Watershed Development: Reflections on recent developments

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Introduction

Indian villages for the most part have traditionally relied on local rainfall for meting the water requirements for drinking, washing and other domestic purposes and for agriculture. A rich and varied array of techniques, adapted to local conditions, have been evolved over centuries for harvesting rain water and storing it in small surface storages and underground. These are still in active use but have been overshadowed by large reservoirs and energised pumping of groundwater made possible by technological advances in civil engineering and water lifting devices. In India, as elsewhere, the quantum of water harnessed by these means has expanded phenomenally and now far exceeds that obtained by traditional devices.

However it is becoming apparent that: (i) the demand for water for all uses has grown, and continues to grow, at an unprecedented rate; (ii) while supplies have increased, all parts of the country have not benefited from it; (iii) nearly two-thirds of the country's cultivated land depends wholly on rainfall; (iv) a large proportion of the population does not have adequate supplies of safe drinking water and many urban areas face acute problems of scarcity and poor quality of water; (v) the scope for augmenting supplies from surface sources is limited and diminishing even as there are clear signs that groundwater resources are being already over-exploited; (vi) competition between different uses and users for the limited supplies of water has increased in many areas and is likely to become even more intense in the future.

In this context, conservation and prudent use of water from reservoirs and underground is imperative. However, this measure alone will not be adequate to meet the needs of the major part of cultivated land (which will continue to depend on rainfall) or the growing needs for domestic use. The only way is to explore and exploit ways by which more of the local rainfall can be trapped and retained in each locality in the soil and underground. This in essence is what rainwater harvesting seeks to do.

Evolution of Rainwater Harvesting

That measures for soil and moisture conservation and improved dry farming practices are essential for raising productivity of rain-fed land – especially in relatively low rainfall tracts – has long been recognised. The government has actively promoted programmes for this purpose from the 1930s. The scale and scope of these efforts have greatly expanded since: Substantial and increasing amounts have been allocated to, and spent, on these programmes under the Plans.

There has also been a significant broadening of the concept to cover integrated development of all land and water resources on a watershed basis. This became part of declared official

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policy in the early 1970s. Substantial funds – over and above allocations for soil conservation and dry farming schemes under the Agricultural sector plan – have been allocated for this purpose under a variety of special programmes, e.g., DPAP, Desert Development, Wasteland Development, Integrated Watershed Development, and employment programmes. However, all these schemes do not seem to have made much of a difference to the overall picture of rain-fed agriculture: while productivity of irrigated land has been rising steadily, that of rain-fed lands shows little or no sustained improvement in most States.

Other than the government, a number of voluntary organisations have been doing pioneering work for rehabilitation of traditional local community, water supply works, and for construction of check dams, percolation ponds and other water harvesting devices to increase groundwater recharge. Non-Governmental Organisations have played an important role in spreading awareness of the importance of local water harvesting and watershed development in village communities. Many seek to facilitate communities to take advantage of funds available under various government programmes, make effective use of these funds, and ensure equitable sharing of benefits. Most of the NGOs emphasise and make a conscious effort to promote active community participation in these programmes. While the growth of NGO activity is impressive – some of them have achieved remarkable successes – they are still too localised and their spread too slow to make much of a dent in the overall picture.

Of late, rainwater harvesting for domestic use in rural areas and for domestic and non-agricultural uses in urban areas has also begun to attract attention. Harvesting of local rainfall can, it is estimated, provide adequate safe drinking water for the entire rural population even in areas with as little as 300-400 mm of rainfall. In urban areas, chronic and growing water scarcity and poor water quality is widespread. Public water supply systems typically can meet only a part of the requirements. A substantial part of the needs are met by private pumping of groundwater.

Unregulated expansion of such pumping has led to a progressive and, in many cases, alarming fall in groundwater levels. Unless this trend is reversed, even the present levels of supply from this source cannot be sustained leave alone increased. Many cities and towns depend on outside sources of supply brought from long distances to meet the demand. This is not only expensive but may not always be available in the measure required. They also give rise to or aggravate conflicts between agricultural and non-agricultural users. Under theses circumstances, measures to increase groundwater recharge through RWH in both rural and urban areas are essential. The need and scope for it is large enough to merit a purposive, concerted, and large-scale effort. Studies of the potential for RWH are now available for some major cities (including Delhi, Chennai, Bangalore, and Hyderabad).

Apart from the Tamil Nadu Government, which initiated a pioneering attempt in the mid-1990s to make RWH compulsory for certain categories of new buildings in Chennai, this option has so far not been pursued seriously. The impact has not so far been impressive. However, the severe drought of the past two years has resulted in a strong revival of interest both in the citizenry and in the government. During the past year, the government has greatly intensified its effort and support to promote RWH as a key element of its urban water supply programme.

It is worth pondering why this eminently sensible and promising idea of *in situ* conservation of rain water to meet basic needs for human consumption and increasing productivity of rain-fed land has not struck deeper roots, gained wider acceptance, and made a bigger impact. Based on material available in numerous evaluations and critical appraisals, one can identify three major factors: (i) Inadequate technical data and analysis for design of projects; (ii) paucity of credible and authentic data on the magnitude of impact on water availability and productivity; and (iii) institutional weaknesses.

Gaps in Information and Knowledge

The concept and rationale of water harvesting is deceptively simple. However, the potential for increasing the proportion of rainfall, which can be retained for local use as well as the measures needed to tap the potential depends on numerous factors: notably rainfall characteristics, terrain, present state of soil and vegetative cover, nature and depth of soil cover, and sub-surface geology. Other things given, the potential is likely to be larger, even in regions with low rainfall, if precipitation is seasonally well distributed and incidence of intense rainy spells is low. The potential is likely to be high in watersheds with gentle slopes and relatively even terrain; where forest/tree cover is thick and soil erosion is not significant; and where the soil cover is deep and made up of permeable material (sand and alluvium). In areas where the proportion of land under cultivation is low, more efficient water harvesting of local rain can make a bigger difference to the water supply for human and agricultural use. Given the immense variations in these characteristics both across and even within regions, the nature, scale, and mix of appropriate interventions will have to be tailored to specific conditions of each watershed.

Planning for watershed development requires data on the nature, conditions, and use of land and water resources at the micro-watershed level. Much work has been done in defining agro-climatic regions and sub-regions for the country as a whole. A classification of regions according to soil characteristics based on a nation-wide survey is available. Meteorological data are collected regularly in most *taluk* head quarters.

In most States, detailed data on land use, irrigation, and cropped areas are maintained on a continuing basis at the village level. The Agricultural Census, conducted under the auspices of the Ministry of Agriculture, compiles these data on a quinquennial basis, as well as data on input use for some years. Published reports give tabulations at the district and *taluk* levels. The primary data, which are supposed to be computerised, give a good amount of village-wise information. Soil quality ratings for land revenue purposes are also available at the village level.

Satellite imagery has been used to delineate different orders of watersheds right down to the micro- watersheds in several states. Maps based on this data, taken in conjunction with Survey of India maps and soil survey data, give an idea of terrain, vegetative cover, sub-surface geology, and land use within micro- watersheds. Studies indicating potential groundwater recharge areas and even sites for location of check dams and percolation ponds are also available for some micro-watersheds. Groundwater geologists have estimates of natural rates of recharge and sustainable rates of exploitation at a fairly disaggregated level

(up to blocks) and also some regional studies to assess potential locations and magnitudes of artificial recharge.

Compiling, collating, and correlating data from all these sources in a systematic manner would provide a great deal of useful data for watershed planning. A major hurdle to be overcome is the non-accessibility of much of this information (which is buried in the archives of various government departments and agencies). The data collected are not always stored properly so that retrieval is often difficult. Data gathering agencies are loath to part with data to users even within government and more so to the public. A concerted and purposive effort to overcome this hurdle is necessary to strengthen the database and deserves strong support from institutions like the Planning Commission.

At the same time, we must recognise gaps and inadequacies in the data. Part of the problem relates to the scope, design, and methodology of inquiry with a bearing on data quality and reliability. This is important in the case of statistics of land use, irrigation, and cropping, of crop yields and quantum of water extracted and used from different sources. The other problem lies in the level of detail and disaggregation at which data are available. Thus, the scale on which soil surveys, Survey of India ' topo-sheets' and maps based on satellite imagery are prepared (mostly 1:50,000 and occasionally 1:20,000) is too large for planning at the micro-watershed level. In some other cases, such as water extraction and use, depth, nutrient status and permeability of soils, the amount of water they can potentially store – reliable and validated data are not available even at the basin level. Data at the micro watersheds are simply not available.

There is much scope for expanding the coverage and improving quality of the existing hydrological data sources: a higher density of meteorological observatories, a larger number of points for measuring stream flow and water releases from reservoirs, and measurements of water levels and volume of groundwater extraction from a larger, representative sample of wells will help. They need to be much more transparent and open in making their techniques and data freely available to users. It would be rather unrealistic to expect government agencies to take the responsibility for providing detailed disaggregated data at the micro- watershed level. Much of it will have to be collected by local project agencies on their own or with the help of professional organisations outside government.

Continuing advances in remote sensing technology – in terms of resolution and interpretation techniques – can give more of location-specific data. Universities and research institutions should be encouraged and supported to play this role. They, together with concerned technical agencies of government, should also help in building a decentralised capability in local agencies to collect and interpret the relevant data. They can do so by specifying the key data needed for watershed development; devising and disseminating relatively simple methods and instruments for getting them; training of local personnel in using these techniques and the information for planning; and providing higher level expertise when needed.

Effective watershed development calls for a great deal of knowledge and understanding of the relation between rainfall, surface flow, and infiltration into the ground; different ways in which surface flow can be reduced and recharge increased; the manner in which they contrib-

ute to greater *in situ* conservation of rainfall individually and in combination; the mix of interventions appropriate to specific locations; the kinds of structures, materials, and designs for different works, which are technically sound and cost- effective; the measures needed to ensure that the works have the maximum, sustained impact on water availability, soil erosion, and biomass production. Knowledge on these aspects is far from adequate for a massive, decentralised watershed programme adapted to varying local conditions.

Several governmental organisations (Indian Council of Agricultural Research, Groundwater organisations of the Central and the State governments and the National Geophysical Research Institute, to mention but a few) are engaged in research on the rate of natural groundwater recharge, the potential for and techniques of artificial recharge; design of contour bunds, gully plugs, check dams, and percolation ponds; trees and vegetative cover for checking erosion in upper catchments and steeper slopes; and improved techniques of dry farming. Several NGOs active in this activity have evolved and tried different ways of tackling these aspects appropriate to local conditions; a few have also done systematic research to evolve techniques for better designs and materials. The ICAR also implemented, during the 1980s, some 42 model projects spread all over the country to demonstrate the benefits and potentials of integrated watershed development.

However, the scale and coverage of these activities has been limited. Often research tends to focus on particular aspects (e.g., groundwater infiltration, soil conservation, cultivation systems, and methods to use available soil moisture to maximum effect problems; designs of different structures) individually and not as part of an overall package. The experiments do not seem to be designed to assess relative merits of different interventions in different situations. At any rate, the results have not been analysed from this perspective. Despite these limitations, a systematic collation and review of the available research studies to distil such useful insights as they may have to offer and, more importantly, to make research better focussed and structured to serve the needs of watershed development is desirable.

Impact Evaluation Studies

Planning cannot of course wait for the results of these investigations. We have necessarily to do as best as we can with available facts and understanding and make modifications and improvements in the light of experience and the accumulation of research findings. Studies of the performance and impact of projects implemented by government and non-government agencies are therefore particularly important for building the knowledge base for watershed planning. Evaluation studies of performance of research findings based on field trials under diverse conditions are rare. A large number of evaluation studies of watershed development projects are available. The ICAR has published an evaluation of its 42 model watershed projects. A recent list counts more than 300 such studies by researchers and NGOs.

However, for the most part, these studies are of limited scope; methodology is unclear or defective; and the results far from definitive. Most studies refer to the number of check dams, gully plugs, soil conservation works, and percolation ponds, but give little information on the specification of component works, their designs, and rationale in relation to the specific conditions (terrain, rainfall, soil characteristics etc.) of the particular location. Prac-

tically none has much to say on the actual performance of these works in relation to design assumptions or about their relative costs and effectiveness.

Nor do they give a reliable assessment of the impact of different components of watershed development individually and collectively in terms of outcomes such as volume and quality of water supply for domestic use, land use patterns, and agricultural productivity and non-crop biomass. Many give data, based on farm surveys, of number of wells, area irrigated, crop pattern and yields (overall and for farms of different sizes) before the initiation of the project and immediately after its completion. Few give data on the volume of tree stock or output of crop residues and non-crop biomass. The design and methodology of these surveys are usually not spelt out clearly. Organisational and institutional aspects are discussed rarely and when they are, only perfunctorily.

Moreover, crop areas and yields depend on seasonal conditions. Typically they are not the same in the year before and the one after the project is implemented. Changes in output between the two points of time cannot therefore be taken as a reliable measure of the effect of the project alone: it is also affected by differences in seasonal condition. Thus if the pre-project year happened to have below-normal rainfall and the post-project year had a higher than average rainfall, a part of the increase in output must be attributed to seasonal conditions. A proper comparison therefore calls for data on average output for at least three years before initiation and three years after completion of the project. Even this would be inadequate to assess its long-term impact.

Improvements in soil moisture, stream flow, and groundwater regimes - all of which affect land productivity – may not be fully manifest immediately after the project works are completed and may take a much longer time to unravel. This is all the more so in respect of trees planted in upper catchments and contour bunds, which take a decade or even two to grow to their maximum dimensions. Because of these factors, it is difficult to provide credible and validated information on the magnitude of benefits which watershed development can bring to their communities in order to stimulate wider public interest in the programme.

Impact evaluation studies of watershed projects must therefore be considerably broader than what is currently available in terms of scope, (covering water availability and use, crop production and non-crop bio mass by way of trees, grass, and crop residues) carried out over a fairly long period beyond the completion of a project. Moreover, these evaluations need to be properly designed and carried out by professional organisations independent of implementing agencies.

Such in-depth long-term evaluations are expensive and difficult to organise on a large scale. Nevertheless, it is possible and necessary to get them done in a selected small number of micro-watersheds based on a broad typological classification of watershed. They are the best way to get reliable and credible assessment of immediate and sustained impact on different aspects of watershed ecology and production systems, and to better understand the role of various elements individually and in interaction with each other.

We cannot, however, afford to wait for 10-15 years for such data to be generated by such studies. Other ways of demonstrating the impact within a shorter time need to be explored. One such approach, which seems promising and technically feasible, is to make a list of watersheds in which soil and water conservation works have already been carried out. From this list, a selection covering different agro-ecological regimes can be made of projects, which, on informed assessment, are considered 'successful'. For comparison purposes, a contiguous watershed where no intervention has taken place could be chosen.

Satellite imagery of land use/cropping and greenness index for both sets covering the pre-intervention phase and say 10-15 years thereafter could be used to assess the difference in respect of the extent and quality of forest/tree cover, intensity of land use and crop patterns. This could be supplemented by sample surveys of farms in the two sets to ascertain details regarding crop and crop residue yields in recent 'normal' and drought years. Demonstration that watershed development, properly done, could make a significant difference is important to make people more interested in the programme; but not enough. All the land – private and public in the watershed – has to be viewed as a totality and plans geared to get the maximum increase in water availability and output.

Institutional Aspects

The third major area of weakness is in organisation and management. How much and how sustained these improvement are depends not only on the appropriateness of the works and the quality of their design and construction but no less on how well they are maintained and managed.

Government has been, and remains, the dominant player in this sphere. Most schemes bearing on watershed development are decided, planned, and executed by government agencies. There is a plethora of such schemes of varying scope under several agencies working in parallel, independently of each other and with little interaction between them. Moreover, even under integrated watershed programmes, different components are decided and implemented by functionaries of concerned line departments independently of each other.

Following the Report of the Hanumantha Rao Committee, the government has declared its commitment to integrated watershed development with community participation. Attempts by several states to achieve 'integration' by restructuring the organisation of the programme have been fitful, half-hearted, and unsuccessful. Neither the Centre nor the state governments seem willing to seriously consider suggestions for scrapping the existing schemes for land and water development and replacing them with a single unified programme for integrated watershed development.

It is apparent from the unusually frank and honest assessment of the Planning Commission in its paper on Approach to the Tenth Plan, that little has changed at the ground level. Integrated watershed planning remains only on paper. Watershed-related programmes, or elements of it, are still carried out by parallel agencies independent of each other. Under any given programme, components of watershed projects at the ground level continue to be planned and implemented by line departments. Departmental agencies pay scant attention or

concern in the maintenance of completed works or monitoring their impact either on their own or through local community-based institutions.

The problem, however, is not only or even mainly one of reorganisation within the government. Equally important is the interface between government agencies and the watershed communities. Active involvement and participation of the latter is now recognised as crucial for the success of these schemes. The 'expertise' of officials is far less than presumed and their knowledge and local conditions, problems and potentials of watersheds even more so. A good deal of this knowledge (though not all especially when it comes to solutions) is available within each community. Combining it with outside technical expertise will contribute greatly to designing interventions appropriate to specific needs of each watershed. Moreover, outside agencies, especially the state bureaucracy, are not capable of ensuring proper management of watershed resources on a continuing basis. These tasks are best left to the communities themselves.

Active involvement of communities in the process of planning and implementation is essential for them to understand its rationale and appreciate the necessity for formulating clear rules for continuing management of the watershed (maintenance of works, regulations concerning land and water use, and sharing of the increased supplies of water and of usufructs and biomass especially on common land) and that the rules are observed. This is now well recognised in policy statements and Plan documents. In point of fact, however, there is a marked scepticism about its feasibility or even its desirability.

The extent and quality of community participation in government watershed programmes is very weak and in most cases nonexistent. Some attempts at reform are nevertheless being made. Thus in the case of Andhra Pradesh, the state agencies are given the central role on the ground that communities do not have the required knowledge/experience. However, a formal structure for consultation has been created by setting up watershed committees made up of people from the community. How widely such committees are constituted is not known. There is a widespread impression among those familiar with the ground realities of the programme that these committees are not representative; 'consultation', to the extent it takes place, is perfunctory; and the committees have little role in determining the content of the programme, its priorities, and implementation. They have little say, not to speak of control, over decisions regarding the disposition of funds or award of contracts.

Under these conditions, it is difficult to see how participation in the watershed committees would help the community to become familiar with the issues involved and ways to tackle them and eventually equip them to take over the responsibility.

The Madhya Pradesh approach is much more promising: there is more of a conscious emphasis on restructuring the government programmes to eliminate fragmentation and duplication of schemes and funding at different levels; the government agencies seem to play more of a supportive role with the community being given a much wider say in deciding the content of the programme, the disposition of funds allotted to them, and in the arrangements for execution of works. Here the problems deserving attention are the quality of knowledge and expertise brought into the planning, inducing the communities to share a substantial part of the cost

of development and, more importantly, devising effective institutional arrangements for continuing management of the watershed.

People's Participation

Indian villages have had, and continue to have, functioning informal mechanisms for several community activities such as settlement of intra-community disputes, conduct of temple and village festivals, and management of tanks and other community assets. Integrated watershed management for sustainable and equitable development of natural resources is undeniably more complex – technically and organisationally – than the above activities. Traditional arrangements were neither designed nor equipped for integrated and sustainable development of local natural resources. It is also true that these arrangements have undergone far reaching changes due to a combination of factors - the strong and active presence of state agencies in villages; increasing demographic pressure; changing caste composition of land ownership; wider and growing interactions with the outside world; and the spread of education and political consciousness. Nor were they particularly sensitive to or concerned about inequalities in the access to resources and livelihood opportunities characteristic of rural society. The moral and political imperative of addressing the needs of the poor and the underprivileged have become more compelling. All these factors have weakened the authority and power of traditional community institutions. Experience has shown that government and its agencies are not better equipped to handle these problems. Getting existing community institutions or creating new ones to manage the complex tasks of watershed management at different levels is a big, in fact even bigger, challenge than remedying the technical lacunae or ensuring that the necessary expertise, knowledge, and skills are made available to the communities.

Experience of several NGOs gives room for optimism about the prospects of community initiatives in resource management. A large number of NGOs – a recent directory compilation by CSE tests some 350 of them - are actively working in promoting water harvesting. They vary in scope, scale, and orientation. Most of them operate in a relatively small number of communities. But some (like Swadhyaya and Swaminarayan organisations, Dhan Foundation, and Tarun Bhagat Sangh) cover several hundred villages and have acquired the characteristics of mass movement. Most emphasise community participation but their strategies vary.

For example the Dhan Foundation has a two-pronged approach: It seeks to stimulate and mobilise the latent interest of communities in rehabilitation and improvement of existing tanks, their main source of water for irrigation and domestic use. Simultaneously they intercede with government agencies to release resources from various official programmes to the communities in which they are working and to facilitate a larger, more meaningful, role for the communities in implementing them.

Dhan's personnel needed expertise on technical matters, administrative procedures, and legal aspects. This has led to significant community contribution to and participation in implementing improvement works, successful community efforts, without much direct intervention by state agencies for removing encroachment of tank beds and inlet channels. In many

cases, the success of community initiative in tank- related matters has stimulated interest and action and in more comprehensive watershed approach to land and water development as well as other local development programmes.

The work of Swadhyaya and Swaminarayan movements and other organisations for promoting rainwater harvesting in Gujarat would seem to follow a similar approach. A large number of village communities have been mobilised to fight drought by constructing check dams and percolation ponds to increase groundwater recharge. Their reach and scale is wider, the emphasis on community contribution is stronger.

There are also some instances of successful watershed development based almost entirely on community initiatives and efforts. Sukhomajri, Relegaon Sidhi, and Daltonganj are some well-known examples. In some cases (eg. Ralegaon Sidhi and Pani *panchayat*), as their achievements became known, several other communities in the area have begun to show active interest in adopting it. Anna Hazare, Soppecom, and other NGOs are in the process of replicating the approach on a wider scale.

Tarun Bharat Sangh's programme in Alwar district of Rajasthan is another striking example of local water conservation and development based entirely on local knowledge, skills, and resources. It has greened an extensive area covering more than 500 villages in the Arvari basin. It has also created a functioning institutional network to make and enforce rules of allocation between villages, and to settle disputes. By all accounts the results, in terms of water availability in dry seasons and even drought years, crop production and regeneration of tree cover are striking.

The experience of NGOs shows that awareness of the wastefulness of government programmes is increasing and becoming more widespread in village communities; that dissatisfaction with the way these programmes work is inducing them not only to be more vocal in articulating their dissatisfaction but also to take a more active role in the programmes by taking up the responsibility for construction and being prepared to contribute a substantial part of the costs of local development works. There are numerous instances, which unfortunately remain to be systematically documented, to show that public works done with community participation are more relevant, cost substantially less than works done on contract, and of better quality. The community also has greater sense of stake in such works.

Future Directions

Clearly, much is wrong with the current programmes of watershed development: They are dominated by the government agencies; the programme formulation as well as implementation is fragmented, poorly monitored, and open to enormous waste and leakages; the quality of technical knowledge and expertise, which goes into the programme leaves much to be desired; so do the arrangements for continuing management of works and resources. Affected communities have practically no role or stake in the programme. There are signs that local community interest and initiatives harnessing and using local water resources to greater effect is growing and spreading in different parts of the country. However, these initiatives, and the NGOs who foster them, are hampered by difficulties of accessing government re-

sources and numerous constraints – legal, financial, and institutional – impeding effective use of the resources.

There is urgent need to address these deficiencies by replacing existing programmes with a single unified watershed development programme starting from the micro-watershed; taking steps to improve the information and technology base for watershed planning; consciously change the role of government agencies from one of deciding the programme details and implementing and managing the works, to one of providing, in conjunction with NGOs, the required technical support to village communities; and create an environment conducive to active community participation in all phases of the programme.

Devolution of the responsibility for local development (including watershed development) along with authority and resources to democratically constituted representative local governments, desirable on several other grounds, will also help strengthen community management of watershed resources. This in essence is the rationale of the 73rd and 74th constitutional amendments. Progress in implementing even the letter of these amendments, not to mention their spirit, has been halting.

Many States have not even held elections to local bodies. Some have not only held regular elections but a few have made serious attempts to empower local bodies in varying degrees and different ways. Even in these cases, effective devolution of power and resources has been limited and heavily circumscribed. A major impediment is strong resistance from politicians at the state and the central levels as well as the bureaucracy who stand to lose the considerable power they have under the existing arrangements. The complex mechanisms for transfer of resources, the multiplicity of development schemes for which central and state governments give assistance and the rigid conditions regarding scope and content of each scheme limit the scope for local initiative.

The mere fact of consultation with and involvement of people in decision-making does not ensure that they will be willing to take up the responsibility for management. For several reasons:

(i) They need to be convinced that watershed development will make a significant difference to the overall livelihood opportunities and incomes of the community. For this purpose, validated data based on actual experience is essential, lack of which makes it difficult to enthuse communities to take active interest in watershed development. Where the conditions are not yet propitious for community involvement in comprehensive watershed development, a prudent strategy would be to focus on mobilisation around particular components (such as rehabilitation of existing water sources, upper catchments, and common lands) and expand the scope progressively.

(ii) Communities know much about conditions of local resources and problems experienced in their utilisation. But locally available knowledge and expertise needed to make use of the resources to maximum collective advantage is generally inadequate. Measures to fill these gaps by collecting more and better data, research and training in government and in NGOs are needed.

(iii) Interventions in a particular watershed often impact beneficially or adversely, on neighbouring and downstream communities. These externalities cannot be handled at the micro-watershed level; they call for a broader perspective covering plans for groups of communities forming part of a higher-level watershed. Watershed planning has to be organised in different tiers from micro through macro watershed through to sub basins and basins. The state has the responsibility to lay down guidelines and mechanisms to handle these aspects.

(iv) If the entire cost is borne by the government or other external agency, the sense of stake on the part of the community in the project is apt to be weak. It is therefore important to insist on the community sharing, in cash or in kind, a substantial part of the costs of the development. The larger its contribution the greater will be the incentive for the community to address seriously the task of maintenance and sharing of benefits and costs.

(v) Watershed development works affect the productivity of different kinds of land and their owners differently depending on how the augmented supplies of water are allo cated among them and how well they conform to the desirable patterns of land use. It is therefore necessary to have (a) clear rules regarding land use and cropping, sharing of responsibility for maintenance of structures/trees, and access to increased water availability and biomass among various groups in socially equitable manner; and (b) a credible mechanism to ensure that the rules are observed and enforced in a fair way.

The last one is perhaps the most important and most difficult in a situation, typical of most parts of the country, of intense demographic pressure, pervasive caste and class differences, and existence of a large, socially underprivileged and asset-less and asset-poor segment in the population. Equitable sharing of benefits, and in particular ensuring that the poor and underprivileged get a fair share in the benefits, is therefore an important issue. Some see equitable sharing of incremental benefits as crucial both on ethical grounds and for the continuing viability of community efforts. An extreme view is that without a radical land reform, democratisation of village politics and community-centric local development will not be possible at any rate not sustainable. A minority view is that distributional equity need not be an overriding consideration and that increases in the community's overall production and employment from improving soil quality and water availability would also benefit the asset-poor and the underprivileged.

Villages in India vary a great deal in caste composition, configurations of power, and ability of the underprivileged to voice and press for their interests. While the stereotype of upper caste-large land owner domination over village community is by and large valid but not uniformly and everywhere. There are indeed villages where feudalism of the worst type is still in place. However, as pointed out earlier, a variety of forces have eroded traditional power structures, and given greater political voice and space for the poorer, lower castes and communities but in varying manner and degree. Since property relations are unlikely to be altered in any significant measure, conflicts over priorities of local development and 'fair' sharing of benefits cannot be expected to conform to a standard pattern. Rather they will

have to be sorted out through a process of negotiation and compromise within each community. Electoral democracy at the local level facilitates this process and permits periodic renegotiation of entitlements hopefully in the desired direction.

The state can affect the process to a significant extent by ensuring free and fair elections, mandatory reservations in electoral office for the underprivileged, vesting all non-private land with the community and requiring that the benefits of improvements on common lands be reserved for the asset-poor and underprivileged sections and increased water availability is used to assure them of a minimum to meet their requirements. But it cannot legislate a uniform institutional pattern into existence in all cases. The strategy for institutional change has to be selective and differentiated. This has indeed been the case with NGO initiatives.

There is much to be learnt from a critical and objective study of their experience – successes and failures. We have some informative general accounts of such experiences. But one would like to see more by way of systematic documentation and assessment of their working, the extent to which they have had led to a broadening of approach to planning for local land-water development; whether distribution of the benefits of water conservation has been a problem and if so, how they have been handled; the nature and working of institutions for continuing management and the extent to which their activities have stimulated community initiatives and involvement in other local development problems. The scope for NGO in this sphere will be greatly enlarged if the government's programmes were rationalised, made community- centric, and communities enabled and supported to solve their problems on their own.