



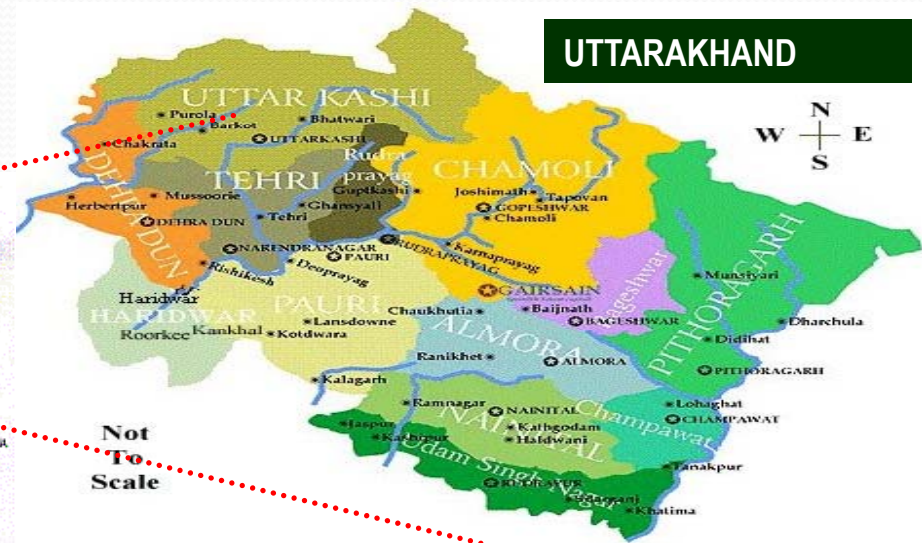
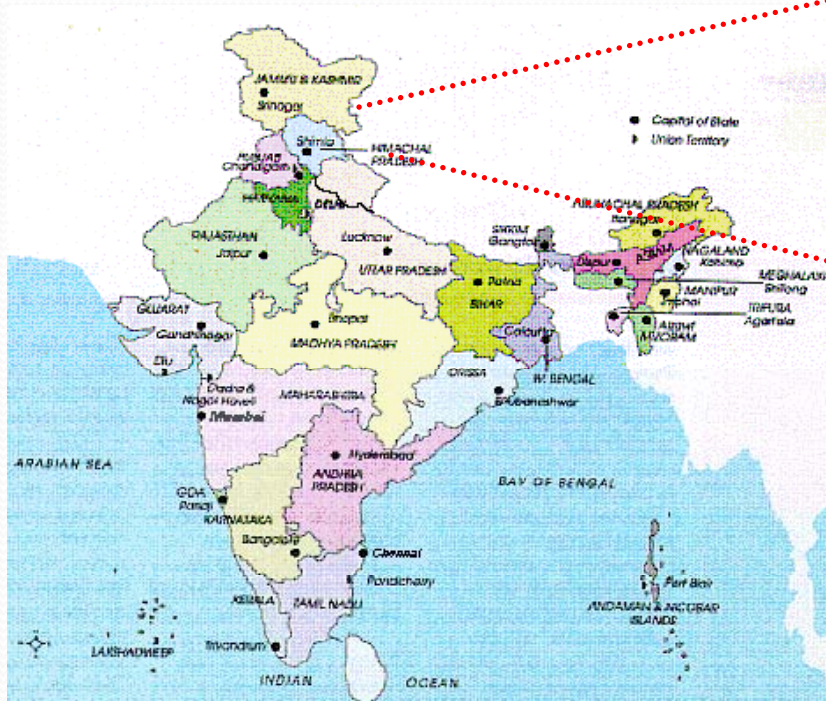
# **Impact Evaluation of Community Based Catchment Area Treatment Works and Water Quality Monitoring- A case study from India**

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# UTTARAKHAND AT A GLANCE



Total Geographical Area :53483

% Forest Cover as of total geographical area : 64.79

Total Population: 8.4 Million

Population Density (Per Sqkm): 159

Literacy Rate: 71.62

Per Capita Income (Rs) : 18427

Districts: 13

Blocks: 95

Gram Panchayat: 7227



# Water Scenario In India



There is a general feeling that our country with mighty rivers like the Ganga, the Brahmaputra, the Krishna, the Godavari, the Narmada etc. has abundant water resources. But from the last decade it was realised that this impression is not correct. It is therefore necessary to review the availability of water.





# Water Use Pattern

- 85% of water is used for farming,
- 10% for industry and
- 5% for domestic use.

The supply is reducing on account of increasing population and pollution due to human activity.

**80%** of the 14 perennial rivers in India are polluted with sewage.

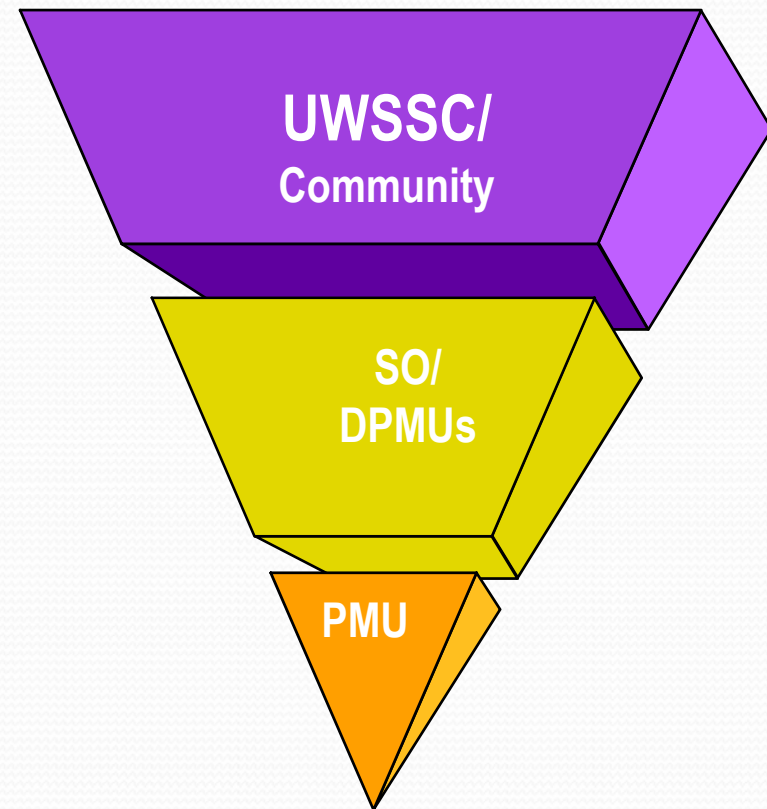
## **Causes of Water Pollution :**

- Industrial effluents,
- Agricultural run-off,
- Dumping of toxic wastes in rivers and other large water bodies



# Demand Driven Approach

- Demand vis-à-vis community contribution
- Not only user but also owner
- Community's perception - we plan, we make, we maintain
- Government's new role- Facilitator as against Provider



**UWSSC:** User Water and Sanitation Sub Committee  
**SO:** Support Organization  
**PMU** : Project Management Unit  
DPMU: District Project Management Unit



# Components

- Water Supply schemes
- Sanitation (Total Sanitation Campaign)
- Catchment Area Conservation & Management Works (Quantity intervention)
- WQ monitoring (quality intervention)
- Women Development Initiatives





# Interventions Proposed

## **(a.) Forestry & Soil Conservation):**

- i. Plantation of multipurpose trees mainly broad leaved species.
- ii. Locally suitable plants to be planted along with shrubs and useful brushwood.
- iii. Check dams in all streams and gully plugging in gullies of micro-mini-catchments.
- iv. Staggered contour for source protection.

## **(b.) Uncontrolled & overgrazing in catchment :**

- i. Protecting the catchment area from grazing animals.
- ii. Rotational grass cutting (for fodder) to be permitted in community pasture lands.





Development of Community Pasture and Individual Grass patches are proposed.

For encouraging stall feeding, dovetailing is proposed with Animal Husbandry Department.

- Above mentioned intervention are being proposed depending upon the requirement of the area.

### **(C.) Fuel wood pressure on catchments**

LPG distribution camps.

For Biogas plants and wood saving devices,



# Source Centered CACMP Interventions

- **Biological Works**

- A forestation (Model 1000/Ha- Maximum 5 Ha)
- Demonstration Gras Patch (200 Sq.mt)

- **Soil and Water Conservation Works**

- RR Dry Stone Check Dam (1 in 5Ha of 7.37 Cum)
- Crate Wire Check Dam ( 1 in 5Ha of 8.4 Cum)
- Brush Wood Check Dam (5 Nos in 5 Ha)

- **Rain Water Harvesting Structures for Ground Water Recharge**

- Percolation Ponds ( 2 per Ha of 15.19 Cum each)
- Recharge Pits (5 Per Ha of 0.125 Cum each)
- Rejuvenation of Existing Chal/Khal (100 Cum of Excavation for desilting )
- Roof Top Rain Water Harvesting structures, preferably in the School buildings and Gram Panchayat Bhavans for ground water recharge and use in case of acute shortage

- **Social Measures**

- Social Fencing/ awareness, LPG and Environmental Sanitation Awareness Campaign.
- Poly House Bamboo based (7.5\*4\*2)



# Components of CACMP

## Afforestation- 5 Ha Area on an Average per source Catchments

- ❖ Included plantation of saplings as chosen by the community for purpose of fuel wood, fodder and Small Timbre
- ❖ Basic idea is to restore the lost vegetation cover in the Catchment of the depleted water Sources
- ❖ Afforestation is done in a single unit or as different patches of smaller size or other suitable options as per site conditions.
- ❖ This improves the vegetation cover of the Catchment area and reduces erosion.





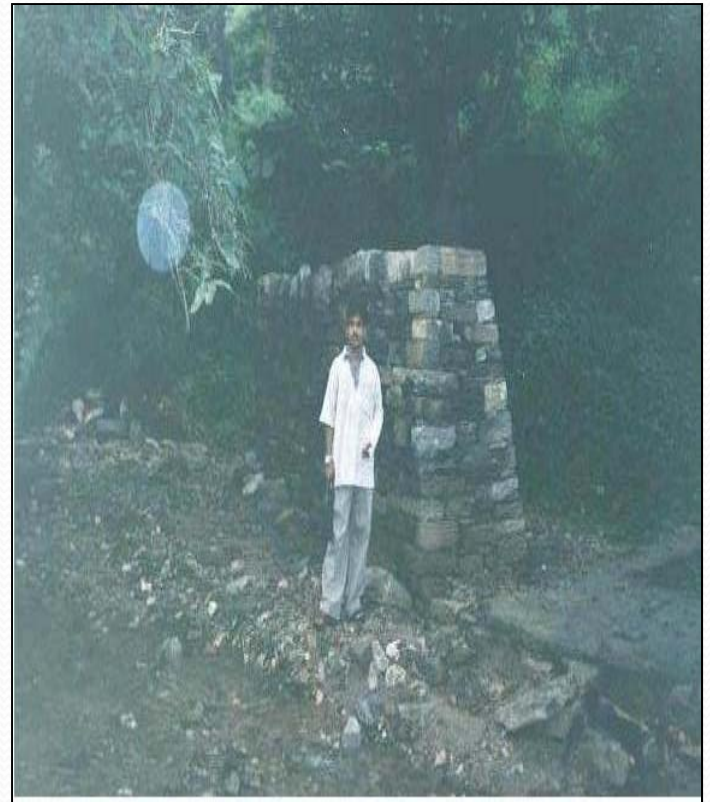
# Components of CACMP

## Soil and Water Conservation Measures

The following structures are promoted for conserving soil and water conservation in the Catchment.

- ❖ Stone Check Dam
- ❖ Crate Wire Check Dam
- ❖ Cross Barrier and Wing Walls/Bank Protection
- ❖ Vegetative/Bio Treatment to Structures  
(Agave, Bamboo, Narkul) 250 per Ha
- ❖ Recharge small Pits -10 per Ha
- ❖ Percolation Pond 5 per Ha

The structures reduces the runoff speed of water and promote recharging through percolation and also reduces soil erosion.





# Components of CACMP

## Individual Items

### Homestead plantation

1. Will improve the green cover of the village area
2. Reduce the frequent visit to the Catchment for fodder and fuel wood
3. Less frequent visit to Catchment will prevent anthropogenic activities responsible for Catchment degradation.





# Components of CACMP

## Individual Items

### Nadep Compost Pit

1. Promote waste disposal
2. Convert waste to organic manure
3. Improve environmental Sanitation.





# Methodology

- **Phased Activities:**

- **Pre Planning Phase (3 months)**

- Selection of Gram Panchayat & Support Organization

- **Planning Phase (6 months)**

- Empowering the Community
    - Formation of Users Water & Sanitation Sub Committee (UWSSC)
    - Choice of Technology
    - Preparation of Community Action Plans and Detailed Project Reports

- **Implementation Phase (6-18 months)**

- Implementation Phase Quadruple Agreement
    - Community Contracting

- **Operation & Maintenance Phase (3 months)**







# Community Based WQ Monitoring

- Generation of awareness among the rural masses about water quality problem and water borne diseases.
- Monitoring and Surveillance of all rural drinking water sources in the state by the community in decentralized manner.
- Building capacity of Panchayats to own the field test kit and take up WQM&S activities and test all drinking water sources.
- Institutionalization of community participation and involvement of PRIs for WQM&S
- Preparing water quality maps





## Quality of Water

- Community Based Water Quality Monitoring



# Components Of The WQ Programme

- IEC
- HRD
- Monitoring & Surveillance activities,
  - includes field test kits (chemical and bacteriological),
  - strengthening of labs and administrative expenses
  - community Contribution for O&M





# IEC activities

- Inter-personal communication (door to door contact)
- Audio-visual publicity
- Hoarding and wall writing etc
- Slogans, picture frames, group meetings, street play, participatory rural appraisal and exhibition may be used as a tools.
- To be operationalized through the CCDU/ SWSM



# Illustrative list of activities under HRD

## **Training of VWSCs/GPs on**

- Water quality issues including health related diseases
- Water quality monitoring
- Water quality surveillance
- Sanitation and hygiene

## **Training of block, district level officers, State level functionaries on**

- Social mobilization
- Water quality monitoring and surveillance
- Sanitation and hygiene





# Monitoring

- SRI to refer complicated cases to NRI.
- DDWS to monitor overall implementation of the programme
- Monitoring through regular field inspection by the State and District officials
- Monitoring by Review Missions of GoI

NRI: National Referral Institute



# Concept of Monitoring & Surveillance (M&S)

- Monitoring – Laboratory and / or Spot Testing of water samples collected from different locations in the water supply system including sources, water treatment plants, distribution system and house reservoirs.
- Surveillance – Keeping a watch at all times, from the public health point of view over the safety and acceptability of drinking water supply.





# Key components of Surveillance

- Sanitary survey
- Monitoring
- Data processing
- Evaluation
- Remedial and preventive action,
- Institutional analysis
- A continues and systematic programme of sanitary inspection and water quality testing



# Responsibilities for M&S

Sl.No	Functionaries	Monitoring	Surveillance
1.	Grass root level	Grass root level workers/GP/VWSC	Grass root level workers/GP/VWSC
2.	District level	District labs of water supply agencies	District labs of Health Departments
3.	State level	State labs/SRI	State Health Department





# Strategy

- Taking up State and Region specific IEC activities involving PRIs, Co-operatives, Women groups, SHGs, NGOs by CCDU/SWSM
- HRD-Training at district, block and gram panchayat levels
- 10 % sample testing – At State level and surveillance by State Health Departments
- 30 % testing – At District level labs and surveillance by District Health Departments
- Sanitary surveys and 100% testing of all sources at village level by grass root level workers.





# Institutional Mechanism

- At the Grass root level, the VWSC/GP will identify 5 workers and a Coordinator for testing drinking water using simple field testing kits (ASHA/Aanganwadi/Science teacher/VWSC member/Panchayat member, etc.)
- Positive samples to be brought to District laboratory by the GP Coordinator
- DWSM and the District laboratory would administer IEC and HRD activities in the district involving PRIs, reputed NGOs and in active co-ordination with Health authorities at all levels.



# **Role and Responsibilities of GP/ Village Water and Sanitation Committee (VWSC)**

- Monitoring of all drinking water sources
- Sanitary survey
- Disinfection
- Recording keeping
- Communication to District labs/ Health authorities for remedial action.



# Parameters For Testing

- At the State/District Lab :-
  - Colour, odour, taste, pH, turbidity, hardness, TDS, alkalinity, chloride, fluoride, nitrate, iron, arsenic, selenium, pesticides, MPN and faecal coliforms, etc. in reference to IS-10500.
  - Testing procedures as per Standards Methods /IS-2488, IS 3025.
  - May initially examine all parameters and set only key parameters for routine analysis.
- At GP using Field Test Kits
  - Includes analysis of turbidity, pH, hardness, chloride, iron, nitrate, fluoride, residual chlorine, arsenic and bacteriological quality (only for qualitative analysis)
  - May restrict later on to region-specific elements only.





# Sampling Frequency

- Quarterly for bacteriological parameter – as per Implementation Manual.
- Once a year for chemical parameters – as per guidelines
- Once a year – Sanitary survey



# Community Contribution

- It is estimated that Re. 1 may be required per family per month for the following O&M costs :-
  - Refilling cost of Field test kits – Rs 500 per GP
  - Honorarium to 5 Grass root level workers @ Rs 500 per person per annum
  - Cost of disinfectants and minor remedial expenses = Rs 1500 per annum per GP
  - Annuity cost (for procuring kit after expiry of Govt. provided FTK) = Rs 250 per GP per year.
  - Honorarium to one GP Coordinator who co-ordinates activities of the 5 grass root level workers – Rs 1200 per annum.



# Sustainability Evaluation

- Increase in Productivity (irrigated Land): 7-23 %
- Increase in Productivity (unirrigated Land): 7-29 %
- Increase in Veg Production (Irrigated): 12-23%
- Increase in Veg Production (Unirrigated): 15-47%
- Increase in milk production: 36-45%
- Fodder waste reduction: 20%
- Soil erosion reduction: 65-79%
- Increase in women income: Rs 1500 out of 1/3 landless.



# Sustainability Evaluation

- Benefit to rural masses revealed by studies
  - Time saved per household 3.5 hrs per day.
  - Reduction in incidence of diarrhea 13.9 to 3.6% of less than 5 years children
- Hygiene practices improved from 54% to 85% (hand wash, safe water, infant excreta disposal)
- Improvement in economy and quality of village life
- Capacity building and self sustenance of villagers increased
- People discuss WQ issues





# Sustainability Evaluation

- Fully functional scheme – 92%
- Partially functional – 6%
- Non functional – 2%
- Reasons for partial/non-functionality
  - damage to structures due to land slide - 05%
  - drying up of water sources - 02%
  - Community dispute - 01%
- Institutional Sustainability - Village Water Supply and sanitation committees are functional in 87% of the villages
- Financially Sustainable schemes - 80%
- Special tendency: Post implementation motivation support to all is desirable to complete the process of consolidating the scheme operations.



# Sustainability Evaluation

- Benefit to water and Sanitation Sector
  - Lesser dependence on state budget towards operation & maintenance cost
  - Sector institutions have more time for technical & quality related matters
- People made to co-relate water supply with conservation of water sources and act proactively







# Sustainability Evaluation

- Augmentation of Source discharge due to lower rate of decline in discharge after rains due to physical measures.
- Increased Sponge Action of Land Surface due to biological measures(Moisture regime increased).
- Soil and Water Conservation after physical structure like CD,PW restricted soil erosion.
- Awareness, Monitoring

**Overall impact Positive**



# Sustainability Evaluation Exercise – Conclusions

- Demand Driven delivery system possible
- Government - NGO – Community partnership works
- Community participation sustains interest and enthusiasm of the communities





- **WATER**

- **Warrants Adequate Testing** for  
**Effective Regulation** of quality

**Thank you.....**







# Thanks