

Water Conservation

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Abstract: The rapid depletion of ground water is usually underestimated and even ignored. Policy and legislative interventions are required to be integrated with groundwater and surface watershed initiatives. At the micro level, the growing competition among irrigation, domestic and industrial uses of water had led to over extraction of ground water that had receded the groundwater table below the critical level, forcing the State government to declare some of the area as a dark zone.

Lack of traditional rights and practices in the contemporary modernization process is noted to be the main cause of failure of many modern systems. Thus, need arises to regenerate and multiply the traditional ones.

In response to the impending crisis, the people of Alwar district revived a traditional watershed technology "Johad", to restore the ecological balance of the region. **Johad** is a traditional watershed practice in Rajasthan. This local initiative has proved to be far more rewarding than conventional watershed approaches. An organization Tarun Bharat Sangh (TBS) has played its crucial role in reviving the Johad practice in this region. The paper presents the some information of work done by the TBS. The phenomenal success that TBS has achieved in mobilizing the village community to construct over 5600 Johads and manage the water resource also proved to be the greatest strength of its work.

THE ACHIEVEMENTS

The paper starts with a background giving the water resources scenario of Alwar district. It also highlights the "rebirth" of a river running through the district, Arwari, resulted from the groundwater recharge by series of Johads developed in the catchment's area. Impact of Johad has brought out prosperity to the village communities enriching their livelihoods through increased agriculture production. The TBS success in constituting Gram Sabhas (village level councils), and ensuring that the village bodies have the ultimate say in managing Johads brings out a key message for the "Decision-Making Process". The slow but steady growth of Johads brought out a transformation not only in terms of the ever-changing face of land, but also people's attitudes. A new sense of belonging has been developed among the people. As a consequence of an upgraded day-to-day life pattern, a new concern for the degraded ecology is being emerging. People's wholehearted participation in the anti-mining crusade, as usually seen in the forest-conservation and regeneration endeavour, is enough evidence of the new sensibility. The cycle of eco-regeneration is set in motion.

ALWAR DISTRICT IN RAJASTHAN: A CASE EXAMPLE

Rajasthan is the largest state of India covering an area of 34.271 million hectares, which is more than 10% of the total geographical area of the country. About 5% of the total population of the country resides in the state and it has more than 15.7 million hectares of land suitable for agriculture. Rajasthan is one of the driest regions in the country, and total surface water resources is only about 1% of the total surface water resources of the country. All the rivers of the state are rainfed, and identified by 14 major basins divided into 59 sub-basins.

Ground water also plays an important role especially in agriculture and drinking water supply. In large areas of the state, over-exploitation of ground water has depleted groundwater table, in some areas, at the alarming rate of one metre per year. Such a situation existed in four blocks of Alwar district until 1985-86. Alwar district is located between the latitudes 27°15' and 28°15' and longitudes 76°15' and 77°0' East. It covers an area of 8,380 sq. km. The terrain is hilly and scattered with rocks. The slopes of the hills are fairly steep with flat ridges and plateaus of varying widths. The soil is generally dry, impoverished and deficient in humus.

The climate is typically that of eastern Rajasthan having an intense and long summer, low rainfall and a short winter. The temperature normally varies from about 5°C in January to 45°C in June. The monsoon usually breaks in the second fortnight of June and continues until the middle of September. The average annual rainfall is about 500 mm. The water supply depends mainly on rivers, streams, springs, wells and tanks that are present all over the place, but are mostly seasonal.

Broadly, two types of habitations exist, they are: those located inside the forest territory more dependent on minor forest produces; while those outside the forest territory focus more on agriculture activities. Water is the common problem in both communities.

Revival of Johad Traditions by TBS

Tarun Bharat Sangh (TBS) is an NGO located in the Bheekapura village of Alwar district. TBS has played a leadership and catalysing role in building more than 5000 Johads (water harvesting structures) with the help of village community in 1058 villages. Areas of the villages cover parts of contiguous districts of Alwar, Dausa, Bharatpur, Swaimadhopur, Karoli, and Jaipur. Besides these districts, few Johads have also been built in the districts of Jaisalmer, Ajmer, Udaipur and Bharatpur. Several works related to Natural Resource Management have been undertaken for conserving each single drop of rainwater in the drought prone area of the Rajasthan. These structures include building of Johads (the earthen dam), anicuts, small check dams. Uptil year 2005, all together more than 5000 Johads, anicuts, and check dams in 1058 villages have been made and 6500 sq. km of the land have been regenerated. Before the water conservation works, the place namely Thanagazi tehsil in Alwar, which was recorded as “**Dark Zone**” in the Government records in 1985, has been transformed into “**White Zone**”. The dark zone means nobody is allowed to further exploit the ground water. After the adopted water conservation measures in all those villages, groundwater tables have gone up, and irrigation water requirement is met through the operation of wells even though severe drought condition existed during last four years. The work done and success attainments in Alwar district is being replicated in Western part of Rajasthan mainly in districts of Jodhpur, Pali, Nagaur, Jalore, and Barmer.

In recognition of these efforts, then President of India, Shri K. R. Narayanan has felicitated the Gram Sabha of Bhavta-Kolayala village in year 2000 with an award.

Activities, Campaigns and Movements

The broad area of activities of the TBS may be divided into the following categories:

1. **Community Development:** Members of more than 1000 Gram Sabha, the village institution, known by 'Mahila Sangathans' (women groups) and 'Yuvak mandals' (youth groups) mobilised by the TBS form the main motivating force. The responsibility of the Gram Sabha starts with initiation of discussion, decision taking, and implementation of decision taken collectively by them. The community develops and imposes self-discipline among them for practicing true democracy in the management of water, forest, and natural resources.
2. **Economic Development:** Water conservation by construction of Johad (water harvesting structures) increases and improves irrigation potential and crop practices, which lead to increase in incomes of every household. It also leads to optimum utilisation of land, and also increase in livestock that in turn increases hope of livelihood in the form of milk production. This has provided a sustainable means of livelihood to more than 1000 villages of Rajasthan.

The guiding principles to acquire the above development as laid down by the TBS can be summarized as follows:

- (i) Empowerment of the people to the extent that they start managing and caring the natural resources;
- (ii) Inculcating and nurturing of the belief that only people can protect, conserve and regenerate the forest at the same time managing the other natural resources (Transformation of the Dark Zone into a White Zone is an example);
- (iii) People ought to have unimpeded and uninhibited access to the uses of biodiversity (medicinal and other tradition-sustained uses), it will also lead to providing access to easy economical and affordable health-sustaining avenues;
- (iv) Involving people rather than imposing prohibitive policies is the key to regeneration and management of natural resources. Minus the people and see the quantum of the damage done, avoidable damage at that; and
- (v) Revival and contemporary-contextual modification of the indigenous wisdom can go a long way to make people self-reliant, thereby cutting at the dependence on the multinationals who, under the processes and policies of globalization and liberalization, have suddenly become the key players.

Gram Sabha—An Innovative Institution of Water Management: Method of Working

A Gram Sabha is an informal body comprised of representative from each household in the village. Each village has its own internal management system, known by Gram Sabha. Every village has its own Gram Sabha (village institution), and they carry out most of the tasks. Active involvement of the villagers has led to use of water as a regenerative input for various socio-economic and ecological developments. It is obligatory for all households to attend the meeting held usually twice a month except during the harvesting season. At times, different villages take decisions jointly. If necessary, an emergency meeting is called. There is no single leader or a core group that oversees management of the system. Instead, all households take active part in the working of the Gram Sabha and all decisions are taken by consensus. In practice, village community/Gram Sabha controls the available

water in Johad. The Gram Sabha in the long run can be a sustainable source of resources mobilization. The sporadic efforts of some Gram Sabha need to be converted into an integral part of the project for developing a "*village fund*". The objective of creating village fund is to ensure financial independence of the village institution in the long run. The creation of such a village fund is a recent initiative by Tarun Bharat Sangh. Such initiative towards financial autonomy can strengthen future development activities at the village level. This step is towards making, the process of Johad watershed system financially sustainable.

JOHAD—THE PIVOT OF DEVELOPMENT

Johad, popularly known as pond, is a well-known traditional system of water storage for lean periods in several parts of peninsular India. This traditional system of water conservation has a strong community support for erection and maintenance of water supply in villages for periods when most schemes, if not all, run short of water. Johads are not merely relevant, they are necessary, and in some cases, even vital. It was against the backdrop of utter neglect and stiff opposition by the state that traditional system of Johads was put into practice in Alwar.

Johads are simple mud and rubble barriers built across the contour of a slope in a small watershed to arrest and accumulate rainwater. Sometimes, a series of these are constructed depending upon the type of slope and terrain. These structures are comprised of high embankments on three sides, and the fourth side is left for entry of rainwater. The shape of Johad in most cases is concave and resembles a crescent shape. The height of the embankment is such that the capacity of the Johad is more than the volume of run off generated from the catchment. This is worked out based on a rough estimation of maximum possible run-off. Therefore, the height varies from one Johad to another, depending on the site, water flow, pressure; etc. The surface area of Johads in Alwar varies from 2 ha to a 100 ha. The interesting part of the entire process is that, all those estimations are based on villagers' own experience and intuition, without any physical measurements. The point at which the water pressure is more, the width at the base is increased by 2-3 times than that of the normal. In some cases, a masonry structure is also made as outlet to pass out excess water. To prevent the Johad from being trampled upon by cattle, the inner side is constructed vertical up to a height of about 5-7 feet from the base; thereafter it is made to slope outwardly.

The water collected in the Johad during monsoon is used directly for irrigation, drinking and other domestic purposes. For irrigation purposes, it is either pumped or taken to the field through unlined contour channels. The advantage of this structure, apart from arresting and storing rainwater, is that it improves moisture level in the sub-soil level, particularly in downstream areas and recharges ground water and wells.

Decision Making Process

People's participation is prerequisite for any developmental activity. TBS does not undertake any activity unless villagers agree to contribute maximum resources in term of cash and also as voluntary labour. The villager's involvement gives them a sense of ownership and ensures maintenance of the structures.

An important factor inspiring farmers to participate actively in the process is the revival of their traditional system "Johad", with which most of them are familiar. Moreover, Johad has a distinct role in their cultural milieu. The process involved in construction of a Johad is as follows:

- (i) Detailed discussions are held with villagers to help, identify local people's talents and traditional technology which elders have still preserved.
- (ii) The discussion focuses on identification of location of the Johad. This necessitates looking into the local topography to suggest possible sites on the basis of traditional knowledge and understanding of the people.
- (iii) That follows by the discussion on fixation of size of the Johad. Size of a Johad is fixed based on the anticipated amount of run-off from the catchment holds by it. The shape is dictated by the flow of water and its pressure. All Johads are concave in shape. In case there is more than one location where more water is likely to collect, either those points are made slightly convex in shape or a masonry structure is provided for releasing the excess water.
- (iv) After the site is selected, the households directly benefiting from each Johad area is identified and they are motivated to contribute their share of voluntary labour as well as land, in case, it covers some cultivable land.
- (v) Simplicity in the nature of Johad construction also evolved a simple management system. This is decided in the gram sabha meeting involving TBS. The task includes: a) annual repairs, b) formulation of rules and regulation for distribution of water and common property management, and c) conflict resolution.
- (vi) There are not many conflicts over the use of water or over maintenance of a Johad.

Cost Sharing Norms

TBS follows a clear guideline for construction of Johad in villages. It contributes to mobilize the external resources required for construction. Johad being based on local technology most of the resources required are mobilized within and from the villages. Table 1 indicates cost involved in construction of few Johads in Alwar district and participation of villages in sharing of cost. It can be seen from Table 1 that the villagers' contribution account more than 70 percent of the total cost involved. In one case, villagers have contributed up to 90 per cent of the total cost. TBS mainly contributed resources for hiring skilled labour, buying cement, iron, and diesel for tractors.

Table 1. Cost sharing between village and TBS in construction of few Johads (in rupees)

<i>Johad's name</i>	<i>Village</i>	<i>TBS contribution</i>	<i>Village contribution</i>	<i>Total</i>	<i>% of village contribution</i>
Gopal Johad	Buja	14,510.60	1,76,000.00	1,90,510.60	+90%
Sankada Johad	Bhanvata	15,183.50	60,701.30	75,884.30	+80%
Harala Johad	Kakar ki dhani	17418.00	29,159.80	46,577.80	78%
Bhajaka Johad	Natata	83,537.00	96,497.50	1,80,034.50	65%

With an expectation of improved livelihood through Johad, some villagers even have contributed cash money. For instance, to construct a Johad in Bhanvata village, apart from voluntary labour, each family has contributed a sum of Rs. 400, which is relatively a big cash contribution in any marginal farmers' community. The increasing contribution of villagers in making of Johad indicates that the approach can be made financially sustainable. It may be possible that in the coming times, the villagers may not need the TBS to play any roll in this regard.

CULTURAL BOND WITH JOHAD

Johads are much more than mere water harvesting structures for the community to which they belong. These are an integral part of the socio-cultural milieu. Many ceremonies do take Johads into account as if these mute structures are part of a large family.

When a newborn arrives in the family, villagers worship the Johad. Three days after the birth, the entire house is cleaned with water from the Johad. The local belief is that if a cow drinks water from the same Johad, the water is sacred and helps in purifying the house.

During wedding ceremonies, the bride and the groom along with other women in the village take a salutary walk around the Johad. According to the villagers, the purpose of this is to show the bride the water reservoir upon which the entire village is dependent so that she knows from the very first day her water destiny. Also as a part of marriage rituals, the bride's family is supposed to contribute to the village committee an amount between Rs. 11 and Rs. 101 for the maintenance of the village Johad.

When a person dies in the village, villagers after the cremation bathe in the Johad. On the 10th day after the cremation, the villagers perform all the last rites on the banks of the Johad.

Johad being regarded as sacred place, a small temple is constructed on the embankment of the Johad. It also serves a practical purpose. According to the villagers, while visiting the temple every day, people take note of any breakage in the bund and also any other maintenance required.

IMPACT OF JOHAD

Economic Aspects

Agriculture wastelands are common in most of the villages, which were either left barren or occasionally cultivated for one/two Rabi crops. Prior to intervention by TBS, a few patches of land were cultivated for wheat depending upon distance of land from the wells and water available in them. A comparison of wheat production before and after construction of Johad is given in Table 2.

The impact of last 10 years tireless effort has brought about a significant improvement, declared "dark zone" has transformed into a "water surplus" zone. The wastelands, which were scarcely cultivated before, are now cultivated at a higher cropping intensity. The average productivity of wheat has increased from 720 kg per acre to 1500 kg per acre. Although there is surplus water, there is no significant influx of cash crop in the region.

Increase in agriculture outputs has increased the incomes of every individual including his households. Nevertheless, deforestation has reduced drastically; there is an improvement in greater rootstocks, and the cattle yields have also increased markedly. Gainful employment has increased in villages. The

Table 2. Wheat production before and after construction of Johad

<i>Village name</i>	<i>Wheat per bigha (in quintal)</i>		<i>Wasteland under cultivation (in acres)</i>
	<i>Before Johad</i>	<i>After Johad</i>	
Debri	7	15	70
Kaled/Natata	8	17	50
Pathroda	5	10	50
Bhanwta	6	15	40

Johads have given employment to many, over the years. Two hundred women are self-employed in spinning and weaving.

Social Aspects

Gujjar or Meena community inhabits most of the villages in the Alwar district. Not many differences exist between these two communities in terms of socio-culture values. The primary occupation of these villagers is agriculture, followed by livestock rearing. Villages located inside the reserve forest areas also earn their livelihood by collecting and selling minor forest produces.

Johad has made visible impact on the socio-economic scenario of the region. Within a year of construction of Johad, the scenario of water availability of drinking and irrigation water has changed. Nobody has visualized that one single Johad could bring so much prosperity. Livestock rearing being their lifeline, increased water and fodder availability brought about an improvement in their economic status. Enough milk, and milk products brought considerable money to take care of their family needs. The material benefits through Johad have also brought out a change in motivation levels, and willingness to pay. The significance of collective effort has united them further, in terms of strengthening of Gram Sabhas, setting a new code of ethics to prevent and deal with violation of common property resources.

Accomplishment of primary needs, such as "drinking water and other domestic use: bathing, washing and cooking", seems to be the key achievement of Johad.

It is well established that women in this region suffered a lot on account of fetching water for the family. They, who are responsible for procuring fodder, fuel wood and fetching water, were most affected by these scarcities. All these activities are referred to as women chores. The average time spent on those activities is about 18 hours a day. Therefore, the creation of water harnessing structures (Johad) has benefited women immensely. Liberated from backbreaking work of fetching water, they now find time for themselves. The increased availability of water for cooking, washing and bathing has improved quality of their life. Over 200 girls are now studying in schools. Prior to existence of Johads they used to devote their big spell of time in fetching water for family. These have resulted into women to seek further sources of empowerment such as, livelihood schemes and social sector development in the areas of education, health, etc.

Ecological Aspects

The cumulative effect of several interventions, such as construction of Johads, protection of forestland, field bonding on individual farm landing has resulted into rise of groundwater table in the region. Undoubtedly, Johad plays a major role in recharging groundwater. Table 3 reflects few data indicating rise in water level in most of the wells and also revival of some of the dry wells. Wells in the region are the main source of drinking water. A survey conducted by AFPRO (Action for Food Production) along with TBS in year 1988 suggested that out of 970 wells in 120 villages of Alwar district, only 170 wells were operational and the rest didn't have any water. The survey in year 1994 by the same team found that all the wells (970) were in use as perennial supplier of water.

Rise of water level is dependent on distance of well from Johad, soil type and its moisture retention capacity, and also porosity of rock types in a region. The recharge in wells also depends on the quantity of water impounded in the Johad. A large Johad stores more water, hence can recharge large quantity of water. According to the villagers, a series of small Johads would be more cost-effective than one large structure. The same approach is adopted by TBS in most of the villages.

Table 3. Groundwater level in wells of the village Buja before and after Johad

No.	Total depth of well (in feet)	Water level before johad (1988)	Water level after Johad (1994)
1.	81	Dry completely	44.5 feet
2.	81	10 feet	66 feet
3.	73	Dry completely	37 feet
4.	66.5	Dry completely	25 feet

Over the decade, initiative of Johad in watersheds has revived several dry rivers, such as Arvari in the region. With the perennial source of water in river, aquatic life has begun to reappear in the river.

EFFECT OF JOHAD

Case Study of Nimbi Village (A Typical Village)

The aim of this study was to assess the change in per capita income of people in the Nimbi village because of construction of two Johads, and also to assess the impact of Johads on the social lives of the villagers. Location of the village is about 35 km from Jaipur, about 11 km from Dhand (village on Jaipur-Delhi highway), and about 8 km from Bhanpura.

Desert-like sandy areas surround the Nimbi village like all other villages in the Alwar region. In year 1994, the villagers with the help of TBS built new Johads and repaired the existing one under the following state of affairs:

- 25% of cost of the dam would be from the villagers' side besides donating money, as substitute of not opting for giving labour or volunteering labour.
- Deforestation had to be stopped and conservation of trees and wildlife had to be taken care of.
- Alcoholism to be stopped immediately. There were nine families producing alcohol, they were convinced to cease.

After consultation with elder persons in the village, two Johads were built and the existing old Johad was repaired at a total cost of Rs. 5,00,000. The Johad prevented runoff, and water soaked into the soil gradually increased water levels. A comparison of productivity of different economic indicators are shown below.

Indicator	Before Johad	After Johad
Wheat production	5 quintal/beegeha	8 quintal/beegeha
Income by wheat production	Rs 9,00,000/-	Rs 14,40,000/-
Maize production	3 quintal/beegeha	5 quintal/beegeha
Income by maize production	Rs 4,80,000/-	Rs 8,00,000/-
Income by Milk Production	Rs 21,60,000/-	Rs 14,40,000/-
Income by flower production	Nil	Rs 3,96,000/-
Rent of land per year	Rs 3000/-	Rs 12,000/-
Total income of village per year	Rs 22,40,000/-	Rs 59,96,000/-
Population of village	800	900
Per capita income per year	Rs 2800/-	Rs 6662/-

Progress due to Johads

- The price of selling arable land in year 1994 was Rs. 3000 per beegha, which has risen to Rs. 25,000 per beegha in year 2000.
- Prior to year 1994, no vegetables could be grown. Now many varieties are cultivated. Flowers like Hazara and Rose are grown during four months of the year.
- Contractors for farming are leasing land.
- Irrigation is not required for farming.
- Price of fodder has increased nearly five times.

Due to the increased level of farming and related activities, employment generation has taken place. Labourers from other parts of the country are now hired to work in the fields.

This case study establishes example of sustainable economic prosperity, like many other hundreds of villages in which TBS had built Johads with the active participation of local community.

Ecological Miracle: The Arvari River brought back to Life

The Arvari is a small river in the Alwar district of Rajasthan. Over decade's effect of groundwater depletion, it had been reduced to a monsoon drain. The region had suffered under chronic drought conditions, which caused river to go dry completely. As early as year 1988, with the help of people living in the remote village of Hamirpur, TBS could succeed in arresting and draining water through small and big monsoon nallahs. By early 1990's more than 350 Johads had been built in the catchment area of the Aravari River covering surrounding villages of Bhiriavas, Dumoli, Khatala, Samatsar, Chosla, Lalpura, Palasana, Jogge-ki-dhani, Samra, Natala, Kaled and Jagnathpura in the river basin.

The consolidation of these various schemes came in year 1993 with the campaign to save the Aravalli Hills. People from three districts participated in the campaign and covered the entire seven hundred kilometres range in fourteen separate groups. Hamirpur was inspired to make a difference, and Shri Ramchander Baba, the respected village elder, became the voice of the people. He served as a linking unit for mobilizing four neighbouring villages by streamlining their interests and participating in various village meetings.

Most of the Johads in the Aravallis were built on the mountain slopes for arresting and storing flow of rainwater. However, inadequate tree-cover and absence of forest used to swiftly wash down the rainwater through slopes eroding much of the topsoil and damaging the water bodies. Over the years the tradition of Johads had died out leaving heavily silted depression sites, while the hills stood in mute desertion, devoid of trees. With the new impetus, people are motivated to protect and conserve their forests and water resources.

Many small Johads on the tributaries of main watercourse raised the water level in wells. A large "bandh" (dam) was constructed on the main watercourse of the Arvari river. The bandh is like a concave shaped johad having catchment area of about 1103 sq. kms. Results of all these pro water conservation activities have led the dead and dry watercourse of the Arvari alive for the full year. The people of Hamirpur considered this to be a miracle started, so for the team of TBS. The restoration of the River Arvari has brought a lifeline of prosperity in seventy-five villages situated along its bank.

ARVARI RIVER PARLIAMENT

The concept of river basinwise community approach for water management was adopted for Arvari river basin. This concept has been named as "River Parliament". The River Parliament for Arvari was

constituted during year 1998. The parliament meets twice a year at an interval of six months. The Arvari parliament met 12 times since its formation. The Arvari river basin has 46 micro watersheds. There are broadly two major streams joining the dam "Sainthal Sagar".

The specific objectives of Arvari River Parliament are:

- (a) Sustainable management of natural resources,
- (b) Control usages of water by treating it a scarce resource,
- (c) Checking land erosion by construction of Johads,
- (d) Controlling illegal mining activity affecting the land, water and vegetation,
- (e) Generating self-employment and alternative livelihood options through better management of land, water and forest resources,
- (f) Sensitizing and building awareness among women groups on water related matter and seek their active participation, and
- (g) Increasing agricultural productivity by growing water saving crops with local seeds and organic fertilizers.

Community Support System

Tarun Bharat Sangh (TBS), a registered Society with its headquarters at Bhikampura, has a Governing Board of nine members headed by a Chairman. It has a team of about hundred and fifty associated members, of whom seventy-five are women and twenty-five are men. The real strength of TBS is its volunteers of 3500 including 60 voluntary women organizers in the villages. TBS trains local villagers and employs them from time to time.

Shri Rajendra Singh, President of Tarun Bharat Sangh, was the winner of year 2001 Ramon Magsaysay Award for Community Leadership (Govt. of The Philippines), widely known as the Asiatic Nobel Prize. The major national and international partners helping TBS to promote "Johad" are United Nations, SIDA, embassy of Sweden, Ford Foundation.

Deliverables

Johad is ecologically sustainable. The Johad watershed system harvests the rainwater and pours it into the earths and recharges the ground water. The increased groundwater level increases the moisture content of the overlying soil, which helps in re-generation, and ecological conservation of forest. The Johad also prevents the soil cut that helps in preventing transfer of fertile soil to somewhere else.

Johad is socially sustainable. Active involvement of the villagers in making of Johads has led to local community control over local resources available in the region. The local management institutes like Gram Sabha (village council) and Arvari Parliament look after its executive activities. There is no external interference of technological inputs, management and control system. The Johad watershed is practically socially sustainable.

Johad is economically sustainable. The villagers contribute a large share of making of a Johad. The participation is in the form of liquid money or voluntary labour. The indirect benefits of a Johad can be seen as increase in the agriculture productivity, milk productivity etc. The easy accessibility of water could save the time of women to do other economic productivity works, such as small industries and other works.

The concept is transferable. The concept of harvesting rainwater is applicable at places where the rainfall is limited and invariant having no other permanent source of water. The innovative theme of

this project; active participation of the local community, is transferable anywhere in the world and can be replicated in the areas having same geography as that of district Alwar.

CONCLUSION

Johad approach of water conservation can be adopted as one of the best possible options in any agro-alimatic situation for conserving maximum rainwater and recharging groundwater. A "Johad" might vary in terms of shape and size, but the technology would remain the same and also easily adaptable. Such traditional technologies exist in different parts of the country under different names, i.e., Tank water conservation in Orissa, Andhra Pradesh, Karnatka and Tamilnadu, etc.

The guidelines of macro irrigation schemes in India hardly reflect an understanding of operational perspective. Water being extracted from a public domain, water rights and regulatory mechanism for equitable distribution should be the key thrust in implanting any watershed development programme. Unlike mega watershed programme in India, some of the micro watershed initiatives (i.e. Johad system) certainly reflect incorporation of "Water Rights" and "Equity".

