

Sustainable integrated watershed management and the community efforts for the same in the north eastern region of India

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Abstract

Watershed management in the past was mainly meant for soil conservation and was highly government driven. Now it is synonymous with poverty alleviation and encompasses human as well as natural resources management, the first focus being on the former. Sustainable integrated watershed management is tried to be achieved through participatory processes as it satisfies democratic requirements and prevents adverse impacts of bureaucratic and elite-dominated development on disempowered actors. The approaches which may result into people's participation in management include indigenous, traditional and facilitated efforts or a combination of these. Empowering users and institutionalising important ownership of resources, programmes and processes of watershed management are very important key elements in the participatory processes. Lack of vision and mission on the part of all the implementing agencies including participants is a serious constraint to the progress in this respect. A change in attitudes among all concerned is therefore called for. Some good models developed in the past as well as in recent times adopting various approaches are notable and worth emulating. The tribals of the North Eastern Region of India devised some watershed management systems through indigenous approaches and community efforts which have stood the test of time, have proved to be sustainable and are excellent examples of their skills and ingenuity.

INTRODUCTION

Watershed, catchment, drainage basin, river basin and divide are synonymous; but the term watershed is relatively new and made popular recently. It generally implies a drainage area from which the entire runoff drains towards a single outlet or point. In other words, it is understood to be a topographically delineated area that is drained by a stream system. A small stream forms part of a big watershed which in turn forms part of larger watersheds until the combined watersheds become a major river basin draining millions of hectares of land.

Watershed management is the process of guiding and organising land, water and other resource use on a watershed. The objective of watershed management is to generate a

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sustainable flow of desired goods and services by utilising the resources of the watershed. It is basically the management of forests, soil and water of a particular hydrologically bounded geographical area for the sustainable production and use of goods and services needed by the people. Watershed management was synonymous with soil conservation in the past, but now it is more appropriately synonymous with poverty alleviation and sustainable development for the welfare of the local people or the land users. A notable characteristic feature of watershed management is that the upstream use of resource affects the downstream area and intimate linkages exist among the resource uses (soil, water and forestry) of a watershed. This makes the coordinated and interdependent action imperative in the utilisation of the resources of a watershed.

The past and conventional watershed management programmes have been highly government or outside agency driven, have not proved to be successful and have resulted in waste of limited fund available for the purpose. With the new focus on poverty alleviation and food security through appropriate natural resources management, the people, rather than the natural resources, become the first focus of watershed management.

To combine poverty alleviation and food security with watershed management, participation of local people in the processes and programmes is not only crucial but also a must. Unfortunately people's participation is a social phenomenon and its evolution requires lot of determined efforts and takes a long time, while watershed deterioration is a natural process which occurs at a much faster rate and is aggravated by increased population pressure and indiscriminate and unscientific human activities. To reduce this discrepancy, people's participation in watershed management is to be ensured by all means.

Though recently much attention has been given to promoting watershed management as a viable means of people oriented sustainable integrated development, the concept is not entirely new. There are several examples of very rich ancient and traditional participatory experiences in watershed management which facilitated development of cultures through them or which used the traditions and culture for sustainable integrated watershed management. Some such systems developed indigenously by the people of the North Eastern Region of India are worthy of attention and emulation elsewhere under suitable conditions.

SUSTAINABLE INTEGRATED WATERSHED MANAGEMENT

Sustainable integrated watershed management may be defined as “ processes of utilisation, development and conservation of land, water and forest resources for continually improving livelihoods for households and communities in a given hydrologically independent area.” Thus it deals with the sustainable development (i.e. development that meets the needs of the present without compromising the ability of future generations to meet their own needs) of land users and farmers, and their own and common property resources for poverty alleviation. The aims of sustainable integrated watershed management include holistic human development and encompass the human as well as natural resource management dimensions in a watershed. It is based on the dominant cultural and value system in relation to the dominant thoughts of a society with nature and the universe. Thus spiritual or other ways of Man's role in Nature and the Universe become a continuous activity of the watershed management programmes (Sharma, 1997).

Watershed management means different things to different people. It no doubt deals with the use and conservation of the natural resources in a watershed. Sustainable integrated watershed management includes everything in a watershed, both human and non-human. However, in practice, the scope of watershed management is location specific and is geared to catering to the problems and needs of the local people. Thus integrated watershed management has the common objectives of (I) natural resources management for human development within a target group, (ii) poverty alleviation through capital and income generation, and (iii) distributional equity among men, women, all social groups, class and castes.

Human welfare being at the centre stage of any watershed management programme, it is obvious that prioritisation of integrated watershed management activities is addressed at local level through suitable community's organisations. Recently much attention has been given to promoting integrated watershed management as a viable means of people oriented sustainable development. The philosophy behind it is that local people achieve with their own effort and input will be sustainable, because they fully understand and value their needs. Local people have definitely a better understanding of the complexities in the watershed and are better equipped to deal with them than outsiders. However, this does not mean that the outside intervention in the matter is ruled out. Since the rate of degradation of a watershed far exceeds the rate of its rehabilitation and people's participation takes long time to evolve, government or any other external agency may work for initiation or facilitation of the processes of watershed management.

Participation, people's participation, popular participation and community participation are today commonly used terms in the parlance of development. The adoption of a participatory orientation in contemporary mainstream development is a somewhat peculiar but welcome turn of events. Demands for participation have their origin in radical politics. The democratisation of developmental activities have been a long standing objective of radicals in both industrialised countries and in the third world. The aim of this is to prevent adverse impacts of bureaucratic and elite-dominated development on disempowered actors and to generate receptiveness to the people. However, this is a very welcome development.

Community effort or people's participation is a dynamic group process in which all the members of a group contribute to the fulfilment of the common objectives, share the benefits accruing therefrom, exchange information, and experience of common interest, and abide by the decisions of the group. Three factors (I) interdependence of human beings with other living creatures, (ii) main concern of development being economic and social uplift of the people, and (iii) threshold of irreversibility, are required to be integrated to attain sustainable resource management which in turn is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.

The approaches that can lead to community effort or people's participation in sustainable integrated watershed management are: (I) indigenous efforts which have been a way of life of the people for very very long time on which a society was practically structured, (ii) traditional efforts which are based on the culture and mores of the people, and (iii) facilitated efforts which are helped by various means including government. The partici-

pation process may even include a combination of these approaches. Indigenous and traditional approaches are based on ancient rituals, old culture and way of life of the people and therefore they may generally pave the way for long lasting participation, which is so vitally needed in case of sustainable integrated watershed management. The facilitated efforts can be co-opted by providing development aid, incentives, payments or by top-down policy instruments like laws obliging people to participate. However, the coerced or forced participation is definitely very temporary and may easily result into counter-reaction or rebellion completely inhibiting the creative powers of the people. Keeping this in view, a suitable approach for participatory processes for sustainable integrated watershed management may be selected. It should never be forgotten that people accept an approach only when they find that the same is used for their welfare.

One very important key element in the participatory processes for sustainable integrated watershed management is people's empowerment and ownership of watershed management processes and programmes. Empowerment is linked to control over resources, which in turn is linked to the ownership of the resources, the participatory processes and the watershed management programmes. As such land ownership is an important aspect of facilitating people's participation. Different types of ownership call for different approaches to management of these lands. However, a serious constraint coming in the way of progress in this respect is the lack of vision and mission on the part of all the implementing agencies including the professionals and the participants. This requires a determined change in attitudes among all concerned.

SOME NOTABLE MODELS

Watershed management has been practised for centuries. In many a case, it has been done in integrated manner, had stood the test of time and has proved to be sustainable. Three such models based on tradition and facilitation are described hereunder. Three models developed with indigenous approaches and community efforts are also mentioned under the next heading.

Subak System

Subak system is basically an irrigation management system adopted in Matreganga watershed in Bali Island of Indonesia. In the eleventh century a water resources development project was constructed whereby the flow of the Matreganga river was diverted with the help of a weir and conveyed to agricultural fields to be used mainly for irrigating paddy crops. After the project had run for some time, the then king of Bali called the beneficiaries in the premises of a temple in 1076 AD and declared that it had not been an encouraging experience for his administration to maintain and run the project efficiently and therefore he wanted the farmers to take over this responsibility as they were the main stakeholders. Subsequently the farmers were empowered to run the project. Even the ownership of the resources was transferred to them. Subak committees consisting of beneficiaries were formed at outlet to project levels, which were entrusted with the complete responsibility of scheduling, implementation of programmes, maintenance of the system, collection of water rate, overall village welfare, social rituals etcetera. By now the management is fully integrated with the social system and all social/traditional rituals and functions are based on water management and crop cultivation calendar. As a matter

of fact, this management system has helped the growth and development of the unique culture in the island. Bali is predominated by Hindu population (about 90%) and the people are generally God-fearing. Small temples like tulusi chabutara (small pedestal with hollow top in which Ocimum Sanctum is planted) are constructed at all outlets. The Subak outlet committee leader would open the outlet giving it required ventage according to the schedule and invoke God to safeguard the same. For fear of God the outlets are not generally tampered with. However, the cases of default, if any, are handled and punished for by the respective Subak committee with religious tinge. It is this aspect which is responsible for the system working wonderfully well for the last almost a thousand years. This is an excellent example of a successful and very old system based on traditional and facilitational approaches ensuring people's participation in sustainable integrated watershed management.

Sukhomajri Watershed Management Project

The Sukhna lake was artificially created in 1958 in Chandigarh in Chandigarh primarily for recreation. Due to the uncontrolled denudation of the hills in the catchment, the lake started silting up at an alarming rate and within a period of 15 years only it cost 60% of its storage capacity. During summers, many small silt islands would surface above the water level and would create serious hindrance in boating activity. To tackle this problem, a watershed management project in Sukhomajri village, located 35-km north-east of Chandigarh, was taken up in 1975. As a part of it, apart from adopting other measures, three 6-m, 12-m and 6.5-m earthen dams were constructed in 1976, 1978 and 1981 respectively for controlling sediment from the gullies and incidentally making 1.80, 5.63 and 0.90 hectare-metres of storages respectively available, which could be used for irrigating crops to enhance agricultural productivity. This situation gave clue to the new concept of watershed management for the mutual benefit of the catchment and the command where it could be possible to tie up the interests of the people in the command with the catchment as water, which is so scarce and valuable, is the product of the watershed. If the people continued with the practice of uncontrolled grazing and illicit cutting of vegetation from the hilly catchment, the small reservoirs would have silted up fast and there would have been no water available for irrigation. To take care of this aspect, Water Users' Association was constituted in 1980 which was subsequently renamed Hill Resource Management Society and was given the responsibility of protection of hilly areas from grazing and illicit cutting of trees, distribution of irrigation water among its members, and maintenance of dams and water conveyance system (Mittal et al, 1986). The notable feature of the management was that every family, irrespective of land owning and crops grown, had equal share of water. A coupon system was introduced to get water. The coupon could be traded or sold if the family was not able to use the water of its share. This was done to create stake for everybody in the project area. This is called hak-bandi (rule of right) and is a good model based on facilitated effort.

Watershed Management in Ralegan Sidhi

Ralegan Sidhi is a small village, with an area of 982 hectares and population of about 2000, located in Parner taluka (country) in Ahmदनगर district of Maharashtra. Prior to 1975 the village presented the profile of a poverty-stricken and debt-ridden society. The combination of poverty, unemployment, alcoholism, indebtedness, mutual suspicion, and use of money and muscle power for malpractices shattered the village economy and also

degraded the social/community life. Not even 30% of the foodgrain requirements could be met from rainfed monocropping practised in the village. About 45% of the villagers had a single meal per day and about 33% of the households missed their meals every alternate day. Scarcity of water was key to distress which limited the prospects of agriculture. In this critical situation Mr. Kishan Baburao Anna Hazare, popularly called Anna, appeared on the scene in 1975. He was shocked to see the pitiable conditions of the villagers, but instead of blaming the darkness he decided to light the lamp. He started with renovation of a temple for which he spent all his money, snapped all ties with his family, decided not to marry and started living in the temple. He initiated reform through religious moral undercurrent adopting Gandhian approach. Initially his action went unnoticed, but in due course his sincerity influenced the people and his activities gathered momentum. He organised the youth under Tarun Mandal (youth organisation) and with their help eradicated alcoholism from the village. An oath for giving up drinking was taken by the villagers at the temple, which served as a common platform for meeting for all without any consideration for caste, creed or economic background. The Gandhian dictum of personal morality, drawn from Hindu religion, is the first step for change. The country changes with changes in villages which in turn are effected by changes in individuals. This was fully recognised by Anna. He always stressed on consensus discussions in village assembly based on which he started with watershed management as the shortage of water was the most serious problem in the village. Five codes were formulated and imposed voluntarily – ban on open and uncontrolled grazing, stoppage of felling of trees, control on population growth, abolition of dowry system, and enforcement of prohibition. Structures were constructed to conserve every drop of water by using simple but effective technology through shramdan (voluntary labour). Five lakh trees were planted and ground water was recharged. Consequently irrigation potential increased from 0.5% in 1975 to 70% in 1985 and agricultural production increased by four times. Now there is enough food, fodder, fruit, firewood etcetera in the village not only for its own consumption but also for export. There is now an intermediate college, post office, bank, cooperative societies, solar street lights, low-cost village toilets, bio-gas plants, organic farming, training centre for watershed management etcetera in the village. Mahila Mandal (women's organisation) manages women-specific issues. The single greatest factor responsible for this change is the selfless, committed and sincere leadership provided by Anna. This is in fact the success story of poverty to prosperity and is a unique example of participatory sustainable integrated watershed management based on holistic approach (Sharma et al, 1996).

NORTH EASTERN REGION OF INDIA

The North Eastern Region of India, consisting of seven states endearingly called seven sisters, namely, Arunachal Pradesh, Assam, Meghalaya, Tripura, Mizoram, Manipur and Nagaland, lies between latitudes 21 57' N and 29 28' N and longitudes 89 40' E and 97 25' E. The total geographical area is 25.5 million hectares which is about 8% of the country's total area. The region is characterised by the high rainfall (annual average more than 2000 mm), hilly terrain and predominant tribal population. It is bestowed with rich natural resources of water, land and forest, but is still backward economically. The main problems of the region are floods in the plains and soil erosion in the hills, which are aggravated by watershed degradation (Sinha et al, 1994). However, through centuries, the

people of this region have developed some indigenous and unique methods of watershed management to meet their requirements. The systems make use of locally available materials and have stood the test of time proving to be sustainable. They are good from the point of view of resource conservation and environmental protection. Further, they are based on collective community efforts. Most of the operations like construction of earthen dams, embankments and channels etcetera, which cannot be undertaken individually, are taken up through collective approach and therefore induce the sense of unity, discipline and belonging among the people (Sinha, 1997). Brief descriptions of three of such models follow.

Watershed Management in Apatani Valley

The valley lies between two rivers at an altitude of about 1524 m in the state of Arunachal Pradesh. It is inhabited by about 20,000 persons of Apatani tribe. The remarkable feature is the fact that the population density in the valley is 554 persons per sq km as against an average of 7.5 persons per sq km for the state. This indicates the prosperity of the valley, which is mainly due to watershed management practice that the local people follow. The farmers practise paddy cultivation in terraces integrated with fish culture and finger millet crop on the ridges. Every stream rising from the surrounding hills is tapped soon after it emerges from the forest, channelised at the rim of the valley and diverted by a network of primary, secondary and tertiary channels. At a short distance above the terraces, the first diversion from the stream takes place. Usually only a little water is allowed to flow in the first feeder channel while the stream continues its course. The feeder channel branches off at angles leading water through the stream continues its course. The feeder channel branches off at angles leading water through the series of terraces so that by blocking or opening the connecting ducts (called Huburs) any field can be flooded or drained as required. The most important aspect of the management in low land paddy fields is to keep water layer on the soil surface at permissible depth. This is done by adjusting the height of the ducts in the fields. Nutrient and fertility management is done mainly through recycling of the agricultural wastes and fish channels are made in the terraces for preservation of fish during draining of water from the fields which is done twice during tillering, once during flowering and finally at maturity. A well marked division of labour is generally followed for various operations in farming. Menfolk usually take care of hard work such as constructing terraces and irrigation channels, fencing, removing earth and planting trees, while womenfolk look after nurseries, transplanting seedlings, weeding, fish management, harvesting, threshing, drying and storage. The system is working wonderfully well and it has not only helped economic growth but also led to the development of a distinct Apatani culture.

Bamboo Drip Irrigation System

This system has been in practice in Jaintia and Khasi hills of Meghalaya for the last about 200 years. This is very useful in the area where land is steeply sloping, water is scarce, soils have poor water holding capacity, topography is rocky and undulating, and crop water requirement is relatively low. In this system water is carried from the source at higher elevation with the help of pipes/channels made of locally available bamboo cut into different shapes and forms as per requirement and feasibility. Water is further distributed into different bamboo sub-channels for application at the desired site. The special feature of the whole system is that water is conveyed to site of actual use without any leakage or loss on the way. The flow of water thus carried is efficiently controlled. Water diversion from one channel to another is the

key to success and is done with great skill at every stage. Water trickles down drop by drop at the plant site. The system is useful for irrigating only a few low density plants like betel-vines, areca-nuts and black pepper planted on hill slopes. This system is an excellent example of the local people's skills and ingenuity.

Zaba Watershed Management

Zaba means impounding of water. This system was developed in Kikruma village in Phek district of Nagaland located at an altitude of 1270 m above mean sea level. The village comes under rain shadow area receiving 1625 mm of average annual rainfall. It is surrounded by two rivers on the south and the north. It is not feasible to construct terraces or irrigation channels across the steep slopes of the river valleys. The unique system was devised under the compulsion of such situation. The system has forest land on the top of the hill which serves as the catchment area, water harvesting pond in the middle, and the livestock yard and paddy fields at the foothills. Sediment retention tank is constructed at some point before runoff enters the storage pond. This is de-silted annually for proper maintenance of the system. Water is supplied under gravity. The cattle yard is washed with water which is then taken to paddy fields for manuring. Green manures are also used, but not the inorganic fertilisers. Agricultural operations are done manually. This system can be used elsewhere under similar agro-climatic conditions with suitable improvements by way of introduction of improved tools and implements, high yielding varieties of crops, chemical fertilisers, fish production in paddy fields, multiple cropping pattern etcetera. However, this again is an excellent example of sustainable integrated watershed management by indigenous community effort.

CONCLUSIONS

Sustainable integrated watershed management encompasses human as well as natural resources management. Its prime objective is poverty alleviation and holistic human development. It should be based on dominant cultural and value system prevalent in the concerned society. It should be people oriented and the local people should have a major role in planning and implementation of most of its activities. Empowering users and institutionalising their ownership of watershed management processes and programmes are the important key elements in ensuring people's participation. This calls for vision and mission on the part of all the implementing agencies. History has shown that such programmes can be successfully implemented if concerted, coordinated, determined and sincere efforts are made.

References

- Mittal, S.P.; Mishra, P.R.; Grewal, S.S.; and Agnihotri, Y. (1986), "Success story of Sukhomajri Watershed Management Project," *Indian Journal of Soil Conservation*, Vol 14, No. 3, December.
- Sharma, P.N. (1997), "Participatory processes for integrated watershed management," edited PWMTA-FARM Field Document No. 7, Participatory Watershed Management Training in Asia Program, P.O. Box 25, Kathmandu, Nepal.
- Sharma, P.N. and Wagley, M.P. (1996), "Case studies of people's participation in watershed management in Asia," Part I : Nepal, China and India, edited PWMTA-WMTUH-FARM Field Document No. 4, Participatory Watershed Management Training in Asia and Watershed Management in Tropics and Upper Himalayas/FARM Program, P.O. Box 25, Kathmandu, Nepal.
- Sinha, C.P. (1997), "Management of water resources under high rainfall and flood conditions," *Proceedings, IX World Water Congress*, Montreal, Canada.
- Sinha C.P. and Raghuvanshi, C.S. (1994), " Socio-economic evaluation of Bordikarai Irrigation Scheme," Report, North Eastern Regional Institute of Water and Land Management, Tezpur (Assam), India.