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SUSTAINABLE ENVIRONMENTAL SANITATION AND WATER SERVICES

Water Resource Management : An Integrated Approach

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Introduction

The World Bank supported Uttaranchal Rural Water Supply & Environmental Sanitation Project; 'SWAJAL' is currently being implement in 857 villages of 12 districts of state Uttaranchal, since year 1996. The major objective of the project is Sustainable Health & Hygiene benefits to the rural community, by improved Water Supply & Environmental Sanitation facilities through demand responsive approach. The project is running in four overlapping batches, with the total coverage of 857 villages. The 33 months long project cycle in each batch has three distinct phases : Pre-planning, Planning and Implementation. The selection of villages is done on the basis of demand, felt need, technical feasibility and willingness of community to pay.

The local NGOs, Community Based Organizations (CBOs) and Private firms are working as Support Organization assisting rural communities in planning and implementation of different project components. In the pre-planning phase, the support organization and villages are selected on the basis of pre-decided transparent criteria. During planning phase the community action plans are drawn up with the help of Village Water & Sanitation Committee (VWSC), ensuring the participation of community at each level of project process. The actual execution of all drawn Community Action plans i.e. Water Supply, Environmental Sanitation, Health & Hygiene, Women Development, Cash & Labor contribution and Monitoring & Evaluation, is undertaken during implementation phase. The project duration is seven years i.e. 1996-2003.

Problem Identification

The Swajal project is based upon participatory approach, aimed for evolving an integrated model of Water Supply & Environmental Sanitation, has drinking water as its central point. Although the project has adopted the design criterion that no source having discharge less than 9 liter per minute during acute summer, shall be selected for water supply in a village, but the discharge pattern data collected in last few years revealed that, even sources having discharge up to 15 liter per minute are least sustainable. Looking upon the vulnerability of these water sources, the site appraisal study was conducted by the project in 301 numbers of villages, having a total of 529 water sources (Table – 1).

During this study, out of 529 numbers of water sources; 283 (53%) have their discharge less than 15 liter per minute, 139 (26%) sources has discharge less than 9 liter per minute, and 80 number, i.e. 15% of sources got its discharge equal to or less than 6 liter per minute, and a total 4 number of sources become dry.

In 132 number of sources (25%) the depletion of water discharge is recorded more than 50% of preceding stage of the time series, and 52 numbers of villages are facing severe thereat to their water supply system, due to erosion, landslide and flash floods.

Problem Analysis

The drinking water supply systems are dependent on the aquifer yield, in the hilly terrains of Uttaranchal state, and the planning of any water supply scheme has a big question of its long term sustainability, due to different natural and anthropogenic factors. The study data indicates that the depletion and disappearance of discharge in the water sources of these villages poses a potential threat, to the sustainability of water supply scheme. The various reasons for depletion in water discharge and threat to water supply system seems to be intrusion in the upper ridges catchment area due to manifold increase in population, frequent grazing and lopping, resulting in decline in vegetal cover and ultimately mismanagement of natural resources.

Natural phenomena like earthquake, flash floods, heavy rainfall and landslides in catchment area are also the reason behind this situation. All these lead to the loss of precipitation by the way of faster run off, without much infiltration in the soil stratum, to recharge springs and imbalance in the geomorphology of the area. It is estimated that only about 15 percent of the rainwater is able to percolate down through deforested slops, the remaining flows down causing floods, soil erosion and loss of fertility. The real problem is to increase water and retain moisture, to get more sustained discharge of water.

Objective

The main objectives of this paper is;

- to recharge the water sources for sustainable water supply to rural community.

TABLE – 1

THE SITE APPRAISAL STUDY DATA OF 301 NUMBER OF VILLAGES FOR "CATCHMENT AREA PROTECTION WORK", IN 12 DISTRICTS OF UTTARANCHAL STATE

S. No.	District/s	No. of Villages	No. of House Holds in the villages	No. of Population of the villages	No. of Sources tapped for Water Supply in the project	Area selected for Catchment area Protection work during Pre Feasibility
1.	Almora & Champawat	46	2922	18472	75	274
2.	Bageshwar & Pithoragarh	45	2784	17560	75	294
3.	Nainital & Udhamsingh Nagar	43	4448	27378	89	405
4.	Chamoli & Rudraprayag	24	1184	7290	84	260
5.	Dehradun & Tehri	35	1738	11792	51	210
6.	Pithoragarh	46	2444	14610	80	296
7.	Pauri & Rudraprayag	32	1502	9687	34	129
8.	Uttarkashi & Tehri	30	1841	10090	41	111
	G. TOTAL	**301**	**18863**	**116879**	**529**	**1980**

- To recommend the future strategy through integrated water resource management approach.

Reviving the Water Sources & Sustenance of Water Supply Scheme

The project has finally selected 171 most problematic project villages for interventions through its Catchment Area Protection (CAP) program, in all 12 districts of Uttaranchal. The Assisted Natural Regeneration Program is treating the remaining problematic villages. Major interventions in the catchment area are in the form of forestry, soil conservation and social measures. The major rationales of this program are :

- The detailed survey of the assumed catchment area, to get geographical, geomorphologic, land use and environmental data, with problem identification and final delineation of catchment area, of the problematic water source and water supply system. This participatory survey has major components in the form of; vegetative assessment, erosion assessment, solid waste assessment and fuel-fodder assessment, in the problematic catchment area. Rainfall pattern, temperature, slope aspect, demographic data, live stock population, economic use of watershed, assessment of all existing water sources and assessment of village level resources is done during detail survey of the village and catchment area.
- On the basis of above information, a Detailed Environmental Project Report (DEPR) gets finalized with the help of community and experts from Environment, Forestry, Geology, Soil Science and Social field. The participatory approach adopted by the project always keeps care of traditional knowledge of local community in water resource management, which helps in final preparation of catchment area action plans, during pre-planning & planning phase period of 2 – 4 months. Organizing LPG camps, solar device camps, and demonstration of smokeless 'chulha' and health camps, economic generation trainings to women, strengthening of Women Self Help Groups (SHGs), during planning phase are the thrust area, to reduce the anthropogenic intrusion in the catchment area and to retain the sustainability of existing aquifers.
- During implementation phase period (6 months) of project the execution of forestry components; development of grass patches, planting of shrubs and plant species, planting of grass tufts and raising grasses in the terraces of agricultural fields is done. The social fencing and assisted natural regeneration

are the techniques adopted for developing vegetal cover in the catchment for the retention of frequent run off. In soil conservation measures; trench digging, revival of existing ponds, making dug ponds, construction of check dams, gabion spill ways, brush wood check dams, gully plugs, rip-rap drains, bunds, jute matting, diversion drains, protection walls, are major components. The revival of traditional 'chals' & 'khals' (traditional ponds), are also being taken care of.

- In social measures strengthening of village water and sanitation committee (VWSC), women self help groups (SHGs), Bal Van Panchayats (BVP), are major components to reduce grazing pressure and other anthropogenic invasion in the catchment area. Specific village level trainings on fuel & fodder collection, fuel wood use, forest fire, stall-feeding, agro forestry and horticultural development measures are imported through this integrated approach of catchment area protection work. Social fencing in the catchment area, by women self help groups, Bal Van Panchayats is the key asset by which the rural community will certainly get revival of their water source and of any threat to their water supply system.
- Development of individual grass patches in the catchment area (in 200 m^2 land), construction of individual NEDUP compost unit & group Poly houses, for income generation and least dependency on catchment area.
- In this whole decentralized process of project working the rural community is playing key role in the catchment area management planning & implementation with the help of service organisations (NGOs/CBOs). The community is also contributing its part in the form of cash and labour contribution (10% of total project cost) and operation and maintenance of executed project work.

Conclusion

In view of rarity of information on aquifer yield in relation to temperature, rainfall pattern, geology, geomorphology, land use, vegetal cover, slope aspect, anthropogenic interference, social phenomena and natural factors in the discharge regimes, an integrated approach has been adopted by the project. Since the water source yield is a function of many ecosystem processes, so in this newly born Himalayan mountain series, the catchment area protection task undertaken by the project towards integrated water resource management, will certainly give its result in next 5 – 10 years. The approach & technology adopted by the project will help the state government in future rural development planning. The decentralization of work to its lowest appropriate level, use of scientific as well as traditional rainwater harvesting techniques all together, and planning, implementation, operation & maintenance by the local commune, are the key assets of the project. This could be replicated elsewhere for better water resource management planning.

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