailed – pre-British, Colonial, post-Constitutional, and currently, post-economic reform periods[7]. Each period has engendered different institutional mechanisms and processes. Traditionally, water management has been a decentralized activity, as it was located completely within local communities. The Colonial and post-Constitutional periods have witnessed the growth of State-created institutions and management mechanisms characterized by centralization, complexity, absence of transparency, low levels of social participation, and high costs. From the Non-Government sector, more participatory approaches, new technologies and revival of old management norms and processes were promoted. Village level institutional mechanisms were encouraged, and a more integrated approach to water resource management was undertaken. However, these efforts have been microcosmic in nature, presenting problems of scaling up. Yet, they provide learning experiences to assess the nature and function of institutional mechanisms among the body politic, which ought to work in tandem with the State.

In enquiring into institutional mechanisms and processes, some of parameters that were explored are:

- Rights to resources.
- Functional Relationship of institutional structure to use of resource.
- Types, functions and powers of management institutions.
- Representativeness of different stakeholders within management institutions
- Processes of decision-making on management functions - distribution of powers, transparency.
- Financial viability of management institutions.
- Legal status of management institutions.
- Mechanisms for ensuring social accountability of management institutions.
- Relationship of management institutions with elected political bodies.
- Scope and mechanisms for public consultations, acquiring feedback opinion from the public on management issues.
- Extent of response to public representations as manifested in subsequent changes in management norms and processes.

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[7] See M.S.Vani and Rohit Asthana, *Water Rights, Law and Policy in Uttaranchal: Empowered State and Eroded Public Rights* in "Water in Kumaon : Ecology, Value and Rights", Eds G.K.Kadekodi, K.S.R.Murthy & Kireet Kumar, Gyanodaya Prakashan, Nainital, India, 2000.

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6. Dispute Resolving Mechanisms.

The resolution of disputes is a critical aspect of management. Failure in timely and just resolution of disputes leads to environmental distress and social unrest. Dispute resolving mechanisms are usually located either in formal or informal legal networks.

The formal legal framework is usually rigid and prescriptive, and time consuming in solving disputes. On the positive side, formal law holds a potential for impartiality. Non-formal or the customary legal frameworks are highly flexible, and usually present multiple fora for resolving disputes. On the other hand, customary legal frameworks are located in local social dynamics, and are likely to reflect or be influenced by social inequities.

The project enquired whether the varied approaches to supply of drinking water contained in-built dispute resolving mechanisms; the nature and the processes thereof and whether the application of these mechanisms led to the resolution of the conflict to the satisfaction of parties involved. Dispute resolving mechanisms will be evaluated with regard to their accessibility, choice of fora, fairness, transparency, cost-effectiveness, speediness, equity in decision-making, and their potential to promote social consensus, and discourage extension or continuation of disputes.

7. Role of women

With the exception of women of specific tribes such as Bhotiyas, most of the women in Uttaranchal bear the brunt of manual labour. Land use management in the hills is highly labour intensive, due to paucity of capital, topography of the region and consequent unfeasibility of other modern farm technologies.[8] In this context of difficult farm practices, women additionally suffer from unnatural division of labour, burdened with the majority of farm and household related tasks. At the same time, women have less access to non-farm activities, which yield more income.[9]

The lack of easy access to safe and adequate water constitutes one of the greatest burdens of women. While women are vested with the greater responsibility of fulfilling the water needs of the family, they have a negligible role in decision making in the creation and management of water resources.

The project evaluated the different program approaches in terms of the role of women envisaged in water management; the levels of actualizing the empowerment of women in water management, the responsiveness to the special needs of women as judged by their levels of satisfaction and the influence if any, on program approaches due to women's participation.

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[8] "Water in Kumaon: Ecology, Value and Rights", Eds G.K.Kadekodi, K.S.R.Murthy & Kireet Kumar, Gyanodaya Prakashan, Nainital, India, 2000, p.16.

[9] Ibid.

8. Inter-sectoral adjustments:

Water resource is used for many purposes in Uttaranchal viz. human drinking and domestic purposes, animal husbandry, agriculture, industry, including the running of water mills locally. The sources of water for these several purposes are springs, streams, ponds, and rivers. Except for naulas or bauries which were constructed solely for drinking purposes, the above mentioned sources are frequently put to multiple use. In several instances, separate earthen channels were constructed for drinking water taking off from streams which also feed irrigation and water mill channels. In a majority of instances, mills are built to run on water from guls or channels, which also serve irrigation purposes. At local levels, norms have always existed and were consensually observed to adjust the rights to different uses. Traditionally there was negligible conflict between drinking water and irrigation. [10] Irrigation was given next priority.

Over the last couple of decades, inter-sectoral conflicts have arisen due to several reasons. Scarcity of water due to de-forestation and increase of population has resulted in giving importance to drinking water often to the extent of excluding other uses of water. This has had an adverse effect on irrigation and water mills. A major source of conflicts is the State itself. After the State control of this resource, various departments/agencies were created for separate purposes/programmes i.e. drinking water supply, irrigation, soil and water conservation programs etc. As a policy, these institutions function in total isolation from each other, often at cross purposes, adversely affecting the use of water for various purposes.

Another important source of inter-sectoral conflict lies is the urban – rural divide. Urban areas in these hills have also had abundance of water sources such as springs, around which naulas were constructed. Due to increases in population, and unregularized construction, coupled with lack of adequate sanitation facilities, scores of urban sources have become dysfunctional. As an alternative, State agencies have constructed pumping systems drawing water form rural sources from great distances, adversely affecting drinking water, irrigation and other water supplies in rural habitations.

The project examined the occurrence of inter-sectoral conflicts in the water sector, and the approaches of various organizations in addressing these conflicts, in terms of the norms and mechanisms utilized for inter-sectoral adjustments.

9. Ecological Sustainability:

Sustainability has many dimensions – ecological, financial, technological, social, and political. Ecological sustainability is engendered by integrated resource management perspectives, giving importance to all components of the ecology, while intervening in one sector. This is particularly important in the Himalayan environment. The project enquired into the extent of attention paid to integrated resource management in the drinking water sector, through different program approaches, and the impact of such functional perspectives on access to water.

[10] See note 5 above.

1.4. METHODOLOGY

The primary object of the project was to study ***all*** programme approaches that have been adopted in the State so far. As such, it is a total and comprehensive study.

The methodology for study includes the following.

1. Collection of secondary and primary data, review and analysis.
2. Mapping of environmental conditions determining water availability and access in selected villages.
3. Systematic collection of public and official opinion through interviews with rural users [representing different social, gender and economic groups], village representatives, lower level functionaries of line agencies, managerial level representatives of line agencies, policy makers, political representatives at Kshetra Parishad, district level and State level, representatives of Non-Government Organizations and International Financial Institutions and Bilateral Aid Agencies.

Firstly, secondary data in the form of official statistics, reports, books and journals were studied and analyzed. These sources were utilized for the analysis of the research parameters *as well as to finalize the selection of locations for field studies for the collection of primary data*.

For primary data research, the project adopted a case-study methodology. For this purpose, two basis tools were utilized:-

(i) Interview Schedule (IS)
(ii) Focus Group Discussions (FGD)

The conditions for the selection of villages were the following.

1. The selected villages represented all the five different programme approaches detailed above.
2. Both the Kumaon and Garhwal regions were covered.
3. The selection of districts was done on the basis of variations in levels of water availability – water scarce districts and districts with more perennial sources – in each region of Uttaranchal.
4. Villages were selected on the basis of the following conditions.

    - Varying environmental conditions as represented by different types of catchments- fed by snowmelt and rainwater, rainwater only, and rainwater and surface water from rivers – and different altitudes, different vegetative profiles.
    - Variation in location in watersheds characterized by multiple uses of water – drinking and domestic, irrigation, water mills and other industry.

- Villages in watersheds where source is utilized for urban water supply, representing an urban-rural conflict.
- Differences in *types* of State *water supply systems* [single and multi -village gravity – based piped systems, multi-village lift systems] and *types of sources* used [springs, rivers, streams] and distance of source to user-village.
- Villages with varying caste configurations – multi-caste, two-caste and single caste villages.
- Villages with predominantly Scheduled Caste or Scheduled tribe populations.

A total of four districts - two in Garhwal and two in Kumaon – were covered for primary data research.

1.5 Format of the Report

The format of the report is as follows.

Chapter 2 presents the environmental, legal and institutional context of Uttaranchal that has a bearing on the condition of water resources and its management.

Chapter 3 presents the Case studies. These case studies represent the five approaches to water management that have prevailed in Uttaranchal. The case study reviews the condition and management of water in different contexts through the application of the nine parameters chosen for the study.

Chapter 4 presents a comparative analysis of these five approaches, discussing their relative merits and demerits from the perspective of equitable and sustainable management of the resource.

Chapter 5 presents recommendations for policy and legal reform for the drinking water sector in Uttaranchal.

CHAPTER TWO

2.0 UTTARANCHAL - AN OVERVIEW.

2.1 The Environmental Context.
2.11 Location.

The State of Uttaranchal is located between latitudes 29°5' -31°25'N and longitudes 77°45' - 81°E covering a geographical area of 53,485km^2. The Tons River separates the region from Himachal Pradesh in the north-west, while Kali separates it from Nepal in the east. Starting from the foot hills in the south the region extends up to the snow-clad peaks of the *Himadri*, marking the Indo-Tibetan boundary. The region being situated centrally in the long sweep of the Himalaya forms a transitional zone between the per-humid eastern and the dry to sub-humid western Himalaya. The region comprises of two administrative units *viz.*, Garhwal (north-west portion) and Kumaon (south-east portion). A separate state '*Uttaranchal*' comprising the 12 districts of these two administrative regions and Haridwar district from Uttar Pradesh was created on 9th November 2000.

The region encompasses an area of 46,485 square kilometres[11]. It measures approximately 380 Kms east -west and between 215-235 Kms north-south length.[12]

2.12 Physical Characteristics

Like all other parts of the Himalayas, the Kumaon and Garhwal region is also heterogeneous in several aspects, presenting a great variety in topography, altitude, rainfall and vegetation. Sir John Strachey, who spent some of the early years of his service in Kumaon describes that variety: "Thus…the traveller may obtain at a glance, a range of vision extending from 2000 to 25000 feet, and see spread before him a compendium of the entire vegetation of the globe from the tropics to the poles" [13]

There are four distinct topological features. The southernmost part is a narrow belt of Terai Bhabhar with an elevation of about 600 metres above MSL. In Kumaon, the entire belt of Terai Bhabhar lies in district Nainital while in Garhwal, it lies in Pauri district alone.

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[11] Kharkwal S.C., *Physico-Cultural Environment and Development in U.P. Himalaya*, Nutan Publications, Kotdwara, U.P., 1993, p.2.
[12] Swarup R, *Agricultural Economy of Himalayan Region, Vol.II, Garhwal*, Gyanodaya Prakashan, Nainital, U.P.,1993, p.2.
[13] Hunter, W.W., "Life of Brian Houghton Hodgson", reprinted by Asian Educational Services, (1991): New Delhi.

STATE PROFILE

	UTTARANCHAL
Area in [sq. km]	53,485
Population in 2001 [in millions]	8.48
Density/sq.km	159
SC Population [in per cent]	16.7
ST population [in per cent]	3.54
Females per 1000 males	964
Male literacy [in per cent]	84
Female literacy [in per cent]	60.3
Total literacy [in per cent]	72.3
Per cent of cultivators + Agri. Labourers to total main workers [in per cent]	64.5
Average Rainfall [mm]	1666
Livestock Population [in millions]	5.37
Forest Area [as % of geographical area]	64
Pasture Land [as % of reported area]	4
Area under non-agriculture use [as % of reported area]	6
Barren and uncultivable land [as % of reported area]	6
Culturable Wasteland [as % of reported area]	6
Total Fallow [as % of reported area]	1
Net Sown Area [as % of reported area]	14
Irrigated Area [as % of net sown area]	47

A specific feature of the Bhabhar is the complete absence of sub surface water, as the rivers from the hills disappear underground to reappear above the surface at some distance further south. [14] This submontane strip is mainly composed of the detritus washed down from the Shivalik ranges. This tract ranges from 5 to 25 Kms in width in the Kumaon region and about 3 Kms wide in Garhwal region; it is about 95 Kms in length in Garhwal region and 37 Kms in Kumaon region. The Bhabhar strip is characterized by a considerable slope in land surface, very thin layer of topsoil and heavy soil erosion. Beds of porous gravelly soil rest on huge beds of boulders, and are gradually more than 2 metres deep every where[15]. During rains, torrents cut into the ground in high velocities and disappear below, forming characteristic sections of the tract. Formerly the tract was valuable for forest produce, livestock grazing and wildlife, which have reduced considerably due to agricultural and commercial activities.

[14] Swarup, supra note 6.
[15] Kharkwal, supra note 5.

Cultivation is carried on only by irrigation through canals, which tap the river water before it sinks into the ground. [16]

The Terai belt is a long and narrow strip located in the eastern part of the U.P. Himalayas, roughly along the southern boundary of Nainital District. The width varies from 10 to 25 Kms. The northern boundary is defined by a series of natural springs where the waterless tract of Bhabhar ends. Fine sand, silt and clay are deposited by the emerging streams in this tract, which forms the upper limit of the Upper Ganga Plain. This zone of fertile alluvial soil, gently sloping land, high water table, perennial seepage and rich vegetation was once a marshy and densely forested tract. It was significantly transformed through reclamation and is one of the most developed tracts of the country with mechanized farms and industrial units.[17] The springs at the junction of Terai and Bhabhar provide perennial course of water to several minor streams, besides converting large areas into swamps in undrained tracts.

The mountainous part of the region accounting for the greater part of the area can be further subdivided into the Shivalik belt, the Lesser Himalayas, and Greater Himalayan zone.

The Shivalik belt is a long chain of narrow and low hills (750-1200 Mts.), running almost parallel to the main Himalayas. In the north, they are separated from the Lesser Himalaya, by the Main Boundary Thrust. The characteristic features of this belt are that the southern slopes form steep scarps with gentler slopes towards the north. The northern slopes are profusely forested with less directed but more effective precipitation. The southern slopes therefore show greater weathering processes due to torrential run off thus deteriorating the vegetation[18]. The northern slopes are long and gentle, forming flat floored structural valleys called 'duns'. The Dehradun is one such characteristic valley at an altitude ranging from 360 Mts. to 900 Mts. There are several such 'duns' in Garhwal and one in Kumaon, southwest of Nainital. The Shivalik belt is 10 – 25 km wide zone.

Lower Himalayas are the central part of the Himalayas, with an approximate width of 80 Kms (varying between 70 and 120 Kms). In this massive mountainous tract, ridges and valley bottoms range from 1500 and 3000 Mts. to 500 and 1200 Mts. respectively. Several rivers like the Tons, the Yamuna, the Ganga, the Ramganga, the Kosi, the Saryu, and the Kali from west to east breach this zone. A large number of fertile river valleys are found in this region, and is the most heavily populated. Extensive cultivation and dense population led to a concomitantly greater loss of forest resources in this zone. Most of the hill resorts are also located in this region.

A number of sub ranges of mountains emanating from the Greater Himalayas extend into this region, as boundaries of the main river basins dividing this zone into natural sub divisions. The Garhwal region has more such ridges such as the Yamunotri group, the Gangotri group of peaks, the Nandakote range and the Dudhatoli range separating the

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[16] Swarup, 1993.

[17] Jalal, D.S., 1988, Kumaon: The Geographical Perspective, in K.S.Valdiya (ed) *Kumaon: Land and People,* Gyanodeya Prakshan, Nainital.

[18] Ibid.

main river drainage systems. The lesser Himalayan region in Kumaon Himalaya is more subdued accounting for more density of population. However, the mountains rise up to elevations of 3000 metres, before reaching the lower slopes of the Greater Himalayas, acting as the source region of many Lesser Himalayan rivers such as Kosi, Gagas, Gomti and tributaries of Ramganga West.

The Higher Himalaya is the inner most part of the Himalayan ranges, separated from the Lesser Himalayas by the Main Central Thrust. The southern slopes rise abruptly to very high altitudes, while towards the Tibetan high plateau, the slope is more gradual. The region has a width of about 70 Kms with mean altitudes between 4800 metres to 6000 metres[19].

The region contains all the significant snow peaks and glaciers of the U.P. Hills – Bandarpunchh, Gangotri, Kedarnath, Chaukhamba, Kamet, Nandadevi, Dunagiri, Trisul, Nandakote, Panch Chuli, and Kuti Shangtang etc – with altitudes ranging from 6316 Mts. to 7756 Mts. These groups of peaks are separated by transverse gorges. Several mountain passes also lie in this region – 5 in Pithoragarh district, 2 in Chamoli district and 3 in Uttarkashi district. All the passes lie on the Indo-Tibetan boundary. This zone of perpetual snow stretches in a general NW-SE direction, cut by south flowing rivers.

The Higher Himalayan Zone itself can be subdivided into 2 parts – the Central High Ranges and the trans-Himalayan zone. The former is about 15-30 Kms wide. Its upper part above the snowline can support no human population, while its southern lower end below the snows contains rich forests and alpine pastures, which are, used in summer by the Bhotia tribal pastoralists. The latter zone – the Zaskar range – though at a lower altitude than the Higher Himalayan Ranges, lies in rain-shadow area and is relatively dry or dominated by glaciers at high altitudes[20].

2.13 Climate

Climate being a function of the physical characteristics of a region, this region with its highly varying topographical features shows an equally variegating climatic condition, ranging from hot and sub-humid tropical in the southern tract of Bhabar to temperate, cold alpine and glacial climates in the northern part of the high mountains.

Factors such as elevation, slope aspect, proximity of glaciers, forests, mountain peaks and ridges and direction of mountain ranges together give rise to the great variations in climatic conditions, even at the micro and local levels.[21] These actors determine the temperature range as well as the distribution of rainfall.

The frontal ranges of the Shivalik and adjoining Lesser Himalaya receive the highest rainfall of about 242 cms, followed by locations close to Greater Himalaya (216 cms), foothills (188 cms), Terai locations (144 cms) and the rain shadow locations of Trans-Himalaya (72 cms).[22] The monsoon commences after the middle of June and continues

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[19] (Singh & Singh, 1992.)
[20] (Kharkwal, 1993)
[21] Ibid.
[22] (Swarup,1991)

till about the second week of September, by which time about four fifths of annual precipitation is generally received all over the region. However, rainfall occurs in the hills almost throughout the year, though lesser in some months than others. Altitude and aspect vary the patterns of temperature and rainfall.

Generally, the hills are markedly wetter than the adjacent plains. Data based on 10 pairs of meteorological stations located within the Himalayas and adjacent plains indicate that the annual rainfall in a hill station located within the Shivaliks or the Lesser Himalayas is 1.6 to 5.3 times as much as in the adjacent stations in the plains.[23] Interior parts receive comparatively less rainfall during the monsoon period than the frontal parts. During winter, the situation is reversed.

TABLE -1

Amount of Rainfall in Different Seasons.

Location	Seasonal rainfall (%)			
	Winter	Pre-Monsoon	Monsoon	Post-Monsoon
Interior parts	13.2	14.1	58.3	14.4
Frontal parts	8.6	10.7	71.0	9.7

Source: (Kharkwal, 1993)

The amount of rainfall is also associated with altitude. Rainfall increases with altitude up to a certain level above which precipitation again diminishes. At a height of 1270m above sea level, rainfall has been estimated to be 3.7 times higher than in neighbouring levels, but at 300m, it is 1/5$^{th.}$ [24] Temperature variations occur at 1°F for every 100m rise in elevation. In general, the mean temperature is said to fall by 3.7°C with a rise of 1000m in altitude; in higher elevations, the fall is generally thought to be more rapid.[25] Here too there are variations between western and eastern Himalayas; further, rates of decrease in temperature vary between night time and day time, with increase in altitude, differing in each month of the year.

Thus the wide variations in altitude across the region as a whole, exhibit sharp variation in temperature. Slope, aspect and temperature are main factors determining the climatic conditions.

The physiographic and climatic features described above are the basis for the widely varying micro climatic conditions in the hills, which in turn have a bearing on the vegetation and water resources that are to be found.

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[23] Singh J.S. and Singh S.P., *Forests of Himalayas, Structure, Functioning and Impact of Man,* Gyanodaya Prakashan, Nainital, India.

[24] (Kharkwal,1993)

[25] (Singh & Singh, 1992)

2.14 Drainage

The Uttaranchal Himalayas are well drained by numerous rivers and rivulets (locally known as gad, gadhera and raula). The water resources of this region are of singular importance not only for the region but also for the whole Gangetic plains of north India.

There are three main river systems.

1. The Bhagirathi – Alaknanda basin – Ganga basin.
2. The Yamuna – Tons basin.
3. The Kali system.

1. The Ganga system drains the major part of the region covering the whole of Garhwal (except the western part of Uttarkashi district) and the western part of Almora – Nainital districts of Kumaon. The Bhagirathi and Alaknanda, rising in the Garhwal Himalayas from an altitude of 7138m meet at Devprayag and flow as the Ganga thereafter. The Bhagirathi is the main stream; the Alaknanda, Saraswati, Dhauli Ganga, Berahi Ganga, Nandakini, Mandakini, Madhu Ganga, Pindar, Atagad, Bhilangana, Bal Ganga, Jad Ganga, the Kaldi Gad and the Jaipur are the many important tributaries to the Alaknanda and Bhagirathi, or to one another ultimately contributing to the waters of Ganga.
   The Nayar, which drains more than a half area of the Garhwal district, is an important tributary of the Ganga.

2. The Yamuna – Tons system is also located in the Garhwal region. The Yamuna rises at Yamunotri and is joined by important tributaries such as the Giri, and more important, the Tons, which is its biggest tributary, with 2.7 times greater volume of water than the Yamuna. (Kharkwal, 1993). The Yamuna flows out of the hill areas through the Doon valley, and the Shivaliks, into Haridwar district, being joined in the Doon valley by several streams.

3. The drainage of the greater part of the Pithoragarh district and the eastern parts of Almora and Nainital districts i.e. most of the Kumaon region, is affected by the Kali River System. Flowing along the eastern boundary of Pithoragarh district, it is joined by several important rivers of the Kumaon region i.e. the Dhauli Ganga, the Dori Ganga, the Saryu, the Gomti (which joins the Saryu at Bageshwar), the Panar (another tributary of Saryu) and the Ladhiya which is the southern most tributary of the Kali on the Indian side. The Kali leaves the foothills at Tanakpur and thereafter is known as the Sharda. Besides the main river system, there are several others important to the Kumaon region – the Ramganga, Kosi and the Gaula in the east-central-southern part of the region. The Gagas and the Western Ramganga are additional streams of importance in the region.

In general, the main rivers of the region, particularly in Garhwal pass through very deep transverse gorges carving out deep valleys because of their erosive power and huge water

volume[26]. In general, the rivers make a very steep descent in the first 10 or 20 Kms of their longitudinal profiles and afterwards, their gradient is less steep.

Besides these main river systems, glaciers, lake, innumerable streams and rivulets and springs constitute the important water resources of the region.

Kumaon region has most of its lakes near the outer fringe of the Lesser Himalaya in Nainital district. Some high altitude lakes (about 10 in number) also exist in Pithoragarh district. In the Garhwal region, Chamoli district has 9 high altitude lakes between 3000-4000m high.

Streams and rivulets, both perennial and seasonal, which flow down every fold of the mountain ridges as first and second order streams, and springs which occur all over the mountainous region, form the main source of water to rural communities which do not have access to river valleys.

2.15 Natural Vegetation

The nature of vegetation in the region is an outcome of the complex mix of factors such as soil, rainfall, temperature, altitude, aspect structure and relief, amount of moisture and sunshine, seasonal variations in humidity and exposure to hot, dry, cold winds etc.[27]. The varied conditions of climate and topography described earlier have been the basis of equally variegated vegetation.

Himalayan vegetation is broadly divided on the basis of topography into (1) Forests and (2) Bugyal. The latter refers to high altitude grasslands or meadows situated above the level of trees and shrubs. These are the alpine pastures. The different forest zones corresponding to the varying altitudinal zones are generally described by the dominant species in that zone.

1. The Sub-Tropical Forest Zone extends up to 1200m. Sal is the dominant species (Shorea Robusta). They are found up to 750m on the southern slopes and 1200m on the northern slopes. Other species found are Kanju, Semal, Haldu, Khair, Sissu, Tun, Sain, cane and bamboo.

2. The Temperate Forest Zone extends from 1050 and 1900m on the southern slopes and between 900 and 1800 on northern slopes. The Chir (*pinus longifolia*) is the dominant tree of this zone. Above Chir forests, mixed vegetation of broad-leaved species such as oak are found. Birch, Silver fir and Burans follow at the upper limits of oak forests.
3. The Sub-Alpine and Alpine Forest Zone, above the 2120m range hosts varieties of conifers such as Silver Fir, Blue Pine, Spruce, Cypress, Deodar, Birch, amid a dense undergrowth of shrubs.
4. Alpine Bush land and Meadow follow the third zone and are found up to 4200m.

[26] (Kharkwal, 1993)
[27] ibid

2.16 Land Use- Changes in Land Use.

The manner in which land resources are used are a primary determinant of the status of water resources in any region. The environmental conditions of Uttaranchal are highly conducive to water resources; however, land use changes that occur through anthropogenic influences have the potential to have adverse impacts on water resources. The changes relating to land that could have such impacts are:

- Reduction in forest area, or coverage.
- Increase in cultivation.

Of the 53,69,292 ha of reporting area of the Uttaranchal (this excludes Haridwar district), forest occupy 63.98% of land. This is almost the prescribed limits of land use as per our national land use policy. However, studies using satellite imagery have shown that actual forest cover has decreased from the high levels reported to a mere 28.1% of the total geographical area, while the forest area having more than 60% foliage canopy has been shockingly reduced to a paltry 4.4% of the total geographical area, primarily due to pine based commercial forestry practiced in the region[28]. According to Validya (1985), other reasons for this state of affairs are overgrazing by an explosively large population of cattle and reckless exploitation of forests for fuel, timber and fodder. These activities have exposed 95 percent of the ground to erosive forces.

The impact of various land uses on water resources has been clearly established by a study conducted by Rawat[29]. The rate of surface runoff from different land types – such as forest, barren and agricultural land - were monitored in an area having fairly uniform geology, climate and topography. Rainstorm having rainfall intensity more than 0.5mm/hr in the rainy season was monitored. The analysis of the data showed that geological. Climatic and topographic conditions being the same, the least disturbed forest land produces the minimum surface runoff (3.2%) of the total rainfall. The greatly disturbed agricultural land produces the maximum surface runoff (20% of the total rainfall). In the barren land, the surface runoff was 10.38%[30]. Thus human activities have increased the quantity of surface runoff on the hill slopes by a factor approximately seven times greater. The natural culmination of this phenomenon is acceleration of mass-movements and frequent floods. It was evident that a significant proportion of the rainfall went waste as flood water without replenishment of groundwater reserves, that is, without recharging the springs[31].

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[28] Valdiya, K.S., and Bartaya, S.K.(1991): "Hydro Geological Studies of Springs in the Catchment of the Gaula River, Kumaun Lesser Himalaya, India". *Mountain Research and Development*, **II**, pp 239-258.

[29] Rawat J.S., "*Water Resources and Burning Hydrological Problems of Kumaun*", in K.S.Valdiya ed. Kumaun Land and People, Gyanodaya Prakashan, Nainital, 1988.

[30] Ibid.

[31] Ibid.

An examination of the data on land use and changes in land use in Uttaranchal reveals the following characteristics.

- A marginal increase in forest land is reported in Uttaranchal as a whole while there has been a decrease in some districts.
- There is an overall decrease in net sown area.
- There has been an overall increase in fallow land.
- There has been an overall increase in uncultivated land with however, a significant variation in districts which show both increase and decrease.

These changes and their probable impact on water resources are explained below.

Official data on land use does not reveal the true picture relating to forest cover. The data refers to land area under the control of the Forest department, but not on the nature and extent of actual forest cover, which data has so far been brought out only in scientific studies. According to the Table-2 below, Uttarkashi recorded maximum forest area (726,290 ha). All the districts of Uttaranchal have more than 50% of forest land in their respective reporting area. The net sown area which meets the food grain production demands of the population constitutes only 12.42% of the reporting area. Nainital is the only district which shows a significant amount of net sown area (204,317 ha) mainly concentrated in *Terai* region of the district[32]. Table-3 shows the changes in forest cover, as recorded by official statistics. The exponential trend of Uttaranchal (>1) shows an increasing inclination of forest cover, in contrast to observed situations on the ground in relation to water resources – a general decline in water sources, increase in floods, erosion and land slides, etc. This reveals that more scientific, sophisticated means need to be applied to asses the real conditions regarding forest cover in Uttaranchal as a whole. However four districts *viz.*, Pauri, Chamoli, Almora, and Pithoragarh show a marginal decrease in forest cover.

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[32] K.S. Rao and S.N. Nandy***, "Land Use Pattern and Population Pressure in Uttaranchal",*** ENVIS Bulletin: Himalayan Ecology & Development, Volume 9, No. 1, 2001.

Table 2. District-wise land utilization pattern of Uttaranchal (1993-94)[33]

District	Total	Percentage distribution of reporting area in major land use category								
	Reporting area (ha)	Forests	Non-agricultural use	Barren & unculturable	Permanent pastures grazing	Misc. tree crops & groves	Culturable waste land	Current fallow	Other than current fallow	Net sown area
Uttarkashi	817631 (15.23)	88.83 (21.14)	0.85 (5.08)	2.47 (6.81)	1.71 (6.12)	0.94 (3.52)	1.12 (2.89)	0.01 (0.52)	0.48 (6.06)	3.61 (4.43)
Dehradun	307377 (5.72)	68.87 (6.16)	5.57 (12.56)	0.54 (0.56)	0.03 (0.04)	1.40 (1.98)	3.93 (3.82)	0.92 (33.99)	1.55 (7.42)	17.20 (7.93)
Tehri	574544 (10.70)	69.13 (11.56)	1.88 (7.94)	2.09 (4.05)	0.49 (1.23)	Neg. (0.01)	12.46 (22.68)	0.01 (0.66)	1.44 (12.86)	12.50 (10.77)
Chamoli[a]	841382 (15.67)	61.93 (15.17)	2.15 (13.27)	19.60 (55.59)	2.59 (9.56)	4.20 (16.24)	3.96 (10.56)	0.01 (1.10)	0.19 (2.51)	5.37 (6.77)
Pauri	759650 (14.15)	59.40 (13.14)	2.30 (12.81)	4.50 (11.52)	5.69 (18.93)	8.09 (28.23)	5.83 (14.04)	0.02 (1.75)	2.34 (27.76)	11.82 (13.47)
Almora[b]	728701 (13.57)	54.06 (11.47)	2.39 (12.80)	4.42 (10.85)	8.33 (26.59)	6.38 (21.35)	8.26 (19.06)	0.09 (7.83)	1.03 (11.72)	15.00 (16.39)
Pithoragarh[c]	637200 (11.87)	51.84 (9.62)	2.46 (11.52)	4.22 (9.06)	13.26 (37.02)	7.18 (21.01)	8.77 (17.70)	0.18 (14.08)	2.05 (20.33)	10.03 (9.59)
Nainital[d]	702807 (13.09)	57.41 (11.75)	4.66 (24.01)	0.66 (1.55)	0.17 (0.51)	2.38 (7.67)	4.15 (9.24)	0.47 (40.07)	1.04 (11.35)	29.07 (30.65)
Uttaranchal*	5369292 (100)	63.98 (100)	2.54 (100)	5.52 (100)	4.25 (100)	4.06 (100)	5.88 (100)	0.15 (100)	1.19 (100)	12.42 (100)

*Excludes Haridwar; [a, b, c, & d] include Rudraprayag, Bageshwar, Champawat, and Udham Singh Nagar respectively; figures within () indicate the percentage contribution of individual district to the respective land use pattern of the Uttaranchal..

The Pauri Garhwal is the worst affected district; the data on Dehradun, a highly urbanized district (>50% population belongs to urban settlements), which is most likely to have less forest, actually shows more forest areas.

[33] Source: Ibid.

Table 3. **Changes in Forest Cover in Uttaranchal.**

District	Five-year average				% change	Exponential trend
Year→	**1974-79**	**1979-84**	**1984-89**	**1989-94**	**1974-94**	
Pauri	470107	455528	453119	450393	-5.99	0.9973
Chamoli	540301	526936	524265	523397	-7.33	0.9977
Almora	402299	394449	392610	392513	-2.41	0.9984
Pithoragarh	331814	330288	330335	330283	-1.94	0.9997
Uttarkashi	710458	710278	710270	713480	2.25	1.0003
Nainital	400593	402208	404635	404703	0.90	1.0007
Tehri	356547	397250	397249	397201	11.39	1.0061
Dehradun	191322	222568	219519	218068	23.79	1.0086
Uttaranchal	**3403441**	**3439505**	**3432000**	**3430038**	**0.43**	**1.0004**

Table 4. **Changes in Net Sown Area**

District	Five-year average				% change	Exponential trend
	1974-79	**1979-84**	**1984-89**	**1989-94**	**1974-94**	
Pauri	102914	101079	98511	89568	-14.44	0.9913
Uttarkashi	33512	30495	33081	30519	-23.98	0.9952
Tehri	74568	73182	70898	70925	-5.57	0.9967
Dehradun	56067	57006	55718	53461	-2.01	0.9972
Pithoragarh	72251	72700	72882	72494	-7.09	0.9979
Almora	111598	117367	105605	111184	2.05	0.9982
Nainital	201417	205979	203091	204383	4.44	1.0005
Chamoli	43195	46264	43463	46463	-3.51	1.0021
Uttaranchal	**695523**	**704072**	**683249**	**678997**	**-3.67**	**0.9978**

The very small portion of net sown area of this hilly state is reducing further, as most of the districts show a declining trend of the area.

While agricultural land – net sown area – shows decrease, this cannot be said to benefit forest area which are more important for conserving water resources. On the other hand, the decrease in net sown area has probably contributed to increase in fallow land, as cultivation is decreasing due to large scale migration of agricultural male work force.

The utilization pattern of other uncultivated land shows the major dispersion among the districts. The districts of Uttarkashi, Chamoli, Nainital and Dehradun show a decreasing trend whereas Pauri, Pithoragarh, Almora and Tehri show an increasing trend of using other uncultivated land including pastures and culturable wasteland. Pauri Garhwal district shows a steady increase of uncultivated land.

In both cases, the impact on water resources needs to be assessed with respect to the nature of land use that is being followed in each case. If the diversion of other uncultivated land is towards cultivation, the impact on water will be more adverse. If the land under miscellaneous trees, crops and groves is converted to pasture, again the impact on water is bound to be adverse. If this category of land is increasing at the cost of forest areas [which are showing decline in four districts] adverse impact on water is inevitable. Only if pasture land is converted to land covered under trees and groves, is there a possibility of positive impact on water resources. However, such data is not available for examination.

Table 5. Changes in the other Uncultivated Land* excluding Fallow Land

District	**Five-year average**				**% change**	**Exponential trend**
	1974-79	**1979-84**	**1984-89**	**1989-94**	**1974-94**	
Uttarkashi	42951	47113	34052	30263	-26.60	0.9750
Chamoli	126827	88770	137376	90082	-33.61	0.9885
Nainital	48406	47422	41484	46933	-7.12	0.9931
Dehradun	17250	16284	16036	16377	-9.82	0.9963
Tehri	73233	80023	80803	75016	4.00	1.0019
Almora	153406	159531	168675	165947	10.20	1.0058
Pithoragarh	147123	165957	186570	179571	30.70	1.0144
Pauri	82213	113319	129805	149149	100.17	1.0391
Uttaranchal	691409	718419	794802	753340	10.80	1.0070

*Includes permanent pastures & other grazing lands, land under miscellaneous tree, crops & groves not included in net sown area and culturable wasteland.

Table 6. Changes in Fallow Land*

District	Five-year average				% change	Exponential trend
	1974-79	**1979-84**	**1984-89**	**1989-94**	**1974-94**	
Chamoli	2614	1742	1726	1696	-39.83	0.9753
Almora	10207	7484	6606	8333	-24.99	0.9858
Nainital	8851	8980	9464	10496	0.28	1.0107
Pithoragarh	10520	10276	10331	13704	34.25	1.0153
Dehradun	5306	6230	6480	7147	44.03	1.0181
Tehri	4655	5636	5986	8373	88.28	1.0358
Uttarkashi	1901	2472	2769	3865	123.44	1.0446
Pauri	8817	10218	13103	17973	112.05	1.0468
Uttaranchal	**52872**	**53038**	**56465**	**71586**	**32.27**	**1.0184**

*Includes current fallow and fallow lands other than current fallow

Except Chamoli and Almora the fallow land of all the districts of Uttaranchal has been increasing steadily. Fallow land has more adverse impact on water resources than even cultivated land in terms of surface runoff, which is increased through lack of vegetative cover; it also results in greater soil erosion, which further contributes decline in water conservation.

The land under area not available for cultivation is increasing in almost all the districts, except Almora, which is the best example of converting a significant amount of area not available for cultivation to cultivable land in the region. The Uttarkashi district situated in the high mountainous region shows that the land not available for cultivation is increasing very fast. The question arises as to the reason behind this overall increase. It is probably due to decline in forest areas, a decline in net sown areas. This also has an adverse impact on water resources. In summary, land use changes have been very unfavorable to water resources, which is evident from the brief description given below.

Table 7. Changes in the area not available for cultivation*

District	Five-year average				% change	Exponential trend
	1974-79	**1979-84**	**1984-89**	**1989-94**	**1974-94**	
Almora	62056	51153	46624	49207	-23.39	0.9850
Nainital	36075	36425	36186	37070	9.08	1.0020
Tehri	22516	16033	18298	23029	-5.38	1.0032
Dehradun	17378	17935	18095	18713	6.57	1.0044
Pithoragarh	35304	41471	39433	41080	26.12	1.0088
Chamoli	136787	195914	197104	182103	49.97	1.0191
Pauri	31795	39089	45694	51697	72.31	1.0321
Uttarkashi	9050	10205	22013	26694	209.70	1.0791
Uttaranchal	**350960**	**408225**	**423447**	**429593**	**29.12**	**1.0131**

*Includes area under non-agricultural uses, barren and unculturable land.

2.17 Status of Water Resources in Uttaranchal

In Uttaranchal, there has been an overall decline in water resources. Hydrological studies over the last decade confirm the diminishing water resources and the worsening crisis[34].

- There has been a diminishing regulatory effect of glaciers of the Great Himalayan Zone.
- Long term decreasing trend of stream discharges.
- The capacities of the lakes have dwindled.
- Surface runoff on the hillsides has shown high increases.
- There has been increase in floodwater and decrease in base flow water in channels and rivers.
- Extensive soil erosion and landslips are recurring phenomena in the region.

These have resulted in decrease in underground seepage which has directly contributed to the reduction of water availability in naulas and reduction of discharge in, and extensive disappearance of springs which are the region's primary source of drinking water.

The status of water resources in this region is currently characterized by the following features.

[34] Rawat J.S., "Water Resources and Burning Hydrological Problems of Kumaun", in K.S.Valdiya ed. Kumaun: Land and People, Gyanodaya Prakashan, Nainital 1988, p. 205

- There has been a change from a situation of water surplus half a century ago to a condition of acute scarcity at present.

- This period has witnessed a tremendous increase in population and an expansion in the categories of water users, as a result of developmental processes which have occurred without reference to the natural resource base.

- The simultaneous and chaotic depletion of forest resources, particularly in terms of foliage canopy - has been the primary reason for highly reduced levels of availability of water.

2.2 Legal and Institutional Framework for Water Resources

The environmental crises described above are bound to reflect on the state of society that comprises Uttaranchal, even a brief examination of which reveals that environmental pressures have had a two-fold effect. On the one hand, the local communities have become alienated from the natural resource base and are losing the traditional management and conservation skills that they have had for centuries. Additionally, supportive interrelationships within communities and between villages have significantly deteriorated or broken down, leading to widespread conflicts and disputes across the region. On the other hand, the State's attempt since the last few decades to tackle, independently, a problem of such magnitude has led to gross mismanagement of the resource.

Uttaranchal State, like other Himalayan States has a very old tradition of community-level informal institutional networks involved in the use-management of all natural resources, including water. These village institutional frameworks have been responsible for the creation and management of hundreds of thousands of drinking water systems [naulas, and bauries], about 16000 traditional irrigation systems or guls, and 50,000 gharats or water mills. These are literally several centuries old. The investments in their construction and their management have been entirely in the hands of local communities. At different periods of history, these local efforts were either encouraged or neglected by the State.

The year 1975 constitutes a watershed in the history of water management in this region when a legislation was enacted - The Kumaon and Garhwal Water (Collection, Retention and Distribution) Act, 1975 - which changed the pattern of administration that prevailed earlier.

Prior to 1975, springs, streams and channels within village boundaries were under either private or village ownership and control; "Prior use rights" were recognized in law. The Kumaon Water Rules of 1930 were the only statutory rules regulating water use in the hills. Their objective was to regulate the construction of irrigation channels and water

mills. These Rules permitted private and community enterprise in construction, subject to permission, and provided for resolution of conflicts of rights on the basis of 'prior use' rights.

The necessity for State regulation of water for drinking purposes did not arise till the 1975 Act. This particular use of water was regulated by customary rights and management practices of individuals and communities as much as the use of water for irrigation and water mills. Customary sharing of traditional drinking water sources between villages is practiced even today.

The 1975 Act abolished all existing customary rights over water, whether individual or otherwise, and declared State proprietorship over all sources.

Along with the abolition of people's rights, their participation in water resource management was conceptually and practically negated. This policy reversed the decentralized investment and management strategies at the community level that had prevailed for centuries and was recognized in law.

Problems that have arisen in recent decades in relation to water resources administration in the hills are a pointer to the fact, that the increased intensity and variety of water use is not matched by appropriate management practices. The adverse impact of the prevailing mismanagement has been heaviest on the drinking water sector.

Until 1985, 75% of the total 15,166 villages in the region were identified as "problem villages" requiring State intervention in the supply of drinking water.

A total of 6369 piped water supply systems (worked by gravity) have been constructed, covering 11,410 villages out of 11,642 problem villages.

A large number of water systems in Kumaon (55%) and in Garhwal (49%) are single-village systems. Data provided by the Kumaon Jal Sansthan indicates that even according to conservative estimates, 45 percent of the total systems constructed are non-functional due to widespread damages. A further 20% are only partially functional. The Kumaon Jal Sansthan reports a total breakdown of 1022 rural drinking water systems, resulting in the loss of several hundred crores of rupees of investment on them.

In the light of these facts, it becomes necessary to examine more deeply the role of society and State in the management of land and water resources in Uttaranchal historically, and to find the causes therein for the current alarming state of affairs.

2.21 History of Water Law and Policy in Kumaon and Garhwal – Colonial and Post-Constitutional Era.

2.22 Governance of Water in the Pre-British Period.

Irrigated agriculture was practiced in the region since ancient times. It may be assumed that water mill technology has the same hoary past. A copper plate inscription of 1514 AD reveals the use of water mills 500 years ago.[35] Some significant features of 'native' rule that were identified by British administrators in the early nineteenth century are shown in Box 1.

BOX1: Rules on Water and Other Natural Resources In the Pre-Colonial Era

- Land – cultivated, uncultivated and forest – had never been *measured* by former kings for the purpose of determining revenue payable to the king. (Atkinson, 1981, p. 467). While the King was technically the sovereign of all resources, forest and wastelands were not subjected to total active control by the State for commercial purposes.
- The village as whole paid revenue due to the State, and not on an individual basis (Sanwal, 1976). This gave village communities the freedom to budget their expenditure on local needs and concerns.
- In his first years as Commissioner of Kumaon, Mr. Traill noted that water rights were commonly held by individuals and communities with respect to drinking water, irrigation and water mills (Hunter, 1991, p. 42).
- The activities relating to water use and management - the mobilization of resources for construction, repair and maintenance; distribution of water, and resolution of conflicts were conducted *with very little reference to the State*, and were part and parcel of the social life of local communities and the micro-environment.
- Local communities had full access to forest resources.
- Customs and traditions governed the major part of rural life.
- Caste assumed a critical role in the access to land and water resources.
- There was a decentralized judicial system.

In sum, in pre-British Uttarakhand, while the nominal authority of the ruler over all land was acknowledged, the governance of natural resources was decentralized. Local communities exercised rights of ownership and use, and powers of management over natural resources systems. Occasional grants of land by the ruler to individuals, while altering the tenurial relationships, did not interrupt the patterns of resource use, which were largely localized.

Custom constituted the legal framework that regulated the use and management of water and other natural resources. There were no formal 'laws' corresponding to modern statutes, which emerged from the Anglo-Saxon legal system imposed by British colonial rule.

[35] A Copper Plate grant of 1514 AD of a Chand Ruler of Kumaon refers to water mills. See N.N.Mishra and Others, "Source Materials of Kumaon History", Shree Almora Book Depot, 1994.

2.23 Colonial Rule on Water Resources – Impact of State Sovereignty over Land and Water Resources.

Colonial rule fundamentally altered the relationship between the State and subjects in the control, use and management of natural resources. State 'sovereignty' over natural resources was brought into operation in an extensive, intrusive and complete way. Besides drinking and domestic uses, the chief use of water was for irrigation and the running of water mills or *Gharats*. The question of water rights developed around these three uses of water and had been exercised by the village community as a whole, or by individuals or groups of individuals. The question of rights vis - a - vis the State arose only with the advent of British rule.

The significant changes that were brought about by British Colonial administration in the region which have a bearing on water resources are summarized in Box 2:

BOX 2: Features of Water Administration in the Colonial Era

- Land tenures were changed with the introduction of private property rights or *hissedari* rights, diluting the nature of common property rights that were prevalent earlier (Stowell, 1937). Land ownership was granted to all castes and classes of persons expanding the scope of acquiring water rights. Community co-operation for the management of water resources had to adjust with the new system of property rights in land. Community modes of management were (and are still) not recognized in law.

- State intervention in the life of the people for the purpose of *revenue administration* was highly intrusive, reaching down to the individual cultivator. By the mid 19th century, all cultivated lands were measured, village boundaries defined and village records prepared. This preliminary 'inventory' of resources laid the ground for active State control over natural resources.

- Land, forest and water rights were *individualized*, the individual placed in relation to the State for acquisition of rights and payment of dues

In the early years of British rule in the region under the administration of Commissioners Traill, Batten and Ramsay, there was an emphasis on consultation with local communities in matters of determination of taxes and revenue, of the respective rights of individuals and communities and in the resolution of conflicts. However, by the mid 19th century, the paradigm of *centralized rule* by the State had been extended to the region. A legal arrangement was made to accommodate the local peculiarities of the hilly region, by enacting the Scheduled Districts Act in 1874, under which rules of governance could be framed separately for the area. However, the overall tendency was towards extensive State intervention in the administration of, among other things, the natural resources of the region.

The first *State intervention with indigenous water systems* may be said to be in 1842, when *water mills* were first assessed to rent. This brought about a basic change in mill

rights. Till then it was a 'private' property of *gharat* owners who exercised a '*monopoly'* use of water[36], subject only to local arrangements. This was transformed into a limited use right by *license*, granted by the State in its discretion, on the justification of State 'sovereignty' over water resources.

At this time, while irrigated land attracted land revenue, no official permission was required for constructing irrigation channels. The construction and management of channels for drinking water, irrigation and water mills continued to be a local activity with no state investment.

Recognizing that agriculture in the hills could not yield as much revenue to the State as forest resources, British agricultural policy for the hill areas did not prescribe any significant Sate support or investment for this sector. This particular place held by agriculture in the British policy in Kumaon province relegated the responsibility of development and management of water resources to the realm of 'private' or 'community' enterprise. At the same time, the British Government did not fail in declaring its sovereign powers over all water resources[37], reserving powers to exploit them whenever opportunity arose. Thus, the British adopted the convenient policy of recognizing local rights to water, in order to ensure private investment, and at the same time, subjected them to State-made law (land revenue, forest and water laws) to reserve powers of centralized control over water resources. Where 'private rights' were required to be abolished or taken over by the State, due compensation was to be paid.

2.24 Land Administration.

The issue of water rights was closely allied to colonial administration of land revenue. The processes of land revenue administration separated the measured land of the villagers (*Nap* Land) from the unmeasured waste *(Benap*) and forest that vested thence with the British Government. The measurement and classification of land - *Nap, Benap,* and forest - also classified water sources as falling on private *nap* land, on *Benap* within village boundaries or in Forest areas, thus defining individual, community and State rights.

Village rights to water were recorded in village record of rights variously known as Wazib-ul-Arz or Yaddast-Haalat-Gaon. *Local customs* in the use of water were officially recognized. They were recorded in village records. However, only *rights to water* were recognized, *but not management practices*. The latter would have implied legally recognizing local social institutions, their property norms, and rules of governance, which the Colonial State did not wish to accommodate.

The separation of *Nap, Benap,* and forest land legally and the institution of distinct rights frameworks on water with respect to each of these categories was the first act of the State towards 'dis-integrated' land and water management.

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[36] For more details, see: National Archives of India, F-830 / 1911 / Revenue A Proceedings Nos 49 to 55, January 1912.

[37] See Preamble to the Kumaon Water Rules of 1917.

Disputes were settled through State - instituted judicial institutions on the basis of customary rights enjoyed by right holders. The rule was that *prior users* had the *first right*, and later users of water could only use water in such a way as not to injure the right of earlier users. *Prior use rights* formed the central legal principle, both in custom and in law, underlying water rights in the hills.

British administrators recognized the rationale of this doctrine and gave statutory recognition to it. The rationale was that in the hills, significant investment of money and labour was necessary for carving out channels in the mountainside to carry water over long distances for human consumption. When any person or community had invested so much labour to do so, it would be against public policy to allow a later user of water to disturb the right accruing from such investment. Thus the 'prior use' doctrine was recognized in the hills while the riparian rights doctrine was not; the latter invested inherent water rights on lands abutting a flowing stream.

2.25 Centralized Judiciary.

Another facet of colonial rule was the adoption of *judicial functions* by the State through centralized judicial institutions. This brought all disputes relating to water before the State and simultaneously impaired indigenous, localized dispute resolving processes. While local custom continued to form the basis of resolving disputes, such custom became subject to external, alien rules of *procedure.* This process deprived custom of its flexibility and authority in governing local behaviour in the use and management of resources. In this phenomenon – i.e. the subjection of Indian custom to Anglo-Saxon law – can be seen the beginning of the erosion of communitarian modes of governance of natural resources.

2.26 Legislation on Water.

While there was no legislation specifically for water in the region throughout the 19th century, State control over water was enabled through other legislation and rules, such as the *Nayabad* and Waste Land Grant Rules (1893), the Forest Act of 1865, the Indian Penal Code, and Civil and Criminal Procedural Codes, besides Revenue Rules and Regulations. The "buying up" of private rights to water was done under the provisions of the Land Acquisition Act of 1874.

The first of these - i.e. the *Nayabad* and Waste Land Grant Rules hold significance to water rights and water resource administration in that they indirectly provided for the cause for the declaration of State control on water, in the first Rules relating to Water in 1917. As more and more grants of Wastelands were given, '*Benap*' land was converted to '*Nap*'. The question arose whether this process involves automatically the destruction of any rights of Government over water. Government felt the need to affirm, through legislation, that all collections of water are the property of and subject to the control of the State.

The need for some form of rules was also felt for the purpose of regulating Water Mills, which had been assessed to rent since 1842.

In 1917, the first Rules for the regulation of water resources - the Kumaon Water Rules - were framed under the Scheduled Districts Act of 1874, completing the slow but steady process of bringing water resources under direct State administration.

In the absence of potential for extensive commercial exploitation of water resources in the hills comparable to forest resources, the British Government found it rational to recognize private rights (customary rights) and private enterprise in the use and development of water. Consequently, while the Rules of 1917 declared the sovereignty of the State over all water resources in the region, it also reiterated the existing policy of recognizing customary rights in existence. Some of the features of this Rule are shown in Box 3:

BOX 3: Kumaon Water Rules, 1917: Features and Implications

Features of Water Rules

- For the first time, channels for irrigation, or water mills could be constructed only with the permission of local *revenue* authorities (who had exclusive jurisdiction), through application by prescribed procedures. Sanction would be granted only subject to all existing right of user belonging to any third party, whose right could not be extinguished, reduced or otherwise injuriously affected. Other important features included:
- All other courts and Officers were debarred from taking cognizance of any matter or dispute in respect of water any suit or application may be brought under the rules.
- The Collector was empowered to direct the closure of any water mill in order to protect irrigation, if he considered it necessary, for which compensation would be payable to the mill owner, to be deposited in advance with the Collector.
- The Collector was empowered to assess mills to rent, stop or dismantle mills worked without sanction, to impose penalties, to revise rental assessment, and to collect rent arrears as arrears of land revenue.
- Surrender of mills was also provided for.
- Local revenue authorities constituted the judicial forum for the hearing of suits or disputes relating to mills or irrigation channels;

The Rules also provided for a period of limitation (3 years) for instituting suits; for the application of the Civil Procedure Code, 1908, with regard to the rules of evidence and for appeals against orders of Collector to the Commissioner.

Impact of statutory water law on customary management.

- Firstly, the non-interference with custom by the State, which was a convention in traditional Indian jurisprudence was overturned by the Anglo-Saxon legal system, by making custom *subject* to law and *regulated* by it.

- Secondly, while custom relating to water use and management belonged to a complex and whole system of local behaviour, in which were included customary practices relating to forest use, agriculture, and social inter-relationships for a variety of reasons (corresponding to the 'modern' concept of 'watershed'), legal rules were framed for each set of customs separately. Customary rights in forests were administered separately from rights to land and water, and all three were likewise separated from social laws (family law). Thus custom became fragmented by law.

- At a third level, customary *rights* were separated from *duties.* It was only the former which the executive regulated more and the courts adjudicated upon. The duties which were enjoined upon users to submit to the collective discipline of maintaining the system, and distributing benefits were left to the local communities to enforce, without the corresponding legal powers to regulate rights.

With these rules, legal regulation of Custom was maximized with respect to all functions relating to the use of water resource - construction, maintenance, distribution of water, taxation, defining offences, imposing penalties, hearing and resolving of disputes.

Clearly, this represented a loss of powers of local governance over the resource.

The Water Rules of 1917 were modified in 1930 as Kumaon Water Rules of 1930. Irrigation and Water Mills were separately dealt with. With regard to the former, provision was made to seek the court's intervention to establish easementary rights i.e. to construct channels through another person's land. The District Engineer, the Chairman of the District Board and the Divisional Forest Officer were given the powers to object to any irrigation channel if it was likely to damage a road or other public work under their charge.

Provisions relating to watermills spelt out the procedure with regard to applying for water mills in more detail. In all other aspects, the Rules of 1930 were similar to the earlier Rules, substantially. Neither of these rules applied to channels for drinking water, nor were drinking water disputes entertained under them.

2.27 Water Rights and Water Law in the Post-Constitutional Period.

It is a matter of utmost significance that there was no change in the law on water resources during the period of 1930 to 1975. This period however, witnessed a significant extent of loss of forest cover, loss of people's access rights to forest, and widespread social tensions relating to forest resources. The impact of these developments on water resources was not taken seriously in official policy from that point of time till 1975, when

the State Government adopted a significant change of approach in policy and law, which had its impact on water rights.

It was only in 1975 that the State government decided to bring in some major changes in water laws. Thus, the Kumaon and Garhwal Water (Collection, Retention and Distribution) Act of 1975 and the U.P. Water Supply and Sewerage Act of 1975 was enacted. These two statutes represent current official policy on water resources. They redefine the relationship between the State and public with regard to water resources. Some salient features of current water policy are shown in Box 4:

At the policy level:

- Drinking Water Supply was made a priority by both Central and State Governments.
- Supply of water became a monopoly function of the State.
- Financial assistance from foreign lending institutions such as the World Bank became available for water supply programmes.
- In the Hill region, it was necessary to enact a law in order to give powers to government to abstract water from any source for the supply of drinking water. The prevalence of customary rights of individuals and village communities over water sources was a legal hindrance to Government. Therefore legal reform was undertaken to give effect to the Drinking Water Supply policy of the Government.

BOX 4: Features of Kumaon and Garhwal Water (Collection, Retention and Distribution) Act of 1975 and UP Water Supply and Sewerage Act of 1975

The K & G Water Act of 1975 was intended for the regulation and control of water sources in hill tracts of Kumaun and Garhwal to ensure rational distribution of water for the purposes of human and animal consumption, irrigation and industrial development. However, it has been utilized primarily to give effect to the drinking water policy of the State.

The main feature of the Kumaon and Garhwal Water Act is that *individual and community customary rights to water, whether customary or otherwise, were abolished, and all water sources brought under the control of the State.*

Under the K & G Water Act of 1975, no person could construct any water-channel, tank, reservoir or water mill, or install any pumping machine or pipeline for taking water from any water source without prior permission of the SDM. The U.P.Water Supply and Sewerage Act of 1975 constituted the Jal Nigam and Jal Sansthan and vested them with monopoly powers with regard to extraction and supply of drinking water.

Powers, duties and functions, including the power to hold property for the purposes of this Act given to a Jal Sansthan were excluded from the powers, duties and functions of Mahapalika, Municipal Board, Town Area Committee, Notified Area Committee, Kshettra Samities, the Zila Parishads and the Gaon Sabha by repealing the relevant provisions of U.P. Municipalities Act. 1916, U.P. Town Area Act, 1914, U.P. Kshettra Samities and Zilla Parishads Act, and the U.P. Panchayat Act. 1947.

Not only rights, but all powers of management – administrative, regulatory, judicial, legislative – were concentrated in the powers of Government. [See Annexure 1 for details]

Thus a law was enacted which had drinking water supply by the State as its objective.

This has had a negative impact not only on drinking water but all other uses of water as well. Stated in a nutshell, under this Act, the rights of the State on water prevails over all water use by any individual, community or groups of persons, firms or institutions.

In any conflict between State rights and other rights, the rights of the State will prevail. In all other situations, i.e., conflicts between individuals, communities etc., where the rights of the State are not in contention, the Kumaon Water Rules of 1930 will apply (i.e. prior use rights will prevail) as provided for under section 22 of the Kumaon and Garhwal Water Act of 1975.

No Rules were framed under the Kumaun and Garhwal Water Act of 1975. It has been used mainly as a substantive Act to enforce the rights of the State.

Some useful provisions of the Act - e.g. sections relating to water conservation, control of pollution, damage etc. of water sources - have never been implemented.

Provisions from Other Statutes on Water.

Besides the Kumaon Water Rules of 1930, and the Water Acts of 1975, several other statutes have a direct or indirect bearing on water resources administration in the Uttarakhand region. These are:

Substantive Law	Procedural Law
• Indian Penal Code, 1860. • Indian Easements Act, 1882 • U.P. Land Revenue Act, 1901 • Northern India Canal and Drainage Act 1873 • Cantonment Act, 1924. • Indian Forest Act, 1927; Kumaun Forest Panchayat Rules 1931, U.P.Panchayati Forest Rules 1972/ 1976; U.P.Village Forest Joint Management Rules 1997. • U.P.Village Panchayat Act 1947 • U.P. Kshetra Panchayat & Zilla Panchayats Act, 1961. • U.P. Minor Minerals Concession Rules, 1963. • U.P. Soil and Water Conservation Act, 1963. • Kumaon & Uttarakhand Zamindari Abolition Act, 1960. • Forest Conservation Act, 1980	Indian Evidence Act, 1872. Civil Procedure Code, 1908. Criminal Procedure Code,

The multiplicity of legislations reveals the fractured approach adopted by formal law in governing a resource. Some of these statutes are briefly analyzed below.

Kumaon & Uttarakhand Zamindari Abolition Act, 1960

Water Rights

Of these, the Kumaun and Garhwal Zamindari Abolition Act 1960 deals directly with water rights, and contains provisions in direct contradiction to the K & G Water Act of 1975. Section 7 and Rule 9 of the Act provide that any well, *baoli, chhal, nauli, naula*, etc.[38] belonging to or held by any person, whether resident in the village or not, shall belong to that person and the site of the wells or other water bodies shall be deemed to be settled with that person by the State Government on such terms and conditions as may be prescribed.

This right is a heritable and transferable right. The owner is not liable to ejectment on any ground whatsoever. The owner has the right to use the site for any purpose whatsoever, subject to the existing rights of easement. Succession to the site is governed by personal law.

If the water source is abandoned or goes out of use, or if the owner dies without any heir entitled to succeed, the site shall escheat to the State. The Act provides that the owner shall pay rent to the Gaon Sabha, if such rent was paid earlier.

Land Rights and Management.

This legislation is significant to the issue of water resources administration in yet another manner. Those common lands that were under earlier [colonial] law recognized as lands over which the village community had recorded rights – rights within the "Sal Assi " boundaries - were now transferred to Government control. They were recorded as "Non-Zamindari lands. The earlier practice of recording, and as a corollary, administering rights over land resources by the State was suspended with this change. The erstwhile customary modes of land management were critical to the conservation and protection of water resources. With the change in the law, and with it, change in rights, the responsibilities of local communities with regard to *land management* has eroded. The State, having de-legitimized the function of local communities, in its turn did not introduce any alternative institutional framework for land management. The results are evident in the serious degradation of land resources in the State.

U.P.Land Revenue Act, 1901.

Under section 120, tanks, wells, watercourses and embankments are considered to be attached to the lands of co-sharers who seek partition. Private ownership of water bodies is thus presumed, again in contradiction to the Water Act of 1975.

[38] Local names for water bodies.

The Land Revenue Act also contains several provisions that have a bearing on water resources administration. These relate to:

- Determining village boundaries
- Settling boundary disputes
- Determination and collection of land revenue.
- Preparation of record of rights of every village.
- Partitioning of land on request of shareholders - such land includes tanks, wells, watercourses and embankments.
- Attachment and sale of land and moveable property for arrears of land revenue.
- Entry and survey of land.
- Settling disputes and recovering fines and costs.

U.P.Soil and Water Conservation Act, 1963.

This Act also provides for certain rights, powers and institutional framework for the purpose of Soil and Water Conservation in the region. However, the Act is implemented in isolation without any reference to or functional relationship with other agencies and departments involved in water resources administration. The Act provides for the setting up of a Soil and Water Conservation Board, a District Soil and Water Conservation Committee and a District Soil and Water Conservation Officer. The Act does not provide for public participation in such works except through representation in the District Soil and Water conservation Committee, whose function is to plan and implement works through the District Soil and Water Conservation Officer. The Act prescribes procedures for preparation of plans by Zilla Committee and execution of such plans by the Soil and Water Conservation Officer. In reality, plans are prepared by the Department and executed with minimal public participation.

The only "right' given to an individual is the right to object to a plan of works, after notice of the plan as been published, if its implementation will affect his livelihood or affect him in any other way. If on hearing the objection, it is found valid, then the Zilla Committee can cancel the plan.

Through this Act, Government is empowered to –

- Acquire land and pay compensation.
- To take action against anyone for any act which is against the interest of soil and water conservation. If on hearing, the violation if found to be true, the punishment is three months' imprisonment, with fine of Rs 500/-.

There is no record of any such action taken by the department in the hill area.

Panchayat Legislation.

With various Departments of Government such as drinking water supply agencies, irrigation department, forest department, soil and water conservation department, revenue departments etc, exercising substantive powers in management of natural resources,

Panchayat Raj Institutions [established under the U.P. Village *Panchayat* Act, 1947 and the U.P. *Kshetra Panchayat* & *Zilla Panchayats* Act, 1961] are left with only a subsidiary role in the matter of water resources administration. These are mostly in the nature of "preparation of plans" for drinking water or irrigation development. More than powers, PRIs are vested with the "obligations" of providing drinking water and sanitation. At the village level, Panchayat bodies are enabled to invest development funds in repairing and maintaining irrigation systems through centrally assisted schemes, without any substantial changes in their legal status, even after the Constitutional amendment on PRIs.

A recent amendment to the Village Panchayat Act provides for the constitution of Village Water Supply and Sanitation Committees. However, this merely places some responsibilities on the committee without conferring any new powers over the resource on village representatives.

Indian Forest Act, Forest Conservation Act, Forest Panchayat Rules.

Forest law envisages forest protection and conservation in the general interest of environmental protection as well as for the specific purpose of sustainable generation of forest produce. Water resources protection is seen as an incidental benefit arising from forest conservation. This is evidenced by the fact that there are no provisions in these Acts and Rules regarding protection and augmentation of existing water sources in forest areas. Forest law does not provide for the rejuvenation of degraded forests for the purpose of creating, protecting or augmenting water sources. The Village Forest Rules are primarily intended for the management of forest for the purpose of supplying and regulating forest produce, and contains no provisions relating to water sources.

The Cantonments Act, 1924.

The law relating to water resources within the jurisdictional area of Military Cantonment in the Uttaranchal is enshrined in the Cantonments Act (2 of 1924). These areas have been excluded from the operation of the K & G Water Act of 1975.

The following provisions relating to water may be found in Chapter 10 (Sanitation and the prevention and treatment of disease) and Chapter 13 (Water supply and drainage) of the Act which vests Rights, Powers as well as Obligations on the Board to regulate and supply water within its jurisdiction.

- Control over sources of public water supply that includes lakes, streams, springs, wells, tanks, reservoirs etc.
- May prohibit irrigation of any land if injurious to the health of the dwellers in the Cantonment.
- Provide safe water supply within the Cantonment.
- Shut down private source of public water supply; withdraw water supply.
- Levy water tax.
- Levy fine/penalize for misuse of water.

This Act vests the Board with powers to regulate only drinking water supply within its jurisdiction. Irrigation and Water Mills do not fall under the purview of this Act.

Though the Act vests the Board with various powers to regulate and control all the water resources within the Cantonment, the same Act does not hold the Board responsible for non-compliance of its obligation to supply water. (Section 223)

Summary of Uttaranchal Water Law.

The history of water rights in Uttaranchal reveals that in the pre-British era, a wide range of rights flourished in a decentralized form of governance, with the State playing a negligible role in the development of water technologies, definition and administration of rights, or settlement of disputes. Rights derived their validity from Custom, the legal framework that governed all natural resources. Custom gave recognition to rights of ownership of water bodies, with all its attendant rights. Water was considered a "common property" even while private rights were prevalent. The State did not claim active rights over water resources. Private rights, group rights and community rights were exercised. Water rights were closely inter-linked to land and forest use, which formed a cohesive whole.

Under colonial rule, property rights over water underwent a complete change. Private property rights were transformed into "licensed use". This change started with mill rights. The basis of transformation was the assumption of active sovereign rights over water and other natural resources by the colonial state. The next logical step was the centralized administration of rights, which now were recognized by statutory law. Even 'customary' rights acquired their legal validity only through recognition by statutory or judge-made law.

Another major transformation in water rights through 'modern' law was the 'individualization' of rights, and the identification of water rights with land rights. This served the purpose of state intervention in land administration for enhancing land revenues through promoting irrigated cultivation.

Water rights were also affected by a multiplicity of substantive and procedural colonial legislations relating to natural resources. In essence, these laws transferred the governance of resources from local communities to the State. The ill-effects of colonial land and forest administration and law continue to have an adverse impact on water management. Multiplicity of laws with water related provisions - the Water Acts, the Panchayat Acts, Soil and Water Conservation Act, Forest Legislation, Revenue Law etc. - contribute to the obfuscation of rights and duties and systems of accountability. It also results in wastage of resources.

The Kumaon Water Rules of 1917 and 1930 gave effect to colonial policy on water. The application of the latter continued into "independent" India. Many of its provisions are protected by the latest legislation on water in the region.

The Kumaon and Garhwal Water Act of 1975 gives effect to contemporary state policy of monopoly state control over water resources. It forms the basis of the "subsidy" culture that informs most State functioning. While the legislation declares unequivocally that all water rights are abolished, except the State's, it contradicts provisions of other laws such as land reform and forest laws, which continue to recognize water rights.

The selective emphasis given by current water law on different types of water use – drinking and domestic, agriculture, animal husbandry and industry – has resulted in a lopsided and "dis-integrated" management of the resource. No norms exist for inter-sectoral management of water resources.

Dispute resolution in relation to conflicts over water rights was centralized. The resolution of conflicts on competing rights is left to judicial institutions, which continue their role of adjudication mostly under the confines of legislative provisions but sometimes work around them to solve conflicts by adjusting rights. In disputes involving a government agency as a party, the decision to protect prior rights of a community arises form judicial discretion and cannot assume the nature of a legal principle determining all such cases. This situation owes its existence to the provision in the Kumaon and Garhwal Water Act 1975 which states that in the case of water supply, communities or persons whose rights were abolished "may" (not 'shall') be given preference. (Sec 4 (2).

Disputes are resolved on a case-to-case basis and benefit only those who access formal courts. Throughout the region, water related conflicts have become endemic, and persist over long periods of time to the detriment of both the resource and its users. From the perspective of water users, specifically rural users, there has been a drastic change from " a right to hold rights" to a situation of insecurity, and ambiguousness in rights. This has also contributed to neglect by rural users of their traditional technologies, scientific skills and management practices.

2.28 Other Institutional Interventions in the Drinking Water Sector.

Over the last decade or so, there has been a growing response from sectors other than Government to the water crisis in the State. Non-Governmental Organizations have experimented with different technologies and institutional mechanisms to address the issue. For instance, hand pumps have been attempted to be installed with varying results. Rain-water harvesting initiatives have been undertaken. Afforestation programmes through social participation has been conducted by some NGOs to augment water supplies. In one experiment, through the joint investment of an NGO and a village community, a water source from an adjoining village was "bought" and pipelines laid on the initiative of the village itself.

A recent major intervention has been the World Bank financed Rural Water Supply and Sanitation Project, the implementation of which commenced in 1995. In the initial phase of this project, Government agencies were substituted by NGOs and Village Committees

in all aspects of the project implementation. In the latter phase, various government agencies - the Jal Sansthan, Jal Nigam and Kumaon Mandal Vikas Nigam – have been given the responsibility of programme implementation.

Several academic and development research institutes and individuals have conducted extensive scientific research on water resources in Uttaranchal. However, they have not been utilized sufficiently in formulating state policy. Nor has there been a consolidated review of these various research results.

The current situation of drinking water for rural communities in Uttaranchal presents a diverse picture of availability, management and control. In general, supplies have evolved from a stage of being a preserve of the local communities to being an issue for a complex network of institutions from local user groups to international agencies. The variety of philosophies which govern the operating principles such as on humanitarian considerations to market opportunities and deriving legitimacy from local laws to multi-lateral agreements on drinking water make it more complicated. And today, there is activity at all scales and levels.

CHAPTER 3

3.0 CASE STUDIES

The case studies presented in this chapter are of the following.

S.No	Type of Management Approach	Villages Covered.
1.	Community Management	Village : Chantoli Gram Sabha – Kiruli Block Dasholi District Chamoli
2.	LSGED	Village : Naurakh Gram Sabha :Naurakh Peepalkoti Block : Dasholi District Chamoli State Uttaranchal
3.	NGO	The Kassar Trust Vill – Mankote Dist – Bageshwar.
4.	Line Department	Jal Sansthan and Jal Nigam
5.	World Bank	Swajal Project

3.1 CASE STUDY – 1.

COMMUNITY MANAGED DRINKING WATER SYSTEMS

Chantoli Village, Chamoli District.

Introduction

This is a case study of Chantoli village, a hamlet in the Gram Sabha Kiruli located in Dasholi Block of Chamoli District, Uttaranchal. It falls in the Garhwal region of Uttaranchal. The hamlet is predominantly populated by Scheduled Castes. The population is 205, with 53 families. [Adult Males – 65; adult females -57 and Children -83]

Chantoli village is one of the remote villages of Dasholi Block, of the border district of Chamoli. It is situated about 3 ½ kms elevation from the Badrinath road. It lies at an altitude of 1500 metres. To the south east above the hamlet, is an evergreen oak forest.

The majority of the population in the village, numbering 205, consists of "Rudiya" castes of the Scheduled Castes, whose main occupation is basket weaving. The majority of the families are landless; those families with land possess only un-irrigated or uncultivated land. The village lacks basic amenities, such as drinking water, hospitals, schools etc. There is a scarcity for drinking water.

This hamlet was chosen for the case study for the following reasons.

1. It relies on its own supply of drinking water, without any State assistance or intervention.
2. It is predominantly a Scheduled Caste village.
3. It is situated in a far-flung, remote area.

There are no Government constructed drinking water schemes in the village.

The traditional / natural sources in the village are:

1. Naula Mangra [spring] – about 150 years old – within the habitation.
2. Paudhar Mangra – 2 kms distance.
3. Khati Mangra - 3 ½ kms distance.

Analysis of the community-based drinking water management system

1. **Resource Valuation.**

Since this is the only source in the village, it is estimated by the villagers to be of great social and cultural value to the community. Drinking water use is considered to be the first priority by the villagers, followed by its use for the village's cattle population. The whole social structure and life system of this backward community is dependent on the Mangra Naula. Villagers understand the criticality of the forest cover above the village for the continued existence of the water source. The water source does not contribute directly to economy of this village, but the majority of artisan families who are dependent on outside labour, are completely dependent on this water source.

All the social and religious rituals of the village community – birth, marriage, death, festivals etc. – revolve around this resource.

From the perspective of the villagers with whom discussions were conducted, it can be observed that they have a holistic understanding of water and its integration with all aspects of life – ecological, economic, and socio-cultural.

2. **Resource Assessment.**

From a survey of the resources of the village, it becomes evident that the population of 53 families in the village is dependent on a single traditional water source – Naula Mangra, in the absence of any Government drinking water systems.

In the months of May and June, the water in the source becomes reduced unless some rains are received. In the latter case, this source is used for watering the village cattle as well, by diverting the water to small ponds which have been constructed for watering cattle.

From July to January, there is sufficient water in the Naula for the whole village for drinking water purposes.

On measurement [in the month of April], the water flow in the Naula was found to be .98 litres per minute i.e. 980 ml / minute. Therefore the flow in 24 hours can be estimated to be 1411.2 litres. From the above assessment, it is estimated that each family in the village [consisting of an average 5 members] receives approximately 29.4 litres of potable water. However, since the water is not tapped during the night hours, the per capita availability is less than 5.8 litres. At night, the water in the Naula is made available to cattle in the village. Due to non-utilization during night time, some overflow from the Naula reaches some fields located near the road below the village.

No construction activities have been undertaken or are allowed to be undertaken in and around the source.

According to the villagers, due to the rocky sub strata in the village, seepage of the water of the naula occurs to some extent. If this could be prevented and the entire water could be stored, the water could be utilized for other domestic purposes, or irrigation, horticulture etc.

In situ moisture in and around the naula may be observed to be higher than other areas of the village. This is primarily due to vegetation in terms of cultivated lands and forests situated above the naula.

Bachi Lal, an elderly villager recounting the history of the naula, recalled that there were nine springs – or 'Mangra' in the local language - around this naula, feeding it. A stream flowing due north west of the naula was called 'Naugad' also signifying that it was fed by nine springs. This stream flows down to join Ghatgad gadhera, which after flowing 3 kms further joins the Alaknanda river, thus becoming tributary of the Ganga.

There is no source for irrigation in the village. However, due to the thick forest cover of oak and rhododendron above the village, in situ moisture and cool climate prevails.

There has been no initiative so far either from Government or non-government organizations for a proper resource assessment in this village in connection with its drinking water supply.

The operation and maintenance and management of the source is done by the Gram Sabha. There is no support system from the Government, Non-Government, or any other department.

This it may be observed that villagers continuously monitor the availability of water and adjust their patterns of use – for themselves and for the cattle population – accordingly.

3. Equity – Rights to Water

In Chantoli village, there is a consensus among the villagers – unwritten, based on mutual understanding - that every family in the village would receive a sufficient supply of drinking water from the source. For other domestic uses such as bathing, cleaning, washing clothes etc., the use of this source is prohibited. The village is composed of families from a single caste – Rudiya. Even though there are class distinctions among the families, in the matter of drinking water rights, no special privileges are generally recognized. However, due to the pressure of scarcity, small quarrels and tensions tend to arise among the water users, who are mostly related to each other by blood or marriage.

There are no institutional mechanisms such as Water Committee or Water Panchayat. The distribution of drinking water continues to be done equitably based on social understanding.

The following rules were observed to be practiced with regard to the distribution of water.

1. First come first served.
2. No distinctions between rich and poor in access to water.
3. Even elected village representatives such as the Gram Pradhan, or ward members are not allowed to jump the queue.
4. Priority is given to persons in emergency / special situations – such as marriage in the family, for funeral rites etc. In cases of marriage, the entire community cooperates and collectively provides water to the family in question.
5. Children are important participants in the provision of water supply to the family, as they fetch water from the naula when the adults are busy. For families who do not have junior members to undertake this task, or for families whose adult members go out of the village for labour, 'out of turn' access rights are allowed.
6. Similar privileges are allowed to families whose adults are in public or private service, and who have to leave the village at particular times.

Violations of these rules do occur from time to time. For example, a particular person may bring several vessels to the naula to be filled in the early hours of the morning and would not allow others to fill until all his /her vessels were filled.

In the matter of queues, vessels are kept in line, while family members wait alongside. Sometimes, women have to leave the line and rush back to their homes, to attend to urgent tasks. At such times, others push aside their vessels and usurp their place in the queue.

During the months of May and June, when Naula Mangra almost dries up, the villagers of Chantoli traverse a distance of 2 kilometres to Kiruli village for water. This village is a predominantly high caste village. Here, Chantoli villagers, belonging to Scheduled Caste, suffer social inequities from the higher castes of Kiruli. They get water with great difficulty. They are not allowed to touch the water source, but are obliged to wait for some higher caste members to provide them with water.

4. Technology

Naula Mangra is built on natural source using the traditional technology of placement of slabs over seepage, for collection and extraction of water. From the environmental point of view, the construction of naula is virtually a nil-cost technology, as compared to new technology such as piped water supply systems. Stone slabs were collected by the villagers from surrounding areas, and the naula constructed by the villagers through free labour. Subsequently, plantation activities were carried out around the naula, using species such as oak, cedar and rhododendron which help in retention of water. The

plantation also protects and enhances the quality of water. Villagers are always willing to contribute their free labour to protect this natural source from damage due to land slip or land slide due to human intervention.

5. Institutional Mechanisms

The institutional mechanism for the management of drinking water systems in Chantoli village is of an informal nature, involving the whole community. Until two years ago, there were no formal institutional arrangements for management and supply of drinking water. With the assistance of a local Non-Government Organization and various self help groups like Mahila Mangal Dal and Yuvak Mangal Dal and the village Panchayat, a Jal Panchayat was constituted. This was headed by the Gram Pradhan Shrimathi Munni Devi. However, the Jal Panchayat has not been able to function either independently, or in coordination with other groups for the protection, augmentation and supply of water. The reason for this failure is mostly seen to be the extensive control by the State agencies over all aspects of water resources management, due to which the Jal Panchayat could not take any new initiatives or pro-active role for development and management of water resources.

At present, a plan is being mooted out by the Government to use this water source for supply to the nearby primary school through a pipe line system. However, the villagers envisage that this work will probably be undertaken without the participation of the community.

Till date, the elected village representatives such as ward members or Gram Pradhan have never taken the issue of the village's drinking water needs seriously. They have mostly considered water as a State subject, and the State's responsibility. The Village Panchayat has not been able to function as a mobilizing force to include the community in management. Whenever there is any discussion in the Panchayat about water problems, villagers are reluctant to come forward and contribute in some manner for their solution.

However, at times of acute crisis, villagers do come forward and give their contributions for cleaning the water sources, digging ponds for watering cattle etc.

It has to be noted that it is the women who come forward to provide their labour in the management of water systems. The male members of the community aspire towards gains but are not equally prepared to share the responsibilities.

In informal discussions with the villagers, we found that there is a consensus among the village community on a water distribution pattern, which in local terms is called "Aglyaar". This is based on the principle of "first come first served ". Since the women and children play a greater role in fetching water, they are to be given priority over men folk who fetch water. This kind of water distribution system may have very little significance to other villages, where conditions may differ. However, in this village, for future improvements, it is considered essential to involve the SHGs or the elected Panchayat in the enforcement of this particular scheme of water distribution.

This system of water distribution is able to be successfully applied in a village such as Chantoli which is a single caste, single source village.

6. Dispute Resolving Mechanisms

By and large, there have not been any major disputes over the past several decades because of the general consensus observed by the village community. Since the life of the whole village is directly linked to this single source - Naula Mangra – small disputes occur from time to time and are resolved then and there. Till date, flexible customary rules alone are used to resolve disputes. Generally, stringent rules such as levying fines and other forms of punishment are never enforced by the community in the resolution of the many small disputes that arise. No disputes have to been taken before official judicial institutions for resolution.

There are a few instances such as the one described below, wherein the more powerful members of the community attempt, through the use of their social, economic or political influence with institutions outside to break the community consensus, and even succeed in doing so.

Recounting an incident of conflict that occurred in January 2002, Shri Bharat Lal, a resident of the village, recalled that as usual, there was a long queue at the naula on that day. When it was the turn of Mrs. Pooja Devi, she was pushed aside by another woman Kumari Ranjana. Both commenced to quarrel. The conflict grew and eventually reached the Patwari – village revenue and police officer. Kumari Ranjana hailed from an influential family. Her father, was employed in the Police Department, and used his influence with the Patwari to slap a fine of Rs 1500 on Pooja Devi hailing from a very poor family. No legal procedures were followed in this case. Neither was there a written complaint nor were there any official records of imposition of the fine. No receipt of fine from Pooja Devi was issued. On the contrary, the fine paid with great difficulty by Pooja Devi was retained illegally b y the Patwari and the complainant's father.

The conflicts that normally arise are related to the turns for water or conflicts between rich and poor families.

Impartial delivery of justice is not possible due to the predominant powers that are exercised by the extended arm of the State in the form of the Patwari, Police or other agencies, which are invariably closely linked to local elites. The common people have no remedy in the form of impartial people's tribunals.

7. Role of Women

In a male dominated society, as in other villages, women of Chantoli too generally experience the hardship of fetching water from long distances for family needs. The formally constituted Pani Panchayat comprises mostly of women – including two members of the SHG, the Gram Pradhan Mrs. Munni Devi and seven other women members. However, these members are unable to devote any time to the activities of the

Panchayat, as they are already overburdened with household chores. In the task of fetching water, due to low supplies, on an average a woman in the village spends approximately 2 hours 33 minutes in collection of drinking water supply alone for the family, assuming a family of five members requiring 125 litres.

Due to the poor socio-economic status of women, most of the political decisions at the village level are taken by men.

8. Inter-sectoral Adjustments

Since this village has a very limited supply of water being used exclusively for drinking water and for cattle, the question of inter-sectoral adjustment does not arise. Water for other domestic uses is also not available sufficiently. It was observed that villagers bathe only once in a fortnight or so during acute scarcity periods.

9. Ecological Sustainability

Villagers are conscious of the fact that the sustainability of the village itself is continuously dependent on the water supply of Naula Mangra. They are also conscious of the fact that there is a vital need for massive afforestation of water retention species for the sustenance of this single water source and to control the fluctuation in water supply. There is a need to adopt other techniques of water conservation as well to augment the source. Present policies and programmes of the Government divert the attention and energies of the younger generation into State sponsored activities which are inimical to integrated resource management.

3.2 CASE STUDY – 2.

THE LSGED APPROACH.

Village**:** Naurakh
Gram Sabha: Naurakh Peepalkoti
Block: Dasholi
District: Chamoli
State: Uttaranchal

Name of the Scheme: LSGED Rikhpani Peepalkoti Drinking Water Scheme.
Population of Gram Sabha: 1342

Naurakh Village:	263 [General Caste]
	281 [Scheduled Caste]
Peepalkoti Village:	288 [General Caste]
	42 [Scheduled Caste]
Population of Hamlets:	468

In Gram Sabha Naurakh Peepalkoti, from Gadi Gaon to Naurakh, different Government agencies have constructed different types of drinking water schemes. For example, drinking water scheme by the Animal Husbandry department, by PWD, by Garhwal Mandal Vikas Nigam, three major DW schemes of Jal Nigam, Jal Sansthan, and LSGED. Of these, the LSGED scheme is the oldest. The Jal Nigam scheme was constructed in 1995-96 and Jal Sansthan scheme in 2001-02.

The village also has two natural water sources namely Bamni Mangra , about 200 years old, and Chin Mangra , about 90 years old.

The oldest DW scheme was constructed by LSGED at a cost of Rs 2.5 lacs in the year 1965-66. This scheme was taken over by the Jal Sansthan in the year 1976-77. As standard and sturdy materials were used in the construction of the scheme, the scheme continues to function and supply water to this day. The condition of most of the other schemes is relatively poor and damaged, and supply water of poor quality.

1. Resource Valuation

From discussions with several villagers, the following ideas, norms and concepts regarding water as a resource were elicited.

The community values water as essential to life. Water is revered as life giving and its pollution is considered sinful. Giving water to those in need is considered to be a spiritually meritorious act. The villagers feel that anyone who pollutes water never attains

salvation, but goes to hell. Water is a priceless and most valuable resource. It is as sinful to sell it or gain profit from it, as it is to pollute it. Natural sources maintain the cleanliness of the environment. The sound of water in gadheras and streams gives peace and serenity to the mind. It enhances the beauty of the landscape. Without these water sources, villages will have the appearance of deserts.

The Gram Pradhan remarked that water sources in the villages can also be developed as tourist attractions which can provide gainful employment to the locals. But of late, people have become indifferent to the values that were assigned to local streams, channels, and other water bodies, and have become increasingly dependent on the Government. The tradition of the community providing free labour for the maintenance of water sources has also slowly eroded.
It may be observed from these remarks that from the perspective of the villagers, there is an appreciation of the spiritual, ecological, economic, aesthetic, social and cultural dimensions of the resource. However, these values are generally slowly eroding in the face of greater dependence on the State.

From the perspective of LSGED, however, water is valued as a social good, and it is recognized as the duty of the State to provide drinking water. The limited level of intervention by this institution allows the continuation of community involvement to some extent, and with it, the associated value systems associated as well.

2. Resource Assessment

Till date, no comprehensive assessment of the water resources of the Gram Sabha has been done by any institution. Due to the decline in water sources, the Gram Panchayat undertook the task of rejuvenation of two water sources and repair of certain pipelines in the recent past.

3. Equity – Rights to Water

Out of a total population of 1342, the schemes constructed by Jal Nigam and Jal Sansthan have given less importance to the Scheduled Castes as well as backward caste population. Under the LSGED scheme, only one Standpost had been constructed originally for the SC population, which was sufficient at that time. This continues to supply water to the SC hamlet. Now however, due to increase of population, demands have been expressed by the SC population for two more Standposts. It is significant to note that at the time of construction of this scheme – i.e. in 1965 – the contractor belonging to the higher caste, along with other higher caste people in the village, neglected the SC hamlet entirely. After strong objections were raised by this community, the scheme was redesigned and a Standpost provided to the hamlet. In Naurakh village, the higher caste villagers do not allow the SC people to use the traditional water source - Bamni Mangra. However, Peepalkoti village, the Chin Mangra is being used by all the castes. This situation may be due to its location in the vicinity of the market area where all the castes and classes of people reside.

Disparity in Water Distribution in the several Schemes

The LSGED scheme is a very long one – almost 3 ½ Kms. Under this Scheme, the numbers of tanks constructed were as follows - two in Naurakh village, one in Naurakh hamlet, and four in Peepalkoti Bazaar. Each of them is of 15000 litres capacity. Of late, there has been encroachment in and around the tanks, but the tanks continue to function in full capacity and supply water to all the Standposts under the scheme. All the Standposts under this scheme are functioning in full capacity. Since the transfer of the scheme to the Jal Sansthan many years ago, the SC population has been demanding extra Standposts, which, however, has not been met.

Though it was claimed by official agencies that the LSGED scheme was planned on the basis of habitation, in reality, it has been established on the basis of the caste profile of the village. There is an apparent disparity in the distribution of water. For the 35 families of Scheduled caste in Naurakh, a single Standpost was installed. For Naurakh village, a larger village of 42 families, there are two Standposts; for just 38 families in the market area of Peepalkoti, 4 tanks of 15000 litres capacity were installed. A separate Standpost was installed at the bus stand for public use.

The water distribution in the LSGED scheme is as follows.

S.No.	Name of Stand Post	Thickness of Pipe	No of Dependent Families	Rate of Water Flow
1.	Pradhan Khola SP	½ inch	21	3 seconds per litre
2.	Kula Gadhera SP	½ inch	19	4 sec/litre
3.	Scheduled Caste Basti	½ inch	32	9sec/litre
4.	Palla Bazaar	½ inch	37	4sec /litre
5.	Station SP	1 inch	21	4 sec/litre
6.	State Bank SP	½ inch	18	5sec /litre
7.	Mulla Bazaar SP	1 inch	21	6 sec/litre
8.	Hanuman Mandir SP	½ inch	27	4sec /litre.

The water supply in this scheme gets considerably reduced in summer, during which period, the community depends on the traditional water systems.

In spite of its unequal distribution system, the LSGED scheme continues to be the best of all the schemes in this Gram Sabha, in terms of quantity and quality of water supplied. In using this system, there is a high level of cooperation within the community, and they follow the 'first come first served' rule in accessing water.

4. Institutional Mechanisms

Before the take over of the LSGED scheme by the Jal Sansthan, the water discharge was known to be regular. Also regular cleaning of tanks and chlorination of water was carried out. Pipelines remained in good condition. Two persons from the local community were entrusted with the responsibility of operation and maintenance and overall management of the system, which they did in coordination with members of the community.

Whenever there were any damages to the system after monsoon rains, the locally resident retired army staff would mobilize the youth of the village and undertake repair work, which in certain instances would last for a week or ten days. In such cases, the villagers would draw their water supply from the traditional sources.

Other than these arrangements, the Naurakh Peepalkoti Gram Sabha does not have any formal institution such as Jal Samiti or Committee for water management or distribution. No necessity has been felt for such a mechanism, as water is available in plenty not only in the traditional water systems – Bamni Mangra and Chin Mangra – but also in Mangri Gad Gadhera and Bade Paani Gadhera [both streams].

However, the people of the village recognize that the perennial water sources of the village need to be managed appropriately for other uses as well.

Under the current dispensation of the Jal Sansthan, the institutional mechanism can be described as very weak. The earlier interest and involvement of the community in the LSGED scheme has now been withdrawn, and the relations between the State agency and the community has changed from one of mutual interdependence to one of complete dependence by the community on the State. At the same time, there is an almost complete lack of initiative and responsiveness on the part of the Jal Sansthan, which has taken up full responsibility for the system. The villagers have to complain several times before any cleaning of tanks or repair of pipes is done by the JS.

Another issue related to institutional mechanisms is that of the practice of involving contractors in the construction of drinking water systems. Villagers strongly object to this practice which breeds corruption and results in low quality of work, thus affecting their rights to water supply.

5. Technology

The LSGED system is found to be appropriate as per the conditions and requirements of the Naurakh Peepalkoti Gram Sabha.

Rather than disturbing a natural source such as a spring, water from a stream is diverted through a 2” pipe to a holding chamber constructed at a distance of 100 feet from the stream. Subsequently the water is drawn through a 2” pipe into a filter tank, and thence to as storage tank with a capacity of 5000 litres. This storage tank remains in excellent condition even after 40 years. The original pipeline is also of such good quality that it has provided water supply uninterruptedly for a period of 40 years.

The reasons for the LSGED scheme being sustainable for this long period are:

1. The water from the source was extracted without disturbing the water shed.
2. Participation of the local communities in the construction of the scheme.

3. Corruption and bribery being relatively absent in earlier days, the standard of work was far better.

The technical know-how for the LSGED scheme was provided by the Department, but the construction was undertaken incorporating the suggestions of the local community.

In contrast, the Jal Nigam constructed scheme in 1995-96 at a cost of Rs 11 lakhs became completely damaged in 1999. The pipelines and storage tank were completely damaged, As a face saving device, the Jal Nigam handed over the scheme to the Jal Sansthan. The Jal Sansthan, in its turn, to cover up the deficiencies in the scheme, joined up the new scheme with the earlier LSGED scheme which had been brought under its control.

Similarly, recently constructed schemes for irrigation and drinking water are now in a state of disrepair and damage.

As per the villagers' opinions, the use of cement is construction around natural sources is risky to the sustainability of the source. In earlier days, local people were careful to use only stones in such a manner as to not disturb the seepage lines etc. However, currently, under the influence of modern technological practices, cement was being used even in repair and rejuvenation of naulas – in this case the Bamni Mangra - which, according to the villagers, has resulted in reduction of the water source. When questioned, the contractor who had undertaken the repair work stated that the cause of the sudden reduction of water in the naula could be due to earth movements. However, this does not explain how the traditional technology has withstood such natural occurrences over long period of time.

6. Role of Women

There is no scope for the participation of women in the maintenance and operation of the LSGED scheme. However, women are in the forefront in the matter of management of traditional sources in the village such as the Rikh Paani, Thatha Paani, Badai Paani, and Pangara Paani. They voluntarily contribute labour for the maintenance of these sources, whereas the men folk complain and stay away.

Women's relationship with water starts on their waking, as early as 4 a.m. On an average, women from every household fetch approximately 60 -70 litres of water from different sources for various household uses. Additionally, they go to sources such as Standposts and mangras to wash clothes and bathe. Also, on an average, 150 litres of water are fetched by each household for watering cattle.

The responsibility of maintaining traditional sources rests with women. They clean the spaces near the source. At times of festivals also, such cleaning is undertaken. They also involve children in this task in order to inculcate the practice in them. If any male members are seen to dirty the surroundings of the naula, the women present force them to clean up. On marriage, a new bride is brought to the traditional source, where she

conducts worship and undertakes to participate in the cleaning and maintaining of the source.

Women folk in the village feel that traditional sources are more amenable to their participation. Whenever they see that cleaning is required, they do so promptly and are able to thereby prevent pollution and maintain the hygienic standards of the drinking water source. However, they are not able to respond similarly to piped supply systems. They are unable to judge whether the water in the pipelines is clean or not, as the water is not observable as openly as the traditional sources. Whenever they come across a broken pipeline while crossing the forest, they attempt to repair it, and if it was not possible to do, they promptly report to the men folk in their families.

7. Inter-Sectoral Adjustments

There are four channels for irrigation; however, most of the cultivated land in the village is rain-fed. Four water mills also exist, which are currently non functional; there are several sources for the watering of cattle.

As part of the LSGED scheme, and with the participation of the local community, a gul was constructed from the same stream for purposes of irrigation and for watering cattle. This channel was later on taken over by the Irrigation Department. When water is used for irrigation, bathing of cattle is prohibited. There is no conflict between the different uses of water from the stream that supplies water for drinking.

A waterfall exists on one of the streams in the village, at an elevation of about 150 metres from the village. Not only has this become a tourist attraction, but the village itself is on the tourist route to pilgrim centres in the higher reaches. As a result, several hotels and restaurants have sprung up, all of which are now competing for water from the same traditional sources that serve the village. Villagers are apprehensive that in days to come, there will be a water scarcity in the village, and they will have to depend on outside sources.

8. Dispute Resolution

No major disputes are known to have occurred over the last decade. Recently, some controversies and disputes have come into light.

1. A sheep rearing and research centre was opened by Government in Peepalkoti. The sheep and goats from this centre were allowed to drink water from the natural sources, thereby polluting it. Some recent cases of mental diseases that afflicted five children in the village is being attributed to this practice. With strong protests, the villagers have succeeded in banning the watering of sheep and goats at their natural sources.
2. Some families living near the natural sources were found to be responsible for polluting the environs. The Women’s group of Naurakh Peepalkoti served a

notice of warning to these families threatening legal action against them for their offensive acts. As a result, these families are no more indulging in such activities.

9. Sustainability

There are no forests of any significance in this Gram Sabha of Naurakh Peepalkoti, which is located on steep slopes. The Forest Department promotes mostly pine forests which are adversely affecting water sources. As a protest, villagers have started cutting down pine trees in the forest land. The villagers are conscious that monoculture of any type – whether vegetative, animal or human – creates imbalance in nature and is harmful to life. The Gram Sabha is located in an ecologically sensitive area – that is, in a seismic zone. It has been affected from time to time by heavy landslides, cloud burst, forest fire etc. The occurrence of landslides has increased due to massive deforestation in the upper reaches. All these phenomena have affected the water sources from time to time.

The planning and implementation of the LSGED scheme does not take all these factors into account; conservation and protection of water sources are not envisaged as part of this scheme. So far, the availability of water in the source has sustained the scheme, but with increasing human intervention, and unsustainable governance practices, the life of this scheme is bound to be reduced.

3.3 CASE STUDY – 3.

THE NON-GOVERNMENT APPROACH

KASSAR TRUST

Among the several Non- Government Organizations working in Uttaranchal, the Kassar Trust is known to be the only institution working for amelioration of drinking water problems in Uttaranchal for the longest period of time. Therefore, this institution has been selected for the case study.

The Kassar Trust started its work in Uttaranchal in 1985. The primary concern of Kassar Trust from its inception was to address the problem of acute drinking water shortages which it recognized as the single most important problem facing the people of Uttaranchal. The Trust was concerned particularly about the most scattered villages and hamlets in this hill State which tend to get ignored by the mainstream government developmental program including drinking water supply. About 18 years ago, the Kassar Trust started its People's Water and Sanitation Program, guided by the following principles.

- People must be the main actors and not mere beneficiaries of the program which is providing water to them. Therefore they must take the initiative to resolve their drinking water problem and must be actively involved in all stages of the scheme, specially the women who are the primary users of water right from formulation to implementation and above all, in its careful operation and maintenance to ensure sustainability. The programme was planned to be demand responsive – that is, unless the community made a firm request to the Trust for resolving the drinking water crisis, the Trust would not initiate any action.

- Water was not to be considered as free just because it is a natural resource. Supply and conservation of water through various technologies involved non-recurring and recurring costs which the community was to bear, if it is serious about resolving the water problem. Therefore firm commitment by the Community by contribution in cash, kind and labour was to be made in advance before Kassar Trust would step in to provide technical know-how and materials or skills not available locally.

- The Kassar Trust, under no circumstances, would give cash grants or cash subsidies to any persons or village committees; its contribution would be in terms of capacity building of elected members of village organizations and technical training of *Jal Karmis* or Water Technicians, as well as construction materials needed for the programme, that may not be available locally.

- Before the actual construction work is undertaken, the Village would conduct a feasibility survey followed by an action plan, endorsed by all the members of the community. The community would organize and carry out the construction with technical support from the Trust. Environmental Sanitation that included sanitary latrines would be an essential component of the WATSAN as open defecation adversely affects the quality of water. The same guiding principles as in drinking water schemes would also apply to this programme. The Trust's ultimate objective was to go much beyond just visualizing water and sanitation in terms of a project, but to generate awareness on the health seeking behaviour in a manner that enthused people to do their utmost to improve their quality of life through preventive and promotive health measures.

- While adequate drinking water and easier access to water would reduce the hardships of the daily life of especially the women and adolescent girls, there were other aspects which needed immediate attention, for example Balwadis for children, non-formal education for adults, extra-curricular activities for school going children, better horticultural and agricultural activities for greater food and nutritional security, income generating activities for better financial security etc. While the focus was on water and sanitation, the allied activities, when demand existed, were carefully planned and implemented.

- Instead of inducting "outsiders" [this definition included all those who did not stay in the village] as experts who are not conversant with the ground reality and are not used to the hardships of daily life in the remote Himalayan villages, the Trust had adopted a policy to train locally the people actually residing in the areas. It found this to be more practical and cost effective, even though the persons selected did not have any formal education and the training process took a much longer time. Over the past 15 years, it was the Trust's experience that technology literacy had paid a higher dividend than paper degrees and ensured the sustainability of the project. Currently, apart from the Executive Director of the project, all the staff members are villagers from this region.

The following is an overview of work done by the Trust between 1986 – 2000.

1. Geographical coverage of the Trust's Programs –

Districts	6
Blocks	11
Villages	132
Hamlets	223

2. Accessibility of the villages covered

Distance from the last motorable Road [km]	No. of villages	No. of Hamlets
0	31	34
Between 0 – 5	71	78
Between 5 – 10	14	14
Between 10 – 15	2	2
15 +	14	95
Total	132	223

Note: All villages beyond 15 KM and some, between 5-15 kms, are in heavy snowfall areas in the Greater Himalayas. The most distant village is 57 kms from the motorable road.

3. Type and No. of Schemes

Type	No. of Schemes
Gravity Schemes	75
Lift Pump Schemes	20
Hand Pump Schemes	62
Total	157

4. Details of Gravity Pipelines

Distance from the last Motorable road [km]	No. of Villages	No. of Hamlets	No. of Household Covered	Length of Pipelines laid [metres]
0	18	19	353	1,456
Between 0 – 5	37	52	959	28,251
Between 5 – 10	7	7	228	5,614
Between 10 – 15	0	0	0	0
15 +	10	39	283	17,582
Total	72	117	1,823	52,903

By mobilizing the community in 6 villages in Dafort area, 4 government drinking water schemes have been maintained since March 1993 by the village covering 17,300 metres of pipeline.

5. Storage Tanks constructed

Type	No. of Tanks	Storage capacity [in litres]
Masonary tank	25	81,500
Ferro-cement tank for Drinking Water Schemes	80	190,000
Ferro-cement tank for Rain water harvesting schemes	48	35,000
Total	153	306,500

#Three 20,000 litres capacity tanks are under construction in Nainital and another four tanks are planned for the next year.

6. Sanitary Latrine Program

This program was carried out in Uttarakhand region between 1989 –2000.

Distance from the last Motorable road [km]	No. of Villages	No. of Hamlets	No. of Households covered
0	13	14	112
Between 1 – 5	44	47	466
Between 5 – 10	12	12	195
Between 10 – 15	2	2	2
15 +	13	55	270
Total	84	130	1045

7. Polyhouse [Green House] Program

This program covers 15 villages in Uttarakhand region between 1991 – 2000.

Area	No. of Villages	No. of Polyhouses	Covered area in sq ft.
Greater Himalayas	9	36	9,950
Lesser Himalayas	6	10	1,650
Total	15	46	11,600

Review

The work of the Kassar Trust is reviewed below on the basis of the parameters chosen for the study[39].

1. Resource Valuation

Water is valued as a critical resource for the sustenance of life. Though it is a natural resource, it was not to be considered as "free" and the communities that use it are expected to be able to meet the costs of using water. The Trust has undertaken the responsibility to enable local communities to achieve the capacity to meet these costs. However, while such cost contribution is expected, the water itself is not priced. It continues to be viewed as a social good rather than an economic good.

An integrated approach to water resources management has been adopted by the Trust. Not only has water resources conservation been integrated with resource exploitation, but intervention in the water sector has been combined with promotion of health, environmental sanitation, education, income generation and livelihood security, thus endorsing the interconnectedness of water all aspects of water.

2. Resource Assessment

In the initial stages, the approach to water issues was influenced by the professional expertise of the Founder of Kassar Trust, Dr D.G. Tim Rees, a hydro-geologist. An initial survey of hill conditions about 15 years ago revealed the lack of basic necessities, particularly drinking water. A survey of naulas was conducted and an assessment was made that the standard of quality of water in the naulas required improvement. They were open sources, and thus ran the risk of pollution due to unhygienic practices. This understanding fueled a research into possibilities of technological improvements. The focus remained on drinking water until several years later, when a more comprehensive and integrated approach to water resources was developed, and along with it, a more comprehensive assessment of the natural resource base. The assessment was conducted in a participatory manner, involving the villagers in the selected hamlets, of how resources were used earlier in comparison with current trends in resource use. In resource assessment, forest conservation and management constituted an important component.

[39] The information was collected through personal visit to the Trust's programme area, discussion with its executive members and other staff – Shri Madhav Panda and -------, and reference to the Trust's annual reports and other published literature.

3. Equity – Rights to Water

The particular approach adopted by Kassar Trust in selection of schemes to be implemented, reflects its particular approach to the issue of equity. Firstly, only those villages from a where a demand is received for assistance is selected. Such a demand could be from either a village, a hamlet or even an individual. The demand is accepted on the basis of the commitment of the applicant to observe the terms and conditions of the intervention. As such, Kassar Trust is not placed under any obligation to fulfill the needs of an entire village, or entire hamlet as well, but acts on the basis of demand.

In addition to this, from the initial stages, an attempt was made to achieve consensus of the village on the source to be improved, or created, in order to avoid conflicts relating to rights. No special attention was given to any particular social groups in the village, such as Scheduled Castes or tribes; all were considered to have equal rights to water. Thus the caste issue was not taken seriously, but all treated alike.. However, in the case of mobilizing contribution from the applicants, an option is provided to provide either cash or labour contribution, which permits economically disadvantaged families to also participate. Thus, the hand pump was made freely available to all. In cases of piped supply, the use was restricted to those who contributed either in cash or labour.

No social problems have been reported so far in the use of hand pumps.

4. Technology

The approach of Kassar Trust in the matter of the nature of technology to be used was based both on an understanding of the hydro-geology of the region as a whole as well as its local variations. As such, no attempt was made to impose the same technology in all areas. On the contrary, a trial and error method was followed in the initial stages, to confirm the nature of technology that best suited local conditions. The mechanisms that were introduced were mainly deep infiltration wells and hand pumps. Eight or nine different types of hand pumps were experimented with. While a hand pump was found feasible in the Lower Himalayas, in the Greater Himalayas, conservation activities were found to be more necessary. Here, a combination of infiltration chambers and gravity-based pipe lines were used. Through experience it was found that normal iron pipes [GI] were not suitable for the cold climate of the upper reaches; therefore, HDP pipes were used, which were uncommon at the time. These pipes were at the time being produced by only one manufacturer in India, with German collaboration. The Infiltration chambers or underground tanks – in the construction of which materials such as sand, cement and stone are used – helped to avoid the water contamination that occurred in open sources.

When storage tanks of cement and stone were made in the Greater Himalayas, it was found that due to earthquakes and land movement, cracks appeared in the structures. The use of bricks was considered, but had to be rejected as they involved high transportation costs. It was decided that a new technology developed by the Structural Engineering Research Centre, Ghaziabad – the use of ferro cement for construction of tanks etc. –

would be applied. The staff of Kassar Trust underwent training in the use of ferro cement for manufacture of storage tanks. Tanks up to a capacity of 10000 litres of water could be made with this material.

Hand Pumps and Lift Pumps were attempted in the Lower Himalayan region. However, while lift pumps were technically feasible, socially they were created conflicts and were not promoted. In places where hand pumps showed a low discharge, rain water harvesting activities were combined and households provided with tanks. The installation of hand pumps was dependent on the availability of seepage, and the size and nature of the catchment as well.

New technologies were thus introduced by Kassar Trust taking into account local environmental conditions, and integrating conservation measures in the water extraction programme. No attempts were made to universalize the technology, but instead, modifications were introduced to suit to specific locales.

From an initial preoccupation with introducing technologies for drinking water alone, the programme saw a slow development of an integrated approach to the issue of water resources. The observation of unhygienic practices of local communities in the vicinity of water sources led to the introduction of a sanitation programme, involving the promotion of sanitation awareness and installation of a large number of latrines – in many cases, for the first time in interior villages.

Here too, in the interest of cost-effectiveness, materials used in the construction of latrines was modified in different places – stones were used where they were easily available, and cement blocks [a technology introduced by the Trust] were used where it was found to be cheaper than construction with stone

Simultaneously, plantation activities on private and common lands were made compulsory.

5. Institutional Mechanisms

The introduction of institutional mechanisms for water management matched the gradual and experimental intervention in the drinking water and sanitation sector.

Village Committees

In the initial stages, some operational principles were adopted. If any community or individual wished to install a hand pump or infiltration well, the Trust would extend assistance in the form of materials and technical know how. Financial assistance was mobilized from another Non-Governmental Organization in the same district – the Uttarakhand Seva Nidhi. The assistance was given to the community through a local committee formed for the purpose. By 1988, four such committees had been formed in

four different areas, each committee covering not just a village or hamlet, but a watershed. Altogether, 64 hamlets were covered in both the Greater and Lesser Himalayas. Interested persons from the locality became members of the Committee. The leaders of these committees were chosen by the members. Two women became members in two of the four committees. The members represented not only the benefited hamlets, but chosen on the basis of their interest in promoting the programme. The committees initially had simple tasks – of mobilizing contribution from villagers and supervising the implementation of the programme. Tasks such as monitoring and evaluation etc. were not included. In some places, the committee was dissolved after the conclusion of the programme.

In course of time, when it was observed that the Committees were not functional, User Committees were mooted in 1993. A one-time contribution of Rs 3000 was required to be paid by the user groups. The User groups were obliged to undertake catchment protection. While the trust met the costs of plantation activities, the protection was to be done by the Group. Two members from the group were also provided training for the maintenance of the water supply system.

The User groups, however, had nor functional relationship with the rest of the community, particularly those sections which had not opted for a programme, or with the Panchayat Institution.

Cost Sharing

The terms of participation were that the Trust would provide materials and technical know how, with the applicants providing labour as their contribution. Prior to 1999, it was not common to raise capital contribution from the village partners for sharing the cost of the drinking water scheme. Whatever capital was raised normally went into an operation and maintenance [O & M] fund which took care of O & M expenses of each drinking water scheme. From April 1999, the project insisted on capital cost sharing for construction of drinking water schemes and decided that each household should pay Rs 200 in cash. This rule is relaxed for the economically marginalized households who are asked to make the contribution in kind, i.e. local building material and cartage. Both the capital and labour contribution was equally divided so that each household, rich or poor, has equal right over the drinking water scheme. This contribution was formalized by the village partners in their community action plan and was spent by them directly towards the expenses related to the scheme i.e. construction material and /or its cartage. The accounts for this were maintained by them initially under the supervision of the Grassroot Support Organization. The labour contribution too was also spelt out by the village partners in its action plan; this contribution included digging and filling of pipeline trench, local cartage of material and pipes, and provision of unskilled labour for the work. Apart from this, the village partners also provided land for drinking water assets created – i.e. trench for pipeline, storage tank, Standposts, soak pits etc. This land was donated free of cost to the scheme and was decided unanimously by the village partners in a plenary meeting of each drinking water scheme.

By 1996, water supply systems with pipe lines 2 – 4 kilometres long had been installed. A contribution of Rs 200 /- per family was collected towards construction costs. An amount of Rs 60 per family annually was also collected towards maintenance expenditure. A monthly contribution of Rs 5 was additionally collected. There was no pricing of water. A small contribution of Rs 1 or 2 was collected for payment to the person who undertook maintenance of the system.

Schemes were undertaken at the hamlet level, not the village level. Schemes for small groups of 3 to families were also taken up.

6. Dispute Resolving Mechanisms

The Trust had adopted the customary mode of dispute prevention rather than creation of institutions for dispute resolution – substantial dialogue with partner villages prior to the commencement of the programme leads to consensus, and thereby the avoidance of conflicts.

However, less attention has been paid to the post – programme dynamics in the use of the system. No information is available on whether any conflicts have arisen in access to water, or any other matter, and in what way they have been addressed.

7. Role of Women

In the Trust's own admission, the promotion of the active role of women has been a weak point of the organization. However, each of the programme since the 18 year history of the Trust has direct positive implications for the status of women and female children and adolescents.

1. As a result of the drinking water schemes in the various villages and hamlets covered, the labour saved by women and girl children in the beneficiary households ranged between 402 -1671 Kilometres annually[40] . Similarly the new drinking water systems resulted in substantial saving in labour by way of reduction in kilometre/metric tons of water carried. This saving ranged from 8.04 – 33.42 thousand kilometre/metric tons weight.
2. Substantial time was saved by women and girl children ranging from 447 – 1857 hours annually, or between 18.5 – over 77 days annually.
3. The sanitation programme with construction of latrines is also of direct benefit to women. There has been a substantial saving of distance traveled and time taken through this intervention.

4. The programme for personal hygiene, household and environmental sanitation awareness programme contributed to improved health status of women and children.

[40] Annual Report of the Kassar Trust, 2000-2001.

5. The educational programme for pre-primary children through Balwaris has helped to save a substantial amount of time every day for women and older girl children – on an average 4 hours per day.
6. Programme on improved agricultural practices resulted in a production of almost 30 metric tons of vegetables, thus increasing income of households, and making available more vegetables for the family's nutrition. [None of this production has been marketed outside so far.] New varieties of fruit and nut trees were also introduced. The improvement of health and economic conditions of the household is of direct benefit to women, as it reduced their responsibility in health care.
7. The introduction of improved chulahs has resulted in a 50 % reduction in the use of firewood, and thereby saved substantial time in the collection of firewood. These chulahs drastically reduce smoke in the kitchen, thus preventing health problems of women due to inhalation of smoke on a regular basis.

In spite of these women –friendly programme interventions, the Trust itself has recognized that the role of women in decision making structures and processes has not been sufficiently addressed. The Trust is currently initiating a larger dialogue about women, environment and development involving a wide range of institutions and individuals to develop broader and deeper insights on the strategies to be adopted for enhancing the qualitative and quantitative participation of women at all levels of programme implementation.

8. Inter-Sectoral Conflict

No such conflicts are reported to have arisen in the areas covered by the Trust's programme. The reason that is stated is that a great deal of discussions and negotiations are undertaken with the applicant villagers prior to the programme, and this helps to avoid any later conflicts.

9. Sustainability

The technology of hand pumps is not universally applicable in the hill regions. They can be installed only in locations that are favorable – i.e. where there is sufficient seepage, and where there are no rocky strata. Compared to piped water supply schemes, they are cost-effective. With proper maintenance, they have a long life of 20-25 years.

In places where there are no underground water sources, piped supply is necessary.

In the Trust's water supply and sanitation programme, the issue of sustainability is addressed by making it mandatory that source protection work is undertaken by the applicant hamlets or families. In one case, where there was private land above the source, over which plantation work could not be undertaken, a forest area of about 100 acres above the source was willingly fenced by the villagers.

Secondly sustainability of the scheme is ensured when the community takes up the responsibility of operation and maintenance of the system. In the earlier stages of the

Trust's programme, the beneficiaries of each scheme created, with the support from field teams, a self-financing mechanism – Surakhsa Samiti – for each scheme's operation and maintenance. But it was found that through the years, unless these samities were given training support in technical (minor repair of pipe-line, hand pump etc) and managerial (accounts, record keeping, regular collection of O & M contribution etc.) aspects, they became dormant in time, thus affecting the sustainability of the scheme. SO from 1999, the Trust set up a training programme for persons selected by the community in the technical aspects of the scheme. This person was then given the responsibility of looking after the daily operation, and was paid a small honorarium from the village O & M fund.

A measure of transparency in the maintenance of accounts was also ensured by introducing a rule that the treasurer of the village committee would present the accounts at a monthly village meeting.

The sustainability of any development programme is dependent on the capacity of the local communities where the programme is implemented, to meet the costs of maintaining and operating the system and attending to the repairs that may be required form time to time. This capacity is in turn dependent on the improvement of the socio-economic status of the community, form the stage in which they receive the development assistance. The Water supply and Sanitation programme of the Kassar Trust was logically integrated forward into a community health programme, a Livelihood and Income Generation programme, an Energy conservation programme [use of improved chullahs to reduce use of firewood, which in turn contributes to water conservation] and Nutrition promotion programme [growing green vegetables, fruits and nuts]. The general improvement in health results in saving of money spent on medical care. Improved income generation also results in greater savings, thus enabling the community to meet the expenses incurred in utilization of basic facilities such as a water supply system.

3.4 CASE STUDY – 4

THE JAL SANSTHAN / JAL NIGAM APPROACH

3.41 History of State Intervention in the Drinking Water Sector- Institutional Mechanisms

The new State of Uttaranchal was part of the larger State of Uttar Pradesh since Independence and part of the United Provinces prior to that date. Initially, Public Works Department, United Provinces Government held administrative responsibility for drinking water in the State. The formation of Public Health Engineering Department in the year 1927 during the British Period saw the beginning of new era, which gave importance to the public health. The British Administration established this department to ensure hygienic conditions around their settlements.

Not very late after independence, in 1949 the Local Self Government Engineering Department was formed, which prepared water supply schemes with several local bodies. These were executed through liberal grants and loans from the State government. Till the end of the Third Plan, domestic water supply programs were mainly focused on cities and district headquarters. From the Fourth Plan [1969-74] onwards rural domestic water supply was given primacy. The LSGED role was to strive for providing health living conditions to the public. It was the umbrella organization performing functions such as execution of works along with an advisory role on public health and engineering issues for the urban local bodies. The supply of safe drinking water to the rural and urban population was the sole aim of this body. LSGED acted as the facilitator for the local level institutions, handing back of schemes to the local bodies for operation and management. A Chief Engineer at Lucknow with Senior Engineers at the various local levels headed the LSGED.

In the hill region of Kumaun and Garhwal, since the advent of modern law through colonial rule, customary community rights to water sources were legally recognized, and recorded in village record of rights under revenue administrative procedures. While the colonial State declared its overall sovereign rights over all water sources[41], legal recognition was given to community's usufructuary rights, under the legal doctrine of "prior use rights". This legal mechanism protected a village's rights to sources within its legally defined boundary [Sal Assi Boundary] or an individual's right to water, against later users.

This policy of according legal recognition to customary rights of communities and individuals promoted community and private enterprise in construction, operation and maintenance of water technologies for drinking water, irrigation and water mills, thereby enabling "community management" on a wide scale.

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[41] Kumaun Water Rules of 1917

During this stage, which lasted until 1975, there was very little intervention by the State in these sectors in the hill districts. Water management – creation of technology, operation and maintenance – remained an aspect of "governance" – mostly local, and supported by the State. The LSGED was a supportive technical body, intervening where required, and withdrawing after completion of schemes, so that management could continue in the hands of the users.

It was only in 1975 that the State government decided to bring in some major changes in the administration of water resources through changes in legislation. The prime reason for this change was the receipt of a loan from the World Bank for investment in the Drinking Water sector. As the World Bank considered that delivery and recovery of loans from innumerable local bodies [district governments] throughout Uttar Pradesh would be an unviable task, it advised the formation of corporations which would have the monopoly function of provision of drinking water and sewerage services in the State. This was the beginning of the attempt to transform what was an aspect of "self – governance" to "service delivery" by the World Bank. The second stage of de-monopolizing the role of the State and introducing the private sector as competitive "service deliverers" was to come much later.

Under the aegis of the World Bank, two statutes were enacted in 1975 - the Kumaon and Garhwal Water (Collection, Retention and Distribution) Act of 1975 and the U.P. Water Supply and Sewerage Act of 1975. These two statutes represent current official policy on water resources. They redefine the relationship between the State and public with regard to water resources. Some salient features of current water policy are shown in Box 4:

At the policy level:

- Drinking Water Supply was made a priority by both Central and State Governments.

- Supply of water became a monopoly function of the State, replacing community/individual efforts.

- Financial assistance from foreign lending institutions such as the World Bank became available for water supply programmes.

- In the Hill region, it was necessary to enact a law in order to give powers to government to abstract water from any source for the supply of drinking water. The prevalence of legally recognized customary rights of individuals and village communities over water sources was a legal hindrance to Government. Therefore legal reform was undertaken to abolish these rights.

BOX 4: Features of Kumaon and Garhwal Water (Collection, Retention and Distribution) Act of 1975 and UP Water Supply and Sewerage Act of 1975

The K & G Water Act of 1975 was intended for the regulation and control of water sources in hill tracts of Kumaun and Garhwal to ensure rational distribution of water for the purposes of human and animal consumption, irrigation and industrial development. However, it has been utilized primarily to give effect to the drinking water policy of the State.

The main feature of the Kumaon and Garhwal Water Act is that *individual and community customary rights to water, whether customary or otherwise, were abolished, and all water sources brought under the control of the State.*

Under the K & G Water Act of 1975, no person could construct any water-channel, tank, reservoir or water mill, or install any pumping machine or pipeline for taking water from any water source without prior permission of the SDM.

The U.P.Water Supply and Sewerage Act of 1975 constituted the Jal Nigam and Jal Sansthan and vested them with monopoly powers with regard to extraction and supply of drinking water. Powers, duties and functions, including the power to hold property for the purposes of this Act given to a Jal Sansthan were excluded from the powers, duties and functions of Mahapalika, Municipal Board, Town Area Committee, Notified Area Committee, Kshetra Samities, the Zilla Parishad and the Gaon Sabha by repealing the relevant provisions of U.P. Municipalities Act. 1916, U.P. Town Area Act, 1914, U.P. Kshetra Samities and Zilla Parishad Act, and the U.P. Panchayat Act. 1947.

Not only rights, but all powers of management – administrative, regulatory, judicial, and legislative – were concentrated in the powers of Government. [See Annexure ----------for details]

Thus a law was enacted which had drinking water supply by the State as its objective. This has had a negative impact not only on drinking water but all other uses of water as well.

Stated in a nutshell, under this Act, the rights of the State on water prevails over all water use by any individual, community or groups of persons, firms or institutions.

Prior to the formation of Uttaranchal, the structure of the water supply agencies was as follows. The Uttar Pradesh Jal Nigam, constitutes by the UP Water Supply and Sewerage Act of 1975, was a financing and construction organization, with a supervisory and advisory role to the Jal Sansthans. The Nigam was entitled to perform the functions such as preparation, execution, promotion and financing of schemes for supply of water and for sewerage; setting of tariff structure, taxes and charges of water supply in the urban areas under the Nagar Parishad and for rural areas.

There were 9 units operating at the zonal level (8 civil and 1 electric) and 44 branches (39 civil). The Nigam was headed by Regional Chief Engineer at Nainital and Dehradun, and Chief Engineer (Uttarakhand), Dehradun.

Two Jal Sansthans viz. Kumaon and Garhwal Jal Sansthans were in position after the 1975 Act. Jal Sansthan has the power to abstract water from any natural source and disposes of wastewater; can adopt its own budget annually; to incur expenditure and manage its own funds. The JSs are headed by General Managers at Nainital and Dehradun.

Jal Sansthans are responsible for the operation and maintenance of water supply and sewerage schemes installed by UPJN. Initially there were three Jal Sansthans in the districts of Bundelkhand, Garhwal and Kumaon divisions (eight districts in Garhwal and Kumaon). In Uttaranchal there were two Jal Sansthans, Kumaon Jal Sansthan with its headquarters in Nainital and Garhwal Jal Sansthan headquartered at Dehradun. The Jal Sansthans were headed by the General Managers.

Other Institutions in the Water Sector

The liberalization phase i.e. after 1991 opened the doors for bilateral agencies to enter the water sector. The formation of National Watershed Development Programme in 1994 was launched with World Bank and European Economic Council. In 1992 an expert group formulated a national policy for integrated development in Himalayas **(**9th five year Plan**).** The other institutions such as Forest department, soil and water conservation department, watershed directorate and many others were formed but all of them followed their sectoral interests, without taking into consideration the integrated approach towards development.

The maximum population of the new State of Uttaranchal lies in its in the hilly region, which is characterized by a highly varied altitudinal, topographic, climatic and vegetative features, that determine an equally varying nature and extent of water resources. In such a context, centralized administration of water resources would be apparently in contradiction to the realities on the ground. The formation of Uttaranchal two years ago, was fuelled by a motive of evolving a hill-specific developmental model, which was denied under the administration of Uttar Pradesh State. However, even after the formation of a new State, the old legacy of centralized administration in all sectors, including the water sector, continues. The administrative control of Uttar Pradesh Jal Nigam still exists in Uttaranchal and it is the prime body controlling and planning water supply schemes. The other line institution is the Jal Sansthan, which is known as *Garhwal Jal Sansthan* and *Kumaon Jal Sansthan* respectively. The Jal Sansthans maintain the schemes handed over to them by UPJN. Other than these, several other agencies are involved in an uncoordinated manner in the administration of water resources.

Government of India in the Drinking Water Sector

The GoI launched various schemes which were implemented through the state governments. It was investigated in 1964-65 that there was a problem of inadequate facility of drinking water in the hill districts i.e. Uttarakhand (Out of 112624 villages in the UP state, about 35506 villages were problem villages). Again survey was carried out in 1972 and 1985, which featured 11,642 villages as *problem villages* out of 15,166 villages.

The various schemes of the GoI are presented below.

Table – 8. Government of India Schemes.

Scheme	**Year of Starting**	**Features**
1971-72	Harijan Drinking Water Scheme	❑ Construction of diggies [tanks]
1974-75	Minimum Needs Programme	❑ State sponsored scheme ❑ Implemented under District Plan ❑ Installation of hand pumps, water supply schemes, rejuvenation of schemes.10% earmarked for O&M
1977-78	Indo-Dutch Cooperation Programme	❑ Piped water supply, Hand pumps, development of surroundings, drainage around HP and construction of sanitary latrines. ❑ Component of Community participation.
1977-78	Accelerated Rural Water Supply Programme	❑ Installation of Handpumps ❑ From 1999-2000, O & M has been increased from 10% to 15%.
1993-94	Water supply to quality problem villages	❑ Centre and State share of 75:25 ❑ The amount required, as central share will be met from funds allocated for ARWSP; this amount can be up to 20% of normal allocation under ARWSP.
1999	Community Based Rural Water Supply and Total Sanitation Project	❑ Incentives would be given to the states, which initiate steps for institutionalizing community participation in the rural water supply programme. ❑ 20% allocation in accordance with the State initiatives for sector reform in the following areas: • Demand driven approach • Village level capital building • Streamlining the institutions for better delivery of service. • 100% O & M by users

Institutional Performance

The major problem faced in assessing the performance of State agencies in the matter of drinking water supply is that the data that emanates from various official sources are generally incomplete, or unreliable, or contradictory to one another. Two contradictory scenarios are successively presented. On the one hand, the data suggests that almost 100 % of problem villages have been covered by water supply. On the other hand, several review reports by the same or other agencies indicate that much more need to be done in the matter of meeting the drinking water needs of the population. The reasons behind this ambiguity are apparent. A justification is being made both for the funds that have been spent [**which require reportage of success**] and that need to be spent further [**which requires a statement of need**].

These data are presented below.

Jal Sansthans

The earlier Garhwal and Kumaon regions comprise of 5 and 3 districts viz. Uttarkashi, Tehri, Chamoli, Pauri, and Dehradun; *and* Nainital, Almora and Pithoragarh respectively. The region of Kumaon was covered by piped water supply to the tune of 91% on the whole in the year 1993. Out of the total 2790 schemes, 2687 are gravity fed and the remaining are based on pumping.

As per an estimate the government has invested Rs. 24296.48 lakh till 1992 on rural water supply in the eight hill districts of Uttaranchal. The eighth plan outlay for the same was Rs. 8350 Lakh as reported in the Uttarakhand plan.

Kumaon Jal Sansthan handles various schemes in the four districts of Kumaon region. There are 24 urban drinking water schemes and 2790 rural drinking water schemes along with 5 water-sourcing schemes as shown in Table below.

Table 9. Drinking Water Schemes in Urban and Rural Areas (Kumaon)

District	Urban Drinking Water Schemes	Water Source Schemes	Rural Drinking Water Schemes	Total
Nainital	9	3	288	300
Udhamsingh Nagar	7	0	50	57
Almora	3	0	1348	1351
Pitthoragarh	5	2	1104	1111
Total	**24**	**5**	**2790**	**2819**

Source: UPJN

Garhwal Jal Sansthan

The drinking water schemes, which have been taken up by Garhwal Jal Sansthan since its inception in 1975, have been listed below:

Table 10. Number of Schemes and Coverage over a Period of Three Decades

Year	Schemes	Villages	Remarks
1975	535	1270	Hamlets Included
1975-76	539	1277	
1976-77	555	1355	
1977-78	738	1768	
1978-79	958	2139	
1979-80	1102	2677	
1980-81	1239	1837	Revenue Villages Included
1981-82	1358	2203	
1982-83	1478	2518	
1983-84	1759	3138	
1984-85	2035	3476	
1985-86	2212	3649	
1986-87	2400	3947	
1987-88	2495	4064	
1988-89	2488	4127	
1989-90	2483	4125	Handed over by UPJN
1990-91	3655	5854	Handed over to Gram Sabha's
1991-92	3235	5502	
1992-93	3140	5545	
1993-94	2940	5208	
1994-95	2880	5149	
1995-96	2769	5072	111 schemes taken back from Gram Sabha's for Maintenance
1996-97	2768	5071	
1997-98	2775	5149	
1998-99	2795	5922	
1999-2000	2752	5794	
2000-2001	2811	5978	
2001-2002	3026	5609	
2002-2003	3063	5626	

Source: Jal Bhavan, Dehradun

Table 11. Comparative Situations of Schemes (Garhwal Jal Sansthan)

Heads	**1975**	**2000-01**
Drinking Water Schemes	535	2811
Benefited Villages	1270	7497
Pumping Schemes	13	47
Hand pumps	18	113
Water Tanks	560	3640
Length of Pipelines	6925	30820
Total Cost of Schemes	**10672**	**57600**

Source: Garhwal Jal Sansthan

As per an estimate by the Garhwal Jal Sansthan pipeline of nearly 31,000 Kms has been laid in the schemes. It is quite clear from the above comparison that the dependency on the government schemes has increased at a very rapid pace. There were only 535 schemes in 1975 (during the formation of GJS) whereas, it amounts to 2811 today. The Local Self Government and Engineering Department was the key department before the formation of Jal Sansthan. The Local Self Government and Engineering Department designed, constructed and operated schemes for the short period of time. Later on the schemes were transferred to the Local governing body.

Regarding Sources of Water Supply, the following information is available.[42].

Table 12. Sources of Water Supply

Nature of Source	**No. of Schemes**	**Percentage of Schemes**
Rivers and streams	3573	61%
Springs	2173	39%

The table below shows the achievement during the four five year plans. As per the estimates in 1993 there are only 232 villages, which are having problems, related with drinking water in the region.

[42] Ibid.

Table 13. Achievement under Various Plans[43]

District	Total no. of village	Problem Villages as per 1972/1985 survey	Achievement upto VI Plan	Achievement upto VII Plan	Achievement upto March 1993	No. of remaining village upto 1.4.93
Almora	3024	2398	1556	2243	2359	39
Nainital	1799	1648	1573	1631	1641	7
Pithoragarh	2186	1569	995	1422	1541	28
Kumaon	**7009**	**5615**	**4124**	**5296**	**5541**	**74**
Uttarkashi	678	429	363	426	429	-
Chamoli	1569	1152	742	1093	1149	3
Tehri	1959	1609	739	1407	1573	36
Dehradun	746	595	441	554	583	12
Pauri	3205	2242	758	1807	2135	107
Garhwal	**8157**	**6027**	**3043**	**5287**	**5869**	**158**
Uttranchal	**15165**	**11642**	**7167**	**10583**	**11410**	**232**

The table above shows that as of **1993,** almost *all problem villages have been covered by water supply. The percentage remaining to be covered was only 1.5%*

However, in 2002, 3.2% of settlements were still to be covered.

Table 14. Status of Rural Drinking Water Supply in Uttaranchal [1.4.2002]

S.No	District	No. of Settlements			
		FC	PC	NC	Total
1.	Chamoli	2379	27	1	2407
2.	Rudraprayag	1171	16	2	1189
3.	Dehradoon	1810	104	3	1917
4.	Haridwar	530	0	0	530
5.	Pauri Garhwal	3818	22	18	3858
6.	Tehri Garhwal	3915	324	31	4270
7.	Uttarkashi	1037	0	0	1037
8.	Almora	4736	138	22	4896
9.	Bageshwar	1865	83	8	1956
10.	Champawat	1461	45	13	1519
11.	Pithoragarh	3899	74	5	3978
12.	Nainital	2302	75	4	2381
13.	Udham Singh Nagar	1053	0	0	1053
14.	**Uttaranchal**	**29976**	**908**	**107**	**30991**

FC: Fully Covered; PC: Partially Covered; NC: Not Covered.

[43] Complied for the study from various Plan documents

Even this information however, does not provide an assessment of the actual availability of water. This is dependent on the actual functioning of the systems installed, and secondly on the volume of water that they provide per capita. The following official statistics are used to explain the situation.

In **1994,** 36 % of schemes were shown as partially or fully non-functional [Table 8 below].

Table15. Status of Schemes in Uttaranchal in 1994

District	Total Schemes	Functional	Partially Functional	Non-Functional
Nainital	329	109	152	68
Almora	1333	603	368	357
Pithoragarh	1097	779	201	117
Kumaon	2759	1491	721	542
Dehradun	284	239	14	31
Pauri	852	447	209	196
Chamoli	742	534	172	36
Uttarkashi	431	392	28	11
Tehri	736	603	88	45
Garhwal	3045	2215	511	319
Total	5804	3706	1232	861

Source: *Uttaranchal Jal Sansthan, Dehradun*

In 1998, the figure on Partially and Fully Non Functional schemes remained at 36 %, **the same as in 1994.**

Table 16. Status of Schemes in Uttaranchal in 1998

District	Total Schemes	Functional	Partially Defunct	Non-Functional
Nainital	329	109	152	68
Almora	1333	603	368	357
Pitthoragarh	1097	779	201	117
Kumaon	**2759**	**1491**	**721**	**542**
Dehradun	284	239	14	31
Pauri	852	447	209	196
Chamoli	742	534	172	36
Uttarkashi	431	392	28	11
Tehri	736	603	88	45
Garhwal	**3045**	**2215**	**511**	**319**
Total	5804	3706	1232	861

Source: *Uttaranchal Jal Sansthan, Dehradun*

In 2001, the situation in Kumaon as is shown by official data below, reveals a grim picture.

Table 17. District Wise Status of Schemes in Kumaon (2001)

District	Total Schemes	Villages included	Totally Functional		Partially Functional			Closed Schemes	
			Total	Villages	Total	FV	NFV	Total	Villages
Nainital	288	2151	117	590	121	833	466	50	163
Udhamsingh Nagar	50	589	10	80	21	326	138	19	45
Almora	1348	3061	639	1223	346	719	416	363	703
Pitthoragarh	1104	2918	766	1689	195	492	344	141	393
Total	**2790**	**8719**	**1532**	**3582**	**683**	**2370**	**1364**	**573**	**1304**

Source: UPJN

As per this table, the efficiency at which KJS is operating is very poor; with 57.78% villages either totally or partially affected due to 45% drinking water schemes going non-functional. Nearly 31% villages are those where the schemes have totally dysfunctional and 27% villages are those, which are partially affected.

In 2002, the percentage of partially and fully non-functional systems was 15.5%; in Kumaon, the figure on partially and fully non-functional systems had suddenly dropped to about 20 percent from 45 % the previous year.

Table 18. Status of Schemes in Garhwal and Kumaon, 2002

Jal Sansthan	Total Schemes		Functional		Partially Functional		Non-Functional	
	Schemes	Villages	Schemes	Villages	Schemes	Villages	Schemes	Villages
Garhwal	3063	5626	2726	4935	268	586	69	105
Kumaon	2807	5495	2234	4161	436	1128	137	206
Total	5870	11121	4960	9096	704	1714	206	311

Source: Garhwal Jal Sansthan, Dehradun

Other evidence exists as to the actual extent of coverage, in contrast to that claimed by the drinking water supply agencies.

An official survey of the eight mountain districts of the former U.P. State, conducted in 1971-72, identified 7771 problem villages out of a total 15,166 villages in the region. Of these, 452 were “No Source” villages.

Despite 5817 Problem Villages being covered in the Fourth and Fifth Five Year Plans, a survey report (1985) prepared for the Seventh Plan revealed **4323** Problem Villages.

During the International Decade of Water Supply and Sanitation (1981-90) Rs. 327cr were spent on supplying water to about 11,000 villages. Yet, in 1991 a survey conducted by the Rajiv Gandhi National Drinking Water Mission found **4980 (33%)** Problem Villages and **871 (6%)** Not Covered.

Further evidence is available from the State Government itself on the actual status of schemes.

A Report prepared by the KJS and presented in a Seminar conducted by the KJS in 1995 reveals the following, probably most accurate picture of the status of drinking water systems in Uttaranchal.

Table 19. Coverage and Status of Drinking Water Schemes in Kumaon

Districts	Total Nos. of villages existing	Nos. of villages identified as problem villages	Nos. of DRWS constructed	Nos. of systems Functioning	Nos. of systems Non-Functioning	% of Non-Functioning systems
Nainital	1799	1648	1641	607	1034	63
Almora	3024	2398	2359	1046	1313	56
Pithoragarh	2185	1569	1541	762	779	51
KUMAON	7008	5615	5541	2415	3126	57

Table 20. Coverage and Status of Drinking Water Schemes in Garhwal

Districts	Total Nos. of villages existing	Nos. of villages identified as problem villages	Nos. of DRWS constructed	Nos. of systems Functioning	Nos. of systems Non-Functioning	% of Non-Functioning systems
Dehradun	745	595	583	263	320	55
Pauri	3205	2242	2135	1092	1043	49
Tehri	1959	1609	1573	672	901	58
Uttarkashi	678	429	429	187	242	57
Chamoli	1569	1152	1149	590	559	49
GARHWAL	8156	6027	5869	2804	3065	53

The official data show that the State agencies have succeeded in laying a network of rural water supply schemes covering almost all the habitations in the State. But the crucial question is whether it is able to provide a minimum of 40 lpcd of safe water every day. As mentioned earlier, the Tenth Plan (2002-2007) document highlights the fact that

coverage data hide more than what they reveal. The issues that interest common citizens and policy makers are the amount of water supply, its regularity, seasonal variation, potability and cost.

The following Table on Per Capita Daily Water Consumption in Rural Uttarakhand is based on a comprehensive survey in all the eight mountain districts of erstwhile U.P. State, carried out by a Dehradun based NGO, the People's Science Institute in 1999.[44] The survey covered 240 villages, 30 per district on an average and gathered data from over 4000 households, about 500 per district. The survey substantiated the 1991 Census data in terms of the coverage of villages by Rural Water Supply Schemes. Out of 224 villages for which water use figures were available, barely a quarter (58) consumed more than an average of 40 lpcd. Of the 4077 responding households, again, only a fourth (24.2%) consumed more than 40 lpcd. The district wise consumption averages fell between 21 and 30 lpcd. Pithoragarh remained the only exception with 40.2 lpcd. [This is a district which is naturally endowed with more water resources]

Table 21. Per Capita daily Water Consumption in Rural Uttarakhand (1998-99)

S. No	District	% Coverage			% of Households Sampled					Av. Cons. lpcd	SS. No. of HH
		1991 Census	1998 Survey [PSI]	SS*	0-10 lpcd	11-20 lpcd	21-30 lpcd	31-40 lpcd	> 40 lpcd		
1.	Chamoli	89.3	86.6	30	1.3	21.4	30.5	9.6	37.4	25.8	532
2.	Dehradoon	91.8	100	29	4.2	31.8	26.1	13.3	24.7	28.6	551
3.	Pauri Garhwal	86.6	85.2	25	4.2	19.1	34.3	18.3	24	29.3	382
4.	Tehri Garhwal	92.8	90.0	30	6.3	36.5	35.4	9.0	12.8	26.7	509
5.	Uttarkashi	92.4	93.3	27	4.5	31.9	41.1	12.1	10.4	23.4	598
6.	Almora	90.9	100	30	4.2	27.9	31.5	11.8	24.6	30.7	524
7.	Pithoragarh	90.7	91.3	30	2.5	17.2	31.7	13.8	34.8	40.2	475
8.	Nainital	90.4	95.6	23	2.4	24.5	29.1	16.6	27.3	28.8	506
9.	Uttarakhand	90.1		224	3.7	26.7	32.5	12.9	24.2	28.3	4077

*SS: Sample size: No. of villages surveyed.

A similar study of 135 households in Garhwal conducted by the Govind Ballabh Pant Institute of Himalayan Environment and Development, Almora (GBPIHED)[45] reported an average daily consumption of only 29 lpcd. The villagers used a combination of sources to meet their water needs. The per capita average consumption break-up was as follows:

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[44] "Sisyphean Labours" – Domestic Water Supply in the Central – Western Himalayas. People's Science Institute, Dehradun.

[45] Him – Paryavaran Newsletter (undated), GBPIHED, Almora as cited in "Sisyphean Labours – Domestic Water Supply in Central Western Himalayas", PSI – Dehradun.

Drinking	1.51 lpcd	5.1%
Cooking	2.8 lpcd	9.5%
Cleaning utensils	7.2 lpcd	25.5%
Bathing	5.7 lpcd	19.4%
Washing clothes	6.9 lpcd	23.5%
House cleaning	3.0 lpcd	10.2%
Toilet	2.3 lpcd	7.8%
Total	**29.4 lpcd**	**100%**

Reasons for Poor Performance

It is well recognized by the Water Supply agencies that due to less staff and frequent occurrence of natural hazards in the region the schemes are frequently damaged. The non-involvement of local community and the technology used by them is not conducive with the local physical and ecological situation. The schemes are more engineering oriented without any component of socio-economic component of the rural population. Moreover, the assistance that line agencies request for, for making the defunct schemes operational comes after two to three years, by which time, the cost of repairing schemes has increased.

In a workshop organized in 1996 by the Commissioner, Kumaun Division, it was discussed that the schemes for the rural areas are a loss-making venture as these schemes works more for welfare of rural population. Government has spent nearly Rs. 242.96 Crores in rural sector and Rs. 83.50 Crores were approved during the ninth five-year plan with no commensurate results. The following issues were raised by during the workshop.

- *Administrative Conflicts among JS and UPJN*
- *No financial situation is depicted in the schemes in the completion stage, which keeps the asset value of Jal Sansthan static.*
- *No transfer of residential and non-residential buildings to JS by UPJN under the schemes*
- *Transportation costs and T & P costs are not included during scheme transfer.*
- *Lack of provision for spares and stand by pumps in multi pumping stations*
- *Formation of Jal Parishad, thereby constituting a single body for drinking water delivery and management in Uttaranchal.*

On 05.03.94 according to the Order No.1184/28-01-94, a task force was formed for passing the proposals on drinking water and the management. As per order no. 921/9-3-94-278-W/93 dated 26.04.94 a technical committee was formed for drinking water programmes but nothing concrete has come up. Such decisions are generally taken in wake of the periodic crises that occur, but are not acted upon.

Till 1995, there were 395 schemes with Kumaon Jal Sansthan and 844 schemes with Garhwal Jal Sansthan, which were transferred or handed over to the respective Gram Sabhas'. Out of these schemes 105 in Kumaon and 212 in Garhwal were closed due to one or the other reason. An issue also came forward from the Village Pradhans expressing their inability to maintain these schemes and thereby making request to the Jal Sansthans to take back these schemes. The unavailability of local services and lack of know how of these technologies resulted in the inability of the Gram Sabhas' to handle these schemes. Various facets have to be looked upon while designing of the schemes for hilly areas in the hills. So far the same approach has been adopted as is adopted in the plains. The tough terrain in the hilly regions calls for a holistic approach for the provision of drinking water, which is the foremost need of the people.

Technology - O&M Issues

More than the Terai areas, the hilly areas of Uttaranchal hold the maximum rural population (around 78%), and that too at varying altitudes. Most of the pipes water supply systems that have been installed are gravity based, and as such, require no recurring expenditure on power supply for operation. The sustainability of these schemes depends more on the capacity of either the State or local communities to repair and maintain them. Landslides, landslips and soil erosion being common in the mountain ranges in the State, the expense of keeping in repair thousands of kilometres of pipeline has proved to be beyond the capacity of the State itself. Even in the case of single village systems, the length of pipelines may extend to several kilometres, as the water source may be at considerable distance from the habitation, at the top of the mountain ridges, whereas most habitations in the hills are located in the mid region of slopes. Thus, even an eco-friendly, low-operational-cost system such as a gravity-based piped supply system can become unsustainable, given the topographical, climatic and geological conditions, not to mention sociological.

Not all schemes are gravity based. At some places pumping schemes are felt necessary to provide water to habitations which do not have available sources at higher locations. In such cases, water is pumped up from rivers and streams. At some places pumping is done in four to five stages, with pumping heads varying from 400 meters to 1500 meters which raises the question of the operation and maintenance of this hardware. If one pump becomes defunct, several villages are without water. Bursting of pipelines and malfunctioning of the pumps always hinder the supply of water to the villages.

In the Kumaon region, two to four stages' pumping is done for Nainital, Almora and Pithoragarh urban centers. The O & M costs exceed the self-generated revenue in the ratio of 1:3 to 1:18 for Nainital and Almora respectively. The increasing O and M expenses are also due to the unavailability of maintenance services nearby, distance from the road head etc.

To cope with the high costs of operation and maintenance for pumping schemes, the government has promoted the installation of hand pumps in the regions of Haridwar, Udhamsingh Nagar, Tehri, Pitthoragarh etc. But due to the centrally controlled mechanisms, this technology also suffers from the usual problems of functioning. Moreover the hand pumps are shallow in nature, which does not ensure safe drinking water. Series of Mark II pumps in the region have a problem, which occurs frequently. The steel pipe of the pump stand is connected to the PVC pump pipe by means of a PVC adapter with internal threads, which is damaged due to frequent rusting and dismantling. The plunger inspection and checking for foot-valve leakage requires lifting of the entire pump.

The other point against the hand pump schemes is that it is not feasible for the centralized institution such as the Jal Sansthan to maintain these hand pumps due to various reasons like, accessibility, costly O & M etc. There has been no initiative to involve the community which is living close to these mechanisms and can maintain them if given proper technical support.

During discussions with the engineers it came out specifically that there is no specific mechanism through which the operation and maintenance of schemes be carried out. The need is for appropriate technology options suitable geographically as well as acceptable to community. Hilly areas, especially the rural settlements in the state face a lot of problems related to landslides and other kind of damages. The economic potential of rural areas in Uttaranchal is so low that it has triggered a high level of out-migration. The Water Supply agencies design highly engineering oriented schemes without taking into consideration the local realities.

The choice of technology and management paradigms adopted by the State on its assumption of monopoly control over water sources and monopoly responsibility of drinking water supply reflects the State's narrow perspective and approach to water resources management as a whole. This is discussed further below.

Resource Valuation

From the perspective of the State, after Independence, water was valued solely as a social good. The State was seen to have a duty to provide water where required. In the first two and a half decades, this approach by the State did not exclude the role of other bodies such as local elected bodies, or local communities themselves. Not only did the State invest in water supply, but the responsibility was shared at all levels. In Uttaranchal, this approach of the State reflected in a non-interference with the rights of communities and individuals over water sources.

After 1975, with the advent of international interest in health and development of the world's population, particularly in developing countries, norms regarding water and its access and control began to be set at a global level. International conventions and agreements were brought into play, to which India too became a signatory – such as the Alma Ata Declaration on Health for all by 2000 A.D. These developments brought in their wake two simultaneous changes in approach. On the one hand Central and State

Governments in India began to adopt a larger and more direct approach- in many cases a monopoly approach – to the issue of drinking water supply. On the other hand, international financial institutions such as the World Bank and other bilateral aid organizations began their investments in this sector, promoting as part of their agenda, the norm of water as an "economic good" as well. This change in policy was adopted by Government in India in the wake of international investments. By the Eighth Plan, the policy of GOI on water had crystallized into viewing water as a commodity, for the supply of which, appropriate costs are to be charged to users. The 8th Plan reflected the following principles.

- water should be managed as a commodity;
- water supply should be based on effective demand, that is, standard of service corresponds to willingness to pay.
- local bodies should be free to levy charges to cover, as a minimum, O&M costs with eventual full cost recovery;
- private sector should be mobilized for construction and O&M of systems-,
- local organizations should be strengthened and assume full responsibility for O&M of systems; and
- State governments should address the need for a comprehensive water management plan to balance competing demands for water by irrigation, industry, and domestic use.

In this approach, ecological and sociological perspectives to water resources management were ignored. This change of policy paved the way for significant investments by international financial institutions such as the World Bank, as well as bilateral aid in the water resources sector in the country.

However, in actual implementation at the State level, the earlier principle of water as a social good prevailed, and institutions such as the Jal Sansthan and Jal Nigam continued to supply rural and urban water on the basis of high subsidies.

By the 10th Plan, a distinction in approach has been made between urban and rural water supply. With regard to the former, the Plan states that water needs to be managed as an economic asset rather than a free commodity. At the same time, the Plan declares that regeneration of sources shall be the responsibility of every user agency, whether they use water for drinking, irrigation or other purposes. Supply of water to consumers was to be based on the principle of effective demand. The "standard of service" was to correspond to the users' capacity to pay for its operation and maintenance. This allows the possibility of providing higher standards of service to those who can afford it. However, the Plan does not fail to point out that special provisions should be made to meet the needs of the poor who have less capacity to pay.

With respect to rural areas, the purely economic orientation has given place to a more holistic approach that is based on not only environmental, social and economic considerations, but political as well. The potential role of Panchayat Institutions in the

water resources sector in the wake of the 73rd and 74th Constitutional Amendments has been highlighted. The beneficial role of civil society organizations has been acknowledged, and private sector participation has been envisaged, not as a primary institutional mechanism, but selectively in areas where there can be a beneficial impact.

These changes of policy are yet to materialize at the State level. In what manner the varied interests – private sector participation, economic orientation to water, social obligations, environmental concerns, and the fostering of local political institutions - are to be practically balanced in policy at the State level remains to be seen.

Resource Assessment

The approach to resource assessment by the water supply agencies in Uttaranchal reflects their overall approach to water resources management – sectoral, non-integrated, non-participatory, with no environmental / ecological consciousness.

Working under the norm that almost all villages in the State are "problem villages" and need to be "supplied", the agencies approach the issue purely from a specific scheme point of view. Once a village or habitation is selected, a survey is done of water sources – their distance and output. Too often, going by the general complaints of the villagers, the discharge of water is measured during the rainy season, and rarely in the summer season; the latter would in many cases disqualify the source, or at least prevent the claim of "complete" coverage. Once the distance and water availability are measured, the scheme is drawn up in the agency offices and construction commenced.

The sustainability of the source is never taken into question; no noting is made of the nature of the location of the source, the conservation or protection measures that are required, the actual extent of demand, existing multi-sectoral usages of water, prior rights, etc. Nor are the local residents involved in the assessment procedures.

Equity – Rights to Water

It is a matter of much significance that the landmark legislation of 1975 – the Kumaun and Garhwal Water [Retention, Collection and Distribution] Act of 1975 – which changed the legal and administrative history of water resources in Uttaranchal by abolishing customary community and individual rights, declares in its preamble that the Act is intended for the "equitable distribution of water" for drinking and domestic purposes, irrigation, animal husbandry and industry.

An assessment of the extent to which equity in access to water has been achieved is in a sense, a test of the legislation itself.

A measure of equity has been achieved under the dispensation of the Jal Nigam and Jal Sansthans in the sense that piped systems have been installed in the vast majority of habitations – both rural and urban – in the State. Thus the "potential" for equitable access may be assumed. However, in actual levels of access to water, the inequity that prevails is apparent, and on many levels.

1. The norms for supply between urban and rural areas are distinct from each other – 70 lpcd for urban residents and 40 lpcd for rural residents. There is no rational explanation for this distinction. The norms are based not on an objective, scientific and accurate assessment of the respective needs in urban and rural areas in the specific conditions of Uttaranchal, but in extension of "plains" policy. There are no norms for rational, mutual adjustment between rural and urban uses of water. In rural areas, drinking water sources are shared with cattle that are an inalienable part of the local economy. However, the drinking water needs of the cattle population are not taken into account at all in the planning of schemes there. Water is abstracted from sources in rural areas without taking into account the extent of prior uses and the impact of such abstraction on upstream or downstream rural users. In Almora District, water is pumped from the Kosi River for supply to Almora Town. In the summer of 2003, there was a n acute shortage of water in Almora. The level in the Kosi river also came down alarmingly, more than ever reported earlier. The Government issued a direction that irrigation [through mostly traditional guls fed by the river] in the Someshwar valley upstream of Almora should be suspended for a period. This was the very critical stage of nursery development of paddy, to be followed by transplantation. Suspension of irrigation at this stage would put to risk the whole paddy cycle, threatening the food security of a very large population residing in the valley. On the other hand, the civic authorities in Almora Town, the urban area which is reputed to have had, of the whole Himalayan region of Uttaranchal, the largest number of traditional water systems called naulas, has done nothing to protect or conserve these sources, or to undertake its own rain water harvesting schemes, which have been very successfully demonstrated by private initiatives in neighboring parts of Almora district. *The complete lack of definition of the respective rights of urban and rural water users, coupled with monopoly control of sources by the State has resulted in this apparent inequity.*

2. Within habitations – whether urban or rural – where water supply had been provided – unequal distribution is the norm, rather than the exception. In villages, firstly, the whole Gram Sabha or revenue village, whichever is chosen, is rarely covered. Either particular hamlets or clusters of households are left out of the distribution system. A reason that is given is that the topographical limitation in extending pipelines from the source for supply through gravity. However, in such cases, proper alternate arrangements are not always made. In some instances, these isolated clusters are provided Standposts from some other neighboring scheme, which is more accessible. Often, being connected to such other schemes is disadvantageous to these households, as they are at the mercy of other users, with whom they have no connection whatsoever. Any potential "user participation" in such circumstances becomes negated. In many villages, one can find a crisscross of many several systems bringing water form different sources, in different supplying different clusters in the same village, or different villages in an uncoordinated manner. Neither the volume of water available nor its timing is constant or regular, thereby promoting inequity in access to drinking water to the residents of a habitation as a whole.

3. Even where there are single village schemes, supplying water to all clusters, one can still observe inequitable access. Firstly, laying of pipes and fixing of valves are done in such a manner that some clusters receive water adequately, while others do not. Scheduled Caste clusters are particularly affected by this syndrome. Often, through irregular means, influential persons in the village, often the Gram Pradhan, or any Government functionary, get private connections fixed to their houses either from the head of the distribution system, or from the holding tank itself, so that their supply is not subjected to the common use system. While private connections were not allowed in the initial period, there has been a change in Government policy triggered by the presence of international aid in this sector, towards permitting private connections in rural community systems. This facility has been used almost solely by the richer sections of the rural community at the cost of the poorer. This has been enabled by the absence of community participation in management, and the monopoly control by the State.

4. At another level, the location of Standposts, which determines the number of households that would be dependent on it, is also an issue of widespread discontent. There is no uniformity in the number of households dependent on a single Standpost, and combined with disparity in volume of water that the Standpost supplies, results in inequity.

5. Another fact that contributes to iniquitous distribution is that traditional drinking water systems such as naulas, bauries, dharas etc. are not taken into account at all when implementing a water supply system for a rural or even an urban habitation, for such naulas are to be found in urban areas as well. A village may have anything from one 1 to 10 such sources, or even more. They are in specific locations. They may be seasonal or perennial. They are accessible to specific clusters of households in their vicinity. In almost every village, where there is a Scheduled Caste population, separate naulas exist for their use. One finds these to be usually smaller in size, and seasonal as well. These traditional sources supply half the water supply required by villages, and in summer, when piped systems fail, almost the entire supply. No survey is made of the levels of access to this supply of water for the different households, while installing Standposts under the piped system. In combination, they result in iniquitous access to water. This is a problem particularly faced by Scheduled Castes. Normally, their Standposts do not supply water reliably. This is not only due to distribution mistakes, but also due to sabotage locally by the higher castes. The taps are often found broken. SC naulas, as stated earlier, are also often seasonal; in summer, these families become dependent on the mercy of the other castes, to provide them with water, as they are not allowed to touch the other water sources, whether traditional or modern. Thus they are discriminated by both the State as well as the local society.

6. Similar irregularities may be observed in the urban context as well.

Institutional Mechanisms

The institutional mechanisms involved in this approach comprise of only the State Government and the water supply agencies – the Jal Sansthan and the Jal Nigam. An attempt has been made to transfer some 2500 schemes to the Gram Sabhas for operation and management. 849 schemes are being managed under the Swajal Programme with the community and NGOs. But not much success has been reported in this direction. No programme has been developed so far by the Water Supply agencies for involving the village community or Panchayat Institutions in the planning and implementation of its programmes.

After the formation of Uttaranchal, the Uttaranchal Jal Sansthan was formed incorporating both the construction and the operation and maintenance wings and staffed by engineering professionals at all levels. There is no structural or functional distinction from the former institutions – the Nigam and Sansthans – under the dispensation of the U.P. Government.

Dispute Resolving Mechanisms.

To put it briefly, there are no dispute resolving mechanisms associated in the administrative paradigm of the water supply agencies.

In a survey conducted by DCAP in 1995-96, the following status regarding disputes and their resolution was observed[46].

Table 22. Location of Conflicts arising from State Drinking Water Systems.

DISTRICT	WITHIN VILLAGE	BETWEEN VILLAGES	BETWEEN VILLAGES AND GOVERN-MENT	NO CONFLICTS	TOTAL
ALMORA	2	9	17	3	31
NAINITAL	3	4	9	4	20
PITHORAGARH	1	7	14	5	27
TOTAL	**6**	**20**	**40**	**12**	**78**

In survey of 78 villages in three districts of Kumaun, it was found that disputes or complaints regarding the systems had arisen in as much as 84 % of the villages surveyed.

[46] "Law and Custom in Water Resources Administration: Case Study of Uttaranchal ", Development Centre for Alternative Policies, New Delhi, Monograph. 1996. Sponsored by the Ford Foundation, New Delhi. [*To be published*]

Of these, 60 % of conflicts were between the village and State agencies, and 30 % between villages.

Table 23. Action Taken and Results

District	No Conflict	Complaint to Govt. (JN / JS / BDC)	Litigation	No Action Taken	Local Arbitration / Solution	TOTAL
Almora	3	17	3	2	6	31
Nainital	3	13	--	2	4	20
Pithoragarh	56	17	--	1	3	27
TOTAL	**12**	**47**	**3**	**3**	**13**	**78**

Complaints had been sent to the concerned agencies in 71 % of the cases, none of which as the following table reveals, were resolved. 13 cases were attempted to be resolved through local arbitration of which 8 were successfully done so. No action was taken on 3 cases. The unresolved cases included 47 complaints to JS / JN, 5 arbitration cases, 3 litigations, and 3 'no action' cases.

Table - 24 Results of Action Taken

Districts	Resolved	Unresolved	Not Applicable	Total
Almora	5	23	3	31
Nainital	2	15	3	20
Pithoragarh	1	20	6	27
TOTAL	8	58	12	78

The JN/JS are unable to resolve all the complaints received due to paucity of funds and institutional mechanisms and capacities.

Role of Women

Since there are no mechanisms to involve local communities as such in the operation and management of water supply systems, the question of involving women specifically does not arise at all in this context. Nor are any special consideration of women's needs and requirements taken into account in the planning and implementation of the projects.

Inter-sectoral Adjustment

This issue constitutes another weakness of the approach of the Government in supply of drinking water. There are neither polices nor institutional mechanisms for integrated water resources management. The old administrative legacy of multiplicity of departments, programmes and policies for various water related activities continues in the new State of Uttaranchal.

In this context, in their functioning, the water supply agencies have never taken into consideration the multiple uses of water sources which they tap, or the necessary land management practices that may have to be undertaken for protection and conservation of resources. At the root of this attitude is the fact that, under the current law, water supply agencies have been provided a blanket power to abstract water from any source for supply of water for drinking and at the same time, no mechanisms for inter-sectoral adjustments have been developed by the State.

Ecological Sustainability

The water supply systems installed over the last nearly three decades by the Jal Sansthan and Nigam are dependent on the existing surface water sources in the form of springs, streams and rivers. The changing trends in these water sources – the general decline that have been scientifically observed – have never been taken into account in the functioning of these agencies. On the contrary, they have assumed these sources to be constant and limitless. This is amply demonstrated by the title of the statute that has given birth to the monopoly Government approach – the K & G Water Act of 1975 which envisages ***Collection, Retention and Distribution of water,*** but not ***Conservation, Protection and Management***. This explains the complete absence of a concern on the part of these agencies on the question of the ecological sustainability of the technology that has been adopted. Two issues are involved. The first is with regard to the conservation, protection and management of water sources. No policy exists on this issue in the agenda of the Water supply agencies. The second is with regard to the nature of technology used in relation to the ecological conditions in the hills. Frequent land movements, soil erosion, flooding etc are damaging hundreds of kilometers of pipelines, the replacement of which is a financially prohibitive exercise. No alternate technological options are currently available with the State, nor are any being sought in current policy.

Field Study

For the purpose of field study in relation to the Jal Nigam / Jal Sansthan approach to drinking water management, a survey of a collection of villages was undertaken in Almora district, the results of which are presented below.

A total of 30 villages were selected in Takula and Dwarahat Blocks in Almora District, where water scarcity is widely felt. The distribution of villages in the two blocks with their main features is listed below.

Table – 25 Nature of Villages selected for Survey

Dwarahat Block	10 villages	Dry rainfed area, severe water shortage
Takula Block	6 villages	Dry area, water table affected by adjacent magnesite mining
	4 villages	Scarcity of drinking water, breakdown of State systems
	10 villages	While water supply is better than other villages, it is still less than the State norms.

Table – 26 Number of villages surveyed

S.No	Name of Villages	Nyaya Panchayat	Block
1	Malli Mirai	Chhatena	Dwarahaat
2	Talli Mirai	Chhatena	"
3	Asgoli	Asgoli	"
4	Dhalar Goonth	Kafda	"
5	Basera	Asgoli	"
6	Jaman	Bijepur	"
7	Pinoli	Asgoli	"
8	Nattha Gooli	Bijepur	"
9	Binta	Bhatora	"
10	Parkote	Bhatora	"
11	Chhani Lhweshal	Chanauda	Takula
12	Milti Pande	Chanauda	"
13	Kheerakote	Chanauda	"
14	Boonga Chanauda	Chanauda	"
15	Pacchisi	Chanauda	"
16	Sail Chanauda	Chanauda	"
17	Katli	Chanauda	"
18	Dhoni Gaon	Chanauda	"
19	Guruda Chanauda	Chanauda	"
20	Dhaulra	Chanauda	"
21	Nakote	Bhainsargaon	"
22	Kakdai	Bhainsargaon	"
23	Digra	Bhainsargaon	"
24	Aunjhora	Bhainsargaon	"
25	Khadi	Takula	"
26	Thapla	Takula	"
27	Kotwalgaon	Takula	"
28	Dotyalgaon	Takula	"
29	Jharkote	Takula	"
30	Kangad	Sainj	Bhainsachana

The distances of selected villages from Almora are as follows.

1. Villages in Dwarahat Block - 65 Kms.
2. Villages in Chanauda and Bhainsargaon Nyay Panchayat - 50 Kms.
3. Villages in Takula area - 40 Kms.

Selected Villages have the following characteristics:

1. Having single - village Government Drinking water systems.
2. Having multi -village systems.
3. Villages near motorable roads.
4. Villages more than 3 kms from motorable roads.
5. Villages having their own Van Panchayats.
6. Villages with no Van Panchayat.
7. Multi-caste villages.
8. Small and Large Villages - with very few hamlets and with many hamlets.
9. Villages which have traditional systems in need of rehabilitation.

The traditional systems referred to in the survey are naulas, dharas and ponds. Gadheras have not been included as they are used for drinking purposes by livestock, though they indirectly supply drinking water guls, or recharging of naulas.

The following is the analysis of the data collected from the survey.

It becomes very clear from the survey that villagers are dependent on both State systems and Traditional Drinking Water systems.

- All except one village have State - constructed drinking water systems. [Table – 27]

TABLE 27. AVAILABILITY OF STATE WATER SUPPLY IN SELECTED VILLAGES.

No. of Villages	No of Schemes
Having only One Scheme	12
Having Two Schemes	6
Having Three Schemes	1
Having None	1

There are more *single - village* systems than *multi-village* systems, though the number of the latter type is almost equal in these villages. (Table-28). At the regional level, 55% of the State systems are single-village systems. While single village systems are more likely to be successful, with potential for local management, improper planning and management practices by the Government have resulted in damage and deterioration and consequent poor supplies.

Some villages (21%) are served by both single-village and multi-village systems [Table 28] in spite of which they do not get adequate water.

TABLE 28.

TYPE AND FUNCTIONAL STATUS OF STATE – CONSTRUCTED DRINKING WATER SYSTEMS IN SELECTED VILLAGES.

	Single Village Schemes	**Multi-Village Schemes**	**Single and Multi -Village Schemes**	**No Schemes**
No. of Villages	8	7	4	1

	Functional	**Partially Functional**	**Defunct**	**Total**
No. of Systems.	5	12	2	19

The majority of State systems (48.3%) are only partially functional; 26.2% of systems are functional, while 25.4% are completely damaged. (Table-28). However, it has to be noted that even where there are functional systems, they do not cover the entire population of the Gram Sabha as all Hamlets are not included.

There are a total of 248 Standposts in 20 villages, with an average of 12 per village and covering an average of 11 *families* or an average of 72 persons per Standpost (Table 29). Of these Standposts 48% are partially functional, 26% functional and 26% are defunct.

TABLE 29. SUPPLY OF DRINKING WATER FROM STATE SYSTEMS

S. NO	VILLAGE	POPULATION & TOTAL SC POPULATION		NO. OF FAMILIES & TOTAL SC FAMILIES		SUPPLY OF DRINKING WATER FROM STATE SYSTEMS							
						NO. OF STANDPOSTS						WATER AVAILABILITY [IN LPCD]	
						PUBLIC			PRIVATE			DRY SEASON	OTHER SEASON
		TOTAL	SC	TOTAL	SC	F	PF	D	F	PF	D		
1.	KHARI	390	175	59	26	-	11	-	-	-	-	NO SUPPLY	10
2.	THAPLA	1214	502	176	74	-	3	5	-	5	-	3	3
3.	KOTWAL GAON	855	242	129	38	3	9	12	-	14	-	3	3
4.	MALLI MIRAI	1619	574	296	105	-	16	-	-	-	-	2.5	4
5.	JAMAD	841	393	186	87	-	4	-	-	-	-	2.5	3
6.	TALLI MIRAI	1496	208	215	30	-	21	-	-	-	-	4	5
7.	PINOLI	127	-	20	-	-	7	-	-	-	-	4	5
8.	NATHA GOOLI	570	294	120	61	4	-	-	-	-	-	8	10
9.	ASGOLI	1373	301	236	51	-	15	-	-	-	-	3.5	3.5
10	DALAR GOONTH	500	308	65	40	-	14	-	-	-	-	3.5	4
11	BASERA	574	159	149	34	-	3	4	-	-	-	3	3.5
12.	TITHA-KOTE	575	80	87	12	-	15	-	-	-	-	4	6
13	BOONGA	560	92	84	14	14	-	-	-	-	-	15	20
14	DHOULRA	892	198	135	30	20	-	-	-	-	-	15	20
15	KHIRA-KOTE	1375	409	208	62	-	-	-	-	-	-	NO SUPPLY	NO SUPPLY
16	GURUDA	1400	145	212	22	14	-	-	-	-	-	15	20
17	SHAIL	600	150	120	40	10	-	-	-	-	-	15	20
18	DOTIYAL GAON	953 101		144	15	-	-	15	-	-	-	NO SUPPLY	NO SUPPLY
19	PASDEV	982 268		148	40	-	2	12	-	2	9	5	6
20	KANGAD	1054 165		159	25	-	-	15	-	-	-	NO SUPPLY	NO SUPPLY
		17950 4764		**2948 806**		**65**	**120**	**63**	**-**	**21**	**9**		

There are 212 traditional drinking water systems, including naulas, dharas and pokhars or ponds in the 20 villages surveyed. (Table 30)

TABLE 30. SUPPLY OF DRINKING WATER FROM TRADITIONAL SYSTEMS.

S.NO	VILLAGE	SUPPLY OF DRINKING WATER FROM TRADITIONAL SYSTEMS					
		TOTAL NO. OF SYSTEMS				AVAILABILITY OF WATER	
		TOTAL	FUNCTIONING IN		DEFUNCT	DRY SEASON	OTHER SEASON
			DRY SEASON	OTHER SEASON			
1.	KHARI	10	5	9	1	3	8
2.	THAPLA	20	14	19	1	3	10
3.	KOTWALGAON	12	8	11	1	2.5	4
4.	MALLI MIRAI	11	6	6	5	2	3
5.	JAMAD	8	2	6	2	2	6
6.	TALLI MIRAI	10	3	5	5	2	5
7.	PINOLI	3	1	1	2	0.5	1
8.	NATHA GOOLI	20	12	15	5	8	10
9.	ASGOLI	16	8	12	4	4	6
10	DALARGOONTH	10	2	4	6	4	6
11.	BASERA	6	1	1	5	2.5	3
12	TITHAKOTE	6	6	6	-	5	8
13	BOONGA	4	1	1	3	2.5	2
14	DHOULRA	12	7	7	5	3	5
15	KHIRAKOTE	11	5	9	2	5	7
16	GURUDA	9	9	9	-	5	7
17	SHAIL	6	3	5	1	5	7
18	DOTIYAL GAON	23	10	15	8	3	5
19	PASDEV	5	5	5	-	4	6
20	KANGAD	10	7	7	3	4	6
21	**TOTAL**	**212**	**115**	**153**	**59**	**70**	**115**

Of the total systems, 72% are functional and 28% are damaged. The functional systems are only partially functional; only 54% of the total systems function during the three dry, summer months.

Tables 31, 32 and 33 show the comparative water availability from State and Traditional systems in dry and other seasons. According to these:-

TABLE- 31 COMPARITIVE AVAILABILITY OF WATER FROM STATE SYSTEMS AND TRADITIONAL SYSTEMS

S. NO	VILLAGE	AVERAGE DAILY SUPPLY OVER THE YEAR (LPCD)						AVERAGE DAILY SUPPLY FROM BOTH STATE AND TRADITIONAL SYSTEMS (LPCD)	
		STATE SYSTEM			TRADITIONAL SYSTEM			DRY SEASON	OTHER SEASONS
		DRY SEASON	OTHER SEASON	TOTAL	DRY SEASON	OTHER SEASON	TOTAL		
1.	KHARI	0	10	7.39	3	8	6.6	3	18
2.	THAPLA	3	3	2.5	3	10	8.13	6	13
3.	KOTWALGAON	3	3	2.8	2.5	4	3.6	5.5	7
4.	MALLI MIRAI	2.5	4	3.6	2	3	2.7	4.5	7
5.	JAMAD	2.5	3	2.8	2	6	4.9	4.5	9
6.	TALLI MIRAI	4	5	4.6	2	5	4.2	6	10
7.	PINOLI	4	5	4.6	0.5	1	3.8	4.5	6
8.	NATHA GOOLI	8	10	9.3	8	10	9.3	16	20
9.	ASGOLI	3.5	3.5	3.45	4	6	5.4	7.5	9.5
10.	DALAR GOONTH	3.5	4	3.8	4	6	5.4	7.5	10
11.	BASERA	3.5	3.5	3.45	2.5	3	2.8	6.0	6.5
12.	TITHAKOTE	4	6	5.4	5	8	7.15	9	14
13.	BOONGA	15	20	18.5	2	2	1.9	17	22
14.	DHOULRA	15	20	18.5	3	5	4.4	18	25
15.	KHIRAKOTE	-	-	-	5	7	6.4	5	7
16.	GURUDA	15	20	18.5	5	7	6.4	20	27
17.	SHAIL	15	20	18.5	5	7	6.4	20	27
18.	DOTIYAL GAON	-	-	-	3	5	4.4	3	5
19.	PASDEV	5	6	5.7	4	6	5.4	9	12
20.	KANGAD	3	7	5.4	5	6	4.3	10	13

TABLE 32.

CATEGORIZATION OF VILLAGES AS PER WATER AVAILABILITY FROM STATE AND TRADITIONAL SYSTEMS IN THE DRY SEASON.

	STATE SYSTEMS	TRADITIONAL SYSTEMS
NO. OF VILLAGES RECEIVING NO SUPPLY	4 (20 %)	NONE
NO OF VILLAGES RECEIVING BETWEEN 0 – 5 LPCD	11 (55 %)	19 (95 %)
NO. OF VILLAGES RECEIVING BETWEEN 5 - 10 LPCD	1 (5 %)	1 (5 %)
NO OF VILLAGES RECEIVING BETWEEN 10 - 20 LPCD	4 (20 %)	NONE
TOTAL	20	20

TABLE 33.

CATEGORIZATION OF VILLAGES AS PER WATER AVAILABILITY FROM STATE AND TRADITIONAL SYSTEMS IN OTHER SEASONS.

	STATE SYSTEMS	TRADITIONAL SYSTEMS
NO. OF VILLAGES RECEIVING NO SUPPLY.	3 (15%)	NONE
NO. OF VILLAGES RECEIVING BETWEEN 0 - 5 LPCD	9 (45%)	8 (40%)
NO. OF VILLAGES RECEIVING BETWEEN 5 - 10 LPCD	4 (20%)	12 (60%)
NO. OF VILLAGES RECEIVING BETWEEN 10 - 20 LPCD	4 (20 %)	NONE

20% and 15% of villages receive no water from state systems respectively, while all villages receive some water from traditional systems. The traditional drinking water systems come to the rescue of villagers in dry seasons particularly, and supply water in other seasons also when State systems fail.

TABLE 34.

CATEGORIZATION OF VILLAGES AS PER WATER AVAILABILITY FROM BOTH STATE AND TRADITIONAL SYSTEMS (LPCD).

	DRY SEASON	OTHER SEASON
NO. OF VILLAGES RECEIVING NO SUPPLY FROM BOTH SYSTEMS	NONE	NONE
NO. OF VILLAGES RECEIVING BETWEEN 0 - 5 LPCD	6	1
NO. OF VILLAGES RECEIVING BETWEEN 5 - 10 LPCD	8	9
NO. OF VILLAGES RECEIVING BETWEEN 10 - 20 LPCD	5	5
NO. OF VILLAGES RECEIVING BETWEEN 20 AND 30 LPCD	NONE	4

The majority of systems (95%) receive between 0-5 LPCD from Traditional Drinking Water Systems, 5% between 5 - 10 LPCD, with no village receiving more than this volume. In contrast, 55% of villages receive 0-5 LPCD from State systems, 5 % receive 5-10 LPCD, 20% receive between 10-20 LPCD, while another 20% receive no water at all. These figures reveal a greater level of equity of distribution from traditional systems than state systems*; also traditional systems may be found in every hamlet, which cannot be said for Standposts from piped systems.*

From the above facts and figures, the following conclusions can be drawn:-

In their present state, Government systems are not capable of meeting fully the drinking water requirements in rural areas. Due to source depletion and disrepair, these systems may never be able to supply as per the norms laid down by government i.e. 40 lpcd.

Traditional systems are widely used, and fully depended upon in summer months. They provide critical supplementary water supply. These systems which once met the total requirement for water before modern State systems were introduced have deteriorated due to neglect and adverse environmental conditions; however, they are capable of being revived to provide additional supplies. The quality of water is negative in all Naulas in summer season and water drops are dredged and scooped up in desperation. The same situation prevails with respect to Gadheras or mountain streams due to reduced flow and higher seasonal demand by humans, livestock and crops.

3.5 CASE STUDY – 5.

THE WORLD BANK APPROACH [SWAJAL PROJECT]

Rationale for World Bank Support

A core principle underlying the World Bank's Country Assistance Strategy (CAS) for India is to promote state-level sectoral reforms through its interventions. It recognizes the important role played by the states in India's development process, and the fiscal problems and institutional weaknesses faced by state governments in carrying out development programs.

The key question is with regard to the direction of such state level reform processes. While the goals are common with those of any Government in India – the alleviation of poverty and acceleration of the development of human resources - the strategies to be adopted by the Bank were to give importance to private sector development, environmental protection, increasing the role of beneficiaries and support organizations (SO) in project design and implementation, and enabling women to participate more fully in the development process. [47] **Of these, only the first represents a departure from earlier Government policy in India.**

Policy reform has been considered by the Bank as "urgently required" for two reasons.

1. To replace the current supply-driven approach that results in inefficient service delivery and poor quality of construction with a demand-driven approach where decision-making responsibility is given to beneficiaries [read "consumers"];
2. To integrate rural water supply, environmental sanitation, environmental management, catchment protection, and health and hygiene;
3. To introduce cost recovery to increase sector sustainability.
4. To develop a state water resource management policy.

In its review of the current Government policy in India, the World Bank critically describes it as a "supply driven approach" to "service delivery". In effect, the Bank is critical of the hitherto valuation of water in Indian government policy as a "social good", which is the "duty" of the Government to provide equitably. The inefficiency in provision of water, poor design, lack of accountability, and economically unviable or costly undertakings by Government are laid at the door of the valuation of water as a "social" good rather than an "economic" good. The capacity of State agencies to augment, rehabilitate, and replace existing systems to accommodate future demands, which are estimated to become extremely costly, is assessed to be reduced by treating water as a social good, rather than an economic good. This analysis fails to take into

[47] Document of The World Bank Report No. 15516-IN, STAFF APPRAISAL REPORT, INDIA, UTTAR PRADESH RURAL WATER SUPPLY AND ENVIRONMENTAL SANITATION PROJECT, May 28, 1996

account the fact that these shortcomings may be addressed, not by changing the value system of water, but by improved management practices that involve local communities – their skills, knowledge, and collective strength – substantially.

In contrast, the Bank prescribes the adoption of a management paradigm which rests on the introduction of market mechanisms to water supply – introduction of the private sector in investment, construction and distribution, service delivery, pricing of water, user organization and mobilization, "willingness to pay", user preferences, etc.

A significant aspect of the SWAJAL PROGRAM was that the State Water Supply Agencies – the Jal Nigam and the Jal Sansthan were completely bypassed in the implementation of the program. Instead it was decided that Non Government Organizations would be the Implementing Agencies with Village Committees. This approach was probably intended to develop private sector skills in water supply

The importance of community involvement is acknowledged only in the perspective that it can improve the sustainability of investments, by their taking an active role in the management of the O & M facilities; express their preferences, and set tariff rates and other community contributions.

The integration of Rural Water Supply, Environmental Sanitation, Environmental Management, Catchment Protection, and Health and Hygiene is envisaged, not from the perspective of a larger environmental philosophy that recognizes the integration of all natural resources, and the accommodation that the human species must make with it, but in the rationale that improvements in water supply as a result of increased investments will lead to increased volume of wastewater, which if not managed, could result in high incidence of water-borne diseases. In this understanding, health and hygiene are also viewed as part of "service delivery", State subsidies which need to be withdrawn and users organized to meet the costs involved. The Bank therefore seeks reform in the existing institutional and funding arrangements for these services. **The underlying goal of the World Bank program is thus not to promote environmentally sustainable societal growth, but to introduce market economy in the use and management of a natural resource such as water**.

Project Objectives:

The following objectives of the World Bank Swajal project therefore are rooted in the above:

1. The first objective was to deliver sustainable health and hygiene benefits to the rural population, through improvements in water supply and environmental sanitation services, which will increase rural incomes through time savings and

income opportunities for women, test an alternative to the current supply driven service delivery mechanism and promote sanitation and gender awareness.

2. The second objective was to promote the long-term sustainability of the rural water supply and sanitation sector by providing assistance to GOUP to identify and implement an appropriate policy framework and strategic plan.

Specifically, the project sought to:

- develop a coherent community participation approach that provides for a major decision-making role for the communities in the identification, planning, design, construction and O&M of schemes. Since most communities were thought to lack the organizational and technical skills to design and construct schemes on their own, they were to be assisted by SO (NGOs, community-based organizations, and private sector firms).

- enhance the role of women, the key stakeholders in the sector, by focusing the community development activities of the project on them;

- introduce partial capital cost recovery and full cost recovery for O&M and

- integrate water supply service delivery with environmental sanitation by developing beneficiary awareness of the link between health and sanitation.

Project Components:

The project was conceived to support a package of demand-driven investments in selected districts in the State of Uttar Pradesh and a process of policy reform in the State. The project had three main components[48].

1. Strengthening and operation of the Project Management Unit (PMU). The PMU was responsible for selecting support organizations, using transparent eligibility criteria, helping communities to prepare and implement rural water supply and environmental sanitation schemes (schemes)-, appraising, selecting, and financing schemes that fulfill eligibility criteria-, and monitoring major scheme- related activities.

2. The second component was the selection and construction of water supply and environmental sanitation facilities for single and regional schemes. This component financed improvements of water supply and environmental sanitation services for about 1,000 communities for a design population of about 1.2 million.

[48] Ibid.

Single schemes include a maximum of two villages, and regional schemes include more than two villages. This component included community development activities and the construction of water supply and environmental sanitation schemes. Community development activities were designed to promote active participation of the communities in all stages of decisions about the planning, construction, and management of their scheme, to increase local ownership and effective use and sustainability. These activities comprised capacity building such as community mobilization and organization and non-formal education- hygiene and environmental sanitation awareness-, and women's development initiatives including orientation and training. Construction of water supply and environmental sanitation schemes included financing for pre-feasibility studies, design, construction, and construction monitoring for water supply schemes, human waste disposal, drainage, environmental management, and catchment protection.

3. The third component was studies and sector development. This component supported a major policy study whose objective was to help the GOUP identify the issues affecting sector performance and formulate appropriate policy reforms for the sector. The component also supported a major statewide awareness campaign on sanitation and gender issues and selected studies on sectoral issues.

Poverty: It was intended that over half of project beneficiaries would be in the poverty group. However, the project was not specifically targeting poverty as it was to operate with entire communities, based upon their demand for rural water supply and environmental sanitation services rather than their poverty.

Scheme pre-feasibility and feasibility studies were to be carried out prior to construction and will include an environmental assessment. One of the scheme funding eligibility criteria required that scheme proposals include adequate provisions to mitigate any identified adverse environmental impact.

The *Swajal Project* (Uttaranchal Rural Water Supply and Environmental Sanitation Project) was launched by the Uttar Pradesh Government on the basis of a LOAN sanctioned by the World Bank to the tune of Rs 368 crores. This was intended for a pilot program covering only 1000 villages in U.P. Of these, 600 villages [out of a total of 15166 villages] were selected in Uttaranchal. The project had a duration of six years (1996-2002). Later on the LOAN FUND was distributed between the two separate States'. The Swajal Project has a total of 848 schemes under its programme spread over 8 districts except Haridwar District.

TABLE - 35 BATCH-WISE VILLAGES ACROSS EIGHT DISTRICTS

DPMUs	Number of Villages				Total
	Batch 1	**Batch II**	**Batch III**	**Batch 3X & 4**	
Dehradun	10	9	21	36	76
Uttarkashi	8	24	24	47	103
Srinagar	3	19	24	51	97
Chamoli	4	15	18	32	69
Garhwal Region	**25**	**67**	**87**	**165**	**344**
Almora	7	23	22	57	109
Bhimtal	9	22	40	59	130
Bageshwar	4	18	25	45	92
Pitthoragarh	24	24	25	68	141
Kumaon region	**44**	**87**	**112**	**229**	**472**
Uttaranchal	69	154	199	394	816
				Batch GP	848

Source: PMU, Dehradun

Case Study.

Three case studies were conducted to examine the impact of the Swajal project on the ground, on the basis of the framework for research adopted by this study. This is presented below.

The 3 villages that were selected under DPMU Srinagar were:-

(1) Narkota
(2) Bhimlitalli
(3) Saur Gajeli

From each village 25 Interview Schedules have been filled making efforts to cover all castes & hamlets. There were a total of 75 respondents.

ANALYSIS OF CASE STUDIES

1. Resource Valuation.

The following table presents the responses of members of the village community regarding resource valuation

Table 36. Responses regarding Resource Valuation

Parameters	Scale / Type	Narkota	Bhimli Talli	Saur Gajeli
Value of one bucket of SWAJAL water	Substantial	0	12	7
	Nominal	1	13	18
	Nil	24	0	0
Value of water for the community	Monetary / Utility value	21	20	24
	Non-Monetary value	4	5	1

Table 36 reflects that value of water is maximum for the people in Bhimlitalli followed by Saur Gajeli. This is perhaps due to the fact that in these villages there is an acute shortage of water. In Bhimlitalli most of the 12 respondents for whom the value of water is substantial, are from a single *tok* (hamlet). In this village actually only this hamlet, where about 30 households resides, was in need of a water supply scheme. But under SWAJAL criterion it was not possible to make a single scheme for these 30 households. So two other *toks* were also included where SWAJAL only repaired the old Jal Sansthan scheme. In Narkota the value of SWAJAL water is almost Nil because of the existence of alternative sources of water in the village. The villager's response was - "If we have to pay for each bucket of water from the SWAJAL scheme then we would simply stop using it and will shift to other sources nearby ". In Saur Gajeli, the case is very similar to Bhimlitalli, as the villagers in Gajeli were having enough water and were in no need of any other water supply scheme. But Saur was in need of water. Just to cover the whole revenue village Gajeli was included, for whom the value of water is Nominal. All the 7 respondents of Saur Gajeli for whom the value of water is substantial are from Saur.

This result reveals two facts.

Firstly, it is not possible to inculcate a singular dimension of value to all residents of even a single village. The value of water varies as per its availability. A single norm of pricing of water cannot be enforced even within the boundaries of a single village, particularly in the hill context, as the occurrence of sources are highly locale-specific, differing from ridge to ridge, valley to valley, within a village boundary. The water availability in each source and the households dependent on each are also highly variable. The achievement of a uniform 'service delivery' in these conditions is almost impossible. The value

systems therefore are also bound to reflect the physical and social conditions on the ground.

The second fact to be noted is with regard to the criterion of village selection in SWAJAL. 'Demand', which was intended to be the major criterion was not in reality considered, but other criteria, such as the Rs. 2200 per H.H. cost allocation available under the scheme, which encouraged the selection of whole revenue village. During focus group discussions which involved both beneficiaries as well as non-beneficiaries, the opinion was expressed by some that Swajal has inculcated a habit or mentality amongst the villager to value water only on monetary terms. The non-monetary value of water is not considered at all. This is also reflected in table 1 where most of the respondents responded in favour of Utility value of water neglecting is non monetary values.

This nature of valuation also has implications for the sustainability of the schemes, many of which are questionable due to irregularities in the payments made by the department. Many in these villages hold a higher priority than water. They even say that first they should get operation and maintenance of the scheme. In Narkota the villagers (including the VWSC chairman) said that the scheme would last till the villagers will pay the O&M tariff of Rs. 10 per H.H. per month. The day they would stop paying the tariff, I will not have any motivation to look after the scheme", was the response of both the Chairman of VWSC and the Caretaker (who gets an honorarium of Rs. 400 per month for looking after the scheme).

2. Resource Assessment.

The resource assessment process in SWAJAL is totally a non-participatory process where only the engineers are involved without even the knowledge of the villagers in some cases. Though the source is suggested by the villagers which in most of the cases comprises of an individual or a few influential men in the village, however even they are unaware of the process of resource assessment. The data in table 2 reflects strongly that most of the villagers are not at all aware of how or when the resource assessment was done and they strongly believe that the process do not involves them. Rather most of the time the engineers from the partner NGO and from the DPMUs are involved, who sometimes takes the VWSC Adhyaksha with them. But even he is not aware of the process.

Most of the villagers feel that there is a decreasing trend in the source discharge especially in summer. The figure of village Bhimlitalli gives a rosy image because this scheme has not faced a summer after its completion.

There are other shortcomings too associated with the process followed by the engineers. This is a blue print approach of assessment where a lot of things are standardized which is distanced from the field realities. The consumption in irrigation of Kitchen garden or by livestock is not taken into consideration. In most of the cases the seasonal and the

yearly variations in the source discharge are not recorded before commissioning of the scheme.

All these factors leads to the condition of diversion of source discharge or in other words over exploitation of the resource. This hampers the sustainability of the scheme severely.

Table 37. Responses Regarding Resource Assessment

Parameters	Type of Responses	Narkota	Bhimlitalli	Saur Gajeli
Awareness about the process of resource assessment	Fully Aware	0	0	0
	A bit Aware	9	2	3
	Not aware at all	16	23	22
Opinion about the Process being participatory	Yes	1	0	0
	No	24	25	25
People Involved in the Resource assessment process	VWSC, Chairman	0	0	0
	Chairman + NGO / SO	20	7	4
	Chairman + NGO / SO + DPMU Engineers	5	18	21
Trend of Source Discharge since the commissioning of the scheme	Increasing	0	0	0
	Remain same	1	10	0
	Decreasing	24	15	25
Source discharge depleting in summer months	Yes	24	16	25
	No	1	9	0

3. Equity – Rights to Water.

All the schemes taken under the study have not crossed even 5 years and the condition is that 25% of the sample population (H.Hs) is complaining of inadequacy in the quality of water they are getting. The situation is worst in the village Saur Gajeli where there was no water at all on the day this study was conducted. On the other hand, project engineers claim to have built schemes which would serve the community for 20 yrs.

When asked whether the SWAJAL project treats everyone in the village equally then, about 56% of the total sample of 75 respondents in the three villages replied negatively, especially in Bhimlitalli and Saur Gajeli. They believed that the project functionaries from the department always treat some of the influential men and women in the village in a higher status than the rest.

Another aspect of equity is in terms of participation in decision making. Overall social participation in the VWSC functioning is observed to be very poor. Four major reasons have been identified within the three villages under the study. They are - (a) Not feeling the need to participate or unaware of the fact that their participation would help the cause of sustainability; (b) De-motivation caused by the inactiveness or disinterest of the VWSC Adhyaksha / chairman; (c) The committee members not trying or not willing to involve others in the community; (d) De-motivation caused by irregularities in water supply. In Narkota the VWSC Adhyaksha and Koshadhyaksha are quite active but they are not interested in involving others in the job. In Bhimlitalli the reason (a) is the dominant factor. Here the scheme is relatively new and most of them are getting water and so do not feel the need to participate in the VWSC functioning. In Saur Gajeli the VWSC is almost defunct. There are two main factors contributing to this state of affairs. The first is the inactive Adhyaksha and the second is the fact that eight out of the 12 members of the VWSC are from Gajeli which is the hamlet not at all dependent on SWAJAL water supply scheme. Another reason due to which villagers, specially in Saur are not participating actively is that they are not getting water and this has caused source de-motivation towards the whole project.

Table 38. Responses Regarding Equity

Parameters	Type of Responses	Narkota	Bhimlitalli	Saur Gajeli
Water Adequacy	Yes	17	23	10
	No	8	2	15
Active Community Participation in the VWSC functioning	Yes	5	8	2
	No*	20	17	23
Reasons Inactive * or less Participation in VWSC functioning	Not feeling the need to participate	6	12	5
	De-motivation due to inactive VWSC chairman	0	0	10
	VWSC not willing to involve others	14	5	0
	De-motivation caused by irregularities in the water supply scheme	0	0	10
Project treats everyone in the community equally	Yes	16	10	6
	No.	9	15	19

4. Technology

In most of the SWAJAL village, the villagers feel that the Technology (Gravity based Pipeline) adopted by the Project was the only way to bring water to the village. In the hills, this is the best possible or in some cases the only option to bring water to the remote villages, in spite of the fact that the technology is an expensive one. But one of the critical aspect of SWAJAL is that it promotes the consumption of water from the source, be it a spring or a stream, without regard to conservation. The aspect of water conservation or ground water re-charge thus producing water is totally neglected. This

should have been the part of the catchment area protection work undertaken in selected SWAJAL villages. Due to this it after creates some ill effects or risks in the environment and the surroundings eco-system but one of the interesting findings of the study suggests that al large proportion of the village community is unaware of the fact. The most realized risk that this technology gives birth to is the source loss. Villagers say that the way of tapping water at the source itself often disturbs the underground strata resulting in the source changing its direction and moving elsewhere. Some of the other ill-effects are on the soil moisture on the land surrounding the source and sometimes on the living beings such as crops, flora and fauna. The variations in the opinion can be looked into in Table 32.

The SWAJAL functionaries claim that the scheme would serve the community for the next 20 years but often the field realities makes a mockery of this claim. So, the matter of interest is what the villagers feel regarding the life of the technology. Out of the sample size of 75 about 71% of the respondents from these 3 relatively new schemes believe that the schemes would not serve them for more than 10 years. The Saur Gajeli the situation is worst 19 out of the 25 respondents (i.e. 76% of the sample) believe that the scheme would not last for even 5 years. The responses in Bhimlitalli are a little positive one because it has not yet faced the test of time.

It is quite obvious that in a village where the value of water is judged in terms of money, one cannot expect the collection O&M (Operation and Maintenance) tariff when there is no water in the Standposts. This point is substantiated in the findings depicted in the O&M tariff payments, in Table 4, where in Saur Gajeli 20 out of 25 villagers do not pay the tariff either because they do not get regular water supply or they do not use the SWAJAL water at all. On this parameter Narkota and Bhimlitalli are better off. But the question of concern is whether the annual O&M tariff collection is sufficient enough to meet the securing cost of the scheme. All the respondents of all the villages feel that the amount is not enough. Then can we call it a sustainable project output?

Another issue of concern is that Catchment Area Treatment is not done in all these schemes, rather a selected number of villages have been covered under a separate project (named CAP - Catchment Area Protection work), spending huge amounts of money.

22 out of 25 respondents in Narkota, 11 out of 25 respondents in Bhimli Talli and 6 out of 25 respondents in Saur Gajeli do have an opinion that their source is either a little bit or a lot contaminated. This is another threat to the health and hygiene aspect of the community which is one of the objectives of the SWAJAL Project.

Table – 39. Responses Regarding Technology adopted

Parameters	Type of Responses	Narkota	Bhimlitalli	Saur Gajeli
Technology adopted being the only alternative to bring water to the village	Yes	25	21	12
	No	0	4	13
Opinion about the technology creating some environmental risks or ecological risks	Yes *	7	10	16
	No	3	5	6
	Can't Say	15	10	3
Ill-effect on the Eco-system	on the same	7	7	16
	On the land / soil adjacent to the source	0	3	5
	on the living beings	6	0	13
Life of the Technology	20 yrs	2	2	0
	10-20 yrs	5	13	0
	5-10 yrs	10	9	6
	Less than 5 yrs	8	1	19
Regular operation & maintenance tariff payment	Yes	19	24	5
	No	6	1	20
Opinion about the sufficiency of the O&M tariff in meeting the recurring cost	Yes	0	0	0
	No	25	25	25
Catchment Area Treatment work done	Yes	0	25	0
	No	25	0	25
Contaminated source	Not at all	3	14	19
	A little bit	16	7	6
	A lot	6	4	0

5. Institutional Mechanisms

The parameters used to judge the present institutional mechanism are - decentralization, simplicity in the arrangements, Transparency, social participation, cost effectiveness in the dispute resolving mechanism, speedy decision making and dependency on financial resources. **In all these parameters the responses were in favour of the pre-Swajal institutions.** If we look into the findings of these parameters in table 5, we can observe that the pre-SWAJAL institutions were more decentralized, simple and transparent leading to more social participation. The institutional arrangements in the past we less expensive with a more effective dispute resolving mechanism resulting to much more

speedy decision making. The arrangement under SWAJAL is too much dependent on financial resources and less on human or societal resources and relations.

The success and sustainability of any development initiative is dependent to a large extent on the village level institution responsible for its operation and maintenance. In case of SWAJAL, it is the VWSC (village water & sanitation committee). So the study tried to look into the fact as to how effectively & actively is the VWSC functioning in these three villages. The results reveal that 45% of the sample respondents believe that the VWSC in their village is inactive. It may be indicative of either that they have some complaints against VWSC or the VWSC might actually be an inactive one, which is the fact in the case of Saur Gajeli. In the other two villages of Narkota and Bhimlitalli most of the villages believe that the VWSC in their respective villages are partially active.

Table 40 also reflects that the decision making process followed by VWSC is not at all participatory. Most of the time the villagers are not taken into confidence while taking any major decision. To understand the strength of the village level institution one of the important factor that has be adjudged is its legitimacy (be it formal or informal). When it was asked whether the villagers do abide or are bound to abide by any decision or resolution passed by VWSC, almost all of them either responded ‘not necessarily’ or ‘not at all’. Thus it shows that the public opinion does not recognize VWSC as a legal body having some power which can compel them to abide by the Rules and Regulations framed the body.

One of the biggest problems regarding the SWAJAL project is the fact that the community lacks the ownership feeling as a result of which no one is ready to own the responsibility to ensure the sustainable functioning of the scheme, so that everyone gets a regular supply of water. In most cases, the scheme had come to the village through some individual imitative and now the community believes that the individual is alone accountable to ensure regular water supply in the village. In both the cases of Narkota and Bhimli Talli, individuals like Dinesh Nautial and Chakradhar Joshi are the people responsible and accountable for operation and maintenance of the scheme. How long will they take the responsibility is really questionable. In case of Saur Gajeli the community believes that the NGO and the Department have made some mistakes which have hindered the scheme and so they are wholly responsible and accountable to improve the situation and make sure that everyone gets adequate water.

According to the Govt. order (G.O.), VWSC is a sub-committee of Panchayat, but the question is whether the community is aware of or accepts this fact. If not, then the legitimacy of the village level Institution is questionable. In all the three villages, out of the total respondents of 75, 52 if them had an opinion that they do not believe that VWSC is a part of the panchayat. They do not have any interaction and do not expect any kind of help from the panchayat. One of the biggest lacunae of the SWAJAL project is that they do not consider this fact and have never tried to set up a relation or link between VWSC & PRI before the exit of project functionaries.

While VWSC meetings are not very regular, most of the villagers consider this to be an important requirement because they feel that the problems, disputes and shortcomings can be minimized in this way. Right to Information is violated at each and every level under the project. Everyone, be it the Project manager or Engineer Consultant at DPMU level, SO/ NGO head or the VWSC Chairman, hesitates to reveal information regarding the project to the public. Everyone attached to the commissioning of a scheme seems to have same kind of hidden fear within themselves and so they makes it sure that there is minimum transparency or false transparency in the project especially regarding the financial aspects of any scheme. Most of the villagers are unaware of the timings and conditions of budget releases. In the name of transparency what is done is to write the total scheme cost and the amount of funds to be finally released under different heads on some wall of the village. But no one is aware of the details of the total cost of scheme, i.e. - How much pipelines will be laid down; dimensions of the proposed structures; proposed training for the women and its details. These aspects are neither written on the walls / boards within the village or are they discussed during the VWSC meetings. This causes some kind of mistrust and doubts amongst the community which sometimes leads to non-co-operation.

Table – 40. Responses Regarding the Institutional Mechanism

Parameters	Type of Responses	Narkota	Bhimlitalli	Saur Gajeli
More Decentralized Arrangement	Pre - SWAJAL	19	21	23
	Post - SWAJAL	6	4	2
More simple arrangement	Pre - SWAJAL	17	19	20
	Post - SWAJAL	8	6	5
More Transparent system	Pre - SWAJAL	21	23	23
	Post - SWAJAL	4	2	2
More Social Participation	Pre - SWAJAL	23	23	23
	Post - SWAJAL	2	2	2
More costly	Pre - SWAJAL	1	4	8
	Post - SWAJAL	24	21	17
More Effective Dispute Resolving Mechanism	Pre - SWAJAL	19	20	23
	Post - SWAJAL	6	5	2
More speedy decision making	Pre - SWAJAL	19	21	23
	Post - SWAJAL	6	4	2
More dependency on Money	Pre - SWAJAL	5	6	0
	Post - SWAJAL	20	19	25
Effective and Active VWSC	Fully Active	0	0	0
	Partially Active	20	15	6
	Inactive	5	10	19
Participatory Decision Making followed by VWSC in the village	Always	2	0	0
	Sometimes	11	8	3
	Never	12	17	22

Table 40 (contd) Responses Regarding the Institutional Mechanism

Parameters	Type of Responses	Narkota	Bhimlitalli	Saur Gajeli
Abiding by / Bound to abide by VWSC passed arrangements / Regulations	Definitely	2	1	0
	Not Necessarily	16	12	11
	Not at all	7	12	14
Accountability to ensure regular water supply in the village	Individual	17	14	2
	Community	0	3	0
	DPMP/ Dept.	2	1	10
	VWSC	6	7	2
	NGO/ SO	0	0	11
Opinion about VWSC being the part of the Panchayat	Yes	1	0	2
	No	19	20	13
	Can't say	5	5	10
Need for regular VWSC meeting	Yes	19	24	21
	No	6	1	4
Awareness about the financial side of the project	Fully aware	1	2	1
	Partially aware	3	4	2
	Unaware	21	19	22
Opinion about Transparency in the financial matters	Yes	8	9	3
	No	17	16	22

6. Dispute Resolving Mechanism

Disputes are a part and parcel of every development project. Whenever there are some project outputs that the community has to share among its members, then disputes are likely to arise. SWAJAL is not an exception to this general fact. There are multiple disputes, both inter as well as intra village. But this is not a serious issue, if there is an inbuilt dispute resolving mechanism within the project, which seems to be totally absent under SWAJAL.

In the 3 villages under the study four main kinds of disputes have been observed. They are: - disputes over water sharing; dispute over usage & ownership of source; dispute arising from some sabotage done by the external entities; and disputes regarding the usage of Standposts.

In Narkota the dispute is an inter-village dispute arising over water sharing. The stream which has been tapped by SWAJAL is used by multiple villages. The village which comes before Narkota stops the water and diverts it to their field for irrigation. This leads to shortage of water in the source for Narkota especially in summers. The question that arises is as to why the NGO which is the Support Organization and the project authorities did not facilitate and initiate a process of discussion and some kind of mutual agreement and arrangements regarding water sharing between the two villages prior to the programme.

In Bhimlitalli there is an Intra village dispute over the source. Before SWAJAL there was a single source from which two hamlets shared water. This was the traditional source and

the villagers believe that it is the best & most pure source in the area. But under SWAJAL three schemes were made in this village, tapping three different sources. Now one of these two hamlets gets water from a new source and the other from the old traditional source. But the residents of the former hamlet are not satisfied and often sabotage the latter's scheme, sometimes out of dissatisfaction and sometimes out of jealousy. This matter has also been left unresolved.

In Saur Gajeli again the dispute is an intra village kind of dispute. The hamlet Gajeli had a Jal Sansthan scheme which its residents use for getting water for domestic consumption. So, they are not dependent an SWAJAL scheme for drinking water. They use the water in their fields for growing Bhima fibre (a local grass variety). They use the water from the source for this purpose and have diverted a large portion of the water to their field through a Gul. This has caused immense water shortage in Saur leading to dispute between the two hamlets.

The community in all these three cases believes that under the Institutional mechanism promoted by SWAJAL, there is no inbuilt dispute resolving mechanism and so the dispute are not resolved promptly leading to dissatisfaction amongst the community.

Table 41. Responses Regarding the Dispute Resolving Mechanism

Parameters	Type of Responses	Narkota	Bhimlitalli	Saur Gajeli
Any Dispute regarding the water supply scheme	Yes	20	18	25
	No	5	7	0
Types of Disputes	Standpost Dispute	0	15	0
	Water Sharing Dispute	5	0	25
	Source Dispute	2	6	25
	Sabotage linked dispute	13	15	8
	Any other	0	0	0
Promptly resolved or not	Yes	7	13	0
	No	18	12	25
Level of satisfaction with the dispute resolving mechanism	fully satisfied	2	0	0
	Partially satisfied	5	13	0
	Not satisfied	18	12	25

7. Role of Women

One of the major objectives of the SWAJAL programme was Women's Empowerment. But to what extent the approach followed facilitated the cause is really questionable. It was thought that Self Help Groups will act as a pressure group on the VWSC to keep it active and in case any VWSC became defunct, the SHG may also take over the whole scheme and run it. But the possibilities in present conditions are very low.

When asked about their awareness regarding the technical aspect of the scheme almost 92% of the sample respondents responded negatively. This is so because the women have

been kept away from the decision making since the very beginning. Even though there are women's representatives in the VWSC, they are not at all involved in major decision making regarding the water supply scheme. As a result of this the benefit gained by women in most of the cases may be Time saving but not social or economic empowerment or awareness and prestige enhancement. In Narkota and Bhimlitalli most of the women folk seem to be partially satisfied as they are still getting water, unlike Saur Gajeli. The Role of SHGs have remained restricted to saving and credit activities in most of the SWAJAL Villages. Even the training received was either just a formality in terms of their quality or were irrelevant, which would be of no use to them in future.

Table 42. Responses Regarding the Role of Women in the Project

Parameters	Type of Responses	Narkota	Bhimlitalli	Saur Gajeli
Level Awareness regarding the technical aspect of the project	All are aware	0	0	0
	A few are aware	1	5	0
	None are aware	24	20	25
Women's involvement in decision making	Always	2	5	2
	Sometimes	3	7	4
	Never	20	13	19
Benefit Gained by women	Time saving	20	25	4
	Economic Empowerment	2	8	0
	Prestige Enhancement	0	0	0
	Increase in awareness	7	10	6
	Social Empowerment	4	6	2
Level of satisfaction of the women folk in the family	Fully satisfied	2	12	2
	Partially satisfied	17	13	5
	Not satisfied	0	0	18
Role of the SHGs	Saving Credit	13	18	10
	Operation and Maintenance	2	0	0
	Overall water supply scheme management	2	1	0
Received any training or not	Yes	5	12	3
	No	20	13	22
Opinion of whether the training imparted would help them in future	Yes	3	6	0
	No	22	19	25
Opinion about whether there is a need of training for women	Yes	25	25	25
	NO	0	0	0

8. Inter Sectoral Adjustment

One of the biggest flaws in the process of resource assessment followed under SWAJAL is that the aspect of Inter-sectoral uses and adjustment were not taken into consideration. The fact that the Standpost water is often also used for other purposes is totally overlooked. It has been proved during the study of these 3 villages that apart from human drinking and other domestic uses the SWAJAL water is also used for livestock, micro - irrigation (kitchen garden) and field irrigation. In Saur Gajeli this has emerged as the biggest problem where the community in Gajeli uses the major part of the water for field

irrigation leaving very less for Saur, thus creating a conflict situation. Similarly many of the villagers in Bhimli Talli are using the water for kitchen gardening.

Another concern which the study has tried to look at is that under SWAJAL so much emphasis and importance has been given to drinking water and water for domestic use that the other sectors such as Irrigation or water mills or water for livestock or conservation and harvesting aspects have been totally neglected and hampered. In all the three villages the villagers have accepted this fact. In Narkota, the people say that, agriculture have suffered serious set back after SWAJAL came to the village. They say that a series of BPTs (Break Pressure Tanks) that have been constructed have lead to waste of a large proportion of water, which goes into the forest area. This water was earlier being used for irrigational purpose.

Table 43. Responses Regarding Inter Sectoral Adjustments

Parameters	Type of Responses	Narkota	Bhimli talli	Saur Gajeli
Various uses of the SWAJAL water	Human drinking	25	25	13
	Livestock	10	8	10
	Micro Irrigation (Kitchen garden)	3	17	7
	Field Irrigation	7	9	15
	Other Domestic uses	20	18	8
Opinion regarding the neglect to the other uses of water due to greater emphasis on drinking water sector	Yes	25	18	15
	No	0	7	10

9. Ecological Sustainability

To assess the effectiveness or impact of a project one must test whether the project has addressed the multiple dimensions of JAL [water], JANGAL [forest], JAMIN [land], JANWAR [animal population] & JAN [human society]. If one of these aspects gets addressed at the cost of any other then we cannot claim that the project has met its objective.

SWAJAL tried to get away by giving an excuse that its objective is to provide safe and hygienic drinking water for the community, but in doing so it has disturbed the other aspects of this web resulting in an imbalance in the whole system. Nearly 85% of the sample population have agreed to this fact, in the 3 villagers under the study.

Table 44. Responses Regarding Ecological sustainability

Parameters	Type of Responses	Narkota	Bhimli talli	Saur Gajeli
Opinion regarding whether SWAJAL takes an integrated Development Approach	Yes	1	1	0
	No	20	17	25
	Can't say	4	7	0

Catchment Area Protection under SWAJAL Programme

The following analysis of the CAP under SWAJAL is presented based on information gathered from interviews and discussions with SWAJAL staff at district level and with NGO partners, a s well as from observations from the field.

The weaknesses that are quite evident in the Catchment Area Protection Work under SWAJAL Project are as follows:-

1.*Too Hasty Process*: Catchment Area Protection (CAP) covers a huge spectrum of activities and it cannot be treated as a minor component of a water and sanitation project. The works to be done under this cannot be accomplished within the allotted time period of one year (including preparation of proposals, which takes about six months). This hasty approach adopted under SWAJAL has led to obvious results. For example, due to time restrictions the Village Committees have used naked rooted saplings instead of poly bags, which has severely affected the survival rates of the plantation work. Moreover this has also led to mismanagement and improper allocation and utilization of funds.

2. *Weak Institutional Arrangements*: Due to target based approach, the NGOs as well as the Project Management Unit, have laid emphasis on the accomplishment of physical targets with little or no emphasis on establishing associated institutional arrangements. Thus the sustainability of the Catchment Area Protection Work, which ironically was introduced for ensuring the sustainability of the whole water supply scheme, is under serious doubt. The protection regime is so weak that the question of getting positive impact from this work does not arise as most of the plants do not get an opportunity to reach that stage when benefits can be reaped from them. This is primarily because no institutional arrangements have been established for this purpose. The Village Committees have not undertaken the task of Catchment Protection, which in any way would be beyond their capacity. Firstly, the catchment is a common resource used by all the villagers, whereas the Committee often represents only part of the village which is benefited by the water supply programme.

3. *Non-participatory*: The whole process starting from village selection to the species identification and thereafter the process of plan preparation make little use of the

indigenous knowledge of the community. Non-participation is to the extent that the community is unaware of even the purpose of Catchment Area Protection and the associated technologies. On one hand the project functionaries have failed to involve the community either in planning or in its implementation and on the other hand they are trying to introduce the concept of social fencing. These two are totally contradicting conditions.

4. Weak Technical Support: As the local knowledge is not used and a top down approach is dominant so the works done do have some technical weaknesses. The plan prepared is not need based and area specific. Moreover technical support in the construction of the structures and species selection are almost non-existent. The planting density is not taken care of during the plantation work. The technical aspects of plantation such as soil suitability, regeneration and root stock assessment, and most importantly species selection considering both its technical and social suitability are all overlooked while fulfilling of the physical targets. Moreover development and management of local nurseries are not at all incorporated in the project. If the local people are encouraged to grow nurseries of their own, which can then serve as the sapling bank for the plantation work, then this can be a good source for employment generation in these villages.

5. *Inadequate Coverage*: Out of 857 SWAJAL villages only 229 villages have been covered under the catchment area protection work, that too was done as an after thought, whereas this should have been an essential component in all the villages from the beginning itself. The severity of the problem has also been neglected while selection of the CAP villages. That means, those villages have been selected which are not so needy, at the cost of those where the water sources have seriously depleted and needs catchment area treatment.

On the whole, the directive of the 10th Five Year Plan that water supply schemes should be linked to watershed development programmes for greater sustainability of drinking water sources[49] has not been followed in this project. The Plan further emphasizes that rural water supply and sanitation facilities are vital elements in the overall programme for rural development, which include land and watershed management, soil conservation, afforestation, and social issues such as primary health care, eradication of illiteracy, women's welfare, child nutrition, immunization etc. The SWAJAL method, however, is far removed from these principles.

[49] 10th Five Year Plan, Planning Commission, Government of India, page 603

EVALUATION BY SWAJAL

In the course of implementation of the SWAJAL programme, a Sustainability Evaluation Exercise is conducted by the District Project Management Units 4 times a year using the following parameters –

Parameters	Maximum Score	Village Score and Categorization of Village as HSV*, MSV* or LSV*
Status of water supply structures	15	
Source discharge	10	
Chlorination status	10	
O&M tariff collection	20	
Latrine coverage	10	
Functioning of VWSC	10	
Healthy Home Survey conducted	10	
Status of SHG	10	
General observation	5	

***HSV – Highly Sustainable Village**
***MSV – Moderately Sustainable Village**
***LSV – Least Sustainable Village**

In the context of the present study, it is interesting to note that in an official evaluation by SWAJAL of the villages covered under its programme in Pauri District, the ranking given to Narkota and Saur Gajeli – the villages covered by the present study - in terms of sustainability is quite high. The table with this data is presented below; the two villages covered are marked in bold.

Rapid Sustainability Appraisal, DPMU – Srinagar, Pauri Garhwal

RSA STATUS OF 60 VILLAGES.

Village	Vill Code	W/S	S.D.	Ch.	O&M	Lat	VWSC	HHS	SHG	Gen	Total
Ghariyana	47103	15	10	10	15	5	10	5	6	4	80
Narkota	***17904***	***15***	***10***	***10***	***10***	***7***	***6***	***10***	***6***	***4***	***78***
Vanasu	18204	15	10	7	15	0	10	10	6	5	78
Kimald	17804	15	10	10	7	5	10	10	6	5	78
Makhet	18103	15	10	10	15	5	3	10	6	4	78
Budoli	6502	15	5	7	10	10	10	10	6	4	77
Ghuri	46903	15	10	10	15	5	6	5	6	5	77
Ringwar gaon	47010	15	10	7	20	0	10	5	6	4	77
Bena Mala	1301	15	10	5	15	5	6	10	6	4	76
Garshina	7101	15	10	10	20	0	6	5	6	4	76
Saur Gajeli	***6514***	***15***	***10***	***10***	***10***	***5***	***6***	***10***	***6***	***4***	***76***
Pundal	6511	15	10	10	20	7	3	5	0	5	75
Ratani-Keshpur	7102	15	10	7	15	7	6	10	0	5	75
Dundekh	47003	15	10	7	15	0	10	5	6	4	72
Chopra	18002	15	10	10	0	10	10	10	3	4	72

Palei Malli	47008	15	10	7	7	7	3	10	6	4	69
Pipalsari	46809	15	10	10	7	0	6	10	6	4	68
Saur	47011	15	10	7	15	0	6	5	6	4	68
Simli	7112	15	10	7	10	5	6	10	0	4	67
Kyark	6509	15	10	5	5	7	10	5	3	4	64
Kaphna	47104	15	10	0	15	5	3	5	6	3	62
Soli Talli	17808	15	10	7	7	7	3	5	3	4	61
Liswalta Bangar	18102	9	10	10	10	0	6	5	6	4	60
Bamsu	17901	15	10	0	10	0	10	5	6	3	59
Ghodipala Malla	46805	15	10	0	7	5	6	5	6	4	58
Muchelgaon	17806	15	10	5	5	0	6	10	3	4	58
Musiya Gaon	46907	9	10	5	10	5	3	5	6	4	57
Kudi Aduli	47101	15	10	7	0	5	6	5	6	3	57
Khijani	18302	15	10	7	7	0	3	10	0	4	56
Jakhani	18101	9	10	10	10	0	3	5	6	3	56
Gangora	46804	15	10	5	7	5	3	5	3	3	56
Khal Banjetan	1302	9	10	5	7	5	6	10	0	3	55
Jaskot	17803	15	10	5	5	0	6	10	0	3	54
Maitaa Talla	7106	9	10	5	15	0	6	5	0	4	54
Khand gaon	17903	9	10	5	10	0	6	5	6	3	54
Dumlot	46801	15	10	5	5	0	3	5	6	4	53
Pokhari	46909	15	10	0	5	5	3	5	6	4	53
Khainoli	7103	15	10	0	15	0	3	5	0	4	52
Hatnoor	18003	15	10	7	0	0	3	10	3	4	52
Kuaith	46904	15	10	0	5	5	3	5	6	3	52
Dungari Rawan	18301	15	10	5	5	0	3	10	0	3	51
Daur	47302	15	5	10	0	0	6	5	6	4	51
Moli	18303	15	10	5	0	0	0	10	6	4	50
Sunaura	7113	9	10	5	10	0	6	5	0	5	50
Khandnala Tok	46807	9	10	0	0	0	6	10	10	5	50
Badiyo	46601	15	10	7	0	0	6	5	3	4	50
Jameli	18004	15	10	7	0	0	6	5	3	4	50
Bhadkoti	18001	9	10	10	0	5	3	5	3	5	50
Churthu	6504	15	10	0	5	0	3	10	3	4	50
Dhaksun	6505	15	5	0	7	0	6	10	3	4	50
Mangru	46906	15	10	0	7	0	6	5	3	4	50
Tundri	7115	15	10	5	5	0	3	5	3	4	50
Jal Talla	18201	15	10	0	0	0	6	10	6	3	50
Syansu	18203	15	10	0	0	5	3	10	3	4	50
Manjyadi sain	17805	6	10	7	5	7	3	5	3	4	50
Banchuri	47301	9	5	5	0	0	3	10	3	4	39
Uman	18005	15	10	0	0	0	3	0	0	5	33
Byasi	46901	9	10	0	0	0	3	5	3	3	33
Syunta	7114	6	10	0	0	0	3	5	0	2	26
Chundai	6503	0	10	0	5	0	3	5	0	1	24

Source: DPMU, Srinagar, Pauri Garhwal.

W/S- Water Supply (F, PF, NF); SD- Source Discharge; Ch- Chlorination; O&M- Operation and Maintenance Tariff; Lat-Sanitary Latrines; VWSC- Village level Institution; HHS- Healthy Home Survey; SHG- Self Help Group; Gen-General.

In Kumaun region, one such internal exercise was conducted by the DPMU Almora in September, 2002 in the following 19 villages:-

1. Babri
2. Jaal
3. Chalthi
4. Bashi Kaflani
5. Dhannore
6. Naugaon
7. Kushia Chaun Malla
8. Kumalt
9. Tallabhakura
10. Mallabhakura
11. Khalna
12. Chamni
13. Tana
14. Lotna
15. Kharakot
16. Kotemohar Bind
17. Timta
18. Simali Bangari
19. Dadholi

The Internal Evaluation Team in its report declared all the above villages as LEAST SUSTAINABLE VILLAGE in September 2002. This is reproduced below. However, it is reported that the final report of the DPMU the same villages were declared as HIGHLY SUSTAINABLE VILLAGES. [50]

Sustainability Evaluation Exercise, DPMU – Almora

1. Village Babri – [LSV]
    - ⇒ Controversy over labour payments and salary of the CT.
    - ⇒ Villagers are scared of using the Swajal Standpost for drinking purposes because the pipelines have been rusted from inside and hence water is polluted.
    - ⇒ Chlorination not done for the last 9 months. VWSC along with the implementing NGO misappropriated money sanctioned for purchase of bleaching powder.
    - ⇒ VWSC Chairman is demotivated over the payment issue; not interested in O&M Phase activities – alleges misappropriation of money by the NGO and an official of DPMU.
    - ⇒ No O&M collection.
    - ⇒ SHG defunct.
    - ⇒ Over invoicing of bills.

[50] From a personal communication of a former SWAJAL staff member.

2. Village Jaal – [LSV]
    - ⇒ Chlorinator damaged.
    - ⇒ SHG defunct.
    - ⇒ Misappropriation of money by the NGO and VWSC - as alleged by the village community.
    - ⇒ Over invoicing of bills.

3. Village Chalthi – [LSV]
    - ⇒ SHG at the verge of bankruptcy due to corruption.
    - ⇒ Problem with the source discharge.
    - ⇒ No chlorination.
    - ⇒ Money misappropriated at all levels.
    - ⇒ Over invoicing of bills.

4. Village Bashi Kaflani – [LSV]
    - ⇒ The major problem that the scheme here is facing is the depletion of source discharge. No water in one cluster (Bashi) and erratic supply in other cluster (Kaflani)
    - ⇒ No O&M Fund nor any activity.
    - ⇒ 2 SHGs created are defunct.
    - ⇒ VWSC at the verge of becoming defunct.
    - ⇒ Over invoicing of bills.

5. Village Dhannore – [LSV]
    - ⇒ The most critical problem that the village is facing is the internal conflict between Adhyaksha and Koshadhyaksha.
    - ⇒ No O&M tariff collection.
    - ⇒ Conflict between Swajal and Jal Sansthan Scheme. Villagers using Jal Sansthan scheme not ready to pay water tariff for Swajal scheme.
    - ⇒ Chlorinator not in use.
    - ⇒ Illegal private connections installed after bribing DPMU engineer and NGO.
    - ⇒ SHG defunct.
    - ⇒ Over invoicing of bills and vouchers by the VWSC in connivance with DPMU Officials.
    - ⇒ Chloroscope not being given to the VWSC.

6. Village Naugaon – [LSV]
    - ⇒ Of the 2 schemes supposedly constructed, one scheme defunct and in the other scheme, out of 7 Standposts, only one if partially functioning. The reason is damage in wheel wall chamber.
    - ⇒ Chlorinator completely damaged.
    - ⇒ No O&M tariff collection till date.
    - ⇒ SHG is defunct.

⇒ CW not paid salary.
⇒ Money misappropriated.
⇒ Over invoicing of bills.

7. Village Kushia Chaun Malla – [LSV]
   ⇒ VWSC says there is major technical defect in the SCC construction. Water discharged from the source is not tapped.
   ⇒ Misappropriation of funds by the NGO, VWSC and DPMU Officials.
   ⇒ SHG is defunct.
   ⇒ Chlorination not done.
   ⇒ CT has not got salary for 9 months.
   ⇒ Over invoicing of bills.

8. Village Kumalt – [LSV]
   ⇒ Chlorinator not used.
   ⇒ Threat of polluted water being supplied.
   ⇒ SHG comprising embers of only one family.
   ⇒ No equity in supply of water.
   ⇒ Over invoicing of bills

9. Village Tall Bhakura – [LSV]
   ⇒ SSF is non-functional.
   ⇒ VWSC not provided IPCR.
   ⇒ Over invoicing of bills.
   ⇒ Exit has been done inspite of non payment of labour and HSL payments.
   ⇒ Villagers not given back the security money of the HSL by the SO/NGO.

10. Village Malla Bhakura – [LSV]
    ⇒ RF not functioning due to technical defects.
    ⇒ O&M collection never done till date.
    ⇒ VWSC defunct.
    ⇒ Koshadhyaksha and Adhyaksha connived with DPMU and SO in misappropriating funds.

11. Village Chamni – [LSV]
    ⇒ Though according to DPMU, a very good village, funds misappropriation by the NGO/DPMU reported by the villagers.
    ⇒ Chlorination never done.
    ⇒ Problems in source discharge.

12. Village Tana – [LSV]
    ⇒ 2 schemes constructed. One is partially functional and the other is non-functional. It was proposed that an IW will be constructed and it would be connected to the CWR. Work is pending for the last 13 months.

⇒ RF has a leakage and presently by-pass is on. Only one Standpost is partially functional.
⇒ No equitable distribution of water.
⇒ No O&M collection in one hamlet.
⇒ O&M tariff collected in other scheme has been siphoned off by the SO/DPMU engineer.
⇒ Chlorination never done.
⇒ Fake vouchers cleared by the DPMU.

13. Village Lotna – [LSV]
⇒ SHG is defunct.
⇒ Over invoicing of bills and production of fake vouchers.

14. Village Khalna – [LSV]
⇒ No O&M collection.
⇒ VWSC defunct.

15. Village Paanshal – [LSV]
⇒ Misappropriation of funds by DPMU engineer, SO and Koshadhyaksha.
⇒ VWSC defunct.

16. Village Kharakot – [LSV]
⇒ O&M not collected till date.
⇒ SHG defunct.
⇒ Funds for toilet construction siphoned off by SO/Koshadhyaksha/DPMU officials.

17. Village Kotemohar Bind – [LSV[
⇒ Source discharge reduced.
⇒ None of the 5 Standposts are functioning due to the choke in the pipelines.
⇒ Bungling of funds reported by SO.
⇒ No O&M collection.
⇒ VWSC defunct.

18. Village Timta – [LSV]
⇒ Source discharge is less.
⇒ Water supplied in this scheme is polluted. Not appropriate for drinking or cooking.
⇒ No chlorination.
⇒ Decisions made by NGO and DPMU; VWSC defunct.
⇒ SHGs run as private property of Adhyaksha.
⇒ Non existence of O&M fund.

19. Village Simali Bangari – [LSV]
    - ⇒ Heavy conflict over water distribution.
    - ⇒ No O&M collection.
    - ⇒ 2 Standposts closed due to drainage problem.
    - ⇒ Funds misappropriated by Adhyaksha along with SO and DPMU officials.
    - ⇒ SHGs defunct.
    - ⇒ VWSC defunct.
    - ⇒ Salaries of local staff like CTs not paid since last 14 months.

CHAPTER FOUR

4.0 COMPARATIVE ANALYSIS

The case studies presented in the previous chapter are analyzed below, to assess the relative merits of each of the several approaches to water resources management for ensuring access to drinking water.

A rating system has been used to provide a framework for comparative analysis. For each of the parameters chosen for the study, a set of indicative questions have been chosen. Depending on the extent to which these questions are answered in the review of each approach, a rating of 5 to 1 representing Very Good, Good, Fair, Poor and Very Poor respectively is applied to each approach. [5= Very Good; 4=Good; 3= Fair; 2=Poor; 1==Very Poor] The total of points is used to assess the relative merit of the five approaches.

The set of indicative questions with respect to the chosen parameters are as follows.

1. **Resource Valuation**

- How broad / comprehensive is the value system? Is it inclusive of utility / exchange / ecological values? [Social, economic and ecological values]

2. **Equity – Rights to Water**

- Are norms for equity prevalent and understood by all members of the community?
- Has Equity in Access to water among all sections of the community been ensured?
- Is there Equity in decision making in water management?

3. **Resource Assessment.**

- Is there an inbuilt mechanism for resources assessment?
- Is it continuously operative?
- Is it based on an integrated resource management approach?

4. **Technology.**

- Is it economically viable?
- Is it supported generally by all?
- Is it accessible to all?
- Is it environmentally sustainable?

5. **Institutional Mechanisms and Processes.**

- How centralized / decentralized?
- Formal or non formal?

- Is it complex?
- Is it participatory? Does it involve the whole community?
- Is it transparent?
- Is it cost effective?
- Does it have public endorsement – formally or non-formally?
- Is there an effective system of accountability to the community?
- Is there a harmonious relationship with elected bodies?

6. Dispute Resolving Mechanisms.

- Is it accessible to the community?
- Is it fair?
- Is it transparent?
- Is it cost effective?
- Does it ensure a speedy process of resolution?
- Does the process provide a socially acceptable, equitable solution?

7. Role of women

- Are women engaged in specific, significant roles, which is commonly appreciated ?
- Are women involved in management activities, including decision-making ?
- Are women in a position to influence changes?

8. Inter-sectoral adjustments:

- Are there inter-sectoral conflicts regarding the use of water in the specific cases?
- Are there mechanisms for adjustment?
- Have such mechanisms solved the conflict justly?

9. Ecological Sustainability:

- Is there a general consciousness of the fact of the integrated nature of resources? [ecological awareness]
- Have specific actions or mechanisms been adopted in acknowledgement of this ?
- When imbalances occur, are there specific mechanisms for regaining the balance of eco-systems?

Comparative Rating of the Case Studies representing Five Varied Approaches to Drinking Water Supply in Uttaranchal

Type of Approach / Parameters	Community Managed Systems	LSGED	Kassar Trust	Jal Sansthan /Jal Nigam	World Bank Swajal
Resource Valuation	5	4	4	1	1
Resource Assessment.	5	2	4	1	1
Equity – Rights to Water	3	1	3	1	1
Technology.	4	2	3	2	2
Institutional Mechanisms and Processes	4	4	3	1	1
Dispute Resolving Mechanisms	3	3	3	1	1
Role of women	3	1	2	1	1
Inter-sectoral adjustments:	NA	NA	NA	1	1
Ecological Sustainability:	4	1	3	1	1
Total	**31**	**22**	**25**	**11**	**12**

Analysis

Resource Valuation

In this aspect, community managed systems score the highest, followed by LSGED and Kassar Trust, which score equally. These three approaches rate from Very Good to Good. The Government agencies and SWAJAL rate the lowest, at very poor. The reasons are as follows.

In community based approaches, one finds the broadest and most inclusive approach to resource valuation, in which ecological, economic, socio-cultural perspectives are combined. As a result, the concern for protection and conservation of water and of land

and forest is engendered; secondly, the water source is culturally significant and is bound to the everyday events of life, which in its turn promotes a community of interest and consensus, which is critical for the management of the resource. Thirdly, this community of interest inspires the contribution of labour and other resources in maintaining the system at least cost. The religious /spiritual character that is accorded to water as a resource helps to uphold and sustain the notion of water as belonging to all and to none – a notion that is critical to promote equity. The combination of local culture and ecology makes a decentralized approach to management inevitable and imperative. This in its turn makes the management systems accessible to all.

The LSGED and NGO approach [Kassar Trust] are rated next highest because, while they represent interventions from outside – providing technological, financial and managerial resources - they do not attempt to *supplant* community institutions – the local value systems and management paradigms. Rather, they encourage the adoption and integration of interventions into the local dynamic. In the case of LSGED, water is valued as a social good; however, the approach does not deter the community from carrying on its own traditions. In the case of Kassar Trust, water is viewed both as a social and economic good, but, by itself adopting a holistic approach to water resources management that includes ecological concerns as well, it brings itself nearer to the community.

In the case of the Jal Sansthan and Jal Nigam, the rating is on a very poor scale. Water is viewed merely as a social good, to be promoted by the State alone. All other perspectives are ignored. In the case of SWAJAL, water is viewed merely as an economic good. The issue of 'sustainability' is understood merely in terms of sustaining the economics of water.

Resource Assessment

The extent and nature of assessment of resource generally reflects the valuation of the resource.

In this aspect as well, the community management system scores the highest. Villagers possess an intimate knowledge of topographical, geological, climatic, botanical, hydrological and sociological features of their environment and community. The management system of water resources is based on the facts so gathered and understood. In the LSGED approach, however, beyond assessing the water availability in the source, there was no effort to conduct a holistic appraisal of water and other resources, and therefore is assigned low scores. The Kassar Trust has progressively expanded its perspectives, and its programme scope widened, the assessment or a resource was also expanded to match the holistic approach adopted. The State agencies and SWAJAL approach score the least points. In the former case, resource assessment is done for the single purpose of constructing a system. Even this is not done efficiently. In the latter case, the resource assessment that was done was to ensure a minimum availability of water, which would justify installing a system; the socio-economic survey of the community that was conducted was intended to serve the purpose of assessing the capacity of the user group to pay charges for water and to maintain and operate the water

supply system. This mode of assessment reflects a purely economic orientation to the issue of water resource management.

Equity – Right to Water

On this issue, all five approaches fall short of standards. In none of them, is equitable access to water ensured. Of the five approaches, the community management system and the Kassar Trust fare better as some norms for equity are prevalent, even though they are not fully implemented. In the former case, the principle of "first come first served" has been adopted a as a measure to ensure equity; all members of the community are aware of it, and it is generally followed, but sometimes violated. However, even in the context of a single caste community, the impact of class distinctions and influence cannot be entirely ruled out in the matter of determining access to water. Inequity of this nature is enabled and strengthened by contact and connections with outside institutions – political parties, and government bureaucracy particularly. The Kassar Trust loses points as it does not, as a rule, address the community as a whole in planning a water supply programme, but works on the basis of demand, whether from an individual, group, hamlet or village. This approach may result in exclusion of specific sections of the community for various reasons. However, once a partner group has been selected, norms of equity are applied by equalizing the extent of contributions mobilized from all households. Families of low socio-economic status are provided the option of contribution of labour in lieu of cash.

LSGED, SWAJAL and State Agency approaches are all rated as "Very Poor". In all these approaches, neither is water adequately supplied nor equitably supplied within the whole community.

Technology

In terms of technology, traditional technologies created and managed by local communities rates the highest. It is low cost technology, in terms of costs of installation as well as maintenance. It is acceptable to all and accessible to all members of the community; it is environmentally sustainable, proven by the fact that they have existed for literally centuries. Among the other approaches, Kassar Trust scores more for experimenting on a combination of technological interventions and increasing the options available for the local community. The other three approaches are rated equally at "fair"; they use the same technology – gravity based piped systems, and in the case of State agencies, pumping systems as well. Even though gravity based systems are more cost effective, their are not sustainable in the ecological conditions of the hills; also a lack of a holistic approach to water and land resource management limits their sustainability. This technology is also not amenable to decentralized management due to the high costs involved. In spite of these limitations, they are generally acceptable to the population, provided the State shoulders the responsibility of operating and maintaining them.

Institutional Mechanisms and Processes

Judging the nature of institutions and their functioning under the various approaches, Community Management is found to once again score the highest. It represents a decentralized approach; there are no specific management bodies with defined functions. Rather the responsibility of water distribution and system maintenance is shared by all. Being non-formal, it is accessible to all members irrespective of their educational, economic or social status. It involves the whole community through a value system that has social, ecological, economic as well as religious connotations. Being informal, it does not involve any costs; it has the support or endorsement of the community. However, due to the fact that this system cannot ensure equity and is susceptible to the politics of privileges, it does not achieve full scores. The village Panchayat Institution does have a role in the drinking water sector to the extent that it spends funds allocated for the purpose – through the JRY. However, there is no harmonious relationship between the formal Panchayat relationship and the informal village community management system that manages the traditional sources.

The LSGED worked on the principle of installing a system and handing it over to the local community to manage, without prescribing any norms or rules, and thereafter withdrawing. As such, it permitted a decentralized management institution to emerge on its own. In the specific case study conducted, it was found that that management was conducted in an informal manner, relatively transparent, and cost effective. A score similar to that of community management approach has been given to this approach, as for all practical purposes, there is no other institutions in place than the local community. However, this approach too does not score full marks as it could not overcome the inequity in the distribution system, and thereby there cannot be a complete accountability to the community at large.

The Kassar Trust fares slightly better than the last two approaches. While this NGO programme started off without any plans for developing institutional mechanisms, in course of time, committees of partner households who joined the programme were constituted. The relationship of between the Committee and the Trust was more or less contractual, for the purpose of mobilizing user support for the installation of the programme and thereafter, to keep it going. It was not in the nature of a resource management group accountable to the community as a whole, for management of the natural resource base. There is no functional relationship with local elected bodies. Due to its limited scope, the institutional arrangements in this approach are judged to be only "fair".

With respect to the State agencies, the institutional mechanisms can only be described as poor, being centralized, non-participatory, complex and inaccessible. There are no systems of accountability to the public.

In the case of Swajal, an attempt has been made to develop institutional structures in a planned manner. The VWSC was constituted, and arrangements made with the Government to declare this committee as a sub-committee of the village Panchayat. The

program envisaged the involvement of the VWSC in all aspects of planning and implementation and future management of the scheme. However, in reality, as the account of SWAJAL in Chapter 3 shows, this institutional mechanism and its prescribed processes did not represent a progress in this sector. The reasons behind this failure are that firstly, the schemes were not planned to cover the Gram Sabha or revenue village as a whole, but only parts of it, where water supply was available. As such, there is no scope for the VWSC to be representative of the community as a whole, and therefore cannot win its complete allegiance. This same factor restricts the extent of participation in it. Secondly, as reported, in its implementation, the SWAJAL programme did not promote an equitable and fair approach, but resulted in the strengthening of local elites in collaboration with project implementing agencies. As reported in the survey, **transparency and public participation were the casualties in this approach**. The high budgetary allocations made to the programme which covered villages on a selective basis, provided the basis for this trend of exclusion of the public. Though technically the VWSC was a sub committee of the Panchayat, there was no functional or harmonious relationship with that body.

The other components of the Institutional Framework introduced by SWAJAL – NGOs, PMUs and PMU may be assessed to be equally unsustainable. The SWAJAL was intended as a pilot program to be used for further replication. However there are doubts about the possibility of replicating the strategy of using NGOs as implementing agencies. Firstly there is a paucity of sufficient number of qualified NGOs across the State for a future expansion of the program. Secondly, NGOs can function only as long as they are given financial support. As such their role is unsustainable. Therefore this approach of the World Bank was a futile experiment at the cost of the State and citizens.

The bypassing of State Water Supply Agencies under the Swajal Program did not offer any lasting solution to the problems posed by these unsustainable institutions. Thus there are hardly any lessons to be learned from this program regarding an appropriate institutional framework for water resources management in Uttaranchal.

Dispute Resolving Processes

In this aspect, the first three approaches – Community Management, LSGED, and Kassar Trust – score an equal rating of “fair”, while the last two – State agency and SWAJAL – score a rating of “Very Poor”. In the first two, which basically represent a community approach, local mechanisms exist for solving disputes as and when they arise. Disputes are more in the nature of ‘quarrels’ and are generally resolved within the community, involving little cost to the parties. Occasionally, larger disputes arise, involving outside intervention, as in the case of Chantoli Gram Sabha, resulting in inequitable or unjust decisions. Where there is consensus of opinion, as in Naurakh Peepalkoti, the local community is able to take action against violations of their rules, whether by local residents or by outside institutions. Then approach in Kassar Trust, which achieves a similar score, is to avoid disputes by creating clear agreements on respective roles and responsibilities at the commencement of the programme. Further, the User Committee that is created takes the responsibility of resolving any disputes that may occur in future.

In the case of State agencies, dispute resolving mechanisms very poor, as the evidence shows. In the case of SWAJAL, it is non-existent. Several types of disputes were observed - disputes over water sharing; dispute over usage & ownership of source; dispute arising from some sabotage done by the external entities; and disputes regarding the usage of Standposts. None of these were solved.

Role of Women

It is a matter of significance that none of the five approaches fare well in the matter of enabling an appropriate role for women in the management of water resources. This is in spite of the fact of a general acknowledgement among development agencies, government, academics etc. that the status of women in Uttaranchal is characterized by special hardships, that women here are responsible for the largest extent of agricultural and household labour and that their socio-economic and political status is not commensurate with their contribution to society.

However, no institutions or mechanisms exist for promoting a change in the empowerment of women to take their legitimate place in decision making processes in resource management.

Among the five approaches, the community management system and the Kassar Trust fare better. In the former, the social role of women as the main water collectors of the household place them in a position of priority at the water source. They are also automatically chosen for the task of maintaining sources. However, in the event of any investments from the State or other sources, for the improvement of water systems, the men folk come to the forefront, and women are held back.

The Kassar Trust, while it has taken up several programmes that are of direct benefit to women, itself admits that the task of enhancing the role of women is one that it will have to address seriously in future. This proves that in the matter of drinking water supply programmes, women are yet to be brought centre stage.

In the case of the LSGED and JN /JS, no role for women was envisaged at all.

In SWAJAL, while women may have benefited from the programme as in Kassar Trust [to the extent that they actually received water satisfactorily], in terms of social or economic empowerment or awareness and prestige enhancement, there has been no change. This is evidenced by the responses given by women in the surveyed villages to questions on these issues. There is no evidence that the Self Help Group has developed any role in contributing to decision making on water management. Formation of SHG was undertaken as a strategy to achieve this result, but has resulted in failure.

Inter-Sectoral Adjustment

In three of the cases – community management, LSGED and Kassar Trust, the issue of inter-sectoral adjustment does not arise as there have been no conflicts over the water source on the issue of competing use. In the case of the State water supply agencies and SWAJAL, however, such conflicts have arisen, and have not been resolved. Since drinking water has been declared in Government policy as the priority use of water, the other competing uses are plainly ignored. This a situation of conflict and loss among local communities, who, when their grievances are not addressed fairly, eventually indulge in 'illegal' acts to achieve their needs. These two programme approaches therefore have been rated lowest in this matter.

Ecological Sustainability

This is one of the most critical parameters that require to be tested in the context of the specific conditions of the hill ecology. Traditionally, water systems such as naulas were constructed and managed on the basis of a strong awareness of ecological conditions and requirements. The importance of forest cover of appropriate species above water sources was recognized. The technology of naulas and bauries make appropriate use of seepages without disturbing the hydrology. Water is extracted at a rate not greater than the rate of seepage. Water retention species of trees were grown and protected around water sources. No human activities such as construction etc. were allowed around the source. The human community adjusted itself to the natural conditions. Scientific studies have shown that there has been an increasing trend of perennial springs becoming seasonal or drying across the region. This indicates that in earlier days perennial springs were more abundant and are currently decreasing due to human interventions. To achieve development that is ecologically sustainable, what is required is an understanding of the rules of nature and the adjustment of human needs and requirements with them.

Summary

The International Union for the Conservation of Nature (IUCN) defines sustainable development as "improving the quality of human life while living within the carrying capacity of supporting ecosystem".

It indicates a "positive change which does not undermine the environment or social systems on which we depend ". It requires a coordinated approach to planning and policy making that involves public participation. Its success depends upon widespread understanding of the critical relationship between people and their environment and the will to make to necessary changes. Principles of sustainable development encompass the following:

- fulfillment of human needs.
- maintenance of ecological integrity through careful stewardship, rehabilitation, reduction in wastes and protection of diverse and important natural species and systems;

- provision for self-determination through public involvement in the definition and development of local solutions to environmental and development problems; and,
- achievement of equity with the fairest possible sharing of limited resources among contemporaries and between our generation and that of our descendants. "[51]

The broad concern of sustainable development is thus to fulfill the essential needs of all human beings in an ecologically sound manner.

Public participation is central, critical and indispensable to this process. This has a direct relation to the nature of the institutions and processes of governance that are required for the achievement of sustainability goals.

In our study of the five approaches to water supply for drinking and domestic needs, we find, only in the traditional community management approach, some semblance of the concepts of ecologically sustainable use of water. However, even here, the passage of time, the increase of human needs, contrary development polices and processes etc. have all taken their toll. There has been a progressive erosion of ecological consciousness generally, among local populations.

Institutions like the Kassar Trust have attempted to reinstate this awareness by adopting an integrated resource management approach in their development interventions. This is therefore rated next highest as "fair". The State approach – whether through LSGED or JS /JN - and the SWAJAL programme are directed only at "delivery" of "services" – free of cost in one case and priced in the other, and contain no underlying philosophy of ecologically sustainable development.

However, a combination of the positive features of the traditional community management, the old LSGED approach, and the Kassar Trust approach may prove to be the best example of a State-society partnership for the provision of sustainable drinking water supply in the rural areas of Uttaranchal. On the matter of equity however, norms and mechanisms need to be evolved through wide debate across the State, involving all stakeholders.

[51] Hamilton's Definition on Sustainable Development.

CHAPTER FIVE

Summary and Recommendations

The evaluation of the five varied programme approaches to drinking water in Uttaranchal historically, shows that no single approach has yielded an integrated, sustainable and equitable management paradigm for water resources in Uttaranchal. The community management paradigm comes closest to such a framework. However, this approach has lost much of its former strengths over time. An increasing encroachment on the rights, roles and responsibilities of local communities in land and water management by progressive increase in controls by the State on land and water resources has resulted in the erosion of location-specific planning and management that is the only logical approach in a hilly terrain such as Uttaranchal. However, affirmative State action is required not only to ensure equitable access to water by all sections of society, but also to provide the financial and technical inputs that are required at local levels to correct the ill effects of decades' old inappropriate policies, programmes and laws.

The community management approach derives from centuries' old tradition, whereby the task of development and management of water resources was mostly the prerogative of local communities. The period of colonial rule witnessed a declaration of State control over all resources. Yet, in order to encourage private investment in the development and management of land and water resources, the British Government saw fit to legally recognize "customary" rights of communities to water and land. Revenue settlement procedures included the practice of recording of rights of villages over land and water. Coupled with customary systems of management deriving from age old tradition, such a rights framework enabled local communities to invest their money, labour and technical skills in developing water technologies not only for drinking and domestic purposes, but also for irrigation and the running of water mills. However, the intense intervention by the British in the forest resources of the State, and the progressive exclusion of village communities from forests which they had used and managed for centuries saw the beginning of the breakdown of integrated resource management that was part of local traditions. The forest policy thus had, in colonial times, and continues to have to this day, a direct deleterious impact on the management of water resources.

After Independence, the Kumaun Zamindari Abolition Act was the first legislation which removed local control over common lands and brought them under the direct control of the State. Colonial forest policy of limiting the access and role of villagers over forest was continued into Independent India. With both common lands and forests out of their jurisdiction, the water management traditions of villagers became further eroded. However, their legal rights to water continued to be recognized in law. Simultaneously, State investment in irrigation or drinking water supply in the first few decades was negligible. These circumstances allowed villagers to continue to invest in, and manage their water technologies under the rubric of customary law.

The LSGED approach too was tailored to these circumstances. It was intended to provide water where it was needed from where it occurred, by investing the required technical and financial resources. Throughout the existence of the LSGED, the rights framework on water was not changed in Uttaranchal. Rights over water sources on common lands within village boundaries were legally recognized as vested in such villages, and sources on private land were considered to be legally under private ownership. However, at the local level, conventions or customary norms regulated the use of private sources as well, in common interest. Thus private right holders had no objection to common use of their sources, as long as their use was not disturbed. The LSGED did not attempt to abstract water from a source and supply it to another village, as it would violate the legal rights of the affected community.

Along with these rights, the doctrine of "prior use" was used to adjust between old rights that existed and new rights that were sought to be established. New rights were allowed to the extent that prior rights were not diminished in any way. Prior to 1975, the issue of drinking water was not covered under the law [Kumaun Water Rules of 1930]. Disputes on this issue were not entertained by the courts. This left drinking water in the realm of policy at the State level, and in the realm of customary management at the village level. Since water supply for drinking was locally "produced" and locally "distributed", any adjustments that were to be made in terms of priority over other uses or equitable access, was decided locally mostly through arbitration and consensus.

Looking back at these arrangements, the Community management-combined with LSGED nature of State intervention, coupled with legal recognition of local rights to water seems to have been the best framework to ensure decentralized and integrated resource management. However, similar to rights in water sources, rights to common lands and village forests are critical for ensuring a sustainable sue and management of water resources.

The intervention of the World Bank in 1975 saw the complete transformation of a decentralized paradigm. The control and management over water resources was shifted from local communities /local elected bodies to the State through the mechanism of legislatively abolishing all pre-existing rights. The ostensible reason was to address the problem of water scarcity that had emerged throughout the region, and the reported conflicts between communities over water. However, the real reason underlying the change was the interest of the World Bank to promote the establishment of corporations in the place of Local Self Government bodies. This was necessary for two reasons. Firstly, it was necessary to enable the recovery of the loan that was provided for a State wide drinking water program by the World Bank in Uttar Pradesh in 1975. Recovery of loans from a single corporation would be far easier than scores of district governments throughout UP. Secondly, corporatization can be considered to be the first step towards eventual privatization, whereby the corporate private sector may enter the water supply sector. To address water scarcity in Uttaranchal, even at that time, the appropriate policy then, as it is even now, would have been to initiate a water development and conservation policy through an integrated resource management approach.

The topographical nature of the hill areas, together with the absence of extractable ground water resources, renders centralization of supply and management of water a disastrous policy. Yet the U.P. State Government adopted such an approach for the hill areas as well, and the Jal Nigam and Jal Sansthans commenced their monopoly role in water supply for drinking. These agencies follow a **"sectoral"** approach to water. There are no mechanisms for water conservation and protection. Importantly, after three decades, they have been unable to fulfill the water needs of the State. Rather, water scarcities have become exacerbated and more distributed. Also, conflicts over water have increased across the region[52]. Centralized control and supply of water propagates the culture among some sections of taking water for granted, while other sections of society, particularly where the sources are located, are deprived of their essential needs. The problem of State-created inequity between rural and urban per capita availability also arises because of centralized control and management of water, whereby the State controls water sources, "supplies" water to different users and attempts to "meet" the costs involved. Since urban users are more capable of paying the costs, more water is supplied to them. The rural per capita norms are not based on a realistic assessment of water use in rural areas. For no fault of their own, and even though in most cases the water source is located in rural areas, rural users get less water [53].

The issues of equity, environmental sustainability and economics have to be addressed by an appropriate rights framework. Rights have to be recognized as an inalienable part of management strategies. An important and most neglected aspect of rights to water is equity. While the legislation in force in the region - the Kumaun and Garhwal Water Act of 1975 - declares in its preamble that the Act is intended to ensure "equitable distribution of water", there are no clear policies or legal definitions or directives regarding which takes into account the totality of social stratification or social groupings or sectoral or inter-sectoral equity. The goal of "equitable distribution" is set forth in the Act for the limited purpose of drinking water supply, and is attempted to be fulfilled by merely specifying the number of "litres per person per day" that rural or urban consumers are entitled to. Even here, the differences in allocation between rural and urban consumers amount to gross inequity. No mechanisms have been provided in water law for addressing the State's failure of ensuring equity.

Decentralized dispute resolving mechanisms are a critical requirement. While formal judicial institutions such as courts have constituted the first and last resort for the protection of rights of people, there are some inherent inadequacies in the present system of conflict resolution. The judicial role is itself limited by law. Yet attempts to resolve disputes and deliver "justice" has been continuous. There are no mechanisms for

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[52] M.S.Vani and Rohit Asthana "Empowered State and Eroded Water Rights - Water Law and Policy in Uttarakhand", in *Water in Kumaon: Ecology, Value and Rights*, Ed. by G.K.Kadekodi, K S R Murthy and Kirit Kumar; Gyanodaya Prakashan, Nainital, 2000.

[53] That rural users are unable to pay as much as urban users is due to a range of factors that determine rural poverty, which again is primarily due to inappropriate State policy. The responsibility for poverty in rural areas lies squarely at the door of the State.

assessing the impact of judicial decisions on the ground. As with other sectors of government machinery, judicial institutions also need to be decentralized. Conflict resolution is an integral part of management, and requires to be decentralized with the other components of management such as regulation of rights, maintenance and operation of technologies, financial management etc.

From the NGO sector, very few illustrations exist of a sustained programme on water supply for drinking and domestic purposes. One such rarity is the Kassar Trust. The account of the Trust programme given in earlier chapters shows that the approach of this NGO has several positive features that could be adopted in State policy with benefit. Of these, an integrated resource management approach, introduction of several technological options to suit specific local conditions, and the particular strategy for ensuring the participation of the beneficiaries in the whole programme, are some. At the same time, lacunae also exist- chief among them being the issue of involving the community as a whole, the issue of equity and the role of women. What this approach seems to have missed is that water supply must be an integral component of the total philosophy and political economy of "self-governance" which is possible only through the mobilization of the whole community in a more balanced relationship with the State. Without such an approach, water supply may remain a "sectoral" issue.

The SWAJAL programme, based on a loan from the World Bank, as we have seen in earlier pages, leaves much to be desired. This programme also follows a sectoral approach; there are no measures for water conservation; there is no integrated resource management approach, and the institutions that it has fostered are unsustainable. Equity is also a casualty.

With respect to forest, which has a critical role in water resources management, the unique institution of Van Panchayats was established in the 1930s in Uttaranchal under the provisions of the Scheduled Districts Act, 1874. Forests areas were delineated and handed over to village management committees of Van Panchayats, wherever such a request was received from villagers. Importantly, these forests were placed under the administrative control, not of the Forest Department, but under the District Administration. And there they remained until recently. As such, they escaped the centralized control of the Forest law in India. When the Scheduled Districts Act of 1874 was repealed after Independence, the Van Panchayat Rules were technically deemed to have been enacted under the Indian Forest Act, 1927. However, no move was made in Uttaranchal to remove the administrative control of the district administration, and the Van Panchayats continued their unique existence. In 2002, however, a retrograde policy was adopted by the Uttaranchal Government to bring these forests under the direct administration of the Forest Department, with all its attendant evils. These forest areas which are contiguous to the villages are very critical not only for access to forest resources, but also for the management of water resources. While bringing these Van Panchayats under the control of the Forest Department, the existing provisions in the Forest Act of 1927 could have been used to empower local communities in forest management.

Under Section 28 of the Indian Forest Act, 1927, the Government may assign to any village community the *rights* of Government *to or over any land*, which has been constituted a reserved forest [54]. The mere implementation of this existing provision of law would contribute significantly to empowering local communities in Uttaranchal to manage forests for the conservation and development of water resources. Van Panchayats could be constituted under this section.

In the examination of all the programme approaches that have prevailed in Uttaranchal, it becomes apparent that what is required is a complete re-orientation of not only water and land policy but the development policy itself, as minimum requirement for the new State of Uttaranchal, which sought its separation from Uttar Pradesh for the purpose of charting its own path to development, distinct from the "plains" development paradigm.

Thus water resources management should be seen in the context of a potentially new development framework for Uttaranchal.

In this context, and taking into account the relative strengths and weaknesses of the five programme approaches discussed in the previous chapters, the following suggestions and recommendations are submitted.

RESOURCE VALUATION

- Water must be declared as a 'natural resource' belonging to all, owned by none. It is neither a "good" nor a "service " to be provided by the 'owner ' to the 'user'. The State's role should be defined as one of "trusteeship".

- In consonance with this principle, the concept of "water supply" should be replaced with that of "water transfers". Transfer of water from where it is "produced" to areas outside, should be undertaken by local producer/transferors only after local needs are fully met. There should be a "bottom-up" transfer of water rather than "top-down" supply. The "costs "of water 'supply' will thus be converted to the "economics of water transfers". Where water is transferred, whether within or outside a specific watershed governance boundary, pricing of water should be made dependent on the extent of local rain water harvesting in the transferred areas. Such a policy would emphasize responsibilities before rights, 'governance' before 'use'. It would prevent the present practice and policy of "supplying water in as much quantity and in such places as money can buy".

[54] Significantly, this provision has never been used to transfer forest to villages anywhere in the country

INTEGRATED RESOURCE MANAGEMENT

- Drinking water supply should be an integral part of an overall water resources management policy and not through a sectoral approach as it is now[55].

- Water Resources Management itself should be located in an integrated resources management approach, such as a watershed approach, not in selected areas as 'pilot ' programmes, but throughout the State. The principle that there should be no "transfer" of water without "production" of water should be declared by law. A specific focus in watershed management would be rainwater harvesting, which should be mandated for both urban and rural areas.

- The present system of 'revenue boundaries ' of villages must be abolished, as land revenue is no more a significant source of income to the State. Boundaries must be redefined on the basis of watersheds.

- Land rights should be redefined from water resources management perspective i.e. right to land must be combined with duties to protect its rainwater harvesting potential.

- Common lands should be recognized as a resource for water harvesting and conservation and not just for other economic purposes. The control and management of common lands within micro-watershed boundaries must be devolved on Gram Sabhas within watershed boundaries.

- Forest policy should include clear statement on water resources conservation and should have specific water conservation strategies in different categories of forest.

RESOURCE ASSESSMENT.

- A comprehensive, integrated data base on water resources needs to be prepared. This exercise should be initiated at the lowest levels, through participatory processes. The data base has to take into account the land and vegetative resources on which water resources are dependent.

RIGHTS TO WATER

- The right to drinking water in adequate quantity and appropriate quality should be recognized as a legal right for all, with specific mechanisms to enforce the right, particularly for the socially and economically disadvantaged groups in society.

[55] At present, drinking water supply agencies are considered priority agencies, and are not obliged to function in a coordinated manner with other resources agencies- whether in relation to water or land or forests.

- All water sources within the boundaries of a Gram Sabha must vest in that Gram Sabha. Individual rights to use water located within individually owned lands must be recognized legally, but subject to regulation by the Gram Sabha through the Village Panchayat.

INSTITUTIONAL MECHANISMS

- The powers of control and management of water and the responsibilities of water conservation must be devolved on Urban and Rural Panchayat Raj Institutions and watershed institutions appropriately – at village level, intermediate level, and district level, with the State Government being responsible only for river basin level management.

- The Gram Sabha, through its Village Panchayat, will be the management and regulatory body for intra-village water related issues. A separate committee for ensuring drinking water to the community must be mandated as a Committee of the Gram Sabha. The membership of this committee should be restricted to women. The decisions of this committee supported by a majority of its members, after consultation with the Gram Sabha, cannot be vetoed by the Village Panchayat.

- In addition to Gram Sabha and Village Panchayats, at the micro-watershed level, a Micro-Watershed Management and Regulatory Institution must be established to manage and regulate inter-Gram Sabha water sources and related issues.

- Wherever the physical circumstances require, and at the option of the respective Gram Sabhas, a Milli-watershed Management and Regulatory Body may be established.

- The Block level Panchayat should be vested with powers of regulation [only] with respect to inter-micro or milli watershed water issues.

- Zilla Panchayat must be vested with the powers of management and regulation with respect to Rivers and lakes that lie within the district boundaries.

- The State level Watershed Management and Regulatory Authority will be responsible for river-basin level management and regulation.

- Powers to determine taxes for the use of land, water and forest resources within a Gram Sabha must be devolved on the Gram Sabha and the powers to collect such taxes must be devolved on the Panchayats within the micro-watershed.

- The existing Van Panchayats may be declared as “Village Forests” under the Forest Act, and transferred to the Gram Sabhas with powers of control. The

existing Van Panchayats should be declared a Committee of the Gram Sabha, to implement decisions made by the Gram Sabha on forest management.

- The multiplicity of agencies related to water resources – Drinking Water Supply Department and Agencies [Jal Sansthan, Jal Nigam and SWAJAL], Irrigation Department, Minor Irrigation Department, Soil and Water Conservation Department, Department of Land Revenue, the Forest Department [as far as village forests are concerned], Rural Development Department, Directorate of Land Conservation, Urban Development, Agriculture, Horticulture, Fisheries, Animal Husbandry, Tourism, etc – must be abolished, and all these subjects brought under PRIs. At the State level, a single *Watershed Development and Regulatory Authority* must be established. Such an authority shall work in support of PRIs which will be the main planning and implementing agencies in water resources development and management. The function of a Watershed Development Authority would be to consolidate development and management plans at the river basin level for assessment and to advise on appropriate measures at lower levels, develop and utilize scientific data base to enhance the capacities of PRIs, regulate inter-sectoral uses of water and settle disputes arising from various levels of the river basin watershed. As a coordinating, advisory and regulatory body, the Authority would not interfere with the powers of PRIs.

- Planning for Water Resources management including drinking water should be conducted on a water shed basis, with sub plans for constituent Gram Sabhas and micro-plans for hamlets. Planning should be done in a bottom up process, starting with micro-plans to sub-plans to watershed plans, and thence to higher levels. The participation of women in the planning process must be legally mandated and encouraged through policies and programmes for capacity building.

- A new law for water resources in the State - such as "Uttaranchal Water Resources [Conservation, Protection and Management] Act- must be enacted to replace the Kumaun and Garhwal Water [Collection, Retention and Distribution] Act, 1975. The new law will provide for all the above principles, concepts, institutions and functions.

- Education and Awareness campaigns on Himalayan environment and ecology, water resources, importance of water harvesting, role of the State and citizens etc. should be conducted State wide.

- All remaining departments should be required to (a) review their programmes and policies to assess impact on water resources quantitatively and qualitatively and (b) develop a strategy for rainwater harvesting

- The NGOs in the State must be legally limited to capacity building of PRIs and Watershed Institutions at all levels. NGOS must be debarred from direct implementation of programmes, which are in legally in the province of PRIs and Watershed Institutions.

TECHNOLOGY

- A range of technological options for water harvesting and transfers must be promoted to suit the varying topographical / ecological conditions across the State. The Watershed Management and Regulatory Authority must be vested with the duty to promote technologies appropriate to all categories of watersheds across the State, not only for drinking water, but for all other uses as well.

DISPUTE RESOLUTION

- Dispute resolution with respect to water, land and forest resources should be decentralized, by vesting appropriate judicial powers on Panchayat and Watershed Institutions, with appellate powers at Zila Panchayat level and at the State level Watershed Authority.