

# Water Management: Community Participation

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## WATER AND INCLUSIVE GROWTH

Man, water and nature are integral parts of environment, and their concurrent development and management is key to our survival on Earth. Mismatch between environment, ecology and development is tripping the economic growth of India. Ancients realized this and developed their indigenous knowledge and system of management for their well-being and prosperity. They understood that in monsoon dominated India water harvesting and conservation hold key to its agriculture and economy. However, with the passage of time this traditional knowledge went into oblivion and people became dependent on modern technology, and facilities provided by the State. Economy and self-reliance became victims. Post Independence in the wake of recurrent drought and famine, the country understood the efficacy of traditional knowledge and indigenous system of integrated management of land, water and environment with wholehearted participation of community as the fulcrum to the prosperity and economic revival. An experiment was conducted by Tarun Bharat Sangh (TBS) in dry economically backward Rajasthan leading to a spectacular economic boom with a message across the country, as a series of experiments followed fine-tuning the process. The following paragraphs give an insight into this revolutionary concept and the structure of implementation as victory of people's power over poverty. "The country saw the power of togetherness which is a major basis of our resolve in a Developed India" (Narendra Modi, Prime Minister, *Mann ki Baat*). This is the underlying concept of "Sabka Sath, Sabka Vikas".

## SABKA SATH , SABKA VIKAS: Notable Studies

### Tarun Bharat Sangh, Indigenous Knowledge and Arwari Parliament

For centuries dry and arid climate has prevailed over Alwar district of Rajasthan, with a few days or even few hours of rainfall in a year, and consecutive droughts. As a result, people suffered from acute water scarcity, with ponds, tanks, wells all dry, failure of agriculture and stunted economy, chronic shortage of drinking water. Rajendra Singh, Water Man, the leader of Tarun Bharat Sangh (TBS), studied the terrain and understood the relation of man, water, nature and river as integral parts of environment, and hence the famous concept of integrated watershed development with village as development unit. He observed how people developed their indigenous knowledge and system of harvesting and conserving whatever rainfall was received in 'johads', tanks, step-wells, *kunds* for their subsistence and survival. So, he planned integrated watershed development in Arwari watershed of Alwar district as his experimental laboratory. Volunteers of TBS under his leadership motivated the villagers through discussions, meetings

explaining the concept and imparting necessary training. This led to the formation *Gram Sabhas*, *Mahila Sangathans*, Youth groups for collective discussion, decision making, designing and construction of 'johads' based on their indigenous knowledge. *Johads* are simple in design, easy to construct, maintain and cheap with small capital investment required. The motivated villagers came forward with their capital, labour, and constructed the 'johads'. Rivers were rejuvenated, wells restored, agriculture resumed with all round development, and a flourishing economy. Marketing facilities followed. Thus, watershed development led to optimal use of land and water resources, all round growth and economic stability, restoration of ecological balance with significant social and cultural impacts.

Water being common pool resource, prompted community centered water management based on river basin approach through formation of Village Water Councils (VWC) and River basin Parliament to conserve water resources, for equitable sharing and resolving conflict, Each VWC is represented by two or three nominated members in the parliament. A working group of 20 members guided the proceedings/ activities of Arwari Parliament. At least two meetings of full house and two meetings of Management Committee/ Working Group were scheduled (Rajendra Singh, Mem 69, GSI, 2008, pp288). *UN report describes 'johads' as golden institution.*



**Fig.1. (a)** Gram Sabha in Arwari watershed. **(b)** Training Program in Ichalahalla watershed (Sp. Publ. Geol. Soc. India, no.5, pp.16 & 19)

## KVK and Technology Transfer

North Karnataka is a historically drought-prone area with deficient rainfall, rivers dry in most parts of the year, wells with deep water levels are dry, and thus chronic water scarcity, failed agriculture, stunted economy and acute poverty. Farm laborers and youths were migrating in search of employment elsewhere. Taking cue from the success of Arwari, KVK (Krishi Vigyan Kendra), a Technological Institute at Gadag, Karnataka, planned to develop Ichalahalla watershed for river rejuvenation through drought proofing and biophysical interventions, and thus resurgence of economy. The biophysical interventions included soil moisture conservation technologies, rainwater harvesting, rejuvenation of small streams, introduction of drought tolerant crops,

**Table 1.** Awareness and Training programmes

Sl. No.	Activities	No.	No. of participants
i)	Awareness Camps	13	1685
ii)	Seminars	04	1150
iii)	Training programme on rain water harvesting	38	1336
iv)	Exposure visits	15	453

organic agricultural practices, and alternate land use systems. KVK achieved this through organizing farmers, farm women, landless agricultural families into Self Help Groups (SHG), capacity building through conducting vocational training courses in water literacy camps for technology transfer, field trips and discussion sessions (Table 1 and Fig.1) (Hiregoudar, Sp. Pub 5, GSI, 2016, p 18).

KVK facilitated linkages with financial institutions and government schemes like MGNREGA. The endeavors succeed in getting cooperation of Village community and farmers to take up soil and water conservation activities. KVK also facilitated in establishing marketing outlets, (Saturday and Wednesday bazars) for selling their products under supervision of SHG leaders which made them economically self-sufficient. The efforts of KVK yielded remarkable success in rejuvenating the streams, along with introduction of multicrops instead of single crops earlier, increase in agricultural products and employment potential (Men: 58 to 105 Mandays/annum; women: 72 to 278 mandays/annum), and thus income of the villagers, improving overall quality of life. “KVK is a pioneer in entire South India in organizing marginal and small farmers into Self Help Groups in order to make them receptive to transfer of technologies and enable to adopt drought proofing technologies to broad-base their income generating systems to cross poverty line in quickest possible time” (Hiregoudar et al., Mem 70, GSI, p 214).

#### **SWEET PROJECT: Drinking water in villages**

Byrraju Foundation (BF), an NGO, launched a Project “Safe Water for Everyone using Effective Technology” (SWEET), community-based water purification system supported jointly by Gram Panchayat, Community and BF with the aim to provide safe drinking water conforming to WHO standards at affordable user cost. Under the Project 45 plants were set up covering 8.5 lakh people in 170 villages in six districts of Andhra Pradesh (Undivided). The normal source of

drinking water was irrigation canals and well water. The water quality was poor with impurities exceeding permissible levels. BF set up one plant producing 1000-2000 L/hr for every three villages using the best technology for water purification to be operated by trained village youths (Raju, Mem. 70, GSI, 2008, pp136).

It involved Gram Panchayat (GP), Community, Donor and Philanthropic organisations in setting up the water plants turning it to a panchayat-public-private partnership (4P) model. Gram Vikas Samity (Village Development Committee (GVS)), a 9 member team of volunteers including women and youths, was formed by BF in all participant villages to monitor activities. Table 2 below illustrates the responsibilities of various stake-holders.

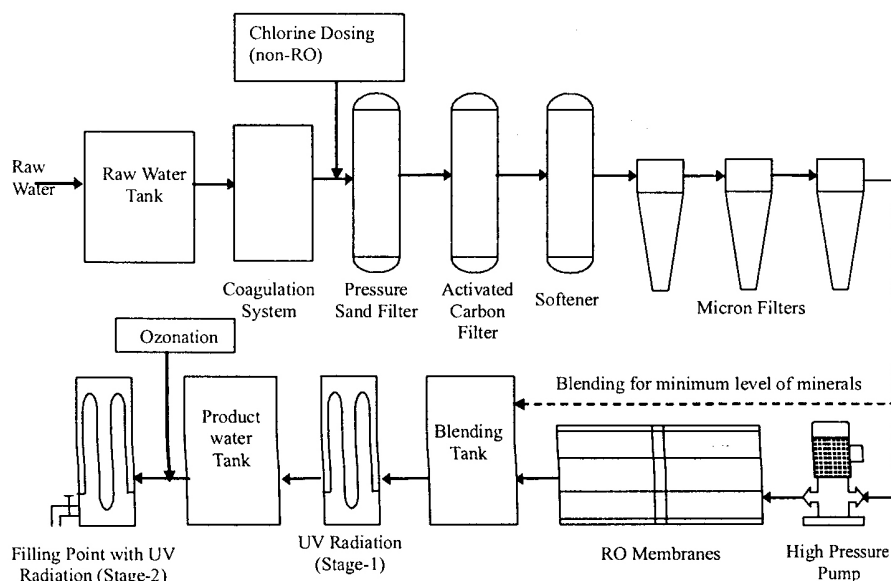
**Table 2.** Responsibilities of Stake holders

Gram Panchayat	Community (GVS)	Byrraju Foundation
Permission to draw raw water	Minimum 50% cost of equipment	Up to 50% cost of equipment
Allotment of land	Construction of building	Technical guidance in setting up of the plant
Power construction at concessional tariff	Supervise operation of plant and distribution of water	Testing of water and quality assurance

BF imparted skill training to GVS on self-reliance in setting up and meeting operational costs through user charges and/or mobilization of funds, and also on leadership development for its efficient implementation. Unemployed youths were trained on technical aspects, operation, hygiene and cleanliness, water quality testing, account keeping, marketing, simple repairs, distribution of water etc. Important features of the Project are: (1) Project is demand driven, (2) Users are involved right from the beginning of the Project; (3) Empowering the Management and User’s Committee in taking responsibility of operation and management of the scheme; (4) cost recovery mechanism with participation of consumers. The product is delivered in 12 liter-cans at nominal user charges thereby ensuring sustainability of the project. A few agencies including UN-HABITAT have replicated the model in India and outside.

#### **Art of Living (AOL): River Rejuvenation Project**

The goal of Kumudvathy River Rejuvenation Project launched

**Fig. 2.** Community managed water purification system. Mem. Geol. Soc. India, no.70, pp.136).

by Art of Living (Vyakti Vikas Kendra) in Karnataka, is increasing baseflows of the river through watershed management in its catchment following an approach of integrated watershed development, community engagement and employment generation. The important features/ steps in the project are: (1) Understanding natural water cycle, process of river flow and process of degradation causing water scarcity; (2) Preparing blueprint of actions and action plan: water use efficiency measures, agroforestry, market creation for their produce etc; (3) Raising awareness of the local community, training youth leaders in each village to implement the program; (4) Implementation of the action plan. After the success of the Kumudvathy Project several such projects followed in other river basins based on the Kumudvathy model and linked with government schemes and other agencies. P.C.Roy of MGNREGA, Government of Karnataka, has summarized the Project implementation structure in Vedavathy basin, as below:

“The project implementation structure starting with GP level execution team involving Kayak Bandhus, Hobli level dedicated technical engineer. Block level social coordinators under Taluk level Executive officer, and at District level AOL coordinators, - all under Zilla Parishad Chief Executive Officer executed the project. The State level Project Management Team led by Special Commissioner, MGNREGA and AOL River Rejuvenation Team guided the Plan execution and quality monitoring. The Kayak Bandhus were given extensive one week training on the concept of river rejuvenation, Scheme objective, and in proper execution, supervision and documentation of work” (Fig. 3) (Jalavahini Conference, AOL, 2017). “The design is interactive, construction friendly, and engaging to ensure a holistic approach that brings wateruse efficiency, builds financially sustainable project for effective and continued participation of all relevant stakeholders” (Gangolli & Desai, Sp Pub 7, GSI, 2020, p75).



**Fig.3.** Project implementation structure. (Ray, Sp. Publ 7, GSI p.71),

### Woman Power

Women hold leverage to the well-being of the family and society at large. But their true potential is stymied in a male dominated society, confined as homemakers to the household chores, upbringing children etc. However, women play a significant role in water management including long hours in trudging over tough terrain for fetching water, cooking, cleaning, washing, ensuring sanitation at home, potability of drinking water. But if they are relieved of even part of this drudgery with the availability of potable water near home, huge manpower will be unlocked for harnessing in other spheres. Women may be equipped with skill training for other fruitful activities (Fig.4), and will do wonders in the well-being of the society. With the spread of education, they are shining in all fields like science, art, culture, sports. In all the projects discussed above inclusion of women contributed to the project's success. In all schemes of integrated growth and development



**Fig.4.** Skill training of women in Ichalahalla watershed for additional employment (Mem. Geol. Soc. India, 70, p.234).

women must have their rightful inclusion, both in decision making and in implementation. “This will ensure adherence to democratic values, to justice, social inclusiveness, to diversity and pluralism. Denial of equal rights is holding back India itself”. (Prof. Jayati Ghosh, Massachusetts University, USA).

### B.P. RADAHAKRISHNA: MASS AWARENESS AND MOBILISATION

#### Mass Mobilisation

Late Dr. B.P. Radhakrishna, the legendary geoscientist, was a votary of water security and equity for the common masses. Moved by the rampant water scarcity and poverty in rural areas he realized that water harvesting and conservation on a massive scale holds key to the mitigation of acute water scarcity and rural prosperity. He steadfastly advocated for revival of traditional technology of water harvesting and conservation which do not require advanced technology



Late Dr. B. P. Radhahrishna, Voice of the Voiceless millions.

and large investment. He echoed late Anil Agrawal of the Centre for Earth Science and Environment making a powerful plea for rainwater harvesting on a grand scale and making a mass movement. “If this spirit catches up, and water harvesting really becomes a mass movement generating employment on a large scale by way of desilting tanks, excavation of contour trenches and erection of bunds, amelioration of rural India cannot lag behind”. ... “What is required is good leadership at village level..... Village community is the rightful custodian of water.....group action at soil and water management aided by government support can achieve wonders”.

#### Educating Public

Water is mobile and difficult to manage. Ownership is hard to define. Radhakrishna knew that it is only through education of the masses about the need of water conservation that all round development and integrated water management is possible. He advocated for



**Table 3.** Geological formations of Mysore state and their water bearing properties (partly reproduced)

System	Series	General character	Water-bearing properties
Archaean	Closepet granite	Coarse grained pink and grey granites, traversed by numerous joints yielding huge tors or boulders. Form hills with steep-sided bare domes.	Comparatively good carriers of groundwater through joints and fissures. Bore wells drilled in valleys adjoining granite hills have yielded good supplies averaging 25-40 gallons per minute.
	Peninsular gneisses	Mostly biotitic and hornblendic schistose and compact with alternating light and dark bands. Not so highly jointed like granites.	Good for small supplies of water for domestic purposes. Yield in bore wells varies from 10 to 30 gallons per minute averaging 15 gallons per minute.
	Schists, Slates, Phyllites, quartzites and crystallines	Highly folded, steeply dipping crystalline schists. Highly shattered and fractured.	Good for small supplies. Phyllites and clay schists poor as sources of groundwater. Average yield 10-15 gallons per minute can be expected everywhere.

traditional water harvesting systems with modern inputs. This needs detailed field study and communication of results to the people. And in this all sections of society including scientists, geomorphologists, remote sensing specialists, agriculturists, meteorologists, have a role to play. "Geological maps can be a source of valuable information on the occurrence of groundwater and its movement. Cadastral maps with contours showing direction of ground slope, soil types, depth to water table will go a long way in educating the farmer and equip him for growing food. Flat land suitable for irrigation, sloping land suitable for horticultural crops and hilly land suitable for afforestation may also be added to the map" (Radhakrishna, *JGSI*, v.60, 2002, pp.233-246). Agriculturists may focus on evolving new strains which can assure maximum yields with least amount of water. He recommended research be conducted into the valuable ancient astronomical observations ("rain nakshatras"), rainfall variability through months, years vis-a-vis farming and water conservation.

#### Know your Aquifer, Manage your Aquifer.

Radhakrishna advocated for village wise microlevel surveys which he launched in Karnataka in 1960, first among states of India, heralding a new era in water management which is now part of our National Policy. The knowledge accrued is embodied in the Bulletin 20, Mysore Geologists Association, a Manual of Hydrogeology giving thumb rules, norms, guidelines for water resource development and management in hard rock terrain. His was also a maiden attempt to establish hydrostratigraphy of hard rocks in Mysore state for common man's knowledge (as partly reproduced in Table 3). Village-wise microlevel surveys will create a valuable database. Scientific knowledge should be put into practice in demonstration plots and the message of water conservation conveyed to the people.

#### Role of Media and Educational Institutions

He felt that media has a big role in transmitting knowledge acquired by the scientists in the field and laboratory for common man's knowledge and understanding. Media, especially newspapers, science magazines may publicise achievements in the model studies. He urged the Universities and Research Institutes to take up study and research projects to update knowledge and develop replicable models / best

practices of water conservation. The latter should also be part of school and college level curriculum.

All these are parts of his famous "blueprint of actions" (*JGSI*, Vol 60, 2002, p243).

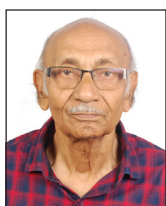
A visionary and a colossus among geoscientists, Dr. B.P. Radhakrishna's everlasting messages will ever resonate for the generations to come. "The time is now opportune to form a regiment of water warriors .....to revive water conservation system with the aid of modern technology ushering in a blue revolution"..... "Water is a crop and, a resource to be cultivated, nurtured and harvested over long periods of time. (Radhakrishna, *Hydrogeological Studies*, GSI, 2007, p.46).

#### 'KHUSHAL BHARAT, VIKSIT BHARAT'

The concept of '*Khushal Bharat, Viksit Bharat*' (Happy India, Developed India) which has at its core all round development and growth is in essence integrated development of economy, natural resources and quality of life with water management as its fulcrum. Rajendra Singh's 'experiment with truth' brought to light the principle of community-based integrated development with a focus on village, which met with spectacular success on all fronts of poverty alleviation. Several voluntary organizations have since come forward adopting the same principle and fine tuning the process with structured approaches for smooth flow of scientific and technical data, planning, linkage with financial institutions, implementation and monitoring the projects. They have served as models of inclusive growth and poverty alleviation in the third world countries. Summing up, the studies highlight:

(1) Usefulness of traditional technology with modern inputs. (2) Whole-hearted community participation. (3) Effective and dynamic Leadership at village level. (4) Mass education through campaigns, padayatras, school and college curriculum on water conservation. (5) Vital roles of geoscientists, agriculturists, engineers, remote sensing specialists, sociologists. (6) Women's participation for all-round success of the projects. (7) Study and research projects in Universities and Research Institutes.

In short, the power of collectivity will take the country to new heights of success.



**Subhajyoti Das**, former Regional Director of Central Ground Water Board, is a versatile hydrogeologist having a rich experience in hydrogeological surveys, exploration, development and management in varied terrains of India. He is a prolific writer, having to his credit 150 research papers in national and international journals, 26 books (edited/authored), 6 book chapters and a significant number of unpublished technical reports.