Watershed Development in Maharashtra: Present Scenario and Issues for Restructuring the Programme

Abraham Samuel, K. J. Joy, Suhas Paranjape, Sowjanya Peddi,
Raju Adagale, Prafull Deshpande and Seema Kulkarni

Society for Promoting Participative Ecosystem Management (SOPPECOM), Pune
Forum for Watershed Research and Policy Dialogue

TABLE OF CONTENTS

The concept of integrated and participatory watershed development and management has emerged as the cornerstone of rural development in the dry and semi-arid regions of India. Over the years the country has been making increasing investments in this area with the objective of enhancing the production potential of rainfed agriculture. Even more ambitious plans have been made for the future–the government has set a target of Rs.76,000 crores for the next 25 years.

In all likelihood the dry lands of India, hitherto neglected from the mainstream development process, would receive added attention in the years to come if we have to go by the recent pronouncements by the central government. The National Common Minimum Programme (NCMP) of the United Progressive Alliance (UPA) government states that, "the UPA government will introduce a special programme for dryland farming in the arid and the semi-arid regions of the country. Watershed and wasteland development programmes will be taken up on a massive scale . . . all existing schemes for drought-prone area development will be reviewed and a single major national programme will be launched". The Prime Minister Dr. Manmohan Singh has announced the government's intention of setting up a Rainfed Areas Authority. Thus we can say that a new generation of watershed based development projects are going to be launched in the country.

At the same time there are mixed feelings about watershed development programmes and what they have achieved. While many now consider them to be the linchpin of rural development in dryland areas – one that integrates sectors and provides the foundation for subsequent development – there are growing murmurs about the effectiveness of watershed development and a feeling that they are falling far short of their promise. In fact the Hariyali guidelines, came into effect in 2003, are already under review by the 'Technical Committee on Watershed Programmes in India' (Parthasarathy Committee) appointed by the Ministry of Rural Development and a new set of guidelines for watershed development projects is expected to come into existence.

As we enter this new generation of watershed-based development programmes with such heightened targets and expectations, it is important to ensure that the experiences from the first generation of widely implemented watershed development are fully understood and internalised. It is important that the practitioners, researchers, policy makers, implementers and funders come together and initiate a discussion on how best watershed development can achieve its potential and become an important instrument of bringing about a sustainable and equitable process of participative development in the rural areas.

The present review of watershed projects in Maharashtra, undertaken by Society for Promoting Participative Ecosystem Management (SOPPECOM), on behalf of the Forum for Watershed Research and Policy Dialogue (ForWaRD), hopes to contribute to this process. It may be noted at the outset that the present review of watershed programmers in Maharashtra is not an attempt to evaluate nor assess the impact of the large number of watershed projects that have been implemented in the state. Rather, this is more or less an exercise in stock taking and learning from the past. Even though the review makes an attempt to provide a 'bird's eye view of achievements' of watershed projects in the state, the focus is on situating the programme in the context of the larger developmental objective of sustainable and equitable livelihoods in rainfed areas. In this larger context, the stock taking exercise has been carried out with a difference where the status of watershed development is being examined through the lens of a normative framework that lays special emphasis on productivity and livelihoods, equity, sustainability, and participation/democratic decentralization.

The present review of watershed development programmes in Maharashtra is also an effort to build on the earlier effort by Joy et al in 2003-04 (Watershed review: Issues and prospects brought out by CISED as Technical Review in 2004) which reviewed the watershed programmes in the dry land regions with a focus on Karnataka and Maharashtra. The review is based mainly on the existing sources of information (studies, reviews, reports, data available with different state departments etc.), which in fact, are quite scanty. There is also a serious problem of availability of such information in the public domain, besides inconsistency in information/data on issues related to the spread/coverage and physical and financial progress of projects. Nevertheless, we have tried to overcome the constraints in qualitative information, at least partly, by holding detailed discussions with a large number of key informants and also by visiting a few sites of selected

watershed projects.

1.1. Watershed Development in Maharashtra

Watershed development has a long history in Maharashtra. In Bhandara age old tanks, some around 500 years old, exist and are managed today which support a much superior cropping pattern there than in the rest of the state. Traditional water harvesting and diversion structures for purposes of artificial irrigation have been excavated in Central Maharashtra (Ahmednagar, Dhule and Pune) estimated to date around 1500-1200 B.C. Social reformers and public intellectuals of the state have exhorted the importance water conservation since centuries. With the Abolition of Proprietary Rights Act (APRA) enacted in 1950, rights over tanks was transferred from the *malguzars* and local village communities to the irrigation department and the zilla parishads which were not equipped to address the maintenance and repair problems of these tanks adequately. Subsequently, during the British and post-independence period, major emphasis was on construction of large reservoirs and dams.

Maharashtra has a large drought prone area (52%) and has faced recurrent droughts and famines (1907, 1911, 1918, 1920,1972 etc.), which generated attention on the improvement of agriculture in non-irrigated areas. The Bombay Land Improvement Schemes Act (1942) became the precursor for the Government of India's Model Bill on Soil Conservation for enactment by all states in the post-independence period. Following the 1972 drought, the Employment Guarantee Scheme (EGS) was initiated in the state and subsequently Comprehensive Watershed Development Programme (COWDEP), in 1982, which saw the first steps in the direction of a systematic watershed development approach within government programmes. Ralegan Siddhi and Adgaon in Maharashtra were the initial NGO successes that popularised these 'model-villages' with watershed development as the central theme and they shot to fame even internationally. Today there are a large number of programmes being implemented in the state through central financial assistance such as Drought Prone Areas Programme (DPAP), National Watershed Programme for Rainfed Areas (NWDPRA), River Valley Projects (RVP), Integrated Wasteland Development Programme (IWDP), Western Ghat Development Programme (WGDP), state supported programmes such as Integrated Watershed Development Projects (IWDP) Adarsh Gaon Yojana (AGY) and bilateral programmes such as Indo-German Watershed Development Progrmamme (IGWDP) besides a number of projects being implemented by Non Governmental Organisations (NGOs) with financial support from local and foreign sources. Almost all these programmes have institutionalised the watershed approach to treating lands and water harvesting in association with people's participation to enhance the production potential of rainfed farming. With Maharashtra's estimated potential of surface irrigation not expected to cross 30% of the cropped area (in conventional sense), the importance of watershed development as a bulwark for rainfed agriculture is obvious in these large tracts of drought prone lands.

There are in all around 44,185 micro watersheds in Maharashtra. According to estimates around 67% of the geographical area requires watershed treatments. Around 26,713 micro watershed programmes have been started in the state since 1992 out of which 8,322 have been completed. Regionally, 23% of the programmes are in Vidharbha region, 8% in Konkan and 69% are in the drought prone regions of Maharashtra. Eighty three per cent of the projects are under the IWDP (State) having 22,302 micro watershed development programmes followed by DPAP (909), NWDPRA (917), EAS (1549) and AGY (645). About 522 NGOs are involved in implementing the DPAP programmes, 766 NGOs in the implementation of EAS programmes whereas all projects under AGY, IGWDP, CAPART etc are implemented through the NGOs. However we should state that there are some discrepancies and inconsistency in the data available on status, progress and coverage of watersheds.

For the state as a whole, of the total land available for watershed development, 29.50 per cent had been treated by 2002 while above 70% of lands remain to be treated. In Konkan 30% land available for watershed has been treated, in the Vidharbha region 21% of the land has been treated and in the rest of Maharasthra, 33% of the land available for watershed has been treated. State programmes accounted for 64% of the total expenditure. The expenditure figures from 1992 shows that the distribution in different regions has fairly corresponded with the size of area to be treated in these regions. About 10% of the total expenditure has been in Konkan region, 69% has been in the drought prone region and 21% has been in Vidharba region. Out of the 16,678 incomplete programmes, 1,344 are in the dark and grey areas, 3,060 are in the drought areas, and 7,681 are in the tribal areas. These incomplete watersheds are prioritised by the state for additional investments and completion.

An analysis of the expenditure pattern for different treatments shows that construction of nala bunds and masonry dams has been one of the important treatments. For example, in many government supported projects, around 60% of the expenditure has been on nala bunds both earthen and masonry structures ignoring soil conservation and moisture improvement. There are also some projects like Indo-German Watershed Programme (IGWDP) where there is a ceiling on expenditure on water harvesting structures Of course this is not to deny the fact that some of the measures (like gully plugging, continuous contour trenches etc) do not check soil erosion and *in situ* conservation. Plantation has received very little

importance overall and where there has been expenditure on plantation, the survival rate has been very low. Data from the evaluation of watershed programmes in the Vidharbha region by Dharamitra also shows that among PIAs there has been an excessive emphasis or focus on creating multiple water harvesting structures at the cost of undertaking effective land treatment and *in situ* conservation and amelioration. When the emphasis is on water harvesting structures, what is generally reported as area covered also becomes a problematic issue.

1.2 Impact of Watershed Development programme

1.2.1 Impact on ecosystem and livelihood

Impacts on many aspects have been documented and they range from bio-physical impacts such as a rise in water table to wide ranging changes in the economy and even social changes in certain places. Data have been reported on various parameters: increase in crop area, cropping intensity, increase in crop yields, change in cropping pattern, increase in irrigated area, increase in the productivity of common/waste lands due to increase in green cover and therefore increase in fodder and fuel from them, change in fodder/fuel consumption (both in terms of quantity and pattern) due to change in the land use or change in cropping pattern, change in livestock composition due to the above, change in water levels leading to changes in withdrawal rate, increase in number of wells, improvement in water quality, improvement in soil quality and reduction in soil erosion, improvement in environment, improvement in employment opportunities, changes in labour requirements, changes in income levels and livelihoods and finally changes in socio-economic structure of the community.

Most of the available literature document many or some of these impacts in a somewhat *ad hoc* manner. The data are often impressionistic and lack rigour. Very few studies have based themselves on rigorous benchmarks established beforehand and compared them with values obtained later. Most have relied on recall and perception of respondents of the change or impact. Even fewer have tried to explore the links between the initial soil and water conservation conditions, treatments and the later processes that lead to final impacts. The chapter on impacts shows that watershed programmes, if implemented scientifically, certainly assure positive changes in a few physical parameters such as an increase in water table, availability of biomass, increased duration in stream flow and a decrease in soil erosion/run-off. It is also observed that soil erosion in non-arable lands reduced when investments were higher in such lands. The review also shows that watersheds where proper area treatments were undertaken could tolerate longer drier spells. In most of the watersheds for which information is available, water level and duration of water available in the wells have increased. However, we should note that most of the projects for which information available are the promising ones. The review finds that watershed development has improved livelihood opportunities for watershed communities though the degree of improvement varies from the spectacular to the “now not very good”. The review finds that agricultural production has improved in most of the watersheds, but the aggregate information fail to reflect the impact on different class of land and for different socio economic categories. One cannot also attribute the improvement in production as an outcome of watershed measures alone. The distribution of benefits has not always been even, and there are also reversals though in all cases some livelihood improvement has carried over. On the whole, watershed development shows significant impact in better years, but has not mostly been able to insure against bad years. In certain cases conflict between drinking water and irrigation needs has been accentuated by watershed development. In many watersheds the problem of drinking water could not be addressed effectively and going back to tanker days is observed. Though watershed development has brought down migration in the initial phases, the post-project phase does not show a uniform trend and in some instances availability of work has been reduced. One of the most neglected area, observed in the review, is the development of common property land resources (CPLRs) and the potential of creating biomass based livelihoods and wherever biomass development has been undertaken it could not produce the desired results due to low survival rate, inappropriate technology and lack of institutional and administrative mechanism of management and usufructs. Lack of coordination and support from forest department is also one of the major reasons for non-development of CPLRs.

1.2.2 Impact on sustainability

The review shows that there has been a beneficial impact of watershed development on watershed ecosystems: soil erosion has been checked, land cover has improved, and groundwater recharge has increased. Together with this, the number of wells, especially bore wells also have increased considerably and there is no corresponding social regulation of water use. There are a couple of instances where cultivation of water intensive crops is not encouraged and digging of bore wells is banned. The available evidences show that resource exploitation (especially of ground water) and nature of agriculture production in a specific watershed is closely related to the mode of agriculture production prevailing in that area. Ground water exploitation and high external input agriculture is widely prevalent in watersheds in the scarcity zones

where agriculture is greatly in a 'capitalist mode of production' as compared to watersheds in the tribal areas. The culture of the community also has an impact on these issues related to resource use.

In many watersheds, non-cropped area is brought under cultivation, and there is a shift away from food crops without an accompanying shift to sustainable crop practices. Watershed activity is possibly showing up in decreased flows into downstream tanks and reservoirs. Drinking water is increasingly being met from deeper aquifers. However, many of these phenomena have not been adequately studied; neither have there been many water balance studies.

While the provision of the Watershed Development Fund (WDF) is a step forward in providing financial backing for the institutionalisation of repair and maintenance of the structures created in the watershed programs, the challenge of operationalising the fund lies largely unexplored as of now. Presently, many projects have significant amounts lying in their WDF accounts – the balances in the fund vary widely from as low as Rs. 5000 to lakhs for certain watersheds. However, presently there is lack of any guidelines and an ambiguity regarding the right to use the money and the purposes to which it can be used. It is generally noticed that very little of it is being utilised even when structures need repair. Delineating the procedures, rights and purposes clearly is an immediate requirement to ensure against misappropriation as well to enable its proper utilization for maintenance of the structures. In almost all instances the local organisations and institutional arrangements promoted as part of watershed development is also not sustained beyond the project period.

Sustainability is an issue least articulated and operationalized as the review suggest. Most often the indicators that are used to judge the success of watershed itself is at loggerheads with issues of sustainability. It is necessary to operationalize a set of criteria related to sustainable impacts including issues related to 1) sustainable productivity enhancement measures, 2) regulation of biomass extraction rate, 3) planning watersheds on the basis of ridge to valley without taking a dogmatic position about it, 4) being aware of the balance while planning run-off suppression measures, 5) studying and monitoring unintended hydrological effects, 6) regulation of ground water extraction, 7) undertaking integrated planning, prioritisation and social regulation of water use, 8) make applied water part of project design and above all 9) designing and facilitating appropriate institutional and organisational mechanisms to facilitate sustainable use of resources and impacts.

1.2.3 Impact on equity

In respect of equity, the review finds that by itself, watershed development accentuates inequity: favours the landed and the lower reaches; as well as those who have the wherewithal to invest in wells and pumps. In some cases, measures like bans on grazing and cutting trees, closing of commons, and a ban on keeping goats, which are imposed from above, have hit the rural poor, especially the Dalits and landless, very hard. However, it also finds now a greater awareness of equity issues related to the landless, the women, the Dalits, and the marginal farmers. However, it often sees the solution as non-land based income generation activity (watershed plus), unrelated to watershed development. There is a need for the resource poor to be ensured a share of the increased resources that watershed generates.

Employment during the project period remains the only important benefit to the landless with no clear and general evidence of sustained increase in work availability once the programme related work has been completed. As agriculture develops it is also noticed that mechanisation is taking the roots slowly. At most places, migration for employment completely halted at least during the project period. While the condition of the small landholders might improve as their lands become more productive and are cultivated across the year, the situation of the landless can improve only with further determined interventions. Only at a few places the landless have bought land in the watershed. At places such as Ralegaon Sidhi labour was employed from nearby villages (or permanently immigrated) due to the sustained increase in agriculture production either because of bringing in additional lands under crops (through irrigation) or due to an increase in the cropping intensity. However in Ralegaon Sidhi, external water from the canal is also used for irrigation. The projects also differed in their approach to granting land rights to the landless. While some NGOs see the provision of land to the landless as a way to resolve the inequitable resource access in the watershed, others believe in lifting encroachment by the landless to free CPLRs for regeneration. Development of CPLRs and issues related to user rights are one of the most neglected areas in the watershed development.

Increased awareness of gender has led to establishment of self help groups (SHGs) that have helped women save, obtain credit, and become more active and visible. But this activity has not become an integral part of the watershed development and has had little impact on traditional gender roles. Women SHGs role in watershed development is not very clear, and nor there are efforts to integrate this institution in the planning and implementation process of watersheds. In some projects women are nominated in the watershed committees, but hardly they have any space in the decision-making. Considering 'women' as homogenous entity also has its problem in addressing issues related equity.

1.2.4 Watershed development and participation

Similarly, the review finds an increased awareness of the need for participation. However, it is mostly viewed as a means to obtain co-operation, raise efficiency, and gain legitimacy rather than an empowering objective in itself. Participation is operationalized in an instrumental way, which creates problem for real empowerment and democratisation. Much of the decision making still remains in the hands of the development agencies and Community Based Organisation (CBOs) function mostly as implementers of decisions taken by the Project Implementing Agencies (PIAs) and Watershed Development Teams (WDTs). It is also observed that the culture and philosophy of the PIAs greatly influence and determine the way participation is facilitated. In the comparatively newer projects, there is greater emphasis on providing representation to all social groups and hamlets on multiple user committees for sectoral interest groups. However, participation of the local communities in crucial decisions has been pretty dismal along with control over fund allocation and expenditure. Major decisions are taken (beforehand) by PIAs and consultation with local people is often synonymous with consultation with the "powerful".

Participation needs to be more clearly defined so that the responsibility of the PIA can be pinned down accurately in terms of the specific tasks and activities that need to be undertaken for effective community organization and participation in the programme. More than 50% of the NGOs seem to have failed to effectively mobilize community participation in the programmes. The Agriculture Department also was poor at community organization and often villages were rejected on the criteria that they were not co-operative, whereas the villagers were not even aware of the purpose and content of the programmes. The ones which are successful in the beginning to kindle interest and encourage participation often get sandwiched at a later stage between the community's expectations from the programme and the DRDA's procrastination.

Treating cost sharing as an indicator of participation is also problematic. Though the core idea of cost sharing ensuring people's commitment may be acceptable, the issue of the quantum is not. Resource poor sections may be "priced out" of the programme because they cannot afford the contributions. Sometimes contributions come from withheld wages or from reduction in wages. Effectively this means that the poor, pay on behalf of the landed. Participatory Rural Appraisal (PRA) is being increasingly used as a tool for data collection, to enlist local participation and to capture local development priorities. Even when not reduced to a bureaucratic procedure it is problematic because often it may represent only the opinion of a few, especially the dominant sections in the village. It is necessary to contextualise PRA and demarcate what it can do and what it cannot. PRA techniques can be an effective tool for a qualitative and rapid understanding of the situation. However, as it does not provide reliable quantitative data regarding quantities like resource status or land use patterns, and may leave no space for interactive learning between local knowledge systems and "external", "modern" systems of knowledge. There is also a lack of adequate space for and articulation of watershed development organisations with the Panchayati Raj institutions. Greater attention is needed to address 1) participatory monitoring and evaluation, 2) the role of local communities as regulatory layers, 3) lack of nested institutions, and 4) the conditions for effective participation and moving on from participation to democratic governance.

1.3. Capacity Building and Training

Given this background, it is important to strengthen the human intervention aspect, access to information and capacity enhancement, which is found as the weakest link in the overall programme. As it is, allocations on training and community organization are only 5% of the entire programme provision. Even this expenditure is sometimes treated casually: typically it may involve one or two exposure visits to successful watersheds such as Ralegan Siddhi, a few stage/road shows in the beginning and a few days' training that is usually limited to the chairperson and secretary of the village watershed committee. It is not uncommon to find that the expectation of policy makers that people themselves acquire the aptitude to understand the complex biophysical and socio-economic linkages that will evolve and take shape over the next few years through watershed interventions rests in practice on the training received by one or two people for 4-5 days! The fact that changes brought in by watershed development impinge on all 'actors' and sections at the village level – landed, landless, herders, women, children – and their conscious involvement is crucial from the beginning only makes the challenge of providing adequate 'training' more formidable. There are some projects, especially those facilitated by the NGOs (not as PIAs of government supported projects) where capacity building is taken seriously and integrated with the projects management cycle.

The performance of the PIAs range widely from those who have been accused of misappropriation of funds with little attention paid even in the construction of basic structures, to those that undertake technical aspects of the watershed well only to fail with imitating effective community organization, to those that initiate long term changes in the economy and the watershed community and look at the effective implementation of watershed programs as just the entry point into bringing in socio-economic change in society.

The Haryali guidelines make ambitious demands on the grassroots level organizations and institutions

such as the gram panchayats to undertake decisions, and are called on to understand and decide on many complex matters. This is balanced by the fact that each community living in the environs of its own watershed is itself the best planning and monitoring agency in respect of watershed development and its impact. However, the community's lack of adequate understanding of the environmental externalities and a traditionally discriminatory and exploitative social structure could lead to a skewed distribution of benefits and selective environmental degradation.

1.4. Constraints: Perceptions of NGO Practitioners

The failure of the DRDA to make timely release of funds to the PIAs seems to be the one major problem that not only affects the performance of the programme but also the motivation of both the NGOs and the VWCs. The planning and the momentum of the work gets affected especially given that the schedule of the watershed work has to be synchronized with the cycle of annual agricultural operations. Labour and even the private lands, where treatments need to be undertaken, are free only after the first crop (or the second crop if it is taken in the village) has been harvested. This means that most of the physical works has to be undertaken between the months of November to May (before the start of the rainy season). Unless funds for that particular year are released before this critical period, the delay of a few months in release of funds can mean postponement of the work by an entire year. Many PIAs felt that the government officials involved with the fund release need to be adequately sensitised to this issue. A performance oriented fund release system is required.

Secondly, not only the fund release is irregular but most often it is incomplete right through the programme. Either the entire funds allocated to 'community organization' are not disbursed, or the NGO's remuneration (as PIA) is not covered and even the funds allocated for the treatments are not sometimes released. Many of the PIAs, which have completed some DPAP programmes, complained that at least 15-20% of the funds allotted is never released and this percentage can be much more in certain cases.

Finally, the DRDA seems to follow a dual policy when implementing norms regarding technical and organizational performance of the NGO vis-à-vis other government departments when they acted as the PIA. The NGOs were often bogged down with superfluous demands made on them to produce additional documentation, surprise checks or evaluations. There is also no statutory provision for the NGOs where they can have their grievances redressed and they also found it difficult to form united forums to collectively raise their voice.

There were mixed feelings about the new Haryali guidelines. While some NGO and GO personnel felt that it was an attempt to marginalize the NGOs' role in watershed projects which would only impact the programmes adversely, others felt that it was the right move in the direction of enabling the Panchayati Raj Institutions and village level institutions to take the responsibility of their development in their own hands. While the guidelines prevent the hegemony of the NGOs over the programme funds, it assumes that the gram panchayat is a democratic body and takes the risk of placing the responsibility in the environ of local power struggles which often bifurcate the community into at least two or more political fragments. Beyond the 'for' and 'against' arguments what remains clear is that in the absence of the NGO as the principal implementing agency, there would be much more need for training and awareness on the part of the PRIs and local institutions on technical, financial and organizational fronts to ensure effective implementation of the programme. The responsibility of better community organization through greater training falls on the Panchayat Samiti or a PIA appointed by the DRDA/ PRIs as part of the Hariyali Guidelines.

1.5 Need to re-orient the approach and policy

The review also highlights an immediate need to re-orient the present approach to watershed development and put an enabling policy framework in place to ensure that watershed development programmes adequately meet the requirements of the four central concerns, namely, sustainability, livelihoods, equity, and participation/self-governance. It calls first of all for a reorientation of approach to watershed development based on the following: a sustainable productivity enhancement orientation; pro-active measures to deal with sustainability and equity issues; preceding resource generation with institutional arrangements to handle those resources; making adequate technology choices; and taking dependability into account in watershed planning.

There is also an urgent need for an enabling legislation for collective regulation of ground water use and eventually moving towards IWRM from below. Many policies, which may not be directly related to watershed development programmes*per se,* also impinge on the outcomes, including electricity tariffs, irrigation policy, agriculture research and extension policy, fertiliser and agricultural produce pricing, and forest policy. There is also a need to restructure the watershed development programme by increasing the watershed development allocation and period, and conduct it in phases. The suggested first phase consists mainly of upper reach programmes, plantation activity, capability building, and institution building; it does not include constructing any major water harvesting structures. The second phase deals mainly with full drainage line treatment and the third phase with what is now being called watershed plus targeted mainly at the resource

poor. Each phase should be conditional on fulfilling the conditions for the earlier phase. Such a restructuring and phasing will provide an enabling environment for groups and organisations that want to fully address the foundational objectives of watershed-based development, namely, sustainability, livelihoods, equity and participation/self-governance.

1. 6 Research needs

The review also identifies the following research needs: a) Development of easy, practical and robust models for water balance studies that can give good, workable, first approximations with sufficient scope for improvement and adaptation as precise data become available; b) Study of the serious hydrological changes being brought about by watershed development at the micro-watershed as well as at sub-basin and basin levels; c) Long term, co-ordinated, multi-locational studies through collaborative research network to capture impacts of watershed interventions, especially the ecological impacts, which take a longer period to work themselves out; d) Inter-disciplinary studies to understand the interventions, processes, and outcomes in a more holistic and integrated manner and capture the multi-dimensionality of the problem in an integrated manner.

The review also makes specific suggestions for research in different areas as listed below:

Hydrological: a) cross-scale and inter-scale hydrological effects (upper to valley portions, intra- and inter-watershed relations up to basin-scale); b) surface water-ground water interactions; c) aquifer behaviour, in particular balance between shallow and deep aquifers, their sizes, recharge rates, locations, and so on; d) net effect of different soil and water conservation measures as well as afforestation and agricultural practices on quantities like infiltration and erosion under different geo-physical conditions.

Land-Vegetation-Water interactions: a) agro-ecological relationships and impact on one another as an ecosystem; b) grazing and forest management, in particular productivity, sustainability, and offsite effects.

Socio-Economic and Institutional aspects: a) compare asset-based approaches with income-based approaches, in terms of benefits, their distribution and sustainability; b) scope for biomass-based value addition – biomass, labour, energy, capital and financial requirements, and identification of possible bottlenecks; c) scope of watershed and NRM-based development in different regions, limits, and implications, especially in resource poor areas; d) indigenous knowledge, its scope, and issues in its interface with modern knowledge; e) role of CBOs and SHGs in improving participation and sustaining benefits beyond project period; f) ways of better addressing the problem of local heterogeneity by equitable and sustainable reconciliation of interests and conflict resolution; g) social and institutional mechanisms and capability building for incorporating rigorous participatory grassroots benchmarking, monitoring, and assessment in watershed based development programmes.

Chapter 1

Introduction

1.1.The Context

Integrated and participatory watershed development and managementhas emerged as the cornerstone of rural development in the dry and semi-arid regions of India. The programme, initially launched to arrest soil erosion in catchments of large and medium reservoirs,[1] has since grown in scope. The current generation of projects represent an attempt to address the issue of sustainable livelihood-generation in resource-poor areas. Watershed development today is one of the largest interventions in the country in terms of scale, resource allocation and agencies involved. Other than the ministries of Rural Development (MoRD, specifically, the Department of Land Resources), and Agriculture (MoA), the Ministry of Environment and Forests (MoEF) is also involved in watershed and eco-development programmes.

Milestones

The decade of the 1980s saw efforts to 'mainstream' successful experiments like Sukhomajri and Ralegaon Sidhi. While some Community organisations/ NGOs had already begun doing notable work in this area, the government in 1982-83, started a programme in 19 locations under the MoA to propagate water harvesting/conservation in rainfed areas. In 1984, the MoRD also initiated conservation strategies in 22 other locations with research and technology inputs from the Indian Council of Agricultural Research (ICAR) to develop 41 'model watersheds'. In 1990, integrated watershed development was launched with the introduction of National Watershed Development Programme for Rainfed Areas (NWDPRA). Simultaneously, conservation work was undertaken through the Drought-prone Areas Programme (DPAP) initiated by MoRD in 1972-73 and the Desert Development Programme (DDP) initiated in 1977-78. Today the major programmes also include the Integrated Wasteland Development Programme or IWDP, River Valley Projects or RVP, and Watershed Development Projects in Shifting Cultivation Areas or WDPSCA, among others.

In 1994, important on-course correction was provided by an impact-assessment and review committee set up under the chairmanship of Prof. C.H. Hanumantha Rao, which revealed a very dismal picture in terms of outcomes and impact. It called for a total revamp in terms of implementation and management, drawing upon success stories initiated by individuals, communities and those NGOs that had independently done notable work during this period. The Committee also formulated comprehensive guidelines for MoRD-implemented watershed projects. These MoRD guidelines were further revised in 2001 and again in April 2003 as 'Guidelines for Hariyali'. The MoA formulated guidelines National Watershed Development for Rainfed Areas (NWDPRA)-WARASA, revising them in 2000 as the WARASA-Jan Sahabhagita Guidelines. Key features introduced in the course of the evolution of watershed development included community participation, participatory planning and implementation, NGO-participation as project facilitating agencies, capacity building, social capital formation and issues related to livelihoods, gender, equity and sustainability. Following the XIth Schedule of the 73rd Amendment to the Constitution in 1993, the Gram Panchayats were made responsible for watershed development. The latest Hariyali guidelines aim at cementing people's participation through the mandatory participation of Panchayati Raj Institutions as the PIA for watershed development programmes. The two important Government of India programmes – NWDPRA (under MoA) and projects following the Common Guidelines (now Hariyali, under the MoRD) – together account for about 70 per cent of the funds and area under the watershed programme in the country.

[1] To stabilize catchments of reservoirs and to control siltation, a centrally assisted scheme of 'Soil Conservation Work in the Catchments of River Valley Projects' was initiated in 1962-63.

A Few Fiscal Markers

Three ministries at centre are involved in watershed and eco-development programmes namely, MoRD's (Dept. of Land Resources), MoA(Department of Agriculture and Coperation)and Ministry of Environment and Forest (MoEF). Besides planned allocation of resources these ministries also implement externally aided projects. As of March 2005, MoA had treated an area of 17.24 mha at a cost of Rs 9368.03 crores (more than half the expenditure under MoA is through external aid[2] and MoRD had treated 27.52 mha at an outlay of Rs 6855.66 crores. Some of the major programmes of MoRD are Drought Prone Areas Programme (DPAP), Desert Development Programme (DDP), Integrated Wasteland Development Programme (IWDP) and that of MoA is National Watershed Development Programme for Rainfed Areas (NWDPRA), River Valley Projects (RVP), and Watershed Development Projects in Shifting Cultivation Areas (WDPSCA) etc. National Bank for Agriculture and Rural Development (NABARD) and the Department of Agriculture and Cooperation (MoA) established the National Watershed Development Fund with an initial corpus of Rs 200 crores. There are also a number of state-sponsored, bilateral and privately funded projects implemented by a large number of agencies and NGOs. Watershed development has today virtually become the flagship programme of rural development in India, with an estimated annual expenditure of Rs 2300 crores during the Tenth Plan (Report of the Technical Committee, 2006 p.42) and a target of treating 63 million ha over the next 20-25 years with an estimated total outlay of Rs 76,000 crores {GOI, 2000: p. 388}. It is no longer seen as an 'experiment', but accepted by governments, donors and NGOs alike, as a core strategy that subsumes all other activities, such as afforestation or common land regeneration and stabilizes rural livelihoods through its multi-sectoral approach, especially in the dry, rain-fed regions of India.[3]

Such large investment in watershed development is justifiable if it enhances productivity of rainfed areas. Even though there is a paucity of reliable, scientific and methodologically rigorous research and studies, those that have been undertaken show that many projects have created positive impacts in terms of increased water availability, agricultural production and rural employment.

1.2 The Review State

The state of Maharashtra is a pioneer in watershed development. Examples such as Ralegaon Siddhi, Adgaon and Pimpalgaon Wagha among others are part of watershed discourses as successful examples of drought mitigation and rural development through the watershed approach. More than half the state's geographical area is drought-prone and also characterized by recurrent droughts, famines, monsoon failure and livelihood distress of the poor and marginal. Hence it is no surprise that the cause of water conservation has been espoused historically by Maharashtrian reformers and visionaries. Successive governments, NGOs and community leaders have also continued the tradition, taking it up as a major rural developmental strategy and approach. Thus, the Bombay Land Improvement Schemes Act (1942) became the precursor for the Government of India's Model Bill on Soil Conservation for enactment by all states in the post-independence period. Following the severe drought in 1972, the first steps in the direction of a systematic watershed development approach within government programmes were the introduction of the Employment Guarantee Scheme (EGS) and subsequently Comprehensive Watershed Development Programme (COWDEP) in 1982. As mentioned earlier, Ralegaon, Adgaon etc. have become models replicated throughout the country. Today DPAP, NWDPRA, RVP, IWDP, IWDP (state) Adarsh Gaon Yojana (AGY) Indo-German Watershed Development Programme (IGWDP) etc., are programmes that have institutionalized the watershed approach of treating land and water harvesting in association with people's participation to create 'sustainable livelihoods'. With Maharashtra's estimated potential of surface irrigation not expected to cross 30 per cent of the cropped area, the importance of watershed development as a bulwark for rainfed agriculture is obvious in these large drought-prone tracts of land.

[2] From Hariyali to Neeranchal: Report of the Technical Committee on Watershed Development in India *pp. 42.*

[3] *Indeed, the same approach is being adopted even in moister and forested regions like the Western Ghats and the Himalayas, whether under the Planning Commission's Western Ghats Development Programme or the Hill Area Development Programme, or as part of the World Bank supported watershed programme in Karnataka.*

There are around 44,185 micro watersheds in Maharashtra. Around 26,713 micro watershed programmes have been started in the state since 1992. As on March 2004, 8188 watershed projects have been completed, covering an area of 41.63 lakh ha incurring an expenditure of Rs 3288.40 crores[4]. About 522 NGOs are involved with the implementation of DPAP programmes, 766 NGOs with the implementation of EGS programmes, and all programmes under AGY, IGWDP, Council for Advancement of People's Action and Rural Technology (CAPART) supported watersheds etc are implemented through the NGOs.

It is now more than a decade since watershed development as an approach and strategy for rural development was institutionalized. All projects based on the earlier guidelines have been completed and new watersheds based on the Hariyali guidelines are underway. Implementation strategies, processes and institutional mechanisms also have undergone modifications during the decade. From mere soil and water conservation measures, the objectives of watershed development have moved towards sustainable development of rainfed areas for production and livelihoods. This shift in objective and approach has been facilitated through a large number of innovations, interaction among the community of practitioners and studies and evaluations of existing approaches, strategies and impacts of development. Through the efforts of a multiplicity of practitioners and projects a wide range of experiences and lessons have emerged in the state. The time is ripe for an appraisal and subsequent consolidation of these learnings, for wider dissemination.

There are a number of reviews, studies, evaluations and research reports on various aspects of watershed development. These cover the impacts, process, technology, institutional issues/ arrangements, gender, and participation, among others. The perspective, objective, methodology and unit of analysis is also as varied as the studies. While some studies have been conducted by external evaluators/ agencies there are a number of them being generated by the implementing agencies themselves. Though most of these studies have generated a lot of interesting information and highlight the complex and varied nature of watershed projects and their impacts, they do not always provide an integrated picture of the outcomes in the wider context of sustainable development goals. Many use indicators related to resource regeneration such as increase in the water table, biomass, agricultural production etc., without looking into the issues of ecosystem sustainability or aspects of distribution of benefits. Most of the time this is due to the overemphasis placed on watershed development as a strategy to enhance dry land farming productivity. Sustainability of these biophysical impacts and their relationship to sustainable livelihoods does not seem to have received much attention. This is very important since some of the 'successful' watersheds have become the story of the 'tragedy of commons' in the post-implementation phase due to increased competition for enhanced ecosystem products and services. Those studies that do focus on these aspects are not well grounded in the social issues and therefore fail to link biophysical parameters with livelihood and equity concerns. First-generation projects and their practitioners may not have been very familiar with these concerns because the issues of sustainability, participation, equity, livelihoods etc. emerged in the watershed discourse and lexicon later. However, an analysis of outcomes of watershed development from this perspective can help in understanding all the ramifications, besides providing inputs for better administration/ implementation of a multi-sectoral intervention such as watershed development.

1.3 Methodology

With this background, an attempt is made to analyse the performance of watershed development projects in Maharashtra covering inter sectoral ecosystem issues from an interdisciplinary perspective. We attempt a comprehensive overview of available literature and data to gain an insight into the dominant patterns and perceptions on the various issues of watershed development. This review, therefore, draws upon many studies, reports and documents along with insights from discussions with key

[4] *Soil and Water Conservation Programme,* Annual Report 2003-04 *Government of Maharashtra, Department of Agriculture, pp.17. This is exclusively for Government-supported programmes. There are numerous other projects implemented by NGOs through other funding sources. There are certain discrepancies in the information on the progress and status of watersheds.*

actors: personnel from governmental and non-governmental organisations, and watershed committees, people from the communities etc. and finally from the personal experience and visits of the researchers to a few watershed development projects.

The review is neither meant to be a hypothesis-driven study, based on primary data collection, nor an evaluation study, but rather an overview of important aspects related to watershed development and an assessment of the performance of Maharashtra state in light of these various dimensions. Information is analysed within a broad *normative framework*, which tries to capture some key issues related to watershed development goals and objectives.

The review draws on the following types of material:

Literature related to watershed concepts and strategies: policy and guideline documents, literature dealing with broader concepts like livelihood, sustainability, equity, participation, and institutions; normative and prescriptive documents which guide action.

Data from the soil conservation department on different watershed programmes in Maharashtra since 1992.

Studies which review watershed literature: reviews, evaluations, research notes, articles and methodologies, etc.

Data from evaluations done by Dharamitra, Amravati of about 115 projects implemented by various NGOs in the Vidharbha region.

Focused workshops with different framework actors in Vidharbha region and in Pune.

Evaluations of watershed experiences and case studies.

Our own historically evolved and accumulated experience and observations supplemented by field visits that were undertaken as part of the present review.

The sites for field visits were not selected on the basis of strict sampling. The primary aim was to cover different types of programmes that would provide a cross-section of the range of experience in the state. We primarily concentrated on agro-climatic zones with (average) rainfall ranging from about 450 to about 1000 mm/year and followed it up with a workshop and a few field visits to the Vidharbha region. The list of villages/watersheds that were visited is given in Table 1.1 (next page).

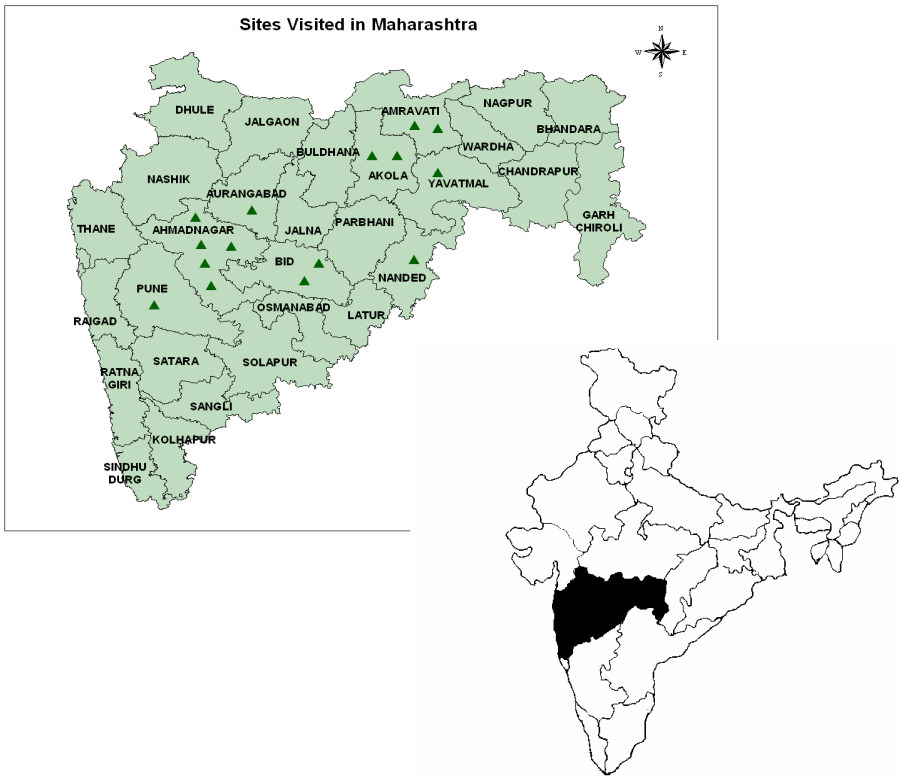


Figure 1:
Sites visited in Maharashtra

Besides these watershed development efforts, we also looked at relevant experiences that are not typical watershed interventions. Some such examples are the Pani Panchayat (Pune district), known for its strong commitment to equity; the Ozar Water Users' Associations (Nashik district) known for their integration of canal water and local water harvesting; Bali Raja Dam (Sangli district), a small dam built by the people themselves and again recognized for equitable water distribution; and Khudwadi (Usmanabad district), which is known for the resourcefulness exhibited by a poor women's group in getting a share of the canal water and farming the private wasteland on a produce-sharing basis. A day-long workshop was arranged at Amravati on 6 January 2006 with those NGOs/government agencies that had been working as implementing agencies.

The sites of the field visits are shown in Figure 1.1 (previous page).

A strict classification of projects in terms of their mode of implementation was not attempted. We have tried to capture the broad trends by including both completed and ongoing projects across various zones and under different programmes[5].

Table 1.1:
List of villages/watersheds visited in Maharashtra

Programme	Organization	Village/Watershed	District
Government Department (Soil Conservation)	Marathwada Sheti Sahayak Mandal, Aurangabad	Adgaon	Aurangabad
Government Department (Soil Conservation, Social Forestry, etc.)	Local organization led by Anna Hazare	Ralegaon Siddhi	Ahmednagar
Adarsh Gaon Yojana	Yashwant Agriculture, Village and Watershed Development Organization	Hivre Bazar	Ahmednagar
Indo-German Watershed Programme	WOTR	Vaiju Babhulgaon	Ahmednagar
Indo-German Watershed Programme	SEVA	Ambewadi	Beed
NGO	Manavlok	Bhavthan	Beed
NGO	AFARM	Dornali	Nanded
DPAP – Common Guidelines	Gomukh Trust	Chale	Pune
NWDPRA (ongoing)	Prabhodini	Kaute Malkapur – Sangamner	Ahmednagar
NWDPRA (completed)	Agriculture Department	Bairewadi	Ahmednagar
DPAP (completed)	Sarvodaya welfare	Vatpur – Nandgaon Khandeshwar	Amravati
DPAP (ongoing)	Chandrapuri Maharaj Shikshan Prasarak Samstha	Pimpalgaon Bahinai	Amravati
Aga Khan Foundation (completed)	Dilasa	Yevat	Yavatmal
DPAP (completed)	Prabhodankar Thakare	Pulsa watershed, Dharani Chikaldhara	Amravati
DPAP (ongoing)	Mahila Utkashta Samstha	Hirangi – Manglurpir	Washim
DPAP (ongoing)	Sriram Shukshanik Sanskruti Samstha	Sanglud	Akola

[5] Though we have not gone into the details of each of these programmes or their distinguishing features, four types of funding sources are identified, based on differences in implementing policies, namely the Government of India, multilateral sources, bilateral donors, and others. GOI sources are MoA and MoRD, Multilateral sources basically boil down to the World Bank. Bilateral sources include DANIDA, SDC, ICEF, SIDA, GTZ, KFW etc. Others include various national and international non-profit organizations that support projects implemented by NGOs (Kolavalli and Kerr, 2002 , 155; Kerr et al., *2000, 39) in their study classifies projects in terms of (i) projects under Ministry of Agriculture (like NWDPRA, ICAR projects); (ii) engineering oriented projects (Soil Conservation, DPAP, etc.); (iii) NGO projects; and (iv) collaborative projects between government and NGOs (Indo-German Watershed Development Programmes, Adarsh Gaon Yojana, etc.).*

1.4 Normative Framework of Review

Understanding watershed development requires a 'normative framework' embracing the notions of 'watershed' and 'watershed development', and how they are translated into practice. Such translation may also be based upon additional assumptions about what is possible and desirable, and how to bring these changes about. One may call this a set of goals, specific objectives, and assumptions the normative framework analyses.

Catchments protection programmes looked upon the watershed as a unit but focused mainly on reducing reservoir sediment load. Soil and water conservation are still central to watershed development, but afforestation, common lands regeneration, agronomic changes, and so on, are also linked to this central theme and watershed development is now being seen a core strategy for stabilizing rural livelihoods in the dry, rainfed regions of India. Further, participation, gender, equity, sustainability, and livelihoods are now much more prominent concerns in the watershed development literature and are increasingly reflected in the official watershed development guidelines. The emergence of these concerns may be through exogenous factors (developmental interactions) or due to internal dynamics (access and exclusion) in the developmental space or may be because of reflections/ learnings. Whatever the reason, these issues bring into focus the poverty reduction objective of watershed to the front.

In a country like India where the vast majority has been dependent on natural resources for their livelihoods, 'development' will have to be based primarily on long-term sustainable productivity enhancement and, in the drought-prone regions, on increasing the dependability of production and, consequently, the security of livelihoods. The interconnectedness of the biophysical and the social is intrinsic to watershed development and draws strength from this interconnectedness. Biophysical and social interventions are not two separate processes, but aspects of a single unified process and ecosystem processes and resources are basic economic resources as well. Moreover, historical processes and factors also interact with the biophysical and social interventions.

1.4.1 Livelihoods

Earlier discussions of needs centred on the fulfilment of basic or subsistence needs. Since the early 1990s, however, the concept of livelihoods and more specifically 'sustainable livelihoods' (SL) has entered the rural development discourse prominently. A definition of these terms is offered by the British Government's Department of International Development (DFID):

"A livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base."

Livelihood is conceptualized in this review in a similar manner. However, livelihood needs, in the sense the term is used in the study, include not only the basic needs of food, shelter, and clothing, but also needs that are imposed due to the nature of the livelihood activity. They also include certain surpluses over and above directly satisfied consumption needs that can be exchanged with the larger system. Finally, livelihood needs place a higher premium on *natural* as compared to other forms of assets, thus for example, in watershed development, they emphasize the need to create equal access. However, most watershed programmes view the issue of livelihood from the 'watershed plus' angle, mostly as income-generation activities, ignoring rights and access to regenerated and augmented resources.

An important question is how many of these needs should be fulfilled locally and to what degree in kind? As a norm, we should consider basic food, fuel, fodder, and domestic water needs separately, and treat self-reliance (not necessarily self-sufficiency) in these needs as one of the objectives to be achieved at the watershed level. In most conditions self-sufficiency in these is possible and desirable at the watershed level. Even in exceptional situations where this may not be possible, it should be possible and desirable for a

substantial component of these requirements to be produced locally, and the rest to be met from exchange on equal terms with the larger system. The fulfilment of needs must also be considered at the level of the watershed ecosystem as well as at the household level. Elsewhere, we have used biomass as the measure to quantify these needs on the basis of a minimum upper bound approach to show that a farming family of five generally needs a productive potential of about 15 to 18 T (dry weight) annual biomass increment to meet all the above mentioned livelihood needs, including estimated minimum cash requirements.

1.4.2 Sustainability and Equitable Access

In the review we use the term sustainability in the specific sense of environmental sustainability and consider maintaining and enhancing the productive and assimilative potential of the ecosystem as the sustainability goal whilst deriving a few operational norms that logically follow from this approach in the context of watershed development. Since watershed is a socio-environmental intervention, the issue of sustainability of local institutions (responsible not only for project implementation but for future care also) is an important one. Livelihood needs depend crucially on who has access to how much and what kind of productive resources, that is, equity. In the normative framework the first dimension is the distribution of human wellbeing across typical barriers of class, caste, ethnicity, and gender, with the implication that one needs to disaggregate the 'local community' and consider the differential impacts of watershed development.

The second dimension emanates from spatial or locational inequalities and this is primarily because of the biophysical characteristics of the watershed itself. Given that the relationship is often fundamentally asymmetric (for example, activities upstream can affect those downstream, but not vice-versa), the issue needs to be carefully addressed at all levels or scales: within the micro-watershed, across watersheds, and across the entire basin. It becomes important to see how those asymmetries map on to the historical inequities of access to productive resources and how watershed development interacts with them. The general experience is that the asymmetries map on to the inequities in a way that more likely accentuates rather than attenuates the inequities within the local community unlike environmental sustainability, which watershed development is likely to enhance per se. The implication is that if there is no proactive element of equity built into the programme it only accentuates inequity.

The normative framework treats water as a common property resource to be managed and regulated collectively in order to ensure equitable and regenerative use. This implies prioritizing water use in the following order: drinking water; water for domestic use and for cattle; water required for ecosystem regeneration; water required for livelihood activity; and surplus/extra water that can be used for cash or commercial crops. The normative framework also aims at a fairer distribution of increased resources with privileged access to the resource poor.

It is important to recognize that water is both a local and non-local resource and that the interdependence effects of scales appear as 'externalities' and unlike slogans like '*gaonka pani gaonmė* (the rain that falls in a village is for that village) that may help conserve water in the short run, we need collective regulation and control of water resources at increasing scales ensuring inter-watershed or basin-level equity as well. Hence, the normative position limits the right of every community of assured access to water from local *as well a*s non-local sources, together necessary for assured livelihood. Accordingly, water is first treated as a common pool resource to be managed and regulated collectively in order to ensure equitable and regenerative use for livelihood assurance and to ensure equitable sharing of shortages and surpluses. Only the residual resource is treated as a resource to be regulated by the market.

The enhancement of ecosystem resources and productive potential with public funds and collective, community effort has the potential for ensuring

equitable access to *the additional resource created, even as prior right to previously existing resources are recognized and left largely undisturbed, thus making equity a positive sum game.*

1.4.3 Participation and Democratic Governance

Participation has gained increased currency in developmental practice and in related research and literature and this increased awareness is drawn from various sources and standpoints. Participation is often seen as a means to achieve other goals, or as a value or a goal in itself. The framework sees it as a goal as well as a means of ensuring more equitable, sustainable, and efficient outcomes.

However, in highly differentiated communities, the simple transfer of decision-making power to 'the community' may turn out to be handing decision-making over to the dominant sections within the community. It is necessary to recognize the heterogeneity and ensure that proactive space is created within the local community institutions for all sections, especially the lower, marginalized strata. This calls for disaggregated possibility of participation for all sections in the entire project process.

The framework also recognizes the importance of outside intervention and believes that participation, livelihood assurance, regenerative use, and equitable access should be the explicit foundational objectives of the collaboration between the community and outside agencies. The key role of outside agencies is that of capability building, by providing information and offering a forum for discussion aimed at resolving issues related to the objectives through discussion and debate. It is also important to recognize that there is a need for greater accountability and transparency on the part of the outside agency to the local communities.

1.5 Comparison of Different Guidelines

Guidelines are a set of proposed strategies and methods for implementing watersheds in different contexts and by respective ministries and agencies. These guidelines are meant for projects financed by the state as part of planned investments for developing dry land areas. As mentioned above, the major ministries involved in watershed development are MoRD, MoA and MoEF and respective states are expected to adopt the main tenets outlined in the guidelines and formulate strategies and processes including those related to unit cost and Standard Schedule of Rates (SSR) rate for different conservation measures and items. There are other programmes being implemented outside the purview of these guidelines such as bilateral and multilateral projects, NABARD-supported watershed projects and other NGO initiated projects. The main objective of watershed development, as outlined in the guidelines, is to improve the production potential of dry land areas, through conservation, mobilization and sustainable use of natural resources such as water, soil and biomass. Watershed is also visualized as a strategy to bring development into the hitherto underdeveloped and backward areas like drought prone areas, desert areas and hilly regions of the country. There are many attempts to include and incorporate emerging concerns in the guidelines through periodic review and changes. The latest exercise in this direction is the technical committee appointed by the Ministry of Rural Development. It aims, under the chairmanship of Shri. S. Parthasarathy, to study and suggest strategies and mechanisms to improve the delivery system and effectiveness of watershed development. One outcome of such periodic reviews are changes in the guidelines, and the introduction of issues and concepts – such as participation, community organization, capacity building, sustainability, transparency – into the watershed lexicon.

A comparison of the different guidelines is tabulated on the following pages.

Table 1.2:
Comparison of Different Guidelines

Contents	MoRD 2001	Hariyali	WARASA, MoA	CAPART
Objectives	Overall economic development. Socio economic development of resource poor Restoring ecological balance by conserving, harnessing and developing NR Conserving and developing NR Sustained community action. Promoting use of simple, easy and	To create sustainable sources of income for the village community as well as for drinking water supplies. Ensuring overall development of rural areas through the GP and income for GP Employment generation, poverty alleviation, community empowerment	Conservation, development and sustained management of NR Restoration of ecological balance through green cover. Enhancement of agri-production. Reduction of disparity between rainfed and irrigated areas. Sustainable employment opportunity for rural poor.	To promote sustainable economic development of the community Sustainable utilization of the watershed's natural resources like land, water, grass, forests, etc Improve the economic and social conditions of the resource poor Sustained community action for the operation and
Unit of development	500 ha	500 ha	500 ha	500 ha
Cost norms	Rs 6000/ha	Rs 6000/ha	Rs 6000/ha	Rs 6000-7500ha.
Responsible institution at national level	Department of Land Resources (MoRD)	Department of Land Resources (MoRD)	Department of Agriculture and Cooperation (MoA)	CAPART (MoST)
Coordinating Agency	Zilla Parishad/ DRDA	Zilla Parishad/ DRDA	District Nodal Agency (Agri.Dept., ATMA, etc.)	CAPART supported by DRDA/SVOs
Implementing agency (PIA)	Govt. Depts. NGOs,KVKs etc.	PRI Institutions/ Govt. Agencies	Agri. Dept, NGOs, KVKs etc.	NGOs/VOs
Village institutions	Watershed association. Watershed Com. SHGs, UGs	Gram Sabha, Gram Panchayat, UGs, SHGs	Watershed association, Watershed Com., UGs,SHGs	Watershed association, Watershed. SHGs, UGs.

Budget allocation	Rs 30 lakh	Rs 30 lakh	Rs 30 lakh	Rs 30 to 37.5 lakhs
Community organization	5% (inc. EPA)	2.5%	7.5% (3%EPA)	5%
Training	5%	2.5%	5%	5%
Administration	10%	10%	10%	15%
Watershed work	80%	85%	50%	75%
Production systems	_	_	20%	_
Livelihoods	---	_ RF to SHGS	7.5%	_ RF to SHG
Selection criteria	Watersheds where people's participation is assured Preponderance of common and wastelands. Concentration of SC/ST Acute shortage of drinking water. Contiguous to treated watershed Actual wage is less than minimum wage.	Watersheds where people's participation is assured Areas facing acute drinking water shortage. Preponderance of common lands, waste lands Contiguous to another watershed Where actual wages are significantly lower than the minimum wages .	Severity of land degradation Preponderance of resource poor and SC/ST Significant proportion of arable land under private cultivation Location in upper reaches Peoples participation No previous investments in watersheds.	Villages from where people's participation is assured contributions made are genuine and not arising out of savings from estimate cost Villages having drinking water problems, food deficiency and migration. A plan for grazing and for sharing and utilization of fuel wood, fodder and other usufructs to be adopted. Preponderance of wastelands and highly degraded land. Large population of SC/ST

Watershed Development Team	4 Members for around 10 watersheds/One PIA with specialization in forestry/plant science, animal sciences, civil/agricultural engineering and social sciences.	Same as in MoRD, 2001.	4 members for PIA/10 watersheds. At least one women member and with a sociologist, animal science, civil engineer, agriculture/ forestry.	Four for a PIA and area of 3500ha preferably from the disciplines of plant sciences, agronomy, agro-forestry, animal husbandry, civil/ agricultural engineering and social sciences
Project period and phasing.	5 years of which one year is probation period. Community organisation, formation of CBOs and PRA/ action plan in probation.	5 years. No specific phasing, organizing community, PRA and action plan in the initial period.	5 years, one year as capacity building phase. Training of relevant stakeholders, formation of CBOs, PRA, action plan in CB phase.	5 years of which one year is pre action plan stage. During the phase include capacity building, baseline survey, action plan formulation and the execution of a mini NRM/Drought Proofing project.
Planning tool	PRA/ discussion with farmers and WA	PRA, bench mark survey	PRA (transect, resource map, ranking, timeline etc) secondary sources	PRA
Conservation Measures	Land development including insitu conservation, afforestation, shelter belt, small water harvesting structures, pasture development, development of CPR, crop demonstration etc.	Development of small water harvesting structures such as low-cost farm ponds nalla bunds, checkdams, percolation tanks and other ground water recharge measures, afforestaion, block plantation, development of CPR, in-situ land development.	Simple and indigenous technologies, diversion drain, contour bunds, waste weir, check dams, drop structures, shelter belts, terraces in hilly region etc. Production technologies using ITK and sustainable production using IPM, INM, LEISA combined with modern production systems/methods.	Low-cost, simple and easy to operate and maintain works and activities Land leveling (50% share) vegetative measures and engineering structures. Block plantations, shelter belts

Monitoring And Evaluation	Quarterly reports to ZP/DRDA, independent evaluations, monitoring and observation through external agencies. DWDC and SWDC to review and monitor Review and evaluation based on a set of success criteria related to project implementation, social mobilization and community organisations.	Quarterly progress report to ZP/DRDA, monitoring by independent agencies/peoplest ate department, state level vigilance committee	Progress reports on quarterly basis, concurrent evaluation by internal/external agencies. Review and monitoring by NWC, SWC and DWC; Review and evaluation based on a set of success criteria related to quality of implementation, social mobilization and community organisation, sustainability issues etc.	Progress reports on each of the watershed conservation projects once in every six months to NSC and DRDA;evaluation process documentation by other agencies appointed by NSC Review and evaluation based on success criteria
Strategies for Transparency	Action plan with SHGs, UGs, WC Approval of action plan in WA Display of action plan Review of progress by WA Payment through cheques/in open area	Action plan with SHGs, UGs, WC Approval of action plan in WA Display of action plan Review of progress by WA Payment through cheques/in open area	Wall posters on project SSR rate etc. Many meetings with community Application system for receiving proposal for treatments Payment through cheques/in open area Social auditing and review by WA	
Exit strategy And Maintenance	Formation of WDF through Local contribution Preparation of exit protocol regarding maintenance, user charges and equity in access to resources	Formation of WDF through Local contribution GP responsible for maintenance Preparation of exit protocol with details on mechanisms for maintenance, collection of user charge, equity in access to resources.	Formation of WDF through Local contribution Common assets through WDF by WA/WC	Formation of Watershed Conservation Fund 50% of the funds will be set aside for the operation and maintenance of community assets created as part of the watershed conservation

1.6 Structure of the Report

Following an introductory chapter, and a discussion on the macro scenario in the state, the review is divided into five sections. The first is an overview of the state's agro-climatic situation, and appraises the volume, scale and resources involved in Maharashtra's watershed programmes with an analysis of regional variations. This is the background on which the other sections are formulated. The second section examines the impacts generated by watershed development on ecosystems and livelihoods. Here sustainable livelihoods are treated as an outcome or an end objective, resulting from augmentation of ecosystem products and services. Different variables and indicators are analysed from available sources to understand the impacts of ecosystem regeneration on livelihoods and production. The third section focuses on sustainability of resources / products and the related problems/ issues thereon. Paucity of hard-core scientific information is a drawback that was faced by the researchers while examining this area. They attempt, therefore, to understand the issue from (i) proxy variables (e.g. increase in number of wells), (ii) from their own experience and observations, and (iii) interaction with practitioners. The fourth section discusses issues related to equity and access, as well as issues of gender and other forms discrimination involved in accessing benefits from investments and created resources. The last and fifth section is on the processes of participation and governance in the context of development intervention. This section covers participation issues in the entire process of watershed rehabilitation from planning, implementation, institution- and capacity building, monitoring etc., onward. The last chapter concludes by summarizing the review and highlighting/ flagging issues with certain recommendations for improving the administration of the projects. This section also looks into the need for generating knowledge and information on certain critical areas related to watershed development through research and studies.

Chapter 2

Watershed Development in Maharashtra: Macro Scenario

2.1 Introduction

Maharashtra is India's third largest state with a geographical area of 3,07,58300 ha. Though agriculture and related activities are the major source of livelihood for more than two-thirds of its population, agriculture is characterized by low productivity – except for sugarcane, the productivity/ha of all other major crops such as food grains, cereals, oilseeds, cotton etc., are below the national average. The causes lie in the low irrigation coverage (15.36 per cent), high extent of light soil (39 per cent), general degradation (42.50 per cent), poor drainage, and salinity (4 lakh ha and proneness to drought (52 per cent). Besides this, 38 per cent of the land is affected by different categories of soil erosion, badly affecting the soil's micronutrient status and hence productivity. The problem is aggravated by monsoon failure, untimely rain, lack of institutional credit facilities and indebtedness driving marginal farmers and the poor to extreme steps such as suicide.

Attempts made by the state and other agencies to reverse this situation and to stabilize dry land farming through watershed development over the past two-and-a-half decades has led to enormous resources being poured into this area. Many watershed programmes funded by the national and state government, multilateral and bilateral agencies, and by a large number of NGOs have been implemented. This chapter analyses issues related to the agro-climatic situation, water resources, land utilization pattern, agriculture productivity, and the volume, extent and outreach of watershed projects being implemented in the state.

2.2 Agro-climatic Situation

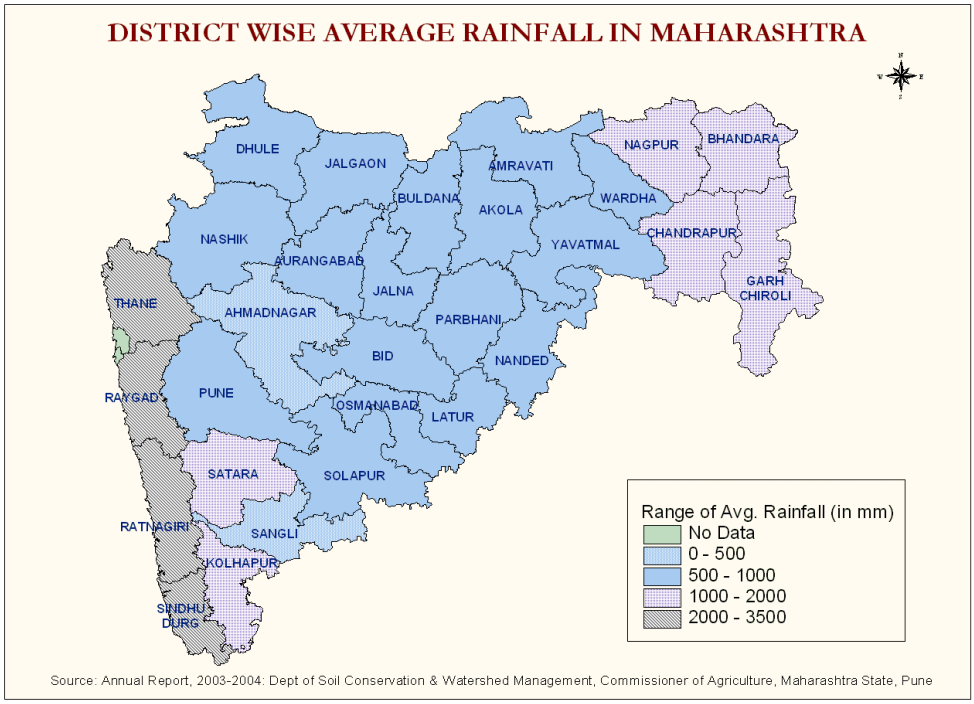
Maharashtra is usually divided into nine agro-climatic zones (Table 2.1). The average rainfall in these zones ranges from 450 mm (in the Scarcity Zone) to 3,750 mm (in the Southern Konkan Coastal Zone). A narrow coastal plain (the Konkan region) which has very high rainfall separates the Arabian Sea from the Western Ghats. To the east of the Ghats lies the large Deccan Plateau which spans the majority of the state. Its western side receives very low rainfall since it lies in the rain shadow of the Ghats. Eastern Maharashtra sees much higher rainfall making conditions for rainfed agriculture favourable. Conditions for rainfed agriculture in the driest zones are difficult, and this is where watershed projects are most concentrated.

Table 2.1: Agro-climatic Zones and Rainfall: Maharashtra

Maharashtra		
Sr. No.	**Zone**	**Average Rainfall (mm)**
1.	Southern Konkan Coastal Zone	3,750
2.	Northern Konkan Coastal Zone	3,281
3.	Western Ghat Zone	2,684
4.	Western Ghat Zone	2,137
5.	Western Maharashtra Plain Zone	791
6.	Scarcity Zone	450
7.	Central Maharashtra Plateau Zone	983
8.	Central Vidarbha Zone	883
9.	Eastern Vidarbha Zone	1,462

*Source: GoM, 2003,*Agro-climatic Zones of Maharashtra

Figure 2.1: Rainfall in Maharashtra



Maharashtra is divided into eight administrative divisions: Konkan, Nashik, Pune, Kolhapur, Aurangabad, Latur, Amravati and Nagpur. The state is also generally divided into the following regions with respective administrative centres – Konkan (Thane), South Maharashtra (Kolhapur), Western Maharashtra (Pune), Khandesh (Nashik), Marathwada (Aurangabad and Latur) and Vidharbha (Amravati and Nagpur). For the purpose of this report we adopt the classification as made in Table 2.2 below, as it allows us to examine region-specific problems that watershed development needs to address.

2.2.1: Region Specific Problems

Region[1]	Characteristics/ Specific Problem
East Maharashtra (Vidarbha)	Predominantly rainfed. Irrigation in Bhandara district higher than state average. Low percentage area under cultivation. Rainfall between 700 to 1500 mm. Moderate to high soil erosion even though good forest cover. Very high intensity of rainfall throughout the rains. Long dry spell between two wet spells. High possibility of fire hazard in forest area, threat to natural regeneration. Low level of ground water development (15%). ***Siltation of reservoirs and tanks.*** Problem of salinity in Amravati, Akola and Buldhana districts across 4.69 lakh ha. Traditional agriculture with cotton and pulses as major crops. Regional underdevelopment. Well-developed horticulture in some areas. Predominantly tribal population.

[6] Khandesh (part of Nashik, Dhule, Nandurbar and Jalagaon) has more or less the same problems as Marathwada and western Maharashtra. However it is predominantly tribal and land alienation of tribals and lack of livelihood is a major concern.

Central Maharashtra (Marathwada)	Medium rainfall ranging between 700 to 1000mm. Irrigation less than the state average (Latur division 10%). High percentage of drought-prone area. Recurring drought. Two-thirds area under cultivation. Very little forest cover (4%), overgrazing and deforestation. Variation and late rainfall. Uneven spread of rainy days. Water shortage especially in bad rain years. Black light soil with slight erosion hazard. Ground water development – average (27%). Mix of traditional and modern agriculture. Strong caste-based society with feudal remnants. Regional underdevelopment.
Western Maharashtra	Very low to medium rainfall (except in some parts of Satara and Kolhapur). Medium to severe erosion. Uneven spread of rain in time and space. Some major irrigation projects. Irrigation is above state average at around 23%. Recurrent droughts; large drought-prone area, except for Kolhapur. Undulating land. Poor forest cover. Around 60% area under cultivation. Light soil. Ground water development high (42%). High input and water intensive cultivation. Well developed region of the state. Heterogeneous society with history of collective action.
Konkan	High rainfall above 3000 mm. High intensity rainfall. Severe soil erosion along Western Ghats and coast. Very low irrigation. Forest area above state average. High percentage of barren, uncultivable waste land. Less than 30% of land under cultivation. Ground water development very poor (7.6%). Coastal salinity. Flooding of cultivated lands. Predominance of paddy and perennial horticulture. High incidence of migration, average development.

Figure 2.2: Division-wise Land Utilization in Maharashtra

2.2.2 Land Utilization in Maharashtra

Net sown area in the state is 57.57 per cent, whereas the area sown more than once is about 15.52 per cent (see Table A 2.1). Konkan, Nashik and Nagpur divisions have the highest percentage of forest area. Konkan and Nagpur also have the lowest net area sown, as well as the area sown more than once. Latur (101.57per cent) and Aurangabad (95.11per cent) has the highest gross cropped area with around 15 per cent of the reported area under pasture and fallows. Cultivable waste and fallow lands are highest in Konkan, which also has the highest percentage of what is generally known in environmental discussion as 'sacred grooves'. Nagpur has the largest forest cover (39 per cent) followed by Nashik (24 per cent) and Konkan (20 per cent). The predominance of forests, waste and fallows in these regions makes less land available for cultivation (hence the high incidence of landlessness and encroachments) whereas Marathwada and Western Maharashtra have very little area under forest cover. The non-availability of forest and pasture land in these regions also has implications for issues related to the livelihood of the poor and marginal. It is interesting to note that there is no category or nomenclature called 'common property resources' in any official documents of land classification, even though there are a lot of discussions around this theme in watershed development.

2.2.3 Irrigation and Drought

Maharashtra has very low irrigation coverage. Only around 15 per cent of the area under cultivation is irrigated as compared to the national average of more than 35 per cent. The state has a rugged and uneven terrain, and many rivers originate here, resulting in a large number of comparatively small irrigation projects. However, the total number of dams above 15 meters high is around 900 as compared to 2900 for the entire country. Most of these dams are concentrated in western and central Maharashtra. In irrigated agriculture ground water plays a dominant role through 1.51 million wells.

Table A 2.2 gives a district-wise and division-wise picture of the area under cultivation, under irrigation and of areas that are drought-prone. Drought prone areas are affected by low and inadequate rainfall, long inter-spell breaks and an erratic distribution of rain through peaks and troughs. A very limited part of this area gets the benefit of the major irrigation projects even though a very high percentage of drought prone area has been brought under cultivation. Amravati, which has a

large area classified as drought prone, suffers considerably less in terms of intensity of drought.

Fifty-two per cent of the total area in the state is prone to drought. Of this, more than 60 per cent lies in the Nashik, Pune, Aurangabad and Amravati divisions and 40 per cent in the Kolhapur and Latur divisions. The present study lays stress on these drought prone regions, where watershed development programmes are widely seen as a drought-proofing strategy.

Only a little over 15 per cent of the state's cropped area is irrigated. Pune, Kolhapur, Aurangabad and Nagpur (by virtue of high irrigation coverage in Bhandara) divisions have above 20 per cent irrigation, followed by Nashik (15 per cent) and Latur (10 per cent). One could observe a trend of low irrigation in Amravati (five per cent) and Konkan (six per cent) divisions. Bhandara district has the highest irrigation (46 per cent) followed by Gadchiroli (24 per cent). This is partly an outcome of the traditional tank systems still functioning. The high incidence of drought with large tracts of drought-prone land in the Deccan plateau, and low irrigation potential becomes the backdrop for large-scale watershed development in the state.

2.2.4 Water Resources

Table 2.3 gives some important indicators related to water resources in the state and country. At present, the net irrigated area as a percentage of net sown area is just 16.61 as against the national average of 40.01. The surface vis-à-vis groundwater potential is in the ratio of 60:40, while the national ratio is 55:45. The area under irrigation is limited and it is said that even with full utilization of its irrigation potential, the total area under irrigation (in the conventional sense) would not cross 30 per cent. Maharashtra is estimated to have been exploited: According to a survey by Ground Water Survey and Development Agency (GSDA), ground water development is maximum in ten districts of Western Maharashtra (42 per cent) followed by eight districts of Marathwada (27 per cent) and eleven districts of Vidarbha (15 per cent). Ground water development in the four districts of Konkan is the least (7.6 per cent). In 76 areas in the state comprising about five per cent of the total state area, ground water is over-exploited causing concern about resource sustainability. The over-exploitation is manifested by progressive decline of water table at the rate of 0.3m per year.

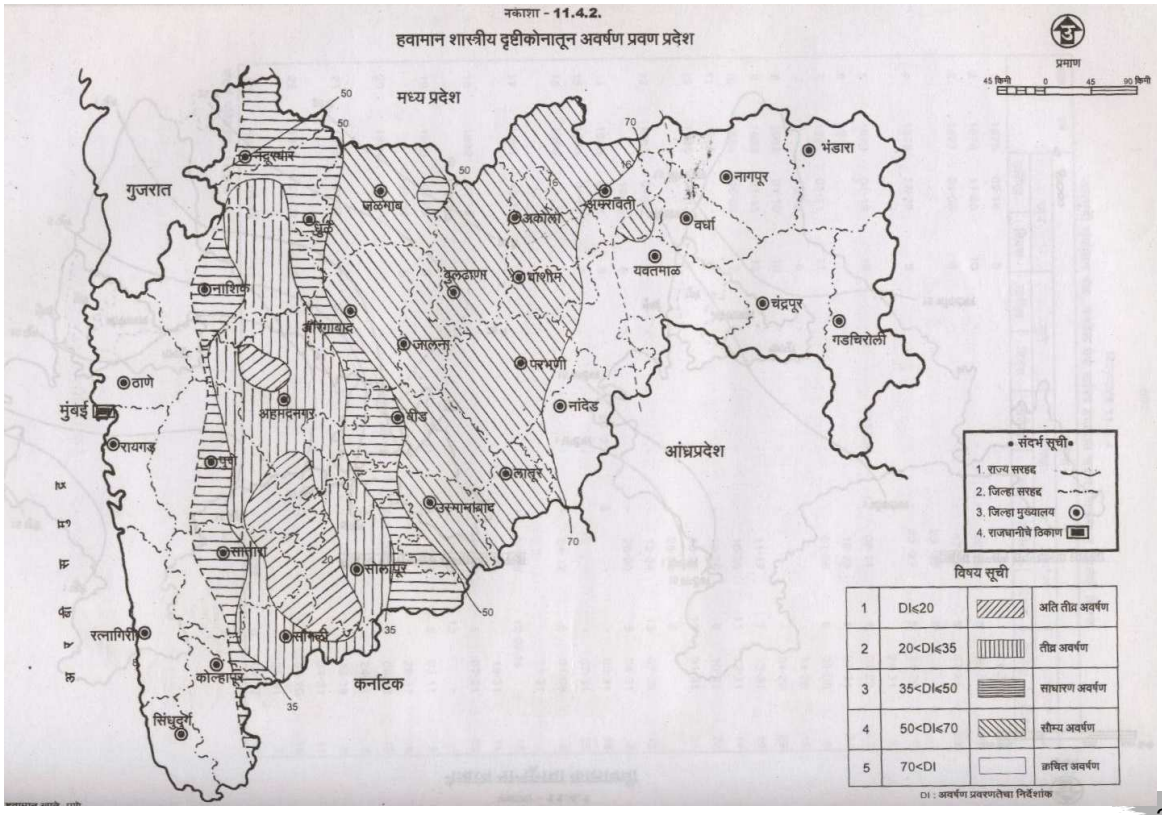


Figure 2.3: Map of Drought-prone Areas in Maharashtra

Table 2.3: All-India and Maharashtra Water Resource Situation

State/ Country	Ultimate Irrigation Potential: Major, Medium and Minor Irrigation (In 1000 ha)					Net Irrigated and Sown Area (In 1000 ha)			Ground Water Resources (as on 1.4.98)						
	Major and medium	Minor		Total mnor	Total	Net area sown (NSA)	Net irri. area (NIA)	% of NIA to NSA	Total replenishable groundwater resource Mha-m/Yr	Provision for domestic, industrial and other uses Mha-m/Yr	Net available ground-water resources for irrigation Mha-m/Yr	Net usable ground-water resources for irrigation Mha-m/Yr	Gross draft (based on pro rata basis) Mha-m/Yr	Net draft Mha-m/Yr	N b g w r f u n
		Surface water	Ground water												
Maharashtra	4100	1200	3652	4852	8952	17732	2946	16.61	3.78677	1.23973	2.54704	2.29233	1.26243	0.8837	
India	58465	17378	64050	81428	139893	142598	57055	40.01	43.38593	7.12655	36.25938	32.63345	19.29173	13.50404	2

Mha-m: Million Hectare-metres
Source: Annual Report, 2002-03, *Ministry of Water Resources, Government of India (excerpted from* Economic and Political Weekly, *4 October, 2003)*

2.3 Agricultural Productivity

Data on area under important crops and their productivity since the 1960s is presented in the table 2.4 below. Cereals occupied about 44 per cent of the gross cropped area (GCA) in 2000-01, but now reveal a declining trend. The proportion of area under pulses and oilseeds shows an increase. There has been an increase in productivity for almost all crops except for a few like rice and *tur* (pigeon pea). The area occupied by sugarcane has been steadily increasing, which, being a very water-intensive crop, consumes the bulk of the irrigation water.

Government of Maharashtra's *Maharashtra Human Development Report* also highlights the concern over the declining importance of agriculture in the GDP of the state. The share of agriculture declined from 42.14 per cent in 1960-61, to 27.69 per cent in 1980-81, further falling drastically to 17.44 per cent in 1999-2000[7]. This is generally due to the declining productivity of irrigated agriculture, stagnation in rainfed agriculture, low investments, fragmentation of holdings, skewed preference for certain crops like sugarcane etc. This trend calls for long-term planning with an emphasis on improving rainfed-farming systems.

[7] *Human Development Report 2002, Government of Maharashtra*

Table 2.4: Area and Productivity of Major Crops in Maharashtra
(Area in 000 hectares, Yield in kg/ha)

Crops\Year	1960-61			1980-81			2000-2001		
	Area	*%*	*Yield*	*Area*	*%*	*Yield*	*Area*	*%*	*Yield*
Rice	1,300	--	1,054	1,459	7.43	1,587	1,512	6.82	1,277
Sorghum	3,638	--	810	3,999	20.36	822	2,977	13.44	1,039
Wheat	907	--	442	1,063	5.41	834	754	3.40	1,256
Millet	1,473	--	306	1,350	6.87	451	1,639	7.40	590
Total cereals	**10,604**	**--**	**637**	**10,976**	**55.88**	**788**	**9,824**	**44.35**	**865**
Gram	402	--	334	410	2.08	335	676	3.05	519
Pigeon pea.	530	--	884	644	3.28	495	1,096	4.95	602
Soyabean	--	--	--	--	0	--	1,142	5.15	1,117
Total pulses	**2,351**	**--**	**421**	**2,685**	**13.67**	**307**	**3,557**	**16.06**	**460**
Groundnut	1,083	--	739	674	3.43	621	433	1.96	904
Total Oilseeds	--	--		1,708	8.69	426	2,559	11.55	820
Sugarcane	155		10,404*	319		23,706*	664		45,140*
GCA	--	--		1,964	100		2,215	100	

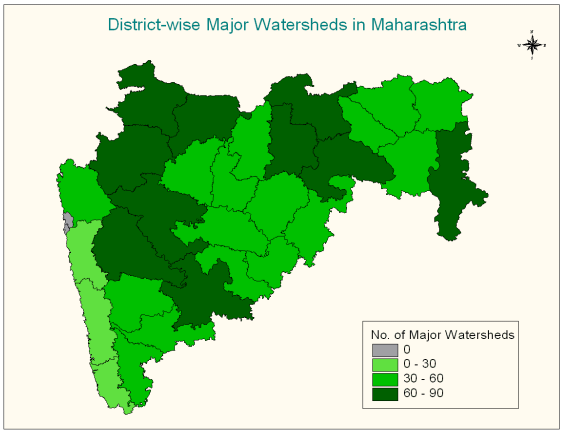
*Production in thousand tonnes
Source: Government of Maharashtra, 2002

Agro-climatic Zones

Productivity of major crop categories for the state is below the national average. For example, food grain productivity per hectare at the national level is 1614 kg/ha but stands at 1058/ha in Maharashtra. A similar situation prevails with regard to oilseeds, pulses, cotton etc. The only crop that stands above the national average is sugarcane, which is fully irrigated in the state. The

2.4 Watersheds in Maharashtra

Table A 2 .3 gives a district wise list of major, sub, mini and micro watersheds as classified by GSDA. About 26,695 watersheds fall in the drought-prone regions of Western Maharashtra and Marathwada



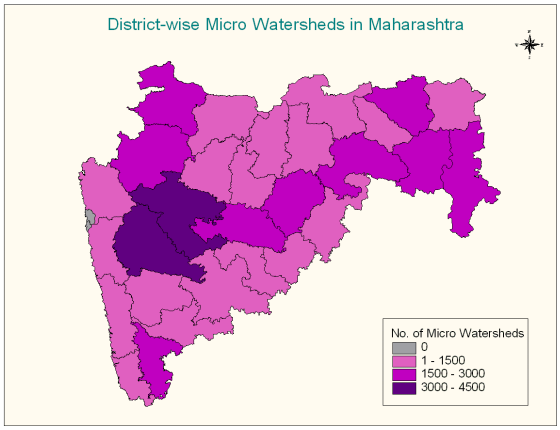


Figure 2.4: Major and Micro Watersheds in Maharashtra

2.5 History and Evolution of Watershed Programmes in Maharashtra

The history of watershed development in Maharashtra is said to date back to the period known as the Dark Ages, that is, the period at the end of the Indus valley civilization and at the dawn of the sixth century AD Archaeologists excavated over 200 Chalcolithic settlements in Central Maharashtra which revealed the practice of subsistence agriculture. Important among these were the sites at Newasa and Daimabad (Ahmadnagar), Prakasha (Dhule) and Inamgaon[8] (Pune). Through artificial irrigation in the Early Jorwe culture (1500 to 1200 BC) winter crops like wheat, barley, jowar, rice, horse gram, hyacinth bean, peas and several other crops were grown. The earliest evidence of an artificial dam in western India that survives today is located at the Kanheri Caves in Mumbai which date back to the Satvahana period. In the midst of the cave system there still exists a system of water harvesting, known as the 'cascade' system, prevalent in those times in Tamil Nadu and Sri Lanka. Thus, watershed development was known and practiced systematically in Maharashtra from very early periods[9]. Around 1514 the British built a dam at Karle on river Bhokar that can be considered the earliest modern dam in Maharashtra. Later, in 1860, the Vihar Lake at Powai was constructed and in 1870, a dam was constructed east of the Kanheri Caves. Research attention was focused in the post-independence period on soil conservation measures mainly to stabilize the catchment areas of large and medium dams and to prevent siltation of reservoirs. In 1943, Bombay state introduced contour bunding.

Drought is an age-old phenomenon in Maharashtra. Sant Dnyaneshwar, seven centuries ago, advised, "While constructing townships, you must develop reservoirs, plant huge forests of different species of plants" as he had realized the significance of afforestation and water conservation (excerpted from a speech given by Anna Hazare). The earliest evidence of the awareness of need for soil and water conservation as a means for increasing productivity and contributing to the welfare of the farming community may be seen in the writings of Mahatma Jotiba Phule. More than hundred years ago, he wrote:

"And so, in order that the vital element from the rotting of meat and bones, dead insects and animals, leaves and flowers shed by trees, grasses growing in the hills and mountains shall not be washed off by the early rains and carried away by the floods to be wasted in the streams, the industrious government should get all these superfluous men from amongst the black and white soldiery and constabulary to judiciously build dams and obstructions in one and many places in such a manner that the rain shall first wet and enter the fields fully before it flows into the streams…. Similarly our kind government should build as many as possible tanks and ponds in all our hills and mountains, our valleys and gorges. Thereby, because all the streams and nallahs downstream of them will have water throughout the summer, they can be dammed and will serve all the wells with ample water and will green all the fields benefiting the farmers along with the government."

(Source: Shetkaryancha Asud – The Whip of the Peasant (1883), cited in Paranjape et al, 1998 , 90)

[8] At Inamgaon there are physical evidences of a channel and a stone wall with its embankments that are known as guide bunds.

[9] The stonecutting Vadar community in Maharashtra was expert in constructing dams by piling loose boulders and filling mortar or soil between the gaps; these age-old structures, some even 500 years old, still exist in Dhule, Bhandara and many other regions. Due to these tanks, Bhandara has a crop pattern far superior to that of the rest of the State and has the lowest proportion of barren and uncultivable areas and fallow lands today, with the proportion of irrigated area higher than state averages in all talukas (Paranjape et al, 1998).

The recurrent droughts and famines (1907, 1911, 1918, and 1920) had made it apparent that desperate measures were needed to improve agriculture in non-irrigated areas, but it was only in the 1930s that scientific inputs were institutionalized through research stations at Solapur, Bijapur, Hagari (Karnataka), Raichur (Hyderabad) and Rohtak (Punjab). The Bombay Land Improvement Schemes Act (1942) provided the most enduring legacy of the period, and also became the precursor for the Government of India's Model Bill on Soil Conservation for enactment by all states in the post-independence period[10].

Following the severe drought of 1972 the Employment Guarantee Scheme (EGS) was launched in Maharashtra and drought proofing the land was among the important activities undertaken by the programme. Construction of water harvesting structures (nala bunds) and contour bunding was also undertaken on a large scale under it. 1n 1982, the Comprehensive Watershed Development Programme (COWDEP) was initiated in an attempt to combine the budgetary resources of the EGS and the technical provisions of the 1942 Bombay Land Improvement Schemes Act for large-scale watershed development effort. The Drought Prone Areas programme(DPAP) was a central scheme under the Ministry of Rural Development (MoRD) started in 1973-74 in 14 districts: 74 projects were funded by the centre and 13 were funded by the state. By the 1980s it became an exclusively watershed development programme. In the mid-1980s ICAR launched model research watersheds at 47 locations of which atleast one was in eastern Maharashtra (Kerr et al., 2000). The World Bank pilot project was initiated in 1984 on lines similar to the ICAR's model watersheds. The National Watershed Development Projects for Rainfed Areas (NWDPRA) initiated in 1990, is the Ministry of Agriculture's (MoA's) counterpart to the World Bank-funded Pilot Project and Integrated Wasteland development Programme (IWDP) where again the emphasis was on low-cost vegetative bunding and contour-based cultivation.[11] In 1992, the launch of the Jal Sandharan Programme attempted a more comprehensive approach where four different programmes were brought under asingle department.

One of the first experiments of people-centred watershed development in Maharashtra took place at Naigaon, initiated by Shri Vilasrao Salunke in 1974. Popularly referred to as the *Pani* (water) Panchayat, this initiative aimed at organizing people around existing village water resources, which were to be shared equitably. In the early 1980s, two villages in Maharashtra too became well known for their watershed development programmes: Ralegaon Siddhi[12] (refer to next page) (Ahmadnagar) and Adgaon (Aurangabad). This marked one of the first instances of genuine people's participation in watershed development (Pangare and Gondhalekar 1998; Gadgil and Guha 1995), the legacy of which is evident in many subsequent government schemes. Similarly, many farmers took up soil and water conservation measures in the Gunjawani and Shivganga valleys of the Haveli and Bhor talukas of Pune district, under the guidance of Shri Appasaheb Bhagwat, a social worker associated with Jnana Prabodhini. Today, the state has many pioneering NGOs that work in the watershed development programmes. Social Centre, Ahmadnagar was one of the first NGOs to adopt the watershed approach and it played a key role in launching and designing a state-wide Indo-German Watershed Development Programme. Today many other NGOs prominently WOTR, BAIF, AFARM, ASSIFA, Manavlok, Dharamitra, Gomukh, Vanrai etc are dominant names in watershed development.

The next development has been the launching of collaborative programmes between government and non-government agencies. The two main examples are the Adarsh Gaon Yojana (AGY), started in 1992, and the Indo-German Watershed Development Programme or IGWDP). The AGY started in 1992 is a major initiative that seeks to replicate the Ralegaon Siddhi model in 300 villages by combining the technical staff of the Jal Sandharan programme with the social orientation of NGOs. The IGWDP is another example of collaboration between a public institution (NABARD) and NGOs that seeks to scale up the success of small NGO programmes. It started in 1992 and as of March 2003 had developed 158 projects covering about 162,000 ha, with the involvement of 76 NGOs (WOTR, Annual Report, 2003)

[10] For a chronology of soil and water conservation works and watershed development programmes in India see Shah (1998: p. 158).

[11] In Western Maharashtra, implementation of the NWDPRA was strongly influenced by the fact that the project was implemented by the same agency that plans and implements the engineering-based approaches of the COWDEP, Jal Sandharan and DPAP. Therefore, the primary focus remained on treating drainage lines and catchment areas to promote infiltration of water, the difference being that they were much cheaper and probably less effective.

Thus, watershed development increasingly came to be seen as the lynchpin of rural development in dry land areas – one that integrates and anchors rural development efforts. Notable examples of watershed development appear to offer a way out of stagnation and degradation for all those areas that development had seemingly bypassed. Watershed development appears to have had a positive impact on the dry lands, wastelands, degraded commons and semi-arid and arid regions perpetually under the shadow of drought.[13]

2.6. Brief Description of the Important Programmes

2.6.1 Centrally-assisted Schemes

Drought Prone Area Programme (DPAP)

A centrally-funded programme implemented in Maharashtra since 1974-75, DPAP covered 87 talukas of 14 districts covering 87 centers (of which 74 centres were funded by the centre and 13 by the state) by 1994-95. In 1995, with the emergence of a new set of guidelines based on the recommendations of the C.H. Hanumantha Rao Committee, the programme revised its approach and strategies (including the unit of intervention) and new DPAP Blocks were identified using scientific criteria based on the moisture index, rainfall and evapotranspiration. The District Rural Development Agency (DRDA) was designated the responsible organization. From 1 April 1995, 22 districts (25 districts at present) and 148 talukas were brought under the programme and 856 micro watersheds were targeted with a total sanction of Rs 15,944.89 lakh. Fifty-three government agencies implemented 334 watersheds and around 100 NGOs implemented 522 watersheds as the PIA. The central and state contributions were equal in this phase of the programme. The New DPAP programme, implemented from 1999 onwards, has as its target 1403 new watersheds at a total cost of Rs. 39,690 lakhs. From September 2001 new guidelines were issued and the project cost norm increased from 4,000 to 6,000 per ha with a total project cost of Rs 30 lakhs per project. Since then 1,009 projects are implemented through 103 PIAs. The new guidelines introduced a capacity-building phase, a probation period for PIA, an institutional mechanism for maintenance after project completion, and planning for five years of watershed development and people's participation. With effect from 1 April 1999, the allocation is shared on a 75:25 basis between the centre and state governments with respect to new projects sanctioned during 1999-2000. The old funding pattern continues for ongoing projects sanctioned prior to April 1999. About ten per cent of the programme's national allocation (Rs 1,136.23 crore) has been released to Maharashtra (Rs 113.67 crores) during 1995-96 to 2002-03. The highest expenditure under DPAP was made in Amravati division followed by Pune and Nashik divisions. The number of watersheds undertaken under DPAP is highest in Vidharba (281) followed by Western Maharashtra (245) and Marathwada (171). If one considers drought proneness as the criteria for selection of watersheds under DPAP, this is quite justifiable because 75 per cent and 86 per cent of the geographical area of Amravati and Pune divisions respectively are considered to be drought prone. The total expenditure under DPAP in Maharashtra from 1995-96 up to June 2003 is Rs 12884.94 lakhs. Tables A 2.4 and 2.5 give details of the watershed programmes sanctioned under DPAP and Hariyali and the progress of DPAP from 1995-96 up to June 2003.

From April 2003, watersheds under DPAP have been implemented under the new set of Hariyali Guidelines where PRIs supported by NGOs or Government Departments function as PIAs. The concept of 'mother NGOs' also is being introduced to support and guide the PIAs and Watershed Communities. According to the *Annual Report of 2004*, (Department of Soil Conservation and Watershed Development, Commissionerate of Agriculture, Government of Maharashtra, Pune, 2004) under DPAP projects, which also include 50 per cent EAS projects, the expenditure incurred under the programme from its inception to end-March, 2004 is Rs 134.7 crores and the number of watersheds

[12] Ralegon Siddhi was a poorly developed village almost devoid of trees and grass and plagued by problems of inadequate food production and rampant alcoholism before Anna Hazare intervened. Realizing that insufficient retention of rainwater was the major cause for low productivity, he organized the villagers to build a series of storage ponds and embankments alongside the surrounding low hills. The results were immediate and impressive with rise in groundwater and recharge of aquifers. Villagers were also mobilized to plant over 400,000 saplings and soon the village emerged as a model eco-development village.

[13] For a detailed treatment of the theme 'watershed development and drylands' see Shah et al., *1998.*

completed is around 1087. Since the emergence of the new guidelines of 2001, a total of 1103 projects have been sanctioned.

Tables A 2.4 and 2.5 give a picture of the watershed programmes sanctioned in Maharashtra under DPAP and Hariyali. We should note that there are certain discrepancies in the information available and this may be due to problems related to computation and cut-off dates for calculating progress. Quite a few projects from earlier phases are always carried forward and recast according to the new guidelines with increased cost, which also impacts the calculation of progress. Besides information in relation to progress is not available easily on the public domain and accessing information is also found to be difficult.

National Watershed Development Project for Rainfed Areas (NWDPRA)

This centrally funded programme (sponsored by the MoA) was launched in Maharashtra at the end of the Seventh Plan period. Its major emphasis was stabilization of rainfed agriculture and improvement in production of food, fuel and fodder so as to improve the lives of farmers and landless agriculture labour. One objective was also to optimize production in rainfed areas so as to reduce the inequality of irrigated and rainfed agricultural production. This was to be achieved through low-cost biophysical measures of conservation and through better agricultural practices such as contour cultivation etc. NWDPRA was launched in Maharashtra during the Eighth Five Year Plan with the implementation of 266 watersheds. An area of 853,099.6 ha was treated at a total cost of Rs 165.95 crores by the end of the Eighth Plan. A chief executive officer is placed as in charge of the district watershed committee and a district superintending agriculture officer is the designated chief of the district coordination machinery/agency. By the end of the Ninth Plan 917 watersheds were selected, of which 646 were completed and 271 were incomplete. The incomplete watersheds in the Ninth Plan were recast as part of the new guidelines under the Tenth Plan. Under these guidelines, this programme is expected to cover 33 districts, 440 micro watersheds (each around 500 ha) spanning 2.04 lakh ha. Rs 15.37 crores of worth of work has already been accomplished by March 2004 and the total budget outlay for the period is Rs 116 crores

Integrated Wasteland Development Programme (IWDP)

The IWDP a centrally supported project was started in 1988-89 by the Ministry of Environment and Forests (MoEF) and later transferred to the Department of Wastelands Development which is now known as the Department of Land Resources (DLR) under MoRD. 1995-onward, projects worth Rs 24,38 lakh were sanctioned with an additional Rs 330,90 lakh sanctioned from 1999-2000 for 1,103 micro watershed projects for Maharashtra. The IWDP started with 18 talukas and 20 watershed development projects in Nagpur, Amravati, Aurangabad, Beed, Latur, Hingoli, Parbhani, Thane, Raigad, Sindhudurg, Ratnagiri, Satara, Sangli, Kolhapur,

Period	District	Watersheds	Area (lakh ha)	Expenditure (crores)
Seventh Plan (1987-92)	19	380	2.94	24.83
Eighth Plan (1992-97)	29	266	9.28	165.18
Ninth Plan (1997-02)	33	271	9.12	89.40
Tenth Plan ('04 March)	33	440	2.04	15.37
Total	33	1347	23.28	214.78

Table 2.5: Coverage and Expenditure under NWDPRA during 1990 to March 2004

Source: Dept. of Soil and Water Conservation: Annual Report 2003-04 *Commissionerate of Agriculture, GoM, Pune*

Yavatmal, Wardha, Pune and Jalagaon. By the end of financial year (FY) 2002 the total area proposed had stretched to include 213143.25 ha and the total planned budget was 10755.99 lakhs. Of this, only Rs 2444.81 lakh (27.73 of the total amount proposed under the plan) was released which works out to be only around 22.73 per cent. This reflects the slow progress of the work under IWDP, which may be due to different reasons such as issue of title/ownership of wastelands, encroachments, faulty planning regarding the extent of wastelands and possibility of treatments, selection of beneficiaries etc. From March 2000 onwards per ha cost was raised from 4000/ha to 6000/ha with the state government's share put at Rs 500/ ha. For 2002-03, Buldhana, Ahmadnagar, Nandurbar, Ratnagiri, Amravati and Jalna were to be included. That the Konkan region has the highest number of projects under this scheme may be because of the greater number of waste and fallow lands as reported here (see Table A 2.6)

Employment Assurance Scheme (EAS)

Commencing as the Employment Guarantee Scheme (EGS) was later amalgamated with the Jawahar Rojgar Yojana and renamed the Employment Assurance Scheme (Sampurna Grameen Rogjar Yojana) in September 2001, with the objective of ensuring social security through creating employment and offering the basic wage in rural areas. It also aimed at creating community assets such as soil and water conservation structures, connecting roads etc. This programme is now being replicated at the national level with the objective of creating rural employment for poverty alleviation and is known as the National Rural Employment Guarantee Scheme with an annual financial outlay of around Rs 14,000 crores. The responsibility for projects rests with the District Collector is the responsible authority for the project. Under EAS in 1995, 149 drought-prone regions were selected for developing 1582 watershed projects

Table 2.6: Status of Activities and Expenditure under WGDP 1974 to March 2004

Activities	Unit	Progress 1974-1983	Progress 1983-1992	Progress 1992-2004	Total
Terracing	Ha.	13,777	29,074	12,114	54,966
Contour bunding	Ha.	273	3,267	0	3,440
Nala bunding	No.	139	1,767	1,370	3,286
Nala straightening	No	0	117	0	117
Mango plantation	Ha.	3,226	8,274	0	11,502
Cashew plantation	Ha.	737	4,277	0	4,924
Land leveling	Ha.	0	1,177	0	1,177
Cement structures	No.	0	0	432	432
Loose boulders	No.	0	0	58,770	58,770
Diversion dams	No.	0	0	223	223
CCT	Ha.	0	0	6,636	6,636
Farm ponds	No.	0	0	107	107
Earthen structures	No.	0	0	1,496	1,496
Expenditure (in Crores)		6.63	39.02	88.82	134.46

*Source:*Annual Report 2003-04, *Commissionerate of Agriculture GoM, Pune, August, 2004*

with a financial outlay of Rs 30,848.90 lakhs. Under this scheme 55 government organizations (816 watersheds) and 136 NGOs (766 watersheds) were selected for implementation. The funding ratio between the centre and state is 75:25. Most of the projects are in the completion stage today. As in DPAP, the maximum projects are in Amravati (369) followed by the Pune region (358). Konkan is not in the EAS programme (see Table A 2.7).

Western Ghats Development Programme (WGDP)

This fully centrally-assisted programme is being implemented in the state since 1974-75 in the hilly regions of 12 districts consisting of 62 talukas. These districts are Thane, Ratnagiri, Sindhudurg, Nasik, Dhule, Nadurbar, Satara, Sangili, Kholapur, Pune and Ahmadnagar. The objective is to improve the lives of the communities living around the Western Ghats through the sustainable and environmentally balanced development of the region. Till 1983 the project had an area development approach, when it shifted to a watershed development approach. Of the 120 watershed projects underway since then 53 have been completed. The total expenditure from 1973-74 up to 2003-04 stands at Rs 134.46 crores.

River Valley Projects (RVP)

This centrally sponsored project is one of the oldest projects in the country and is being implemented in the catchments of Damangaon (Thane, Nashik), Pochampada (Nanded, Nashik, Aurangabad), Ukkai (Dhule, Jalgaon, Nandurbar), Nagarjunsagar (Solapur, Usmanabad, Pune, Sangli, Satara) and Narmadsagar (Dhule, Nandurbar) in the state. The major objectives were control of dam siltation, land-use based on land capability, and increasing the moisture content of land in the catchments. One of the interesting aspects of this project was the silt monitoring stations. Under this programme, as on March 2004, 1.92 lakh ha was treated at a cost of Rs 92.30 crores. The project is now considered as completed.

Table 2.7:
Status of Activities and Expenditure under RVP 1993 to March 2004

Items	Unit	Coverage/expenditure (1993 - March 2004)
Area treatment	Ha.	192,446
Drainage structures	No.	114,047
Expenditure on work	Rs (crores)	69.46
Salary and allowances	--	18.44
Contingency fund	--	1.95
Silt monitoring center	--	0.89
Storage and construction	--	0.40
Training	--	0.29
Corpus fund	--	0.87
Total expenditure (in crores)	--	92.30

Source: Annual Report, 2003-04, Commissionerate of Agriculture, GoM, Pune, August, 2004

2.6.2 State-supported Schemes

Integrated Watershed Development Project (IWDP)

IWDP is a state sponsored project to be implemented in villages having a severe problem of drinking water as well as watersheds declared as overexploited (dark) according to the GSDA analysis. The major source for funds under this programme is the District Planning and Development Corporation (DPDC), Tribal Sub Plan (TSP), funds with the Water Conservation Board, the state-level Plan fund etc. This is one of the largest programmes being implemented in the state. Besides taking up new watersheds IWDP funds are also used for completing incomplete watersheds started in other programmes. However, the information available for IWDP is not very consistent and different sources show different picture. Most sources show it not as IWDP, but as part of the work undertaken under TSP, DPDC, OTSP etc, from which the funds are availed for the work. According to the *Annual Report 2003-04* cited above, based on the Government Order of 30 January 1996, 15,707 villages were selected under IWDP and 32,139 watersheds delineated. The total area of the proposed watersheds is 1, 17,66,955 ha. The actual work started in 11,386 villages and 24,111 watersheds and in an area of 90, 74,856 ha. Of these, 8188 watersheds were completed covering an area of 41.63 lakh ha and the expenditure incurred was Rs 3288.40 crores (*Annual Report:* pp.16-17). The report notes that in the year 2003-04 Rs 688.09 crores were spent. However a closer look at the expenditure for 2003-04 shows that it includes all programmes funded by the state, central and district authorities (*Annual Report* pp. 41-48). The cumulative figure above for the IWDP, we may assume, includes all programmes implemented in the state.

Adarsh Gaon Yojana (AGY)

Initiated in 1992, the programme is the state's attempt at a wider scale replication of success stories such as that of Ralegaon Siddhi, based on the principle of village development through people's participation. The villages selected would follow the five tenets prescribed by Anna Hazare: a ban on grazing, tree felling, alcohol, contribution of voluntary labour and following family planning. The major objective is not only the integrated development of the village but to introduce social discipline and make the village self-reliant. The programme is to be implemented through a village-level NGO registered under the Commissionaire of Charitable Trusts. For selected villages other schemes of rural development would also be implemented on priority. Around 59 programmes of 12 different departments form part of this scheme. The programme is divided into core (watershed areas) and non-core areas. There is a state level committee for implementation and monitoring which makes decisions regarding choice of villages, choice of PIAs, project sanctioning, budgeted sanction, grant release, removal of inefficient villages, change of PIA etc. District, taluka and village level committees have also been formed. At least one village has been chosen in each taluka and the objective is to make at least one village in each taluka a success under this scheme.

Table 2.8:
Status of Adarsh Gaon Yojana

Districts included in AGY	33
Total talukas selected in AGY	321
Included talukas in AGY	156
Total selected villages	*221*
Tribal villages included	15
Total PIA	184
Villages which have submitted proposals	201
Total amount for the received proposals (Rs. crore)	66.66

Table 2.9:
Adarsh Gaon Yojna Expenditure Details1992-2004

Year	Core Area	Non-core Area	Total Expenditure (in lakh Rs.)
1994-5	39.05	226.86	265.91
1995-6	147.56	702.78	850.34
1996-7	199.02	1,535.9	1,734.92
1997-8	270	1,574.85	1,844.85
1998-9	524.4	692.47	1,216.87
1999-0	483.4	806.4	1,289.8
2000-1	246.8	575.8	822.6
2001-2	271.42	180.69	452.11
2002-3	118.61	178.61	297.22
2003-4	24.66	40.59	65.25
Total	2,324.92	6,514.95	8,839.87

Activities	Unit	Achievements 1992-2003
CCT/ afforestation	Ha.	5,742
Plantation	Ha.	3,082
Vegetative bunding/live check dam	No.	5,560
Brush wood dam/loose boulder	No.	2,634
Earthen nala bund	No.	594
Cement nala bund	No.	490
Underground/diversion dams	No.	132
Farm pond/dug ponds	No.	298
Terracing	Ha.	1,079
Other works	No.	204

Table 2.10: Activities under AGY 1992-2003

Source: (Table, 2.8,2.9&2.10): Commissionerate of Agriculture and Annual Report 2003-04,GoM,Pune,2004

2.7. Maharashtra: The Overall Scenario

Watershed development is one of the major public programmes in terms of expenditure. A rough estimate shows that Rs 4,500 crores has been spent over the last two decades under different programmes through central and state assistance. Besides, there are a number of programmes implemented by NGOs and some public institutions like NABARD. This much expenditure, ideally speaking should have treated around nine million hectares of area factoring Rs 5000/ha. During 2003- 04 the expenditure incurred under different programmes was Rs 68,809.90 lakhs.

Table A 2.8 gives programme coverage details under different schemes for a period of 10 years (1992-2002). The IWDP (State) followed by EAS, NWDPRA, DPAP and AGY constitute the bulk of programmes being implemented. Of the 44,185 micro watersheds in Maharashtra, around 26,707 micro watersheds are being covered under various watershed programmes since 1992 out of which 8258 have been completed. Twenty-three per cent of the programmes

started are in the Vidharbha region, 8 per cent in Konkan and 69 per cent are in the drought-prone regions of Maharashtra. During 2004 6.54 per cent investment was in Konkan, the Nashik region accounted for 7.05 per cent, Pune division for 32.50 per cent, Kholapur division for 11.98 per cent, Aurangabad division for 8.63 per cent, Latur division for 19.51 per cent, Amravati for 7.27 per cent and Nagpur for 5.64 per cent. Here too, a large share went to the Pune region, consisting of only three districts with Solapur and Ahmadnagar accounting for the highest investments in the state (*Annual Report 2003-04*).

Eighty-three per cent of all projects (22,302 programmes) fall under IWDP (state) followed by DPAP (909), NWDPRA (917), EAS (1549) and AGY (645). About 522 NGOs are involved with implementing DPAP programmes, 766 NGOs in the implementation of EGS programmes. All programmes under AGY, IGWDP, CAPART etc., are implemented through NGOs.

A cursory glance at investments on different components of soil and water conservation shows a preponderance of drainage and engineering structures. This aspect needs further analysis, which also has a bearing on the total area reportedly covered. This will be dealt later in this review.

According to the sources provided by the Commissionerate of Agriculture 83% of all projects started are under the state Integrated Watershed Development Program having 22302 programs followed by DPAP (909), NWDPRA (917), EAS (1549) and AGY (645). About 522 NGOs are involved with implementing DPAP programs, 766 NGOs in the implementation of EGS programs whereas all programs under AGY, IGWDP, CAPART etc are implemented through the NGOs.

Another major issue is related to data management and availability of information. One could observe some discrepancies in the available data, as mentioned earlier. This is true for both the physical and financial details of the work.

Data available in different sources vary and this is also reflected in certain instances in this review. To substantiate, expenditure as reported in the *Swaminathan Committee Report* for all projects for 1992-2002 is Rs 2,252 crores as compared to the reported amount of Rs 3,288 crores for IWDP in the *Annual Report 2004* of the Department of Soil Conservation and Watershed Development,

Table 2.11: Details of Watersheds under Different Programmes 1992-2002

Schemes	No. of Watersheds Started	No. of Watersheds Completed	No. of Watersheds Incomplete
IWDP	22,302	7,048	15,254
NWDPRA	917	646	271
WGDP	97	43	54
RBP	114	59	55
DPAP	856	132	724
Adarsh Gaon	645	100	545
EAS 50%	1,582	189	1,393
CAPART	78	0	78
IGWDP	116	41	75 *(In progress)*
Total	26,707	8,258	18,449

Source: Report (2003) of the high level committee on the Action Plan for Agriculture for 25 years, under the chairmanship of Dr. M.S. Swaminathan. Chapter 3.

Commissionerate of Agriculture. It is necessary that a proper data/information management system be put in place which is a combination of both GIS and MIS. This should also be made available to the public domain. This is very important from the perspective programme management and planning.

The table below shows that state schemes account for about 64 per cent of the total spending, out of which spending under EGS is a major component. Among the central schemes, NWDPRA, EAS, JRY and DPAP are major sources. The total spending comes to more than Rs 22,5768.85 lakhs since 1992. If we look at the expenditure as given in Table 2.13 maximum expenditure is in the drought prone areas of Pune (21 per cent), Latur (19.17 per cent) and Aurangabad (nine per cent) divisions. Vidharbha accounts for around 21.47 per cent.

Table 2.12:
Budgeted Spending (Maharashtra) on Watershed Development, 1992 to 2002

Budget Head	Total Exp. [in lakhs]	Percentage to total
EGS	72,829.71	32
100-days Programme	1,511.21	1
District Planning and Development Council	14,819.48	7
BACKLOG	15,133.68	7
Constitutional Dev. Board	868.89	0
Tribal Sub-plan	11,201.5	5
Other than Tribal Sub-plan	487.55	0
Jalsandharan	17,258.42	8
World Bank Project	333.99	0
Other	9,555.79	4
Total State Schemes	14,4000.22	64
JRY	15,115.89	7
EAS	16,202.66	7
NWDPRA	24,747.67	11
Western Ghats	6,877.37	3
RVP	6,703.28	3
DPAP	12,121.76	5
Total Central Schemes	81,768.63	36
Total State and Central Schemes	22,5768.85	100

Source: Commissionerate of Agriculture, GOM, Pune

Table 2.13:
An Overview of Watershed Development in Maharashtra

District	Geographical Area [in Ha]	Area Available for Watershed	Completed Watershed	Total Treated Area (including incomplete watersheds)	Balance Area for Watershed Dvlpmnt.	Expenditure Incurred (in lakhs)
Gtr. Mumbai	38,000	7,900	0	0	7,900	[0]
Thane	933,700	372,870	134	158,956	213,914	10,185
Raigad	686,900	454,380	201	178,745	275,635	4,993
Ratnagiri	816,400	789,470	58	177,860	611,610	3,893
Sindhudurg	504,000	445,120	13	102,545	342,575	2,283
Kokan Division	2,979,000	2,069,740	406	618,106	1,451,634	21,354
Nasik	1,563,400	1,052,160	994	331,513	720,647	14,323
Dhule	1,438,000	760,430	260	186,759	573,671	6,667
Jalgaon	1,163,900	821,900	340	214,592	607,308	5,860
Nashik Division	4,165,300	2,634,490	1,594	732,864	1,901,626	26,850
Ahmadnagar	1,702,000	1,265,650	206	420,137	845,513	14,271
Pune	1,562,000	1,005,800	243	322,067	683,733	13,221
Solapur	1,487,800	1,144,160	240	544,813	599,347	19,774
Pune Division	4,751,800	3,415,610	689	1,287,017	2,128,593	47,266
Satara	1,058,200	704,740	162	227,119	477,621	8,091
Sangli	861,000	601,720	116	207,906	393,814	5,133
Kolhapur	776,300	420,900	199	144,574	276,326	4,711
Kolhapur Division	2,695,500	1,727,360	477	579,599	1,147,761	1,7935
Aurangabad	1,007,700	811,610	61	121,758	689,852	5,957
Jalna	772,600	678,750	312	208,784	469,966	9,282
Beed	1,068,600	867,410	785	256,930	610,480	5,032
Aurangabad Division	2,848,900	2,357,770	1,158	587,472	1,770,298	20,271
Latur	715,700	606,240	655	272,431	333,809	7,433
Osmanabad	748,500	659,030	1,143	553,938	105,092	14,819
Nanded	1,033,100	752,190	90	152,618	599,572	12,005
Parbhani	1,097,200	829,030	33	113,688	715,342	8,888
Latur	3,594,500	2,846,490	1,921	1,092,675	1,753,815	4,3145

Buldhana	967,100	745,780	190	138,998	606,782	4,342
Akola	1,056,000	869,970	251	129,109	740,861	5,546
Amravati	1,221,700	806,210	369	165,694	640,516	5,470
Yavatmal	1,351,900	940,890	420	202,398	738,492	5,775
Amravati Divison	4,596,700	3,362,850	1,230	636,199	2,726,651	21,133
Wardha	628,900	461,430	108	85,164	376,266	2,613
Nagpur	986,400	590,870	94	140,003	450,867	6,393
Bhandara	927,900	412,760	175	171,232	241,528	6,194
Chandrapur	1,091,800	556,940	202	105,943	450,997	6,640
Gadchiroli	1,491,600	301,310	73	79,102	222,208	5,382
Nagpur Division	5,126,600	2,323,310	652	581,444	1,741,866	27,222
Maharashtra	30,758,300	20,737,620	8,127	6,115,376	14,622,244	225,176

Source: Commissionerate of Agriculture, GOM, Pune; 2002

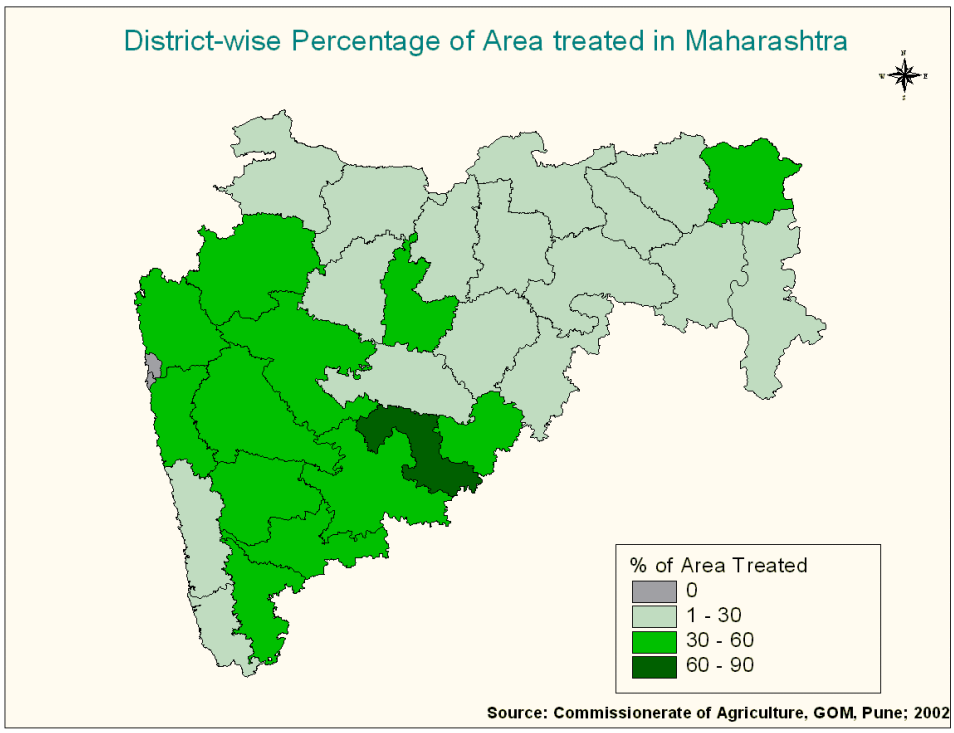


Figure 2.5: Percentage of Area Treated under Watershed Programmes in Maharashtra

Figure 2.6: District-wise Expenditure under Watershed Programmes in Maharashtra

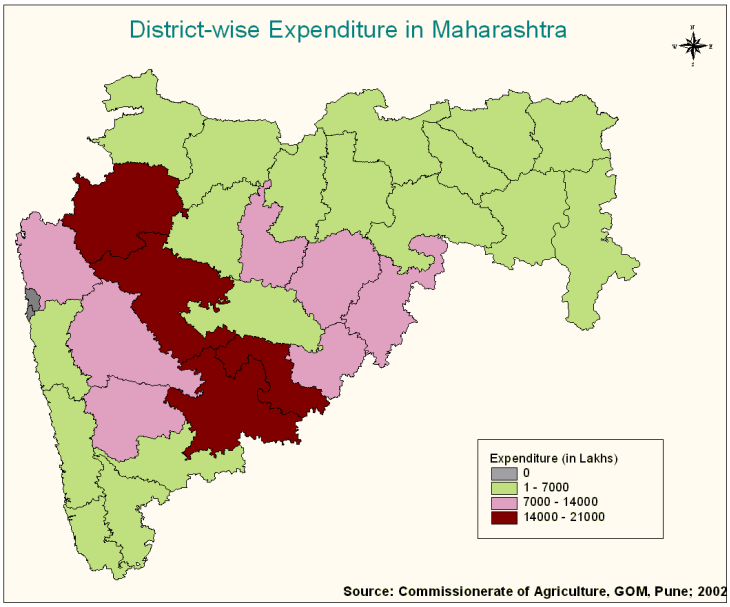


Table 2.14:
District-wise, Priority-wise, Category-wise Information of Incomplete Watersheds
Source: Commissionerate of Agriculture, GOM, Pune; 2002

Divisions	Total No. of Watersheds		Dark and Gray Watersheds		DPAP Watersheds		Tribal Area Watersheds		Other Area Watersheds	
	Incomplete Ws	*%area remaining to be treated*	*Incomplete Ws*	*%area remaining to be treated*	*Incomplete Ws*	*%area remaining to be treated*	*Incomplete Ws*	*%area remaining to be treated*	*Incomplete Ws*	*%area remaining to be treated*
Konkan Division	1,567	47	0		340	45	0		1,227	47
Nashik Division	1,913	44	277	34	909	51	640	39	87	48
Pune Division	5,292	48	672	43	320	63	3,383	48	917	48
Kolhapur Division	1,357	51	120	46	0		579	52	658	52
Aurangabad Division	1,335	45	8	25	0		977	48	350	38
Latur Division	1,340	42	81	32	56	59	723	42	480	44
Amravati Division	2,247	45	107	48	591	45	1,314	46	235	41
Nagpur Division	1,627	39	79	35	844	38	65	58	639	39
Maharashtra	16,678	46	1,344	39	3,060	48	7,681	46	4,593	45

The above table gives a priority-wise listing of watersheds. Of the 16,678 incomplete programmes 1,344 are in the dark and grey areas, 3,060 in drought areas, 7,681 in tribal areas. Of the 146.22 lakh ha available for watershed treatment, 50.21 lakh ha, which is incomplete, should be the first priority. Dark and gray, DPAP and tribal area watersheds should receive the highest priority. According to the data available with the Commissionerate of Agriculture, Rs 2,511 crores is required to complete soil and water conservation work in this area. If we take Rs 6,000 as the per hectare cost as per the present guidelines, it works out to Rs 3,012 crores. Besides this, as per government estimation, Rs 480 crore is required to treat 4.69 lakh ha of saline-affected areas in the East Maharahstra districts of Amaravati, Buldhana and Akola. The remaining 96.01 lakh ha should be the next priority for undertaking soil and water conservation activities. Again within the same, dark and gray watersheds, DPAP and tribal area watersheds should receive first priority. At Rs 6000 per hectare, the total cost to treat this area would work out to Rs 5,760 crores (High Level Committee headed by Shri M.S. Swaminathan). If one goes by the recommendations of the Parthasarathy Committee, which recommends Rs 12000/ha, the required budget would be almost double.

Chapter 3

Impacts of Watershed Development on Ecosystems and Livelihoods

3.1 Context

Watershed development is a series of biophysical and social interventions aimed at restoring a degraded ecosystem to ensure livelihoods for the community depending upon it. However, the issue of impacts on livelihood entered watershed discourse and practice very recently – earlier this aspect was considered either a side effect or serendipitous. Bringing the livelihood issue into focus can, to a large extent, ensure the streamlining of the poverty reduction objectives of watershed development and render productive and sustainable ecosystem resources a precondition for creating livelihoods in rural rainfed areas. Many impact assessments of watershed programmes have been undertaken covering both biophysical and socio-economic programme aspects. Increase in crop area, cropping intensity, increase in crop yields, changes in the cropping pattern, increase in irrigated area, increase in the productivity of common/ waste lands due to increase in green cover and therefore increase in fodder and fuel from them, change in fodder/ fuel consumption quantity and pattern due to change in the land use or change in cropping pattern, change in livestock composition due to the above, change in water levels leading to changes in withdrawal rate, increase in number of wells, improvement in water quality, improvement in soil quality and reduction in soil erosion, improvement in environment, improvement in employment opportunities, changes in labour requirements, changes in income levels and livelihoods and finally changes in the socio-economic structure of the community are some of the changes that could be expected to emerge from watershed programmes. All these indices/indicators of impact have a direct relation to the livelihood issues of the community inhabiting the specific ecospace/watershed. Augmented natural resources from watershed development are expected to contribute towards improved livelihood opportunities for all strata and stakeholders.

Studies document many or some of these impacts in a somewhat ad hoc manner. The data are often impressionistic and lack rigour. Very few studies are based on rigorous benchmarks established beforehand and rely on recall and perception of respondents of change or impact. Also, the multiplicity of studies looking at the short-term impacts is not matched by studies looking at the long-term impacts of watershed programmes – whether biophysical or socio-economic. Even certain short-term changes, especially in socio-economic indicators, are often assumed to emerge from the sum of "watershed activity" and the physiology of each process leading to a particular outcome is often not made explicit or looked into. There is a tendency to ascribe all changes happening in the watershed context as an outcome of the effects of watershed development. Attributing impacts/outcomes to specific watershed interventions also may be problematic because these impacts may be visible even outside the watershed context, and in the absence of comparison with a controlled universe it may not stand scientific scrutiny. In certain indices such as environmental impacts, the long gestation required to register impacts also throws up challenges. Moreover, studies do not deal with crucial questions such as the ability of watershed programmes to deal with drought, or the need to integrate exogenous water with what is locally available to create the critical quantum of the resource required in the watershed. Barring certain exceptions like Ralegaon Siddhi, and some of the Indo-German Watershed Programme (IGWDP) projects, feedback from the field indicates that by and large watershed programmes seem to be successful under normal rainfall conditions of a particular area. This question of whether watershed

development programmes can really offset the impact of reduction in rainfall, and if yes, to what degree, needs to be further researched. The popular perception is that watershed development helps people in good years, but fails them in bad years, when they need the help the most[14].

Literature on impacts is substantial and growing. Many impact assessment studies have been conducted by professional organizations or NGOs themselves or by individual researchers. Certain impact indicators are measured concurrently by the implementation organizations as part of regular reporting and feedback systems and sometimes as post-project evaluations. Apart from this, results of various independent studies have been compiled. Impacts on many aspects have been documented and they range from physical impacts such as a rise in the water table to wide-ranging changes in the economy and even social changes in certain places.

We have grouped the impact variables into: impact on the ecosystem (soil, water, vegetation/biomass etc), intermediary impacts, impacts on agricultural production and socio-economic aspects. These are not independent categories but impinge on each other, however they loosely also capture the sequence of impacts in watershed programmes. All these impact variables have a direct relation to livelihood resources available for watershed dwellers, but to gauge whether the benefit from augmented resources has impacted the livelihood opportunities of all sections in the watershed requires disaggregated information along different socio-economic categories. Earlier, soil and water conservation activities were not visualized or directly aimed at creating an impact on livelihoods. However, this aspect is now increasingly being brought into focus and quite few watershed based development interventions are called Rural Livelihoods Projects. Often in such cases, the strategy earmarks a certain budget for livelihood creation for resource-poor families. However, our position is that watershed development (being an environmental regeneration programme aimed at augmenting the resource base and involving public expenditure) the creation/generation of livelihoods for the resource-poor needs to be strategized on the basis these enhanced resources, i.e. through access to water, fodder, fuel etc.

The next few sections give an idea regarding the range of quantitative values and the specific indicators reported for capturing each impact. This is followed by a discussion at the end of the chapter, which tries to place the results in a more normative perspective.

3.2 Impacts on the Ecosystem

3.2.1 Improvement in soil quality

Soil quality has not been studied intensively in many watershed impact assessments, but is generally reported to have improved due to better *in situ* moisture retention. Due to reduced soil loss and improved farming approaches, the organic carbon content and availability of nitrogen, phosphorus and potash (or NPK) has been seen to increase in the soils on farms of beneficiary households located in the National Watershed Development Programme for rainfed Areas (NWDPRA) watersheds (AFC, 1999, see Table A 3.2 for details of watersheds under study). Analyses of soil samples in the Khed watershed showed that fertility improved to a very limited extent but the availability of major nutrients such as NPK and micronutrients went up appreciably (TERI, 2001).

Lack of information on this important component which has direct bearing on productivity, goes against one of the major objectives of watershed development: sustainable productivity enhancement of rainfed areas. There may be a multiplicity of reasons for this, such as 'time required to register soil quality improvement'; approach and methods, whether interventions are merely conservation based or adopt the farming system approach; availability of baseline information[15](refer to next page); failure to systematically analyse post-implementation changes wherever improvements are reported, whether as an outcome of high external fertilizer input in better land class etc.

3.2.2 Change in soil erosion/runoff

The general review of Kerr et al. (2000) throws up some very interesting findings

[14] There is a related lacuna in watershed planning: lack of consideration of the issue of dependability. Very often, watershed planning is done on the basis of average or mean rainfall figures, which is very close to 50 per cent dependability. This means that watershed planning would work for 50 per cent of the time or half the number of years. In other words, planning would fail once every two years. Since people's livelihood is tied to the programme, it is imperative that it be planned at a much higher dependability-level, say 80 per cent or more when the quantum of rainfall would be smaller than at 50 per cent rainfall. But at 80 per cent rainfall dependability i.e., four out of five years, one is sure to get that much rain. This adds stability to the programme which can thus achieve planned targets four out of every five years. If there is one bad year in five, it is easier for people to build up surpluses during the four good years (of which one or two will be quite good) to tide over the single bad year. Refer to Joy and Paranjape, 2004 for a more detailed exposition.

about the erosion of crop and non-crop land. It suggests that irrigated plots are generally well maintained and show the least erosion. Dry croplands on the other hand, are prone to erosion because they are generally not as well maintained as irrigated lands. The study also indicates that in this respect, control villages perform only marginally worse than villages where the watershed approach has been implemented. However, for uncultivated land they find – somewhat against expectations – that many watershed development areas perform marginally worse than the control villages. (This may be because these control villages were perhaps located in the lower reaches of a larger drainage, and hence were less sloppy and erosion prone as compared to watersheds in the upper areas of the drainage). Their study shows that all projects improve the drainage line; AGY/ IGWDP villages have the best average score and non-project villages the worst.[16] Erosion in non-arable lands has reduced especially when investment is higher and for NGO and AGY/IGWDP projects[17] (Kerr et al., 2000). It is generally observed that farmers invest more in protection of irrigated lands (they do not want the water and fertilizer to flow into farms other than their own), and most often irrigated lands have a less than three per cent slope which considerably reduces the possibility of erosion. Investment increases in non-arable, pasture, fallow and common lands because of high degradation and multiplicity of measures required to protect, such as gully control measures, trenching, plantation, fodder development etc., which in turn may benefit the poor and marginal if benefit-sharing mechanisms are in place.

In the case of Vaiju Babhulgaon (IGWDP), people's perception is that the silt load has reduced by about 60 per cent, which is a significant improvement. In Bugewadi watershed, bunding activity has helped moisture conservation in soil and reduced soil loss. Besides, the vegetative key lines have provided beneficiaries with fertile soil and better groundwater availability (AERC study reported in TERI, 2001). The RPV[18] projects (see Table A 3.1) helped in reduction in silt production rates ranging from 1 ha-m per 100 sq km to 6 ha-m per 100 sq. km. The cost benefit analysis for just this one benefit amounted to 0.66:1, which indicated 66 per cent cost recovery only through silt load reduction. The rainfall runoff analysis for the Pochampad catchment indicated that runoff was as low as 7.1 per cent after treatment (AFC, 1999).

The review also shows that treated watersheds could tolerate longer dry spells compared to untreated watersheds. This is mainly because the soil moisture status and water holding capacity of the soil improved with treatment. This is reflected in people saying that the productivity of the plots has improved after watershed treatment.

Like the issue of soil fertility, measuring reduction in soil loss /reduced runoff is also a complex issue and most often community ingenuity and understanding (like clean water in streams, sediments deposited in gully plugs, vegetative structures) is the source of information in many projects. It is observed that tools and technologies used are not very user-friendly at the community level, besides the cost, requirement of time series data etc.

3.2.3 Change in Life of Wells and Streams; Rise in Water-level and Number of Wells

The water level has increased as a result of treatments in most projects. In Pimpalgaon Wagha (a project implemented by the social centre with government support) the life of wells increased with water becoming available for 11 to 12 months in the year, which helped irrigation and increase in agricultural productivity by nearly 50 per cent. Before watershed development was introduced in Pimpalgaon Wagha, only 40 of the 75 wells had water and that too for just eight months. There was an improvement in the green cover on once rocky hillsides, and streams which would flow only up to November, now flow up to January even in a dry year.

On an average, the water table in the wells increased by 1.5 m in the Khed watershed and the number of wells went up from 310 to 405 (TERI, 2001). The RVP projects saw a staggering percentage increase in the number of irrigation wells in the four watersheds studied between 24 to 237 per cent. The increase in the water table was

[15] In some projects such as IGWDP soil testing is done for a set of soil samples in each watershed during the planning stage

[16] For every rupee spent by AGY or IGWDP, the drainage line score rises by 0.27 on a scale of 1 to 3. For NGOs this is 0.17 and for govt. projects less than 0.10.

[17] Many villages where NGO projects operate there are less common lands.

[18] RVP projects supported by GTZ and facilitated by RODECO had established a Silt Monitoring Station to measure sediment deposits.

between 0.90 to 2.28 per cent, and the area under irrigation went up between eight per cent to 216 per cent. The number of wells dug wells shot up to by 65 in South Solapur watershed in Nagarjunasagar catchment. In other watersheds this number increased by eight to ten. Seasonal wells turned into perennial wells. The perennial wells increased in the range of 43 to 174 in all nine watersheds. The seasonal life of ephemeral streams of micro catchments increased by a month or two as they continued to flow even after the rainy season due to seepage from uplands (AFC, 1998-99).

In the IGWDP-supported Shedashi-Wavoshi watershed in Raigad District (a high rainfall area) water table in the existing wells persistently increased in all the season. For example, in the upper region, the water table increased by 0.40 meters as of March 1998. Similarly it increased by 0.60 meters and 1.20 meters in the middle and lower regions respectively (see Table A 3.9). This is substantial given that the actual rainfall and the number of rainy days during 1997-98 were less than the normal rainfall in the region. The streams, which dried in the middle of December, continued till the end of February in the post-project phase. Tanker trips have been minimized (NABARD, 1999). In the Rajani watershed (IGWDP) in Yavatmal district, the water level persistently increased in all seasons from 1993-98 by about two meters in spite of the rainfall being less than normal (see Table A 3.13). Streams continued to flow up to the end of February instead of mid-December. Floods reduced and water was cleaner in nalas (NABARD, 1999). In Mendawan watershed (IGWDP) in Ahmadnagar district, the number of wells in the watershed has gone up from 41 to 64. As against 54 per cent of the wells, which remained dry in the summer before the intervention (1993), only 14 per cent were dry in the summer of 1998. The average water level of the wells from the ground level in the summer months increased from 4.2 feet to 8.8 feet in some wells under observation (NABARD, 1999). In Sherikoldara watershed (IGWDP) the number of wells increased from 122 to 143 during 1994-2000 (the project period) while the number of perennial well increased from eight to 32 and defunct wells came down from 59 to seven (WOTR, 2002).

In the NWDPRA study, where nine watersheds were studied, the total number of wells in the watershed increased by a minimum of seven, including borewells (30.4 per cent) in Khandas watershed to a maximum by 277 numbers (181%) in Kanhur-mesai watershed (see Table A 2.3) and in 80 per cent of the older wells the water level increased (Gomukh, 2001). Streams in both watersheds flowed for about three months longer than they did before.

The review shows that there has been an increase (of between two to three months) in the duration of flow of streams after watershed development programmes were implemented. In Dornali village (AFARM, 1999), where the stream was reported flowing up to November prior to the watershed programme, now reports water in the stream till the month of March or later, even under normal rainfall conditions. The situation is similar at villages like Bhavthan (in Manavlok) where stream-flow has increased by a couple of months. In Adgaon, where water used to run off by the month of August, i.e., immediately after the rains, it now stays on for another two months.

Hence, it is hardly surprising that reduction of runoff is one of the most commonly reported results of watershed development. Wherever intensive works have been done on the upper reaches of the watershed, a decrease in runoff velocity has been observed along with a corresponding increase in time of concentration and greater subsurface infiltration, resulting in increased levels and durations of base flow. An increase in the number of wells may also be a reflection of increased groundwater availability, as farmers tend to invest in well-digging when they are sure of getting water. A note of caution must be sounded here however, while attributing the increased number of wells to increased groundwater, because most often this information does not show the depth of the wells and comparative changes. Also, most of this reporting is by way of visual observation and local perception rather than systematic, scientific observation. However, many projects have seriously undertaken monitoring of water level changes in wells.

3.2.4 Change in Green Cover, Biomass, Fodder and Fuel Availability

With regard to pastures, forests and commons, the main change is that in most projects, they have been brought under some degree of plantation and fodder development. However, the general experience is that the survival rate of such plantation is quite low (less than even 50 per cent) and that they are unable to achieve significant growth rates. Plantation methods/technology, soil moisture, rainfall pattern, land capability, availability and provision for protective irrigation, regulation on grazing etc. have an impact on the survival and growth of plantation. However it is generally observed that, if some care is taken, fodder is one of the immediate impacts arising out of a watershed project.

Canopy coverage has been reported as poor in comparison with the cover expected by the extent and density of planting, even though it may be better than what it was earlier. Hence, one of the major purposes for planting trees in the commons – namely, to arrest soil degradation and improve the water regime by providing some canopy cover over the exposed landscape – has been only partially fulfilled. In most plantations, the reported canopy cover was less than 50 per cent by the end of the project.

The study of Kerr et al. (2000) assesses the average performance of watershed projects in terms of availability of fodder, especially from common lands. Though the results are quite varied across the different types of projects studied, projects generally show decreased availability of fodder and fuel due to restrictions on access to common lands. This is seen more in AGY/IGWDP projects, which have strict restrictions on access, as compared to DPAP and NWDPRA projects (Kerr *et al*., 2000). However, restrictions may lead to increased production and maturing of grass and shrubs.

In the NWDPRA watersheds the rise in forage crop yield was a minimum of 1.6 quintals/ha in Phuldhaba and maximum of 3.8 quintals/ha in the Nune-gavadi watersheds, with an average rise of about 2.3 quintal/ha. There was an average 21.4 per cent rise. The forage-cultivated area was higher in watersheds located in Kokan and the Western Ghat zones (mainly in the Ratnagiri, Kolhapur, Raigarh and Satara districts). Silvi-pasture cultivation was practiced only in watersheds located in the Konkan, Western Maharashtra Plateau and Vidarbha zones. This may be due to better rainfall and soil depth in the area. Forage areas for the first time increased by 0.01 to 0.08 ha in the watersheds in other zones after project implementation (AFC, 1998-99). (In scarcity and drought-prone zones generally, species planted by forest and watershed developments are of hardy and long gestation).

Shedashi-Wavoshi watershed: The crown cover of the forest increased here. The Forest Department allotted land to the landless in encroached areas to the extent of 50 ha, who planted horticultural plants. More than 12 lakh saplings have been planted under the aegis of this project, covering both forest and private lands (see Table 3.10) and the reported survival rate is 61 per cent. It is also reported that due to grazing restrictions fodder availability has increased substantially, even though the quality of fodder has not improved (NABARD, 1999).

Rajani watershed: the community took responsibility of protecting the forest and stopped illegal felling. Protective grazing helped improve fodder availability in qualitative and quantitative terms. Improved leguminous grasses like Stylo Hemata were planted on improved bunds and mounds of Water Absorption Trenches (WATs) and Continuous Contour Trenches (CCTs). Six hectares of woodlot were developed on common lands and plantation was done on private lands, but the reported survival rate was only 10 per cent (NABARD, 1999).

In Sherikoldara also the fodder production has increased considerably both in forest and private waste lands. In RVP projects too, the biomass production from trees has increased, hence large quantities of fuel wood and fodder were produced. In Adgaon, nutritious green fodder availability increased tremendously. Gross-cropped Area under green fodder which was nil, increased to more than 175 ha including 125 ha in kharif and 50 ha in rabi and a few ha in summer in the year 1991-92 (Vaswani, 1995).

The present review shows that the share of fodder from commons has increased in all villages. Earlier, the contribution of common property land resources (CPLRs) to fodder consumption was zero. Now, it has increased to between three and twelve per cent for beneficiary households. Poor households are the main beneficiaries of the CPLR resources as their dependence on CPLRs is greater. The overall assessment implies that though the impact of watershed development on the availability of fodder is positive, the results are not very emphatic. This leads to the conclusion that the trends shown in this study may not be representative of an average case, as the researchers have chosen better-managed watersheds primarily to demonstrate the potential and not the average performance. In an assessment of 114 watersheds (DPAP and IWDP-state) in Vidarbha by Dharamitra, some kind of plantation activity was undertaken only in 60 watersheds. Among these, plantation was done only on private lands in 40 watersheds. In 12 watersheds plantation was done both on private and common lands. In many instances CPLRs are not brought under conservation measures.

It is important to note that fodder needs have changed along with the increase/ decrease in herd size and herd composition. In our field visits, we found that fodder availability generally improved after watershed development programmes. In some cases, the duration of its availability has increased, as observed in Dornali village (AFARM, 1999). In this case, prior to the watershed development programme, fodder was available only till December-January. After the watershed development programme, fodder is reported as being available throughout the year. Prior to the project, the villagers had, at times, to depend on fodder from outside the village area. Now, this situation has changed with measures such as tree planting, protection of common lands and ban on open grazing. As a result, the time and labour involved in collecting fodder has reduced. Similar changes were reported in other villages like Bhavthan (Manavlok), Adgaon, etc. In Ambewadi village (IGWDP), fodder availability increased twofold as a result of the watershed development programme.

The exception is villages like Chale (Kolwan Valley Project) where, even after the watershed programme that commenced in 2001, people still have to buy fodder from places as far as 10 km away. There are also isolated cases like that of Khudawadi village in Osmanabad district where women took private wasteland for development on a long-term lease and, with collective effort, carried out soil and water conservation works, re-vegetation and protection. Within a year of such measures, there was a significant increase in fodder output. This emboldened them to go for a group IRDP scheme for goat rearing.

Trends in fuel availability follow fodder trends very closely. The review indicates that the availability of fuel in most well-managed cases has increased, although the average performance seems to be poor. In some villages like Ralegaon Siddhi traditional fuel is also being supplemented by the introduction of biogas. Ralegaon Siddhi has a community biogas plant for the landless and dalits in the village and even in new projects there are places where old biogas plants are being renewed or new ones started.

In the Development Resource Organisation through Planning (DROP) study (2003), most villages noted an increase in green cover and fodder availability, however dairy activity went up only in Hivre Bazar and another village, Murkute. Free grazing of animals remained a common practice, only in the two villages above was there stall-feeding. The villagers in these two villages also ban tree felling. More than 50 per cent of the sample households in Hivre Bazar have LPG cylinders, while about 58 per cent of the households sampled in Murkute have installed gobar gas plants. Mendha also shows an increase in the use of gobar gas plants. In many IGWDP watersheds in western Maharashtra and Marathwada women's self-help groups (SHGs) purchased LPG cooking systems through loans from their savings. Women's SHGs from two IGWDP villages have started small-scale LPG agencies. However, there are also reports that the burden (in terms of time spent) of collecting fuel-wood has increased, especially during the implementation phase of the project. This seems to be mainly because of the blanket ban on tree felling that some

projects impose to protect the re-vegetation of common lands.[19] In our field visits, we found that the re-vegetation programme (on bunds, non-crop lands and commons) along with some social regulations like a ban on cutting trees (allowing people to collect only the fallen/dry branches), has helped improve fuel-wood availability. Villages like Dornali (AFARM), Bhavthan (Manavlok), Adgaon, Vaiju Babhulgaon (IGWDP), Hivre Bazar, Ralegaon Siddhi, and others report increases in availability of fuel-wood.

Since the canopy cover on most non-crop land, whether private or public, continues to remain poor even after the watershed development programme, this amounts to a shrinking of perennial cover. Since effective perennial cover in the country has decreased to as low as 15 per cent, an effort to increase perennial cover, without necessarily sacrificing production possibilities and incomes, is urgently needed. Besides change in land use, as increased area (which earlier used to be under shrubs and small trees), is brought under cultivation this leads to shrinking availability of fuel and fodder and green manure.

3.3 Intermediary impacts

3.3.1 Increase in drinking water

One of the main objectives of watershed development programmes, especially in drought-prone regions, is to mitigate the distress with regard to water for drinking and domestic purposes (including water for cattle). Almost all watershed development guidelines factor in the extent of drinking water shortage as a criterion for selection for watershed development. In fact, an assured source of potable water should be the minimum benchmark to judge the success of a watershed programme. However, ground realities are not as encouraging as they should have been. The increase in groundwater recharge would give a longer life to the water in wells and even the spring flow period would be extended. However, if the water withdrawal is unduly high for the rabi crop then it is possible that the overdraft leaves no reserves left to last through summer, even for drinking, and hardships might increase. Similarly, in a drought year watershed programmes might not be able to provide protection against paucity of drinking water. Finally, in villages falling in the saline tract, the regular activities undertaken by watershed programmes might not help in alleviating drinking water problems.

The indicators also do not always document whether the village had sufficient drinking water in the summer periods and in drought years. The study of NWDPRA projects noted an increase in the number of open dug wells for drinking and domestic purposes, and assured availability of drinking water due to seasonal wells turning perennial except in Kundawale and Khandas watersheds, both falling in the Konkan Zone, where, though the volumetric water availability has increased for longer periods, water scarcity is still felt in late summer season (AFC, 1999). In Pimpalgaon Wagha there was an improvement in availability of drinking water even in a dry year, but the situation has changed of late with increased extraction for agriculture and repeated droughts. In the Shedashi-Wavoshi watershed too the number of trips from tankers fell to a minimum after the watershed programmes. In the RVP watersheds too drinking water problems were solved due to project interventions. In watersheds like Sherikoldara and Darevadi (IGWDP), potable drinking water schemes lifting water from the local source started after the watershed programmes. It is also reported that during the year 2002-03, WOTR promoted 41 potable drinking water projects in different watershed projects through other sources of funds. In quite a few cases the drinking water provision also included local Zilla Parishad schools (WOTR, 2001, 2002 & 2003)

For many programmes such as the Jal Sandharan, DPAP and various NGO-implemented projects, overall water scarcity or drinking water problems would form a criterion for the selection of certain villages under the watershed development programme. All the projects except NWDPRA that promoted water harvesting through small tanks and dams directly or indirectly try to increase the level of water in wells for drinking water (Kerr *et al.*, 2000). Excluding villages with additional drinking water schemes, the

[19] *In their study, Reddy et al. (2001) have shown that the time spent on fetching fuel-wood has increased in three out of four villages studied. This seems to indicate that the advent of watershed development has not improved access to fuel-wood in these villages. This is also reflected in the shares of different sources in fuel-wood consumption. CPLRs play an important role in meeting fuel-wood needs (followed by purchase from the market) and their share varies from 34--72 per cent in the four villages under study. The dependence on CPLRs is greater in the case of small and marginal farmers in most situations (Reddy et al. 2001).*

AGY/IGWDP projects had the largest increase in the percentage of villages with adequate drinking water. Control villages had higher improvements than either NGO or Jal Sandharan villages. Drinking water supply (35 per cent), along with improved medical facilities and roads, were among the three most commonly listed priorities in infrastructure development in Maharasthra (Kerr *et al*., 2000).

All the watershed projects implemented by Bharatiya Agro Industries Foundation (BAIF) prioritized the drinking water problem. Even though some programmes had no funding for providing drinking water, BAIF organized funds from other sources to ensure adequate water supply to watershed populations. This leads to the important observation that some watershed programmes provide support only for soil and water conservation leaving the drinking-water issue untouched. Such watershed projects can only augment existing sources but cannot solve the drinking water problem completely. In fact, this has become an issue in several drinking water and sanitation schemes, where drinking water schemes are not integrated with the watershed development programmes. For instance, in Chale village (Kolwan Valley Project under DPAP), the drinking water issue is completely de-linked from watershed development efforts as the village is supplied with water by the Mulshi Pradeshik Water Supply Scheme. On the other hand, in the BAIF projects recharge through the programmes was supplemented by water supply schemes to help solve drinking water problem even in a water-scarcity situation. The study noted that in every project at least one downstream village benefited due to improved groundwater (Kakade *et al*., 2001).

The present review shows a mixed trend in terms of the impact on drinking water. Most of the case studies indicate that watershed development has made a difference in mitigating distress, though the degrees may vary. However, the review also indicates that this holds true only during "normal" rainfall years. If the rainfall is below average for that area, then most of these villages have to depend on external sources such as water tankers. This was corroborated by our field visits to Ambewadi and Vaiju Babhulgav villages (under IGWDP), Dornali (under AFARM), Bhavthan (under Manavlok) and other villages, which reported drinking water scarcity. In Adgaon, the situation is even worse though they also get exogenous water. It was reported that during the summer of 1995-96, drinking water had to be provided to this village by tankers, a situation similar to the one that existed before the programme.

Ensuring availability of drinking water was one of the main objectives in many villages considered for the DROP study. Interventions in two villages, Washi and Nagunichi Wadi, were focussed entirely on drinking water availability while others took an integrated approach to water management so as to ensure year-round availability of water. As all the villages had an assured supply and were 'tanker-free' after the project it was widely accepted that the ridge to valley approach could solve drinking water problem. In many villages it was revealed that there was also a shift in source from open well to hand pumps or tap water. An index was developed where tap water was denoted as the safest source and the river or nala as the unsafe source. In most villages there was an improvement in the index to safer sources. The improvement in index however was not reflected in the lower occurrence of water-borne diseases. This could be due to unhygienic water use and storage practices.

The review shows clearly that watershed development has led to a significant increase in the use of water for agricultural purposes. Unfortunately, in many places, this has been at the expense of drinking water. The review shows that many of the watersheds experience drinking water shortage during the summer months – most villages experience a dire need for water tankers in the summer months to fulfil their domestic water needs, especially during years when the rainfall is less than normal.

Of late, there have been conflicts over the prioritization of water use – drinking water versus irrigation water.[20] For example, one village covered during our field visits in Maharashtra, acknowledged improvement in the drinking water situation after watershed development, but followed it with a rider:

[20] *The mindless extraction of groundwater has ruined 54 watersheds. The groundwater level has gone down by two meters in the past five years. Areas of basalt rock decelerate the process of water percolation, creating smaller and fewer underground pools. Even in areas of abundant groundwater, it is inadvisable for agricultural bore wells to go deeper than 125 feet, while drinking water wells can go down to 200 feet. As these rudimentary instructions have been ignored, it is common for bores to reach down to 400 feet (Lyla Bavadam [2001], 'Of Livelihoods and Entitlements',* Frontline*, May 10-25).*

"This year, because of drought, we had to get water tankers in the months of April and May". This turned out to be a typical response from most watersheds that we visited in Maharashtra. However, in striking contrast, we also could see a standing sugarcane crop in the same watersheds. Thus, a situation emerges where drinking water shortage runs parallel with sugarcane cultivation in the watersheds during drier years. This once again illustrates that most watershed development programmes have overlooked prioritization of water use and access,[21] especially during drought years when there is overall shortage of water in the watershed.

Another issue is that even if the main village is provided with potable drinking water, different hamlets/settlements in the village often fail to get this benefit. This also leads to problems while planning a drinking water scheme in the village – meeting the demand of different hamlets. In fact, NGOs often abandon the drinking water schemes because of their inability to meet the requirements of all settlements/hamlets due to a lack of funds.

According to Sharma (2002), who takes a macro picture of the situation, the continuing drinking water problem in many states indicates that the existing watershed development interventions have not succeeded in drought proofing. There are several examples and situations where projects have not made even a minimum provision for drinking water (Sharma 2002). An article by Sunita Narain on the World Environment Day (2003) noted: "Despite efforts by the government, the number of 'problem villages' – a euphemism used to describe villages with drinking water shortages – does not seem to be reducing." Quoting official figures, she went on to say: "In our mathematics, 2,00,000 problem villages minus 2,00,000 problem villages is still 2,00,000 problem villages" (Narain, 2003).

There are also some indications that water quality has been deteriorating, especially in drought-prone regions. The increasing incidence of fluorosis is only part of the problem. Watershed development, in the absence of any control on groundwater extraction, does not seem to have helped in decreasing the intensity of this problem.

In years of drought, groundwater used to act as a buffer to meet drinking water and other essential needs. Now, there are predictions that meteorological drought would be accompanied by groundwater drought. In Maharashtra, as in other states, drinking water schemes are separate from watershed development efforts. Our review shows that in many places, there are either existing tanks that have been silted up and are not being used, or tanks that are functioning, but are not integrated in watershed planning. Integration can probably overcome some of the problems related to upstream versus downstream, as well as groundwater versus surface water conflicts and also, to some extent, take care of the limitations of both if they function as exclusive systems (Datye *et al* Undated; Paranjape and Joy 1995).[22] (refer to next page)Ralegaon Siddhi is an example of such integration.

3.3.2 Changes in livestock numbers and composition

Most watershed programmes tend to regard grazing as a harmful practice and restrictions and bans are imposed on free grazing, when watershed interventions are underway. Social fencing and restrictions on access bring about a forced migration or reduction of livestock, particularly the small ruminants. One noticeable trend, especially in villages where the ban on grazing has been enforced strictly (in Adgaon, for example), is that the number of smaller ruminants like goats and sheep is decreasing. Dairying seems to have picked up in many watersheds. This also shows that there is a shift towards bigger milch animals, the numbers of which seem to be rising, especially crossbred cows. Similar trends have been reported from irrigated areas. In some watersheds, grazing restrictions have led to a change in herd composition and a shift from open grazing to stall-feeding. For example, in Sukhomajri, there has been a shift from goats to stall-fed buffaloes and an improved breed of cows (Kerr 2002).

Increased mechanization also has an impact on draft animals, especially bullocks and male buffalos. It is noticed that in many successful watersheds the number of tractors as well as the use of tractors has increased.

[21] *This is corroborated by Kakade et al (2001) who studied seven BIRD-K watershed interventions, covering about 7,000 ha and about 2,500 households, to understand their impact on drinking water. According to the study, the problem is complicated because in many places, people draw water for both drinking and agriculture from the same aquifer. Since the water is used for the first two crops (kharif and rabi), generally there is no water left in the summer months for drinking or domestic purposes. According to this study, in villages like Rajkot, which experienced two years of continuous drought, the drinking water problem continues even after watershed project implementation. Two of the important recommendations of the study are: (i) water supply, sanitation and watershed development should be linked together to solve the problems of drinking water supply, sanitation and irrigation; and (ii) controlled utilization of water for irrigation needs to be incorporated in projects to avoid potential conflicts between drinking water needs and irrigation needs (Kakade et al 2001).*

Generally, in most watersheds reviewed there was an increase in milch animals as compared to the smaller ruminants and there was an increase in the proportion of cross breed cows. The NWDPRA study, found the presence of animals of improved breeds in larger numbers, in the developed watersheds of Kanhur-mesai, Phuldhaba and Khandwa. The highest numbers of such improved breeds were found in Kanhur-mesai watershed and the lowest in Tambulwadi watershed. The total milk production of the beneficiaries was more than that of non-beneficiary farmers, it was the lowest in Kudawale watershed (349 and 272 litres per annum respectively), and the highest in Phuldhaba (1,212 and 190 litres per annum per animal respectively). The average increase in milk production per cow, buffalo, and goat was 17.1, 18.1 and 16.1 respectively. The percentage increase in milk production per cow and goat was the highest in Khandas watershed and the lowest in Phuldhaba watershed. However, in the case of buffaloes, percentage increase in milk production per animal was the highest in Phuldhaba watershed and the lowest in Tambulwadi watershed (AFC, 1998-99). A dairy co-operative was started Pimpalgaon Wagha which continues to run successfully and milk production has also gone up to 1,200 litres per day. In Sherikoldara (IGWDP) the number of crossbred cows has increased from 16 to 174, and milk production from 100 to 1,350 litres, between 1994 and 2000.

In Mendawan, dairy activity has picked up, adding considerably to incomes. The net income from dairy activity was reported to have gone up from Rs. 538 to Rs. 3,935 per household per annum in the post-implementation period. Stall-fed activity gained momentum from free grazing. The quality of cattle improved. Veterinary services, however, seemed to lack behind the improvement in livestock (NABARD, 1999).

In Ralegaon the total number of milch animals increased from 225 in 1981 to 574 in 1987 with 40 dairy cows, including 25 crossbred ones, and 25 dairy buffaloes – due to which milk yield increased from one to two litres to seven to eight litres per day. A milk collection centre has been set up and a co-operative society of milk producers formed in village. A veterinary aid center and community cattle shed have also been established (Vaswani, 1995).

In Adgaon, the income in the village from dairy farming increased from Rs. 81,000/- in 1983-84 to Rs. 15,84,000 in 1990-91. The local variety of cows was completely wiped out, and the number of crossbred cows went up from zero to 335. The number of dairy farmers shot up from 40 to- 126, and the average daily milk collection in litres went up from 100 to 864, while the selling price of milk doubled (Vaswani, 1995).

However the impact of many watershed developments on small ruminants in terms of the reduced numbers of the latter cannot be ignored because these are generally a livelihood support for the poor and marginal groups. It is also important to note that most often the increase in improved stall-fed cattle is in favour of the better-off farmers who have greater access to water and fodder. Besides, livestock also contributes to ecological services such as manuring and fertilizing land. Hence it is important that livestock issues, especially of small ruminants/nondescript verities, get specific attention in the planning and implementation of watershed projects. It is also observed in many studies that the cut and feed system increases the workload of women, who spend more time collecting, cutting and carrying fodder.

3.4 Impact on Agriculture

One of the major objectives of watershed development programmes is to create conditions for improvement of agricultural production in rainfed areas. Some projects have a specific budget component also for production enhancement. However, in most cases it is assumed that a better soil moisture regime resulting from *in situ* conservation enhances production and this is corroborated by evidence from the fields and by available information. An increase in the value of agriculture production and the volume of production was noted due to an increase in irrigated lands, bringing non-crop land under production, increasing cropping intensity, changing the cropping pattern and adopting better farming practices.

[22] It illustrates how local water can be integrated with exogenous water in the context of the Sardar Sarovar Project (SSP). Narmada water (through SSP) is used as supplementary water to strengthen and stabilize the local water systems.

3.4.1 Change in land-use pattern

A review of most of the evaluation studies showed a significant increase in the cropped area after watershed interventions. As discussed earlier, the increase has been mainly at the expense of privately owned non-crop area. Such new cropland, is mostly earmarked for seasonal crops, while the rest of the land is used almost entirely for dry land horticulture.

There was an increase in the total sown area in the RVP watersheds, varying from lowest at 6.6 per cent in Mokhada watershed in Damanganga catchment to a maximum of 62 per cent in South Solapur in the Nagrjunasagar catchment. The AERC study too noted a pre to post-project change in the land-use pattern, revealing that while some non-arable land and wastelands have been brought under the arable category, more arable land was being irrigated due to watershed activities (TERI, 2001).

The Shedashi-Wavoshi (IGWDP) watershed brought 24 ha of wasteland under cultivation, improved land productivity, increased groundwater recharge and conservation of soil and moisture, as well as helping to form two joint forest management committees (JFMCs) to look after the agro-forestry plots where 12 lakh saplings were planted on nearly 1000 ha, covering both private and forest lands. Agro-horticulture was thus given importance in this watershed and during the project period, above 4,8000 saplings of mango, cashew and jackfruit were also planted. The reported survival rate was around 71 per cent. The farmers (predominantly Adivasis) have stopped shifting cultivation and marginal lands are being used for cultivation of finger millets and for mixed forestry, besides mango plantation, as mentioned above. The farmers (predominantly Adivasis) have stopped shifting cultivation and marginal lands are being used for cultivation of finger millets and for mixed forestry, besides mango plantation, as mentioned above (NABARD, 1999).

The cropped area in the Khed watershed also went up by 236 ha in kharif and, by 145 ha in the rabi season. Watershed activities brought in 53.90 ha of wasteland under cultivation in Rajani watershed. In Pimpalgaon Wagha, horticulture was introduced in the village on wastelands and private wastelands, and around 33 ha were converted to cultivatable use. Eleven ha was brought under dryland horticulture, while the remaining 22 ha went under irrigated horticulture like mango, chickoo, orange and tamarind. In the Mendhawan watershed, area under-cultivation increased on an average by 23 per cent per family due to reduction in wastelands in the post-implementation period. In Sherikoldara, the area under kharif had increased by 65 ha and rabi by 73 ha by the time the project came to an end: 65 ha was brought under summer cultivation and 14 ha converted into an agro-horticulture land use

A satellite-based study by the Indian Space Research Organization (ISRO) in six selected watersheds in Maharashtra showed that agricultural cropland increased from between two to five per cent in most of them, fallow land varied between (+1.0 to -5.0 per cent) wasteland (-0.40 to -7.57 per cent) forest vegetation increased (+0.06 to +2.28 per cent), plantation increased (+0.15 to +0.18 per cent), and water bodies also increased (+0.05 to +0.54 per cent). Over the years, there has been a considerable decrease in the area under wastelands in the watersheds of Karanjgavan and Sawargaon, which have been converted into croplands and plantations (ISRO–TERI, 2001). The Karanjgavan watershed shows a seven per cent increase in cropland followed by Sawarde (6.0 per cent), Pipari (5.0 per cent), Sawargaon (4.0 per cent) and Warshi (3.0 per cent) in the post-treatment period (1999), whereas Nagazari watershed shows only a two per cent increase in cropland (ISRO - TERI, 2001). The farmers in general, raised social forestry and horticultural plantations along the field bunds and as a result there has been an increase in horticultural plantations by one per cent in the Warshi and Karanjgavan watersheds, but less than one per cent in the remaining watersheds (ISRO Study, TERI, 2001, see Table A 3.7 &3.8)

In Ralegaon, cultivable land increased from 67 to 72 per cent between 1975-76 to 1985-86. Wasteland (128 ha), community pastureland (50 ha) and government reserve forests (136 ha)

were converted into social forestry plots. About 50 ha of wasteland was converted into cultivable land. The Department of Social Forestry planted about 30,0000 trees in the village and orchards of lemon, orange, papaya became common. In Adgaon, the availability of cultivable area increased from 790 ha in 1983-84 to 1005 ha in 1990-91. Rainfed area came down from 67 to 48 per cent of the total area. Wasteland was totally reclaimed for crop production and cultivable wasteland went down from 25 to 4.0 per cent. This enabled rainfed crop cultivators of this village to bring their land under various cash crops and under horticultural plantation (Vaswani, 1995).

However, it is also true that from the point of view of livelihoods it is important to ensure certain quantities of different types of biomass (food, fodder, fuel, timber) and also income. So the issue is whether we can ensure these livelihood requirements without radically altering the land-use pattern through extensive levelling, or bringing sloping land under seasonal crops and tilling. The question is: what are the other options available for this? One option is to adopt methods popularized by Dabholkar's Parayog Parivar network like creating nursery soil conditions near the root zone of the plants which does not call for disturbing the soil extensively (Dabholkar, 1997). A second option is to bring such lands under perennial biomass cover (grass, shrubs, trees) with different uses and economic values, along with appropriate institutional and financial back-up. The argument against such an approach is that it takes longer for people to get any tangible benefits. Here, the issue of species selection becomes important. A judicious mix of short and long duration plants can take care of this problem. Also, because of biotechnology and other technological advancement in nursery raising, the time taken for maturing has been greatly reduced. Tamarind is a good example of this. Increased fodder availability because of protection can also strengthen the pastoral and livestock component of the livelihood basket.

Another issue is the development of common property land resources (CPLRs) such as community pastures, revenue lands and forestlands. Converting them for productive use under watershed development projects and ensuring usufructs can ensure some livelihood opportunities for the poor. But this is an area where very little attempt is being made or where sufficient information is not available. Most often forest departments do not cooperate nor do they ensure that benefits are given to those who require it dearly. In case of other CPLRs, such as revenue land and commons, a multiplicity of issues emerges such as identifying the current users and their status vis-à-vis the land in question, building consensus and resolving conflicts at the community level, resolving administrative and legal formalities for development and user rights, ensuring sharing mechanisms of products and working out institutional structures for management and development of the resource in question etc. Due to these difficulties it is observed that facilitating agencies generally leave this issue to its own fate or, in many instances, do not make sufficient effort to work out strategies (institutional and management structures) for sharing of benefits.

3.4.2 Increase in Yield

The improved productivity of crops, especially rain-fed crops, and its contribution to the livelihoods of the people is taken as an important operational indicator of the performance of watershed development projects. It is also an important indirect indicator of the contribution of watershed projects to the enhancement of ecosystem potential. However, it is very important to note that most often the increase in production is achieved through unsustainable practices such as overuse of fertilizers etc. The review shows that there is a definite increase in crop productivity and total production of agricultural crops. As discussed earlier, soil and water conservation treatments, coupled with specific productivity enhancement measures, have definitely increased productivity or at least helped to stabilize the kharif crop (and, in some places, allowed a rabi crop), especially under normal rainfall conditions.

At places such as the Ranjani watershed, there was not much change in the methods of production or in cropping pattern/intensity (except where wheat and soyabean were introduced in

small patches) gains were in terms of improvement in productivity. The yield rate of jowar increased cent per cent, paddy by 71 per cent, cotton 66 per cent and *tur* by 42 per cent (IGWDP). Though cotton was grown without fertilizers or pesticides, production went up from 4.50 q/ha to 7.50 q/ha. Net value of agricultural production went up from Rs. 20.97 lakh to 49.63 lakh. The total production of cotton increased by 1146 quintals and that of foodgrain by 1157 quintals (NABARD, 1999)). Through just a little increase in the use of fertilizers (a 50 kg bag of urea per acre) coupled with inter-culture operations and through adequate protection from animals and rodents – yields of paddy increased from 17 to 25 quintals/ha, finger millets from 5 to 7.5 quintals and minor millet from three to five quintals/ha in Shedashi-Wavoshi watershed. An increase cereal and oilseed yield was noted in the project area in the RVP watersheds. Yields in the Khed watershed have risen by 15 per cent for local cotton and up to 60 per cent for wheat and cotton (see Table A 3.4) compared to the pre-project period. In the Naigaon project foodgrain yield rose from 1.5 to 2 quintals/ha to 10-12.5 quintals/ha due to protective irrigation and availability of fodder, manure and other bio mass also increased (Vaswani, 1995) Crop productivity during kharif increased by an average 10 per cent, in rabi by 20 per cent and in summer by 25 per cent in the NWDPRA watersheds because irrigation yields more benefits in the dry seasons. The yield rate in Mendawan watershed for almost all the crops has gone up by 20 to 40 per cent. Among the farmers selected for the sample, the gross value of produce per hectare of cultivated area in the pre-implementation period was Rs. 2,673 which increased to Rs. 5,743 in the post-implementation period indicating an increase of more than 100 per cent in the gross value of produce (NABARD, 1999). Productivity increases ranged from 63 per cent for jowar and up to 367 per cent for wheat in the Bugewadi watershed (TERI, 2001).

The ISRO study also noted a considerable improvement in yields and agricultural production in all watersheds (ISRO-TERI 2001, see Table A 3.6). In Ralegaon, kharif yields increased, ranging from the lowest for HYV jowar at 1.25 times to bajra at 3.50 times. The rabi increase in yield ranged from two-times for pulses and 5.62-times wheat. Total increase in yield for the year across all crops was 4.40-times.

Among the field sites we visited, Hivre Bazar (AGY), Ralegaon Siddhi, Dornali (AFARM), Bhavthan (Manavlok), Vaiju Babulgaon (IGWDP) etc. all reported an increase in food production. In some cases, the villages are now able to fully meet their food requirements. In certain cases like Vaiju Babulgaon, they have been able to meet a substantial portion of their requirements (70 to 80 per cent) locally. There are two caveats to these findings: one, these do not represent the average cases as they are the more promising ones; and, two, the increase is mostly during good or normal rainfall years (and not drought years).

However, larger studies such as those by Kerr et al. (2000) indicate that there is great variation in productivity and the trend is not as uniform as it would seem from the case studies of the more promising ones. The aggregate information also may not reflect the regional/plot variations existing with in a watershed due to various reason such as capability of land, inputs such as water, fertilizers etc. In a dryland situation the variation in production, or for that matter the failure of crops, depends heavily on availability of some water for protective irrigation in critical and stress periods. Another important issue is whether increase in agricultural production ensures livelihoods and food security for all, especially the marginal sections.

3.4.3 Increase in cropping intensity

Cropping intensity generally increased in the watershed with the rabi and summer crop being undertaken in watersheds due to an improvement in irrigation or moisture levels. Deshpande (1997) noted an increase in cropping intensity between 111-113 per cent in the scarcity zone and 126-130 per cent in the transition zone. In the Khed watershed the cropping intensity went up from 106.4 per cent to 117.3 per cent. In the Shedashi-Wavoshi watershed farmers started growing vegetables on small patches of land in the rabi season, with water fetched from wells or nalas. In the NWDPRA watersheds, cropping intensity during

rabi and summer seasons in the case of beneficiary farms increased by a minimum of four per cent in Tambulwadi to a maximum of 20 per cent in the Phuldhaba watershed – the variation depending on rainfall, geological conditions and groundwater potential (AFC, 1998-99). In the Mendhawan watershed cropping intensity increased from 114 to 133 per cent.

In the Shastabad-Chincholi watershed, the total area under two crops before the programme was 986 ha while the area under double cropping after the project increased to 1482 ha, an increase in cropping intensity from 99 to 149per cent. Area under improved seed variety increased from 230 ha to 400 ha. The total consumption of chemical fertilizers increased from 22 tonnes to 65 tonnes per annum. In the Kanhur Mesai watershed cropping intensity went up from 99 per cent to 138 per cent, and 38 per cent of the arable area shifted from one crop to double crop. Area under improved seed varieties increased from 389 ha to 732 ha.

3.4.4 Change in cropping pattern

Most of the watersheds showed a change in cropping pattern towards growing cash crops such as sugarcane, vegetables, etc. Overall, there seems to have been a slight shift towards growing horticultural crops and plantations. Foodgrain, pulses and certain other traditional crops appear to have lost out, in spite of an increase in overall area under cultivation. This is more so in those watersheds where the interventions have made a visible difference in water availability. However, there is no uniform pattern to this shift. Different types of crops have been chosen at different places, depending on local conditions and the market. In Maharashtra, the trend is mostly to choose sugarcane, since it fetches an assured price. The area under tomato and onion has also increased in many watersheds, especially in areas of low soil depth, but with irrigation possibilities. Introduction of irrigated grass and sugarcane as fodder is also observable in many watersheds in the scarcity zone of western Maharashtra. Increased area under soyabean is observed in watersheds in the Vidarbha region. Of late, there has also been an increase in the area under horticulture and vegetable crops in both scarcity and assured rainfall areas. In Dornali village (AFARM), there is a tendency to go for water-intensive crops like sugarcane and more than 10 ha is already under sugarcane. In Bhavthan village, (Manavlok), watershed treatments have made it possible to grow rabi crops like cotton and wheat. In addition, some farmers have started planting sugarcane as the availability of water has increased since watershed development.

In the Khed watershed soybean, black gram, hybrid cotton, wheat and gram gained in area and due to water availability orchards of oranges and lemons came up. In the Shastabad-Chincholi watershed, prior to the project, 80 ha were under cash crops increasing to 155 ha after project. The area under perishable vegetables prior to the project was 15 ha which has now increased to 45 ha. Area under fruits and orchards has gone up from 4 to 17 ha. In Kanhur Mesai, the area under cash crops has increased from 102 ha to 213 ha. The area under perishable vegetables prior to the project was 25 ha which increased to 46 ha, while the area under fruits and orchards increased from six to 25 ha (Gomukh, 2001).

In the NWDPRA watersheds, the kharif area under cereals reduced and that under pulses (Khandwa – 89 more ha was brought under pulses) and oilseeds (Phuldhaba from 25 to 347 ha, Kanhur-mesai watershed – 287 ha to 701 ha) increased. In both Phuldhaba and Khandwa, hybrid cotton increased. The area cultivated under vegetables doubled and quadrupled in Nune-gavadi and Khandwa respectively due to improved ground/surface water availability and assured supplemental irrigation (AFC, 1998-99). In rabi there was a reduction in area of cereals and increase in pulses, oilseeds (five times in Nune-gavadi) and vegetables. Irrigated wheat increased from 20 to 160 ha in Wadivarhe. The percentage rise in area under pulses and oilseeds was greater in rabi than in kharif. Vegetable cultivation was started during rabi in Khandas, Wadivarhe and Khandwa watersheds (AFC, 1998-99). Vegetable cultivation increased from 10 to25 ha in Kanhur-mesai watershed. Vegetables and groundnut cultivation were taken up as a new activity in Khandwa and Wadivarhe watersheds. Sugarcane

increased by more than 50 ha each in Tambulwadi, Nune-gavadi and Phuldhaba watersheds. Horticulture crop area increased in Kudawale (by 354 ha) and Khandas (by 122 ha).

The cropping pattern in Mendawan watershed shifted in a limited pattern towards cultivation of wheat and sugarcane with a decline in coarse cereals and mixed cropping. Number of crops cultivated in the watershed went up from seven to 18 because of the introduction of a few commercial crops and dryland horticultural crops (NABARD, 1999). The ISRO study noted a change in the cropping pattern with the introduction of cash crops such as sugarcane and soybean (ISRO-TERI, 2001).

In the Sedashi-Wavoshi watershed paddy occupied almost 100 per cent of the area in kharif, but after the interventions the paddy area increased from 385 to 407 ha in kharif season but in rabi vegetables, pulses and wheat started being cultivated (see Table A 3.11). Agro-horticulture was also given top priority here including alphonso mango, cashew, jackfruit etc., some of which were not grown here earlier. Nearly 50,000 horticultural plants were planted, of which 71 cent survived. The agro-horticulture plants were provided protective irrigation (through manual lifting) and farmyard manure.

The BAIF-supported projects also noted a general increase in horticulture and tree-based farming (Kakade et al., 2002). In Ralegaon, the percentage change in net cropped area in kharif changed with bajra decreasing by 14 per cent, HYV jowar fell by 28 per cent, pulses by 1.40 per cent, oilseeds by .85 per cent and vegetables and horticulture grew by 16.81. Rabi cultivation increased from 426 to 491 ha with a decrease in HYV jowar (15.62 per cent), pulses (2.75), oilseeds (1.38) and an increase in wheat (three per cent), vegetables and horticulture (16.62 per cent). The total gross cropped area across both seasons increased from 782 to 836 per cent (Vaswani, 1995).

In Adgaon, the following changes in cropping pattern occurred – the area under bajra increased from (500 to 800 ha) in the kharif season, tur (150-300 ha), cotton (60-100) and hulga and matki (200-300), whereas mung got wiped off and new crops such as groundnut, sunflower, vegetables and green fodder were cultivated additionally. In the rabi season jowar, kardi, harbara, wheat, sunflower, vegetable, green fodder and mosambi were cultivated. Kharif area increased from 920 to 2,135 ha and rabi area increased to 1,375 (Anonymous, undated). Similarly, in Vaiju Babhulgaon village too, horticulture crops like pomegranate, oranges, sweet lime, chiku, and amla, were planted for the first time on 60 ha. Cultivation of onion and vegetables was also started after the project.

In the DROP study there was an increase in land cultivated during rabi, leading to a rise in incomes of the farmers and increase in rabi crop in all the villages in the study (see Table A 3.17).

The increased area under cash and water-intensive crops needs to be analysed in the context of its impact on livelihoods, food security and sustainability. Most often, the market fluctuation in cash/market crops such as onion and tomato etc. creates innumerable hardships and farmers are unable to meet even the cost of production.

3.5. Increase in irrigated area

It is generally observed in many studies that watershed activities increase the irrigation potential in a given watershed (and even in the downstream areas) thorough increased availability of ground and surface water. However, the correlation between the extent of increase in groundwater and the area brought under irrigation through the increased resource is something, which requires further analysis. This is important because the increased irrigation is most often through an increased number of borewells and in certain cases through increasing the depth of existing dug wells. It is also important to look at the recuperation rate of wells and bore wells (before/ after, normal rainfall/drought) to understand the issue of groundwater recharge.

The Kerr study found a general increase in irrigation across all villages.

The NWDPRA villages had a higher percentage of irrigated area to begin with, but the percentage increase was the greatest between 1987-97 for a number of project villages (104 per cent). The next increase was of AGY/ IGWDP villages at 54 per cent and NGO villages at 47 per cent and Jal Sandharan at 37 per cent (the project portfolio concentrates on water increase but the actual performance has been low probably because it works in a water-scarce areas) and NWDPRA 22 per cent (NWDPRA also does not have large WHS in its project portfolio). The mean increase in irrigation intensity was 0.35 for all projects. The AGY/IGWDP had the highest irrigation increase (.44) but the difference was not statistically significant (Kerr et.al, 2000). In the NWDPRA study, most watersheds saw an increase in the number of wells, which led to an increase in total irrigated area and irrigated area per well beneficiary farms. The area irrigated on beneficiary farms by other means, i.e. from developed water resources as check dams and flowing streams, increased by more than 100 per cent in all watersheds, and to a maximum by of 458 per cent in Nune-gavadi watershed (AFC, 1998-99). In the Khed watershed area irrigation went up from 285 ha to 502 ha. The ISRO study also noted an increase in irrigation potential in the watersheds and a substantial increase in the yield of all crops, which can be attributed to *in situ* moisture conservation, control of erosion, and better agricultural management practices within the watershed. The irrigation potential increased substantially, which is reflected in an increase in number of water bodies (ISRO-TERI, 2001, see Table A 3.8). In Naigaon, irrigated land rose from 60 ha in the 1970s to 400 ha by the mid-1980s and in Ralegaon, irrigated land increased from 26 to 340 ha in 1985-86. In Adgaon, area under irrigation increased from 83 ha in 1984 to 500 ha (eight to 48 per cent of the total area) including about 140 ha of land under perennial irrigation in 1990-91 (Vaswani, 1995). In the Khed watershed, area under irrigation rose by 162 per cent. In the BAIF watersheds too there was an increase in area under irrigation and double cropping due to which crop production doubled. In Mendhawan watershed the net irrigated area increased by 29 per cent, as compared to the pre-implementation period indicating that the additional infiltration of rainwater due to activities like CCTs and WATs had helped increase groundwater in watershed. Twenty-two per cent of the farmers constructed new wells (NABARD, 1999). The land under protective irrigation increased in many villages that adopted the watershed approach as evident in the DROP study. The differences in land use are given in Table A 3.16. After watershed intervention, in three villages out of eight, more than 50 per cent of land received protective irrigation.

Amongst various factors like soil and water conservation treatments, specific productivity enhancement measures, bringing new area under crop production, and so on, applied water seems to be making the greatest difference in productivity enhancement. Various studies bring out very clearly that productivity gains are much more substantial in irrigated holdings and wherever there has been a substantial increase in irrigation as a result of watershed development, the productivity increase has been more stable (Shah, 1998). In the case of rain-fed farming, however, the increases have only been marginal. Farmers invariably say that in good years, everything works out well, but productivity increases are not sustained during bad years. Such examples illustrate the rainfall threshold for the efficacy of measures taken under watershed programmes.

Almost all the evaluation studies within the frame of this review show that watersheds have witnessed an increase in the irrigated area, though there is a great variation in the extent of increase. Mostly, this has been made possible due to the increased number of wells and borewells that came up in the wake of the watershed projects. In such areas, increase in cropping intensities could be another indicator of improvement where water availability extends beyond the kharif season (usually the only season where farmers are able to harvest an irrigated crop), allowing more than one crop in a year. Continued availability of water for supplementary irrigation indicates the effectiveness of watershed interventions during the dry season and the system's increased drought-proofing capability. However, this needs to be seen in the

context of the overall water balance of the area. The review also shows that very often, the increase in irrigated area is quite disproportionate to the potential annual flows. This means that the water has been drawn mainly from the stock (deep aquifer) and raises issues of sustainability (Paranjape *et al*., 1998; Batchelor *et al*., 2000).

Applied water, as a rule, increases the productive potential of an ecosystem. Provision for a longer period of moisture holding and evapo-transpiration increases biomass production. However, it also usually corresponds to higher rates of extraction of biomass. It is quite possible that most of the biomass increase goes out of the system and the amount of biomass that is recycled within the ecosystem falls rather than rises. If that is indeed the case, then the higher ecosystem productivity depends crucially on applied water supplements. If such supplements were to be removed, ecosystem productivity would fall to values that are lower than the initial values without the supplement. This is already evident in some places where reversals have taken place in the post-watershed period.

The point, however, is that applied water, as a means of protective irrigation to stabilize even one crop, is not made part of the project design. Alternatively, applied water is equated with irrigation and seen as falling outside the purview of watershed development. There have been cases where watershed project proposals have been rejected because they contained a component of equitable water distribution system cost as part of the watershed project.

Still, there have been isolated cases where the implementing agencies have taken certain measures or at least shown some sensitivity to this issue. The three areas where such initiatives exist are: a) water sources mostly in terms of certain surface storages or encouraging the community to invest in collective wells; b) water-efficient technologies like drip (including certain low-cost drips); and c) promotion of less water-intensive crops. There are other examples where water has been brought from outside the watershed (and from major and medium irrigation projects) to supplement water requirements over and above the watershed development efforts. Examples like Ralegaon Siddhi and Adgaon fall under this. In the case of Adgaon, water is brought from the Sukna dam, which is about 10 km away, through pipelines and is used to primarily irrigate the orange/sweet lime gardens. Similarly, in Ralegaon Siddhi, water is lifted from the Kukadi canal (Kukadi is a major irrigation project) and flows down the side of Ralegaon Siddhi village. This water is used to irrigate about 200 to 300 ha in the village.

3.6 Methods of production

An important indicator of the impact of the increased productivity of crops on the ecosystem is the nature of crop practices that have led to this rise in productivity. Productivity-associated crop practices, including those actively propagated and supported by watershed development programmes, are something of a mixed bag, with little consistency. Usually it is an eclectic mixture of productivity concerns and practices that are part of the dominant, mainstream paradigm of high-input agriculture[23], along with a sprinkling of some environment- friendly practices in terms of agronomic practices and inputs . For example, activities like vermi-composting and use of INM and IPM are being encouraged as part of some watershed programmes, along with conventional chemical fertilizer use.

In Mendhawan watershed, the use of new varieties of seeds became common and the use of chemical fertilizers increased. There was an expansion in HYV bajra in the dryland. The technological change in cultivation practices was also reflected in the increased cost of production due to use of improved inputs and machine power like electric motors, tractors etc. Area under improved seed varieties increased from 389 ha to 732 ha (NABARD, 1999). In Kanhur-mesai total consumption of chemical fertilizers has increased from 31 to 86 tonnes per annum (Gomukh, 2001).

Though there has been an increasing awareness about and sensitivity towards eco-friendly nutrient and pest management practices, many evaluation studies and our own field

[23] Most studies also indicate that, for the most part, crop technology and cultivation practices follow the mainstream, high-input based agriculture framework. Moreover, most evaluation studies also share such a framework (Erappa 1998; Karanth and Abbi 2001; Shah 1998).

interactions show that use of chemical fertilizers and pesticides have been on the increase in areas where watershed development programmes have been taken up, especially where irrigation water is available.

AFARM's own evaluation of its watershed development projects states that "the most serious negative impact of the watershed intervention, particularly in the sphere of agriculture, is the increased use of chemical inputs like fertilizers and pesticides and also the use of hybrid seeds" (AFARM, 1998). This is an indication that the agricultural component of the watershed programme, by and large, still operates within the mainstream, high-input based agricultural paradigm.

3.7 Socio-economic Indicators

3.7.1 Increase in income

Assessments of economic returns from agriculture also often follow the economic-centred and high-input production paradigm. They fail to factor in the issues of inputs, market structures, sustainability of production and other harm that may be felt by the ecosystem in the long run. In most evaluation studies, increase in income (read cash income) is taken as a success indicator. The review shows that by and large, there has been an increase in the income levels of people through various means and options like increased productivity, shift towards more economically profitable crops, increased availability of employment, development of allied sectors like dairy and non land-based activities. Many villages like Adgaon, Hivre Bazar, and Ralegaon Siddhi produce marketable surplus (especially fruits, vegetables and other food and non-food crops). In most villages, a spin-off effect of watershed development has been the growth of dairy activity as a supplementary source of income. A good example of this is Adgaon, where the dairy economy is flourishing. This was partially made possible by an abundant and free supply of fodder. Earlier, with a livestock dominated by goats (which did not yield enough milk for mass marketing), only about 100 litres of milk per day was available in the entire village. The programme promoted high-yielding Jersey cows in a big way. As part of the programme, the farmers were taken for an exposure visit. Immediately after the visit, a group of 10 farmers spent Rs. 5,000 each to purchase 10 cows. This event triggered a chain reaction in the village with the number of Jersey cows increasing to 100 in a brief time span. The village now has two milk cooperatives with a total of 156 members, including nine women, and collects about 2,000 litres of milk per day. The average annual income of the village from milk rose to an estimated Rs. 43 lakhs (Anonymous Undated). In many watersheds in the scarcity zone of Western Maharashtra one can observe this phenomena unfolding after the initiation of the watershed programme. However, the income through the milk route (diary) may not be a solution in many places and for a certain section of stakeholders, if livestock-based livelihoods are to be emerged.

Increase in incomes was noted due to the multiple changes occurring in agricultural production. Deshpande, (1997) reported an increase in income/ ha in the scarcity zone up to 45 per cent and in the transition zone up to 30 per cent.

Total production/yields in Shastabad-Chincholi watershed was 2668.745 tonnes, including production in all three seasons, which amounted to an incremental income of Rs. 45.1793 lakhs. In the Kahnur-mesai watershed total production was up to 1324.4 tonnes and the incremental income amounted to Rs 55.839 lakhs per annum. The increase in production levels ranged from 27.2 per cent to 83.9 per cent, in all watersheds except Mukhed watershed because of the low level of agriculture activities there. The higher increase in production in comparison to increase in cropping areas indicates that soil fertility levels of farming areas have considerably increased (AFC, 1998-99).

The incremental annual farming income per farmer has increased (the maximum being Rs 36,700 per farmer family and the minimum Rs 4,700 per farmer family) in the RVP watersheds, which works out to an average increase of Rs 12,590 per farmer family. In Nagarjunasagar and Pochampad catchments income levels have increased exceptionally because of cultivation of commercial cash crops

such as sugarcane, cotton and groundnut increased employment during the project years and increased employment after project completion. Farmer income is higher in Solapur and Nanded due to commercial agriculture, and lower in Nashik and Thane being Adivasi undeveloped regions (AFC, 1998-99). A comparative analysis of studies shows that the income increase from agriculture and related activities is higher in case of caste-based agricultural communities as compared to tribal communities. The reasons may be attributed to socio-cultural issues (for e.g., selling of milk), farming practices, reliance on subsistence farming, less exploitation of groundwater, upper location of the watersheds etc.

The total annual income of sample beneficiary households in Khed watershed was Rs 45,900, as against Rs 30,200 for non-beneficiary households. The incremental income of Rs 15,700 accruing to the beneficiary households or Rs 3,264 per capita is largely due to sample households growing cotton and horticulture crops. There was also an all-round economic improvement with a rise in the number of tractors, their repairing centers, cotton-plugging machines, drip and sprinkler irrigation systems etc.

In the Sedashi-Wavoshi watershed, income from crop husbandry rose from Rs 17 lakhs to around Rs 40 lakhs (see Table A 3.12). Forest income would work out to Rs 2.96 lakh per year of which one-fourth would be retained by Forest Department. The total income from horticulture after 10 years of stabilisation would work out to Rs 89.99 lakh. The total income would be Rs 122.53 lakh at the stabilization stage that is at the fifteenth year (NABARD, 1999). In Rajani watershed too the net income has almost doubled during the watershed implementation (see Table A 3.14). In the Shastabad and Kanhur watersheds the per capita income rose from Rs 2362 to Rs 5879, and there was an increase in two-wheelers, TVs, biogas plants and latrines.

In the NWDPRA watersheds, the annual income of beneficiary and non-beneficiary household farmers was the lowest in Khandas watershed at Rs 21572 and Rs 19682 respectively, and it was highest in Nune-gavadi watershed at Rs 41362 and Rs 37013 respectively.

Income of beneficiary farmers was higher than the income of non-beneficiary farmers with the minimum of Rs 605 (eight per cent) in Kundawale watershed and maximum by Rs 5086 (19.2 per cent) in Khandas watershed. The main source of income in all watersheds was from crop production. It accounts for more than 50 per cent of the total income. Whereas, income from agricultural labour, work and livestock, the second and third major activities, accounts for about 20 and 10 per cent of the total income respectively. The highest increase in income on percentage basis was observed for livestock and poultry activities. This indicates the overall success of the watershed programme in increasing green fodder production and increasing assured drinking water availability for animals. The Households Production System did not become the source of income as the beneficiary households consumed whatever little production there was, at home (AFC, 1998-99).

In Mendawan watershed the net income generated from per hectare of gross cropped area of the sample beneficiaries was Rs 2,089 in the pre-implementation period which has gone up to Rs 4,739 in the post-implementation period (NABARD, 1999).

In Adgaon, income from cultivation grew twenty times, subsidiary incomes increased nine times and service labour increased 1.64 times. The sector-wise contribution to income changed drastically: cultivation grew from 22 to 65 per cent; subsidiary occupation from 14 to 19 per cent, while labour fell from 63 to 15 per cent. The average annual income per household increased more than six times from Rs 4,838 to Rs 32,500. Service sector income grew eight times, from Rs 64,500 to 55,7000. The social infrastructure in the village improved greatly (Vaswani, 1995).

In terms of expenditure, people tend to spend more on irrigation-related activities like borewells, pump-motors or on other items like tractors, ploughing implements, livestock (especially milch animals), all of which have a productivity-enhancing function. For example, in Sherikoldara watershed the number of threshing machines, and sprayers has increased considerably as have electric pumps (26 to 114),

tractors (one to six) etc (WOTR, 2003). Increase in the number of consumer durables such as TV, radio, two-wheelers, cycles etc. are also reported from many watershed villages. Another impact is that the value of land seems to have gone up after the watershed development programmes, although this cannot be attributed to intervention effects alone.

However, increase in yield does not mean an increase in real terms or in net income. Many studies have shown that the increase in productivity has been achieved with higher costs. It is also reported that as a result of watershed development, the composition of inputs changes, and there is more dependence on modern inputs like improved/hybrid seeds, chemical fertilizers and pesticides, etc. (To an extent, this aspect explains the relatively less increase of income from agriculture in Adivasi-inhabited watersheds). This has resulted in higher cost of cultivation in watershed projects as compared to non-watershed areas (Erappa, 1998) Hence, net returns would be a better indicator to assess whether the incomes have increased or not.[10] Besides, increased income may not always reflect the impact on livelihoods, because this increase is often seen among farmers with better land in the valley areas, and with a subsequently better access to water resources

3.7.2 Changes in employment and migration

Some issues related to migration and labour availability in the context of watershed development are discussed in the chapter on equity, since they are crucial to the pattern of income-generation among regions and sections. Generally, it is assumed that watershed development helps to decrease the extent of migration. Changes in the pattern of migration are generally taken as indicators of changes in employment opportunities, agricultural productivity and overall quality of life within the watershed village (Kerr *et al*., 2000). The review of available literature and our own field visits and interactions show that watershed development does have the potential to bring down distressed migration temporarily, especially in the initial phase of the programme when the emphasis is on physical works.

However, in the post-project phase, one does not find a uniform trend. In fact, there are some instances where availability of work, especially seasonal agricultural work, has been reduced because of watershed development[25].(refer to next page)

The study by Kerr *et al.* (2000) shows that "with the exception of AGY and IGWDP villages, seasonal migration rose in every project category. The AGY and IGWDP villages had a net reduction in overall migration and the possible reasons for this may be improvements in infrastructure and access to services. However, the average figures mask the fact that more AGY and IGWDP villages experienced net out-migration than net in-migration." The study also noted that employment opportunities were reported to have risen in AGY/IGWDP and NGO project villages, whereas in the NWDPRA, DPAP, Jal Sandharan and non-project villages more people indicated that employment had declined.

The review shows that crop intensity per se does not increase wage labour opportunities; instead, it depends on the types of cropping changes that take place as a result of watershed development. Labour intensive crops like onion, tomato etc have the potential of creating more labour as compared to water-intensive cash crops like sugarcane, banana etc. Labour replacing technologies such as an increased number of tractors, threshing machines in the post-watershed phase are also playing a role in the reduced labour opportunities Another fact that emerges out of the study is that villages with higher water availability (either because of the water locally generated or because of the water brought from outside, as in the case of Adgaon and Ralegaon Siddhi) combined with certain basic access to all (as in the case of Pani Panchayat in Pune district) have a greater potential to offer full employment to the people. Also, there is evidence that employment opportunities have increased during the rabi and summer season because of availability of water and people are shifting more towards horticulture and vegetable cultivation.

Before the project ten per cent of the villagers in Adgaon had deserted it and gone to live in other villages, 70 per cent had to work under EGS or as agricultural labourers in other villages,

[24] Many studies have tried to estimate net returns and also the internal rate of returns from watershed investments. Reddy et al. (2001) studied four watersheds in Andhra Pradesh, but found that only three reported incremental net returns in the case of paddy and only two in the case of groundnut. The incremental net returns varied from Rs 534/acre to Rs 1105/acre Chopra (1999) used a multivariate analysis over a large sample size of 13 projects cutting across different states and agro-climatic zones to do an economic valuation of the watershed projects. The study showed a wide range of cost-benefit ratios, ranging from 1.25 to 3.8, and the internal rate of return varied from 12.33 to 41 per cent. There is also quite a bit of literature on the methodologies to be used for both economic and non-economic valuation of watershed development benefits like Chopra (1999); Kerr (2001); Landell-Mills (1999); Shah et al. (1998) have taken the position that valuation has to be done in the overall framework of "ecological economics". For details of the

[24] contd... principles and methodology see the chapter "Towards a New Theoretical Synthesis: The Interface of Ecology and Economics" in Shah (1998). NABARD's analysis of the Rajani watershed shows a Financial Rate of Return (FRR) of 69.17 per cent and an Economic Rate of Return (ERR) to the tune of 89.11 per cent. For Sedashi-Wavoshi it is 30.88 per cent and 41 per cent respectively.

[25] There are also other cases where migration has increased after watershed development, which is seen as an externality (Reddy et al 2001). This may be due to the fact that during the implementation of watershed development projects, labour participation would have increased consequent to the demand for watershed works within the villages and drawn people away from the larger labour market, then re-released to the market after completion of the works (Deshpande and Reddy, 1991).

20 per cent were fully employed on their own farms. Now 20 families have returned to this village and outside labour is being called to work on the farms. Daily wage rates have tripled. People are no longer seeking employment under EGS. About 100 outside labourers have migrated to this village, as local labour cannot meet the requirements because of intensification of agriculture. In the Adgaon project annual employment has risen from 75 days to 200 days and labourer incomes have risen above those of small farmers (Anonymous, undated).

The Social Center found that after four years in watershed management labourers in Mendhwan village could find eight months of employment as opposed to three months earlier. In Sherikoldara, landowners began to lease land to labourers rather than pay the high wage costs (discussion with staff). In Shastabad and Kanhur watersheds there was an increase in employment on their own farms and in dairy activities and workers were bought in from outside.

However, further analysis is needed to understand the issue of outside labour participation. Is it due to the low wages for which they are willing to work, as compared to the local labour who may be bargaining for a higher wage following their experience of receiving higher wages in watershed work. Lack of employment or work is not the only reason for which people migrate. People also migrate for other reasons such as better wages (as compared to the wages they can get in the villages), for the opportunity of getting a lump sum for a specific period of work, and for more assured labour opportunities[26] and, last but not the least, to escape caste and other discriminations.[27] Hence, using decrease in migration as an indicator of the success of watershed development needs to be judiciously contextualised. Migration has stopped completely in many of the study villages and good employment potential was created even after the project withdrawal in villages such as Ralegaon and Adgaon, where outside labour was needed to carry out agricultural operations in the later years and it was noted that some families immigrated into the village.

Ralegaon had seen massive unemployment with people migrating to Pune and Mumbai. After the project, marginal and small farmers could till their land throughout the year. Labour was imported by medium and large farmers from nearby villages for their own farm work. Earlier 45 per cent of the population lived under the poverty line, which almost became nil. Agriculture income rose from Rs 3,45,910 to Rs 31,72,687, income from other occupations rose from Rs 12,000 to Rs 36,000 and labour income rose from Rs. 48,000 to Rs. 1,08,0000. Per capita income rose from Rs 271 to Rs 2257 per annum. The sectoral share of labour income rose from a mere 12 per cent of the total village income to 25 per cent of it. Social infrastructure increased – renovated temple, school, housing, hostel, gymnasium, gobar gas plant etc. (Vaswani, 1995).

Watershed development creates increased availability of wage labour during implementation and generates increased income from watershed labour as compared to the agricultural wage system. For example in the Shedashi-Wavoshithe project has generated 2.88 lakhs person days of

26 Often, the emphasis is also on completely stopping migration, and success is measured in terms of the degree to which migration has been stopped. However, there is a need to understand the nature of migration itself. In other words, one needs to see whether the migration is out of compulsion (to meet livelihood needs) or out of (family) labour surplus or as an opportunity to increase one's assets, opportunities and horizons. What is important is to see whether the nature of migration has changed due to watershed development programmes. Unfortunately, this has not been explored properly. In a study of natural regeneration programmes in Udaipur region, it was found that irrespective of the fact that there was substantial improvement in the resource base, the extent of migration did not show any significant decrease. While probing more on this, the people responded saying that "Earlier, we used to migrate out of compulsion; now, there is no compulsion to migrate to meet basic needs; people migrate out of choice to improve upon the gains of the NRM programme" (Paranjpe et al. 1997). This indicates that though the figures may be the same, the nature of migration and the reasons for migration have changed significantly.

27 Dr. Ambedkar had given a call to the dalits to leave the villages and move and concentrate in the cities, as they would never be able to fight oppression and discrimination in the villages where they were scattered.

labour during four years of implementation, and a small project like Rajani (the cost of which is Rs 28 lakhs) generated above 61,000 labour days in four years. Better wages based on output of labour also influenced the traditional wage rate, as is observed in many IGWDP watersheds. It was estimated that recurring employment of 15,000 man days every year would be generated which would mean employment of 67 persons through out the year. One landless labourer was able to purchase land from the income he earned from the wages in the implementation period. In the Sedashi-Wavoshi watershed too, employment during project period checked migration and daily commuting of the people to the Thane-Mumbai Industrial Belt prior to the project, leaving their crops at the mercy of stray animals. In this project it was estimated that 3.10 lakh man days would be created by the end of the project with the generation of recurring employment up to 14500 man days per year, i.e., nearly 65 persons working for 225 days a year (NABARD, 1999). In Pimpalgaon Wagha, some families who had earlier left the village returned due to better employment opportunities. In Mendawan the migration of the landless reduced and a few of them received a piece of land from Village Watershed Committee (VWC). Fishing rights were granted preferentially to them. Among the sample population of 60 households 44 were below the poverty line before watershed development. Of these, 22 families crossed the poverty line income of Rs 17,500 per family due to augmentation either from the farm or non-farm business. New sources of income such as dairy and the retail trade gained importance while income from wages and sheep grazing declined. The incremental labour days available per ha of GCA was 18 man-days per annum. Income from service activities rose from 8.78 to 10.5 per cent and income from business activities, which was absent earlier, rose to 10.91 per cent (NABARD, 1999).

In an analysis of the state-level Comprehensive Watershed Development Programme (COWDEP) of Maharashtra (Deshpande and Reddy, 1991), significant changes in the household economy were noted. The study covered 30 blocks in the state and indicated concentration of certain specific components and overall good results of the technology. It was noted that employment generated in each of the watersheds ranged between two and 30,000 person days depending on the agro-climatic zone along with changes in crop pattern, crop intensity, proportion of wasteland and yield per hectare and an increase in moisture availability in the watershed regions.

The NWDPRA projects saw a rise in employment of male beneficiary farmers over the non-beneficiary farmers at a minimum of 15.9 man days (8.5 per cent) in Chatgaon watershed to maximum of 53.9 man-days (22.2 per cent) in Nune-gavadi watershed. The rise in employment for women was by a minimum of 14.0 man-days (7.5 per cent) in Tambulwadi watershed to a maximum of 65.6 man-days (26.9 per cent) in Phuldhaba watershed. The number of days of annual employment for male and female members of beneficiary families was the highest in Kanhur-mesai at 300.9 and 318.8 man-days respectively and the lowest in Kudawale at 174.7 and 204.3 respectively. In watersheds having higher work availability before project commencement, the rise in employment in summer and rabi seasons was greater than the rise in the kharif season. In other watersheds, the increase in employment was the highest in the rabi season, medium during the kharif season, and low in the summer. It was further noted that the female members of both beneficiary and non-beneficiary families worked for a greater number of days as compared to their male counterparts. Female members of both the farmer and labourer categories were engaged for more farm work on an average by about 20 working days (AFC, 1998-99).

3.8 Other social changes

Among the important changes that were brought about in the watershed were a reduction in alcoholism, an increase in literacy levels, an increase in nutrition levels of the families, an increase in capacities and relations with outside world. Many watersheds have also seen an improvement in the quality of life and basic infrastructure. In the Sedashi-Wavoshi watershed, the women banned production of alcohol. In Adgaon, earlier more than 80 per cent of the population was affected by alcoholism which has now been abolished.

At Pimpalgaon Wagha, the backward communities were previously isolated from the village. The watershed development brought about a change in this attitude of the people of Pimpalgaon Wagha. Social taboos have been lifted and these people are now allowed freely in the village. The backward communities have a fair representation on the VWC and participate actively in the decision-making process. Once their financial condition improved, the people from these communities also began to get respect from the other villagers. Injustice by landlords and moneylenders also greatly reduced. The income earned from the work on watershed sites helped them pay off their loans. As more children could go to school, literacy in the village improved and today the literacy rate is about 80 per cent. Biogas plants were set up in some households in the village and their fuel wood consumption declined. As drinking water became available within the village, the women stopped going far to fetch water and so could contribute more positively to the development of the village. They set up a revolving credit and made loans available to the needy at the low interest rate of two per cent a month (Lobo and Kochenderfor-Lucius, 1995.)

In Mendawan there were also other positive impacts on social aspects such as education, housing, health care etc. *Pucca* houses went up from just one to 34 out of 60 sample households after implementation.

In the Shastabad-Chincholi watershed, five biogas plants came up after the project apart from an increase in pesticide spraying machines and threshers. Villagers were also dispersed from *gaothan*(village settlement) areas and they built good new houses in their fields to ensure day round care. The income received from agriculture was invested in digging more wells, buying high yielding seeds and construction of permanent houses of (Gomukh, 2001).

D'Souza (2001) tried to examine the impact of watershed development programmes on the nutritional status of children – the linkage between increased production and improved nutrition. The sample for the study consisted of 1,532 children in the 0-5 age group from 27 villages where watershed projects were in different stages of implementation (out of the 129 projects under implementation in IGWDP). It was found that an increase in crop production and income is not automatically reflected in the improved nutrition of children. The study notes that there is an increase in grasses and fodder as barren degraded lands become more productive which allows more households to own crossbred cows. Thus, as watershed development advances, there is an increase in the ownership of crossbred cows. There is a decrease in other livestock, especially indigenous cows. In Survey 2000, only 10.7 per cent of households in Group I (where watershed work has just begun) own crossbred cows, while this number is 50 per cent among Group IV households (where watershed work has been underway for many years). However, in spite of this there is no direct increase in the number of children drinking cow's milk across project duration. From information obtained from these villages, one notes that as the project advances, the number of crossbred cows have increased with an increase in milk production. In the rain-shadow belt of Ahmednagar district, milk production shot up by the fourth and fifth year in the project period, to over 400 liters per day, and by the sixth and seventh year to over 900 litres per day per village on an average. A dairy cooperative was soon established and more households sold milk. The results of this study also show that the enhanced land productivity translated into only a small improvement of the nutritional status of children. As watershed development advances, an increase in the number of households that have breakfast has been noted and in households where this happens, there is a positive impact on the nutritional status of children in some groups. Data show that households regularly consume sorghum and wheat products with vegetables. Pulses are the only mentioned source of proteins consumed regularly by less than 40 per cent of households and only once a day (D'Souza, 2001).

Large-scale use of bio fertilizer and vermi-compost increased in Khed watershed. The participation of women both in design and implementation of the project in this watershed was exemplary. On average, the literacy levels of males and females in

beneficiary families were higher by 4.4 and 5.5 per cent over non-beneficiary families in NWDPRA. Literacy increase was greater in economically better and well-developed watersheds of Wadhivarhe, Nune-gavadi, Khanur-mesai and Phuldhaba (AFC, 1999). In Sedashi-Wavoshi, housing improved (earlier 90 families were homeless, now this number has fallen to 58), education, assets etc. have increased. One tractor has been added to the community. The 15 self-help groups (SHGs) which began with provision of consumption loans have already taken up some income-generating activities like the development of a forest nursery, transport activities, preparation of greeting cards and cardboard boxes. Among social aspects, empowerment of women, development of self-confidence and improvement in communication skills has given them a feeling of self worth. More children were sent to school in the Rajani watershed (NABARD, 1999).

The DROP (2003) study noted that there was an increase in the workload of women than earlier. Earlier many farmers used to cultivate only single crops and women had to do double duty only for one season. After the cultivation of two or three crops, their work increased considerably. Also, many cash crops, especially vegetables, need intensive supervision.

Across most projects however, the participation of women was found to be of a token nature or marginal. In most projects, women are organized into savings and credit groups. Similarly, special factors such as efforts taken by an individual or the intense involvement of an NGO, are factors that improve the chances of success and sustainability of watershed programmes. The impact of the withdrawal of such an agency and whether the community and institutions created under the project are self reliant, are worthy of examination. Though studies have indicated that institutional arrangements are crucial for sustaining watershed interventions, not many have elaborated upon the nature of these institutional arrangements. These issues will be dealt in detail in the forthcoming chapters.

3.9 Viability of the Projects

In this section we look at the economic and financial analyses available for a few projects in Maharashtra. A word of caution would be in place here, given the growing tendency to quantify everything in economic terms (and putting numbers to everything) and evaluate a project in income terms. Often, there is a tendency to equate increase in income with cash income, or to use it as a proxy for increased welfare or a better livelihood scenario. Livelihood includes income, but also much more. Women, for example, have a great deal to contribute to livelihood, though they may contribute little to income, especially cash income, within the established meaning of the term. There are also situations in which the income may show a rise without necessarily increasing fulfilment of livelihood needs. Dairy farming, vegetable and fruit cultivation are a few examples where the income from the milk, vegetable or fruit so produced may even mean a corresponding fall in their availability to the local community. The situation gets all the more accentuated because men, in a patriarchal society, have full access and control over cash income, which is generated through market-oriented production.

Another example discussed earlier is the tendency towards increased use of improved or hybrid varieties of seeds as a means of productivity improvement. This can lead to farmers losing self-reliance, becoming dependent on both national and transnational seed companies.

A useful compilation of studies is found in the 1991 issue of the Indian Journal of Agriculture Economics (IJAE). The general results of these studies are given by Kerr (1996) who finds that estimated returns to investment are generally high with BC ratios ranging from one to greater than two. While they leave out crucial off-site and non-marketed impacts which would be likely to raise the project's net benefits, the IJAE studies fail to consider two important problems – first they have a tendency to attribute causation of improved crop and livestock productivity to Soil and Water Conservation Measures (SWC) measures even though improvements may have been caused by factors like good weather.

Second, they measure improvements achieved while government support continues, or just after support ended and assume sustainability of gains.

In 1997, ICRISAT published a summary of economic evaluations undertaken by research institutes, state departments and other central and state organizations (Babu et al., 1997). Of the 29 projects listed all have ratios greater than 1.07 and one (Sutle in the western Himalayas) has a ratio as high as 7.06. For those cases where an Internal Rate of Return (IRR) was calculated results varied between 17 and 67 per cent – suggesting higher returns than those of the IJAE studies but leaving out the non-marketed and off-site impacts. Also most studies are not comparable as they use different techniques and assumptions, discount rates and time horizons and also types of impacts included for study. Despite measurement difficulty, the general impression is that watersheds programmes yield high returns and these would be higher if off-site and non-marketed effects were added. But growing evidence of project failure after PIA withdraws shows that Cost Benefit Analysis (CBA) needs to be revised or an alternative technique is needed.

The financial rate of return (FRR) in the IGWDP watersheds is very high at 31

Source: Deshpande and Reddy, (1991).

Impact of NWDPRA in Maharashtra

The study by Deshpande and Reddy (1991) has tried to capture the impact of NWDPRA in three different zones or regions, namely, the scarcity zone, the moderate rainfall region, and assured rainfall zone. In the scarcity region watershed technology has led to intensification of agriculture, higher diversification, risk spreading and increased stability in yield levels. The study notes, "watershed treatment led to higher diversification and risk spreading. The only point of concern was the presence of sugarcane in the water scarce economy. The yield levels do not show any persistent increment across crops and size classes of operational holdings but there is enough evidence to indicate an increased stability in yield levels. It was quite clear from the analysis that the scarcity zone would need a longer gestation period as compared to the other regions -- mainly due to the level of degradation." It was noted that small and marginal farmers of the project area gained on income fronts compared to their peers from non-project areas. The moderate rainfall zone also showed similar results, the study indicates that "the proportion of fallows and uncultivated lands and the cropping intensity were higher in the watershed region, indicating thereby higher resources intensity. The cropping pattern in the project region is well diversified as compared to non-project area, indicating risk spread.... Except in the case of jowar and paddy, the watershed area has a distinct edge over the control region even though the latter had slightly higher irrigated area. This region has a good promise for watershed technology and it is essential to arrest the speed of degradation in this area." The beneficiary group also showed higher net incomes. However, the level of income inequality was higher in the programme area while the reverse is true in the case of a scarcity zone. The assured rainfall zone also showed lower inequalities in the watershed region. The study notes that the initial work of the watershed goes in recouping the damage caused earlier because of the higher level of degradation of the ecosystem. The cropping pattern in the project area is more commercialized, though diversified. Resources are not only concentrated on better quality of lands by releasing marginal lands out of cultivation but also on highly remunerative crops like sugarcane, wheat and cotton to the detriment of others. The watershed region here also has better cost efficiency, ensuring that the net income per hectare in this area is higher than that in the control region. The most interesting aspect of income generation is the inverse size-productivity relationship in the project region as against a direct relationship in the control area. The assured rainfall zone watersheds are likely to yield better results in the short run compared to those from the scarcity zone. Farmer response in this region indicated increased yield rates with greater stabilization, increased income, higher wages and employment.

per cent in Sedashi-Wavoshi and the economic rate of return (ERR) is 41 per cent using the World Bank's conversion factors. In the Rajani watershed FRR woks out at 69.17 per cent and ERR works to 89.11 per cent. In the Mendhwan watershed, FRR works out to be 31.5 per cent without managerial cost and without family labour cost and the ERR under the same assumptions works out to be 35 per cent (NABARD, 1999). The cost-benefit analysis looking at the impact of a water reservoir in the western plateau and hills puts the BC at 1.28 and the IRR at 12.33 (Saksena et al., 1989). The cost-benefit ratio of the Kamini sub-watershed works out to be 1.3 without including secondary benefits like security and dependability of drinking water supply, increase in availability and use of firewood and fodder, increase in employment etc (Gomukh). Walker et al. (1990) reviewed the overall impact of the application of watershed-based technologies at different locations in Maharashtra, Madhya Pradesh and Karnataka. Their results indicated incremental net income ranging between 49 and 203 per cent of the base level. The BC ratio worked out in the range of 1.08 to 3.81 across the locations.

3.10. Watershed Development and Livelihoods

Watershed activities are expected to have a wide range of impacts on the watershed ecosystems and the livelihood opportunities mainly depend on such ecosystems. Earlier, soil and water conservation activity did not directly aim at creating an impact on livelihoods; any such impact was, so to speak, a side effect. The emerging consensus on watershed development, however, no longer accepts such a viewpoint. Most programmes look at effective watershed development as an entry point activity to stabilize and build sustainable livelihoods. However, the strategy in the area of livelihood creation most often visualized is 'watershed plus' along with earmarking a certain percentage of the budget for livelihood activities. Planning and implementation generally follow the conservation and farmer-centric approach and consideration of livelihoods follow after the creation of assets. The livelihood strategies of different stakeholders are not analysed nor their relation and dependency on ecosystem products and services as part of watershed planning. Thus, one sees often examples such as development of CPRs (through biophysical measures and by excluding current users through social fencing) without ensuring user and management rights to those who depend on it the most. It does not mean that a watershed of a few hundred hectares can meet all the resources required for ensuring the basic livelihoods of all watershed dwellers.

The overall picture that emerges from the review is that generally, watershed development has resulted in some improvement in livelihood opportunities for watershed communities. The degree of improvement varies from the spectacular (as in Ralegaon Siddhi and Adgaon), to the 'once good but now not very good'. The internal distribution of benefits has not always been even, with the better-off farmers in the downstream benefiting the most and the landless and farmers in the upper reaches benefiting the least. But in all cases, some livelihood improvements are carried over into the post-project phase. But are there sufficient resilient institutional mechanisms, moral and cultural capital including a sensitive leadership within the community, to ensure livelihood benefits from renewed ecosystem resources to the disadvantaged and marginals in the post project/NGO withdrawn stage? With such a perspective, which implicitly looks at watershed development programmes as providing some degree of livelihood support for watershed communities, the overall performance of the programme would rank as below average. But there would be a great number of cases in which the overall performance has been more than satisfactory.

In this respect, the remark that watershed development measures worked well in good years; in good years, they did succeed in fulfilling their livelihood needs is illuminating. But whenever there was a 'bad' year, whenever the rainfall was below average or the rainfall pattern was not suitable, they faced acute shortage. This is also borne out by our experience in other semi-arid zones in Karnataka, Andhra Pradesh, Gujarat and Rajasthan.

It is interesting to compare in this context, Ralegaon Siddhi and Adgaon, two projects that have generally formed a contrast. Here, we shall look at some of the similarities, which exist between them, despite their apparent divergence in many respects. In both places, and this is significant, water from a major source has been brought to the village – from the Kukdi canal in Ralegaon and from the Sukna project in Adgaon. Norms evolved for the watershed area in Ralegaon (the ban on sugarcane for example) do not apply in the Kukdi canal area in the village. If we do not consider, for the time being, the drinking water problem in Adgaon, we have near full employment in both villages, though Ralegaon Siddhi has a much more equitable distribution of benefits. It may be said that in both villages, watershed development supplemented by exogenous water has led to livelihood assurance (to those who have the basic means of production (land). However, this has been achieved in a more harmonious and equitable manner in Ralegaon, and in a trickle-down manner in Adgaon; in a socially regulated and environmentally regenerative manner in Ralegaon, but in an unregulated and environmentally unsound manner in Adgaon.

We would not advocate the absence of norms for Kukdi water in Ralegaon, nor is sugarcane the only route to stability, but the role that exogenous water has played in both situations needs to be recognized. One of the conclusions of a more in-depth study of a sub-basin in Udaipur region in Rajasthan shows that even under conservative assumptions, for three out of the 12 years, it would be difficult to ensure even domestic water requirements; for another three out of the 12 years, it would be possible to ensure domestic water requirements, but livelihood requirements would not be met; and only in six out of 12 years would livelihood requirements be met. In other words, if we have to ensure livelihoods for this rural population at a higher degree of dependability, a small but significant supplement of exogenous water is certainly required.

A critical analysis of canal irrigation would also argue for a restructuring of the water sector so as to modify the role of large systems from being independent, autonomous entities to a role of supporting and supplementing smaller systems based on micro watersheds and clusters of micro watersheds. The three Ozar Water Users Associations (WUAs) in Nashik district of Maharashtra, to some extent, illustrate the potential of such integration. Unlike in the conventional practice of command management, the three WUAs built check dams on the nalas crossing the command area of the WUAs and used these structures to harvest local rainwater and also to store part of the water that they received from the dam. This recharged the wells in the command area and also added stability to the water regime. As a result, the people have much more control over water delivery and now are in a position to farm diverse crops. The area under irrigation has increased tremendously, as has productivity. One interesting institutional innovation is that the wells have been brought under the purview of the WUAs and farmers are charged for using well water.[28]

If we do require livelihood assurance for all, then we also need to define what place watershed development occupies in the process of achieving that objective. From the review, it is clear that at least in places where watershed development has made a difference, a process of development of water resources and productivity enhancement has gone hand-in-hand and continued beyond the project period. Many other elements have also contributed to the phenomenon and have their own importance for specific aspects. But this, we feel, is the critical element in all those places where watershed development has led to livelihood assurance for a substantial section of the watershed community. This points to the need to treat watershed development as a first step in the process of providing livelihood assurance for all.

This evaluation is good so far as it applies to evaluating watershed development as an essentially soil and water conservation activity, treating improvement in livelihood opportunities and fulfilment of livelihood needs as an associated effect. However, watershed development programmes today are expected to do much more than this. They are seen as being at the core of the process of rural development and

[28] For details on the Ozar experience and the issues related to co-management of local and exogenous water and also surface and groundwater, see the study by Paranjape et al, 2003.

are often supposed to be the lynchpin around which all government-run developmental activity should converge. It is increasingly being claimed that watershed development will ensure fulfilment of livelihood needs, obviating the need for dams and canal irrigation. However, there are issues of sustaining production and livelihoods in the long run and the current trend of impacts, especially those related to water-use, agricultural production, technology adoption management and use of common resources etc., needs to be looked at from a wider perspective of sustainable and equity-oriented rural development.

Chapter 4

Watershed Development and Sustainability

4.1 Introduction

The objective of watershed development in rainfed areas from its early days included economic development of the village community through the optimum use of land, water and vegetation. The success/performance criteria included a set of quantifiable benefits such as increase in ground water and recharging of wells, prevention of soil run-off, improvement in soil quality and moisture content, improvement in agriculture production and production of usufructs like fodder, fuel, minor timber etc. This is reflected in all the guidelines and all impact assessment and performance evaluation used these indicators most often to assess the success of a watershed, as is evident from the reviews/studies analysed in the previous chapter. Most indicators are those generally used to understand agriculture development projects, except the later introduction of social and institutional indicators for performance assessment because of the perception and practice of community participation as a dominant and determining condition for the success of a project. This is understandable because the objective, policy pronunciations and practices were premised on development of resources for improved productivity and growth in rural rainfed areas. Hence, the developed ecosystem resources and the resultant productivity and livelihood became the basis on which project performance and impacts are generally assessed.

By the late 1990s the issue of sustainability emerged as a major concern in watershed development projects following reversals in some successful watersheds, problems encountered in mainstream green revolution agriculture, and through debates, encounters and interactions regarding sustainability of natural systems/resources at the national and international level. Thus one could observe the sustainability issue emerging in the policy statements and to some extent in the operational and implementation strategies. Now most watershed development guidelines, even though in an eclectic way, raise the issue of sustainability of ecosystems and methods of production while pronouncing the objectives and strategies of intervention. Thus one could see statements such as 'sustainable economic development through sustainable utilization of natural resources; sustainable community action; rational long term utilization; sustainable management of natural resources and their use; sustainable production methods and technologies; integrated and allied land-use systems for sustainable production; social regulation on groundwater use; sustainability strategies as part of exit policy of PIAs etc. in all guidelines whether of the MoA, MoRD, CAPART, bilateral, multilateral or NGOs.

Assuming that all the measures in a watershed have been taken scientifically it would emanate into a first round of effects, which let us say are mostly environmental and probably mostly positive. Soil quality is expected to improve, soil erosion is expected to reduce, water recharge should improve, there would be a general increase in the green cover and the carrying capacity of the environment would improve. These impacts are reflected in our review also. To a lesser degree of certainty it could be said that water quality is expected to improve and surface water storage might improve (through holding of water in tanks, nalas and streams flowing longer. However, the amount of water reaching the reservoirs might decrease.

It is important to note here that the above effects are just about all that can be said to be emerging with any certainty from scientifically implemented soil and water conservation activity. However, these by themselves are short term in nature. Beyond this the further round of effects are inextricably linked

to human choices and sensitivity to the environment. The second important level of effects would be increase in irrigation, rate of withdrawal of groundwater, expansion of croplands, cropping intensity, change in cropping pattern and change in agricultural practices. Each of these second level effects is "choices" and not "happenings" emerging "naturally" from watershed development projects. These will cause a further round of effects impinging on socio-economic and environmental variables. The time dimension in the third round might however be much longer before the nature [includes dimension, as defined above] of the impact can be determined. It is these intermediate human choices, which mostly become the dynamic links in a whole range of further effects, which most of the evaluation studies concern themselves with. So when we look at only fodder, fuel, livestock, etc., they are projected to be natural consequences of watershed development programmes. However, only a careful delineation of the above links can determine whether the changes happening in the various bio-physical and socio-economic indicators are going to bring in long term sustainability of incomes and environment, health and well being, biodiversity, food security etc., which are the at the core of 'green' development programmes.

Operationlizing the concept, sustainability is found to be a weak area and there is very little information available from our context. It is often equated with maintenance and repair of assets, which in itself is a major aspect of sustainability strategy. However, it is also brought to the fore that growth processes and production strategies are at loggerheads/ conflict with sustainability to an extent. The very concept of sustainability assumes a continuity, a time frame and is this time frame means 'staying for ever' or should we consider sustainability within the context of the dynamic nature of society, modes of production and social processes. Another important aspect is that after achieving a particular stage in the growth process (visible impacts in the early stages of a project as we have seen in the previous chapter) what are the new structures, systems and challenges for moving to the next stage i.e. to ensure continuity of benefits without compromising the ecological balance or reversing to the previous situation of degraded ecology and endangered livelihoods. Sustainability is impacted by human actions and 'rational choices' the watershed dwellers make vis-à-vis their environment and how far these actions can be 'moulded' when the incentives are for growth (even at the cost of endangering the resource base) both at micro and macro level. What are the implications of neo-liberal economic policies on sustainability of natural resources, when an increasing number of wastelands and commons are being earmarked for Special Economic Zones and corporate farming? The issue is whether watershed development can work in isolation without being touched by the larger economic and social processes unfolding in the march towards 'growth and development' and what are the strategies and incentives available for the historically deprived rainfed communities to preserve and sustain the ecological balance and at the same time earn a better livelihood.

Attempts have been made to address the issues of sustainability in relation to watershed development and the resultant productive potential. They revolve around core issues such as repair and maintenance of assets, continuity of social and institutional processes put in place during the implementation, sustaining the results and impacts and sustaining the growth processes. All these issues are not independent and they impinge on each other. In the following sections of the chapter we will try to look into the status of issues and look for strategies and methods adopted from available sources and evidence. However, this is an issue on which very little information is available, that which is available is most often very sketchy and opinionated and what can be considered as 'best practices' are very limited to certain examples here and there. But one should acknowledge that sustainability is increasingly gaining an important place in watershed discourse and practice, and sustainable production and sustainable livelihoods are considered to be the expected long-term outcomes of watershed development.

4.2 Sustainability of Assets Created under Watershed Development

Watershed development interventions create a number of biophysical assets aimed at conserving soil, water and biomass. These assets are created, either in private lands or in common lands or in drainage courses that either pass through privately owned land or nestle between private lands, but as a common. The location of the structure/ asset, the nature of the property regime in which it is located and the benefits it generates often determine its sustainability. The perception of the beneficiary regarding the benefits from a specific asset/intervention plays a crucial role in its care and maintenance. Studies and experiences show that assets created on private lands in consultation with the farmer and those, which generate immediate impact, have a higher chance of sustainability. Assets on common property resources face problems if the necessary social and institutional arrangements are not in place. The time taken for benefits to register also has an impact on sustainability, where the community may loss interest due to the lack of visible impact in a short time. The longevity of an asset also depends on its technology and quality.

Soil and water conservation works need regular repair and maintenance for them to be effective and generate positive outcomes. Experiences from first generation projects and the status of assets created under them have brought the importance of care and maintenance to the forefront. The situation of contour bunds and large number of Nala Bunds created in Maharashtra during the seventies and early eighties are part of the learning in disasters. Slowly it was realized that the involvement of the community is a precondition for improving the effectiveness of the intervention. Now it is realized that it is not just participation but the social arrangements, institutional mechanisms their structure and functions, availability of skills and resources in community etc., that impact the long-term effectiveness; maintenance and repair also depend a lot on these issues. New generation projects have created at least certain mechanisms in this direction especially for maintenance of assets. But definite conclusions are not possible in the absence of examples in small scale at least. Certain trends can, however, be observed. Projects have some resources at their disposal such as maintenance funds, or the watershed development fund. Some places utilize these funds for maintenance and repair such as plantations and aftercare, building of new structures or paying for watch and ward. But in large number of projects this resource is left idle in the absence of proper management systems and structures, institutional inactivity in the post project at local level etc. Most projects of this generation have recently completed their implementation and have not yet required any major maintenance. For example in Shedasi-Wavoshi the assessment by NABARD notes that leakage to the check dam (due to various reasons) was not even attempted to be rectified despite the availability of funds for maintenance. But in Mendwan a better arrangement has been put in place by engaging a person who has certain skills. The assessment of 115 projects (DPAP and IWDP) in Vidharbha by Dharamitra shows that in many instances loose boulder structures are either damaged or being removed by the farmers. In the case of Gabbion structures in seven watersheds either they have been completely washed away or are partially damaged. Vegetative barriers are also either not visible in places or are damaged. In case of nala bunds and farm ponds, it is observed that they are fully silted in most places.

Maintenance is also dependent on skills available at the community level. Low cost and locally manageable assets generally are maintained if they are seen as beneficial, but for technically-oriented (engineered) assets like engineered structures external services may be required. Generally if the quality is good, such kinds of structures need only some maintenance which can be locally done. The transfer of technical knowledge and capacity enhancement during the implementation period also matters as that is the period of fixing responsibility for the specific resources and beneficiaries. Experience shows that many projects make it part of their strategy to adopt locally available materials and low cost structures so

that it is easy for the community to maintain them. However, one cannot ignore the importance of engineered water-harvesting structures. Issues related to maintenance of structures on common property resources are complex and clear arrangements are required in terms of getting maintenance work done.

One of the major problems encountered is maintenance of biophysical interventions in the common property resources. There are many reasons for this such as no clarity about who the users are or what their rights and responsibilities are, administrative problems regarding user rights and rights to manage, long gestation required for products to benefit the community, nature and kind of activities undertaken etc. Some experiences emerging from the field show that when resource-poor self-help groups (SHGs) are entrusted with the usufruct and management rights for common resources, the performance is better. In some places especially in tribal areas it is noted that cultivators downstream like water and biomass residues to flow into the cultivated lands so that water can be impounded for rice cultivation. It has also come to notice that during droughts the pressure on commons increases as does the cutting of trees and the intensity of free grazing. There are instances in which the village committee has passed a resolution in favour of free grazing in common lands during a drought.

Even though there are resources available for maintenance in new projects and certain instances of maintenance and repair are reported from villages and programmes under review one should not draw a hasty conclusion on this count. Many projects organize the maintenance fund through local contribution, but it is often noted that the fund is not used effectively for operation and maintenance. In Dharamitra evaluation in 21 per cent of watersheds no maintenance fund was organized whereas in 66 per cent of the cases five per cent of the project cost is collected as maintenance fund. In a lot of cases (in almost 73 watersheds out of 90 where a watershed development fund has been orgainzed) there is discrepancy noted in what is reported and what is actually available in the account. There is a lot of concern about the status of maintenance fund after the withdrawal of the PIA. In instances where maintenance is reported, it may not reflect the actual picture. First, much of the data on newer projects is in the form of case studies that often comprise the more promising projects, whereas the real experiences will emerge from studies covering a large sample, including the not-so-promising and the failed projects as well. All that one can say is that since the new projects have taken note of the problems and have evolved certain measures, and however elementary these measures be, there is a greater likelihood that they will show better performance for longer periods.

4.3 Sustainability of Watershed Impacts

In the previous chapter we have seen quite a few evidences regarding the impact of watershed development on soil erosion, on biomass production, on ground and surface water and on agricultural production and livelihoods in general. Though most of the reviews do not have sufficient quantitative data on impacts of soil erosion and quality, some reduction in erosion is generally reported. In our field visits, farmers were able to provide some information about the turbidity of flow based on their perception. There was sufficient evidence across many watersheds that stream flow had become clearer and sediment load had reduced. The review also showed improved moisture status and water holding capacity of soil in watersheds. However, sustaining these impacts requires regular maintenance of soil conservation structures such as bunding and improvement of soil quality through mulching and biomass application. Erosion control in upstream areas and grass and tree cover also contributes in controlling erosion. Field evidence shows that maintenance of conservation measures is better in good quality lands as compared to marginal and uncultivated private lands, and that the intensity of the problem increases in lands that are under common use. In almost all watershed projects the responsibility of maintaining private lands is that of the owner and the tendency observed is that they concentrate their resources on better and productive lands (an economical

and rational decision) and ignore the problems in less capable lands. Thus breaching of bunds, rill and gully formations are left unattended in the post-implementation period in marginal private lands. Some of the farmers do take cereals like Jowar and Bajra on this land primarily for the fodder and grain production is only incidental. However, these lands are increasingly brought under mono-crops such as castor which itself has its impact on fodder and livestock development. Excess digging of soil for trenches in sloppy lands may also add to soil erosion and in some instances where land leveling is done without much technical care and on sloppy lands with less soil depth it has added to soil erosion as is evident in some watersheds in Konkan and Vidharba.

Sustainability of biomass production is also very important in ensuring sustainable livelihoods. Seasonal and annual biomass production estimates are good indicators of the variability of the ecosystem resources in time and space and review proves that there are good indications about improvements in this respect at least in watersheds where biomass development and social fencings are practiced. However our analysis of 115 watersheds from Vidharbha shows that the investment on biomass development is very poor and there is hardly any practice of social fencing and CPLR management. Development of biomass in the commons and its access to the poor is very important from the livelihood point of view and low investments and production show that this concern was not part of planning and that concerns like equity and sustainability are still not thought about. The development of commons for usufructs like fodder and fuel is one of the major objectives of watershed development and very few projects have succeeded in this respect. Wherever the production of at least grass has improved, very little information is available in respect of its sustainable development and use, . Whatever information exists is in the form of visual observations and anecdotal expressions of the community. In many projects, as reported earlier, the plantation survival is poor and as the project progresses, the number of plants that survive is found to decrease. For example, in Sedashi-Vawoshi, a watershed in a high rainfall area, the survival rate of plants (for plantation done in year 1994) is only 40 per cent when survival was assessed in year 1999, even though 92 per cent survival is reported for the plantation done in year in 1999, the evaluation year (NABARD, 1999). Thus, it should be noted that even if a high survival rate is reported for plantation during implementation, it may not reflect the real picture, as it takes time for plants to stabilize and grow. The survival rate after at least five years of plantation might give us a clear picture. Besides the low survival rate, the diversity of plant species is also very limited. In Rajani watershed (assured rainfall area) the survival rate is reported as low as 10 per cent (NABARD, 1999). If the condition is this in high and assured rainfall areas, one can draw a picture of the situation in drought-prone areas to be even worse.

During field interaction it was noted that plantations also lack effective management after the withdrawal of the PIA and many instances of tree cutting were reported. There is no quantitative information either for biomass regeneration or the rate of extraction. Many projects have a ban on open grazing and felling of trees and people are allowed to cut and carry the fodder and collect the fallen dried branches. However, there are no clear rules regarding the rate of extraction of fodder and who has the prioritized rights. Our field visit showed that, except in a few cases, even these rules are not followed after the withdrawal of the PIA, thus one is forced to question the effectiveness of these rules are and whether the community is convinced and has internalized these concerns. The IGWDP villages in Ahmednagar district have worked out Joint Forest Management (JFM) with the forest department in terms of sharing of produce and management responsibilities. To an extent this is working, in terms of preserving the trees and biomass, as compared to the previous situation of pilferage and destruction, sometimes in connivance with forest guards. The issue of sustainability of biomass in non-forest common lands needs further attention in almost all projects in the absence of effective management systems, rules

and administrative procedures. It is considered a very weak area, not only in the state but also in almost all watersheds in the country.

One of the ways to reduce biomass extraction is through herd rationalization. Of course, this is an area that is very contentious. Experiences in this regard, at least from the watersheds in Western Maharashtra, are that small ruminants and traditional breeds are reduced and the poor and women-headed households suffer the most. It also impacts on ecological services that these animals provide, such as manure and fertility improvements.

4.3.1 Land-use Change and Sustainability

From the ecological sustainability point of view, each landform or class has a particular function to play in a watershed. One of the cardinal principles of watershed development, at least theoretically, is that different types of lands have to be put to use as per their capabilities. In fact, watershed intervention aims to improve the functions performed by each of these classes. Bringing sloping (with shallow soil depths) non-crop areas under seasonal and annual tillage could increase soil erosion. Also, it can cause negative externalities in different ways. In traditional land-use systems, there used to be an organic link between the cropped area and non-cropped areas (forest, pastures, and wasteland). By bringing in more and more non-crop land under shallow-rooted, seasonal agriculture, this organic link is broken. By converting more non-crop land to cropland, we are encouraging mono-cultural tendencies which can decrease local biodiversity. Non-crop land has different types of grasses, bushes, trees, creepers and other types of vegetation including medicinal plants. It is a repository of a great variety of rootstock. It also supports a variety of micro- and macro-organisms, all of which have a role to play in the ecosystem. Under watershed projects quite a lot of marginal lands are brought under cultivation growing seasonal crops or dry land horticulture and these days under non-browsable cash crops such as castor. What one encounters here is a conflict between economic and livelihood issues vis-à-vis sustainable land-use practice. However, there are ways in which both these issues can be addressed i.e., productivity enhancement for increased livelihoods and ecosystem conservation. What is needed is a strong commitment to find ways of integrating them rather than considering them conflicting objectives, which makes it imperative to trade-off one against the other. An integrated land-use and production system is required which should be part of watershed planning and implementation. Another possible approach could be to try to meet the food requirements from a reduced area. It has been observed that there is a tendency amongst the people to bring in more and more land unsuitable for shallow-rooted crop production under crop production during drought and scarcity conditions (Joy and Rao, 1993). Experience and various experiments show that it is possible to meet food needs from a smaller area through sustainable productivity enhancement methods. One such example is the experiments with small plot intensive cultivation by many groups in Maharashtra that have been able to achieve very high levels of productivity with local inputs.[29] Another example that is talked about currently is the Madagascar Rice Intensification System (also called System of Rice Intensification, SRI to be brief), which is now spread over a very large area in different countries. It has been reported that it has been able to achieve an average productivity of something in the vicinity of 10 t/ha (Uphoff et al., 2000). Yet another way is to ensure a certain quantity of water to the people as part of the watershed programme. Experience shows that in drought prone regions, critical (or protective) irrigation can make all the difference between a total crop failure and a good crop. This minimum water assurance combined with some of the emerging Low External Input Sustainable Agriculture (LEISA) techniques can build up productivity in a very short time span and meet food requirements from a much smaller area. The saved area can then be devoted to a diversified biomass production system without significantly disturbing the different types of land-use classes. Of course, this calls for a restructuring of the present-day watershed programme

[29] Shri Balkrishana Renke and his group have been doing this for the last five years or so. He has kept a very good record of all the data including inputs and labour outputs. For details see Kulkarni (2000); YUVA (2001)

in terms of fund allocation, institutional arrangements and phasing of the programme. These issues are discussed further in the concluding chapter.

4.3.2 Increase in Irrigation and its Impacts

Many studies and evaluations have proved that irrigated area has increased in almost all successful watershed projects. It also shows that the water table has consistently improved at least during good rainfall years. Though there has been an increase in the water table, especially in the wells close to various structures like checks dams, this has been more than offset by the tremendous increase in the number of wells. In almost all cases that we visited, and those for which some data are available (and this is also confirmed by various other studies), the number of borewells and dug wells have gone up immensely. Now, the dominant trend is to construct borewells and tap water from the deeper aquifer. Watershed development seems to have acted as an additional impetus for investments in wells and pumping devices, leading to a virtual pumping race. There are also cases of groundwater pollution and water going saline because of the excessive withdrawal of groundwater. The investments in borewells in the post-project phase sometime are more than what was invested in the watershed development [30]. Now the tendency among farmers is to go for borewells and submersible pumps. The reasons may include fewer investments as compared to an open well (especially in basalt rocks, where blasting is required), less time involved in construction, and very little land occupied by the borewell and easy availability of drilling technology etc. Whatever the reason, increased irrigation through borewells extracting groundwater from deep aquifers, which have a lower recuperation rate as compared to shallow aquifers, may in the long run result in changed surface hydrology such as drying of springs and seepage zones and eventually lead to what is known as groundwater drought.

Groundwater is one the most important natural resources for rural areas and the recent expansion in irrigation owes much to groundwater exploitation. It is a renewable resource but does not minimize the need for efficient use and its sustenance. Injudicious use may result in permanent ecological damage as is evident from the ever receding water table (and it is reported that about five per cent of the state's area has already crossed the danger mark) or intrusion of sea water in costal aquifers as is evident from other parts of the country, especially in parts of Tamil Nadu, Gujarat etc. The propagation and adoption of compact pumps coupled with energy subsidy has contributed immensely to the exploitation of groundwater, which facilitated the adoption of green revolution technology and water intensive crops by farmers. Thus what we see is a vicious circle.

The issue of groundwater is a complex one from the hydrological and ownership perspective. The availability of groundwater depends upon the rainfall, and the geological and hydrological configuration of the region. One of the most important aspects of groundwater is that though it is a common pool resource (one can also argue that it should be a common property resource as well by virtue of being under the ground with no proprietary entitlement) the means of access to it is privately owned with extraction through private tubewells and open wells. One farmer's extraction can adversely affect the source of another farmer and his ability to invest more can adversely affect many others. For all practical purposes, groundwater is an open access resource until it is captured and privatized and whoever does it first, owns it. These open accesses put this resource at great risks and push it into the realm of competitive exploitation. Ungoverned access to the resource, lack of institutional mechanisms to govern judicious utilization and access, lack of awareness about the resource and its availability among the end users, lack of incentives for sustainable users, statutory measures not put in place are some of the issues affecting sustainable management. The issue of right over groundwater is based on the doctrine of riparian right, the essence of this is recognition of equal rights on use and extraction of water by all those who own the land above, provided that it does not interfere with the riparian right

[30] An impact assessment of five watershed projects in Andhra Pradesh shows that the investments in borewells began immediately after the initiation of watershed development and soon outpaced other types of investment in almost all watersheds (WASSAN, 2004).

of others. Though in reality, the depth of a specific borewell can affect another's right, very often it is not perceived as individual interference over rights but is seen more as an outcome of technology.

Another unique aspect of groundwater is that it is a non-stationary, fluid moving resource merging with water in another's land. By lowering the depth of tubewell access availability of water to a neighbour's well can be denied. Without collective arrangements for proper use of ground water, there tends to be an infinite competitive extraction, with farmers outbidding each other in depth of drilling. Thus it can be said that as land belongs to the tillers, groundwater belongs to the drillers

Secondary data of many villages in the DROP study showed that where watershed development was carried out and where water availability increased, water intensive crops such as sugarcane and banana were cultivated and there was an increase in borewells for irrigation. This in turn led to an excess of groundwater withdrawal leading once again to water scarcity (DROP, 2003). Awareness regarding water resource availability and its translation into the practicing of a suitable cropping pattern is crucial for long-term sustainability. Villages in Hivre Bazar, for instance have decided not to cultivate water-intensive crops and to use irrigation water from open wells of 30-50 feet and deep aquifers of more than 100 feet for drinking purposes. There is also a shift towards horticulture and drip irrigation practices.

However, some attempts have been made in regulating groundwater exploitation and some lessons from some watershed development projects are worth observing here. There are some social regulations brought into some projects like IGWDP, Hivre Bazar etc., where digging of additional borewells are restricted through community decisions. There are community and user group tubewells introduced in some projects, social restriction on the use of tube wells for irrigation, discouraging water intensive crops, guidelines regarding spacing of wells, protection of drinking water wells, equity in access including that for the landless (in Naigaon, Pani Panchayat) etc. These changes could be brought about through decisive participation in the programme of the community and stakeholder groups, strategic conflict resolution at the community level, institution and social capital building, making users aware and conscientious, systems and mechanisms of social regulation etc. However it is also observed that after the exit of the PIA, tubewells started resurfacing again especially in drought years when the open wells dried up.

Water harvesting by creating extra water storage along drainage lines has also contributed to changes in surface hydrology. Flow in ephemeral streams now occurs less frequently, is reduced in magnitude and/or is less prolonged after large rainfall events.[31] There are many cases where existing minor, medium and major projects do not seem to get the flow required (or the flow as per the original design) because of the upstream developments that have taken place subsequently (Paranjape and Joy, 2002). We came across only a few cases like Ralegaon Siddhi, Babhulgaon of IGWDP, and Hivre Bazar of Adarsh Gaon Yojana, with an explicit agreement that water intensive crops like sugarcane and banana would not be taken up with the water generated through watershed development efforts. However, in many cases, people are prohibited from taking water directly from the check dams or surface storages.

In most drought-prone areas, shallow aquifers are not as contaminated by fluorides as the deeper ones. But watershed development has prioritized water for irrigation in such a manner that all the better and shallower sources have been utilized for irrigation. Especially in summer, the deeper sources are the only ones left for drinking and other domestic purposes. This shows the need to pay proper attention for prioritization of water use, different components of water resources and their suitability for different purposes.

The review brings out clearly that there has not been any attempt to carry out water balance studies to understand what is happening to the different components of water as a result of

[31] The study of the KAWAD project shows that extra water storage on drainage course has brought changes in surface hydrology. Though irrigation benefits in the command have more or less remained the same, the mode of irrigation has changed from surface to groundwater. This also means that, in all likelihood, the users have also changed. This change has affected other uses that depended on the tank, like watering for the cattle, pisciculture, washing and bathing. The study concludes that harvesting should be encouraged but within an integrated or adaptive water resource management framework, using procedures that weigh the benefits and tradeoffs associated with altered patterns of water use.

watershed intervention. Without such studies, it is difficult to say whether we are using water in a sustainable manner or not, in other words, whether we are using the annual flows or digging into the stock.

Another possibility of exploring good yields with limited water assurance is that popularized by the late Prof. Dabholkar of Prayog Parivar. It tries to create favourable soil regimes on such lands by concentrating the thin topsoil into pits or heaps using locally available soil and biomass. The system works well for horticulture, or for creepers like grapes, and becomes very profitable when combined with pitcher irrigation or 'fertigation' methods that deliver water and soil nutrients locally to the root zone of the plants. These measures can sustainably enhance the productivity potential of degraded lands without extensive land levelling activity, which would disturb the earth and contribute to soil erosion.

Now there are quite a few instances in which farmers are opting for sustainable water use through the adoption of better technology such as drip and sprinkler irrigation instead of the channel and flood irrigation methods, but the water saved generally through these methods are used for additional irrigation of lands. However, these methods can have better long-term impacts in terms of saving the soil from water logging. However the initial cost most often discourages farmers from going for it. There are some instances in which the watershed committee has purchased sprinklers and rain guns from the maintenance fund and hired it out to farmers.

The best option is to educate and sensitize the community on the nature of the water situation in their watersheds through water balance analysis and monitoring of water resources as an ongoing activity. Simple but robust models that can give useful first approximation which can then be progressively refined through observation and 'ground-truthing', are required. This is attempted in some watersheds with the initiative of the PIAs, but is rarely taken forward after the withdrawal.

4.3.3 Sustaining Agricultural Productivity

In many cases, the initial high productivity gains could not be sustained, especially in the post-project phase. During our field visits, we found that current yields were quite low, though the people generally sounded positive about the impact of watershed development on productivity of crops. When asked about the fall in productivity, they sought to explain it away by saying, "This year, productivity was bad because it was a drought year". In quite a lot of instances the initial productivity gains are achieved in better quality lands and through high external inputs.

Very often, the productivity gains could not be sustained, especially after the withdrawal of the PIA. For example, the mid-term appraisal of the IX Plan programme by the Planning Commission, Government of India (2001) shows that in watersheds surveyed in Maharashtra and Andhra Pradesh, the productivity gains did not last more than two years (Soussan and Reddy, 2003). Similar were the outcomes in some of the model watersheds taken up by ICAR. Productivity and production went up during the implementation phase and fell immediately after the completion of the project, some of which had even bagged national productivity awards.

Productivity associated crop practices, including those actively propagated and supported by watershed development projects are something of a mixed bag, with little consistency in agronomic practices or in the nature of input. They are an eclectic mixture of productivity concerns and practices that are part of the dominant high input agriculture, along with a sprinkling of eco-friendly inputs such as vermi compost, NADEP compost etc. Instances of integrated pest management and integrated nutrient management practices are also visible in certain watersheds along with conventional chemical fertilizers. Most studies also indicate that, for the most part, crop technology and cultivation practices follow the mainstream high-input based agricultural framework and most of the performance evaluation indicators also revolve around this productivity framework.

[32] *See Reijntes et al. (1992) for a good exposition on LEISA.*

Since initial input use in most watershed areas is quite low, higher input levels to achieve higher yields may not be negatively correlated with ecosystem improvement. Yet, it is necessary to identify crop practices that have environmental consequences. For example, an appreciable rise in fertilizer use within the LEISA[32] paradigm may represent an equal productivity increase with little environmental damage, while achieving the same productivity gains from high-input strategies may lead to significant pesticide and fertilizer residues and other environmentally harmful impacts. Nevertheless, the indicators used would show the latter as indicating better performance.

In our field visits we found that, in the case of the newer projects, there are some concerted efforts to encourage environment-friendly practices. For instance, AFARM in Dornali village has promoted organic farming through awareness camps and also organised demonstration of NADEP compost method. A few farmers have expressed willingness to follow natural pest control methods and also use organic manure.

In some of the DROP initiatives, people were encouraged to take up preparation of compost using agriculture wastes and were given training in different methods of application of green manure and integrated nutrient management (INM). Certain integrated pest management (IPM) practices like placing poles in fields to attract birds to eat the insects and pests have also been tried. Following training to farmers on fertilizer application methods, they have been able to bring in more efficiency by adopting split application of fertilizer doses. However, many of these practices occur few and far between and most often with the active involvement of the PIAs. This is observable from the defunct vermin composting and NADEP pits in some of the villages in which this has been propagated.

4.4 Sustainability of Institutions and Social Processes

It is assumed that participation as well as social and institutional issues play a crucial role in effective implementation and sustaining watershed efforts. With this objective almost all projects have created mechanisms and strategies for community participation, social arrangements and institutional mechanisms. The larger issues related to the above will be dealt with in detail in another chapter. Here we limit ourselves to the performance issues in relation to sustainability. Institutions are expected to continue their functions in the post-implementation/PIA withdrawal phase with regard to community actions for sustainable management of the project and PIAs are expected to create a roadmap in this regard as part of their exit strategy. There are also a number of social processes and community regulatory systems evolved or put as part of project conditionality in quite a few programmes. The issues are whether these institutional framework and management strategies are able to continue in the post-project period and whether they are equipped to handle post-management responsibilities. A lot depends on the way institutional and social frameworks are formed and evolved, the capacities and the vision. Since institutions are considered a precondition for project implementation, they are organized as prescribed in the guidelines into bodies such as the Watershed Association, Watershed Committee, User Groups (UGs), SHGs etc. They also perform certain responsibilities in relation to project implementation, together with the Watershed Development Team (WDT). However very little information is available on their structure and functions in the post-project period. User groups, in government-supported projects, are organized with the objective of future maintenance but our analysis of the Vidharbha evaluation by Dharamitra shows that in 28 per cent of the cases no UGs have been organized, and in watersheds where they are organized, UG members are unaware about their responsibilities nor has their capacity been built to work cohesively as a unit. The IGWDP has no UGs and the responsibility of maintenance lies with the Village Watershed Committee (VWC). However there is no conclusive evidence from IGWDP projects to prove that the VWC is performing its duty with respect to maintenance after the withdrawal of the NGO.

In the implementation phase, these institutions play a complementary and

supportive role and many of their functions are more in terms of assisting the PIA in the smooth implementation of the project. It is often noted that some members are only active in this and that the institutional responsibilities are not holistically realized. Capacity-building is noticed as being poor and many studies show that the funds earmarked for capacity- building and community organization are not fully utilized, especially in government-supported projects. The Vidarbha evaluation shows that in 64 out of 115 watersheds, training funds were neither released nor any training conducted. The situation is almost the same in the case of community mobilization funds. Even the curriculum is more oriented towards functional needs related to project-implementation and very little information is disseminated on knowledge and vision building. The abrupt withdrawal of the PIA leaves these institutions in a vacuum and they are unable to comprehend the emerging demands and to respond institutionally. In quite a few NGO projects, the NGO's continuous presence even after the project completion has at least kept some active members. The best illustration is the large number of UGs promoted under different watershed programmes. In the post-project period almost all these groups (in quite a few cases it is noticed that during project implementation, they do not even know that they are UG members) are non-existent, except in certain cases where they have a definite role in using and managing certain resources such as fodder. Once the purpose is achieved, i.e. meeting the project implementation target they loose their original relevance and become defunct. There are no clearly defined portfolios, nor activities or resources for them to continue functioning. The moral/symbolic capital of the group and their continuous influence on the community is thus at jeopardy. It is also evident from our field visits that enforcing norms and governance becomes difficult for these groups after PIA withdrawal. This is evident from instances of free grazing, cultivation of water-intensive crops etc. which otherwise were part of the social regulations in the implementation. One exception, which is often noticed, is the continuity of most SHGs created under watershed programme. This may be due to the economic agenda and continuous flow of inputs. Here one has to take a practical and non-romantic approach to ensure continuity of these institutions, such as ensuring that the active members are trained in some of the post-project responsibilities and systems of incentives are designed. Their skills could be built in certain areas in which services are required at the village level. Service users can pay them, and they can also be paid honorarium for the public and community services they provide. Such attempts are being made in some of the watersheds.

4.5 Conclusion

The programmes show a wide range of impacts, that affect not only the environment but also bring about changes in livelihoods. However, it is not as simple to make an observation about the direction of these effects - negative or positive. Each of the 'natural' outcomes of a watershed programme is supplemented and multiplied by a 'human choices', leading to final outcomes which alone determine the long-term impacts in terms of equity and sustainability. Unless choices are made scientifically and in a long-term perspective through the planning, implementation and monitoring of these programmes most of them could fail, under-perform their potential or bring in negative impacts in terms of equity and sustainability! In fact, at some places it has been observed that at the project implementation stage itself there are serious lapses that could result in negative externalities. Often, at places it has been observed that Continuous Contour Trenches (CCTs) happen along the slope; or in waterlogged/ saline soils the rise in the water table might make the situation worse; extensive land levelling using heavy earth moving machinery can have long-term negative impacts or the encouraging of subsidiary activities like setting up of brick kilns, soil mining from hillsides etc., can right away bring in negative environmental outcomes even at the start of watershed programmes.

The current programmes and also studies lay great emphasis on the implementation and design of watershed programmes with the aim of

seeing a maximum number of successful programmes. However, there seems to be much lesser emphasis on, attention paid to and management of the linkage of effects related to the irrigation methods, crop choices, production methods and land-use choices by farmers. These are important in light of the fact that these policies remain crucial to deliver the desired long-term socio-economic or even environmental effects, even if most of the watershed programmes were successful in their implementation. Also, a normative approach to such development needs to be adopted. Certain PIAs distribute and encourage use of chemical inputs and HYV seeds to increase productivity, while certain other PIAs have concentrated on encouraging organic farming along with the creation of seed banks to preserve local variety of seeds and reduce dependence on outside markets. Certain PIAs have consciously adopted other eco-friendly technologies such as the promotion of bio-gas plants and solar lighting while other PIAs are not concerned with soil mining in their watersheds or brick kilns. If the microcosm of watershed development is to be linked successfully with sustainable rural development then attention to these aspects assumes importance. It is also in the context of these interventions that issues related to equity are going to gain importance. For example, the projects differed in their approach to granting land rights to the landless. While some NGOs see the provision of land to the landless as a way to resolve inequitable resource access within the watershed, others believe in lifting encroachment by the landless to free common lands for regeneration.

The processes that lead to these kinds of impacts, and their dimensions are related to the nature and extent of human activity. The onus of the type of impact falls upon human decisions, which have to be guided by better training and participation.

However, to put into practice the issues of sustainability at the community level requires new systems and strategies which may be qualitatively different from what existed during the mobilization and implementation phase of watersheds. Some of the components can be integrated during the implementation phase itself, such as creating sustainable production and resource utilization models. However, as mentioned above, many attempts die immediately after the withdrawal of the PIA. Watershed dwellers are mobilized for the attempt at rehabilitation, with the prospect of improved productivity and livelihoods, and farmers try to maximize the return even if it is at the cost of unsustainable practices. Then what are the incentives which can be designed in the project that will encourage farmers to adopt practices that encourage sustainable use and methods, and how can the changing demands and claims can be met without compromising the "balance" of the ecosystem (or its primary productivity). Having achieved a particular stage in the development that is resource conservation, reaching the next stage i.e., the sustainable use of resources, necessitates new challenges and structures. This may be investment flows to ensure sustainability (subsidies, at present, hardly make a difference between sustainable and unsustainable use that they are put into), service provision (rural service centers for a large cluster of villages), enforcing norms and governance and incentives for sustainable users, information provision, marketing and systems that ensure quality for sustainable products and general vision building for sustainable growth processes. The timeframe of watershed development also needs to be revisited as the unit of planning. For example, it may not be possible to address groundwater sustainability issues within a 500 ha watershed, but may require aquifer-based planning and mobilization.

Chapter 5

Watershed Development: Equity and Gender

5.1 Context

Issues related to equity have become an important concern in watershed development especially of late and with the advent of watershed development as a strategy to create sustainable rural livelihoods. For a long time, however, this issue did not enter the discourse and practice of watershed development. Even now there is scant evidence on how the issue is put into practice and reflected in the outcomes of watershed development. The focus of watershed development, and of earlier soil and water conservation programmes like bunding has been on soil conservation and to an extent on resource augmentation. Equitable distribution of the increased resources and its access and benefits to the resource poor were not on the agenda of both policy makers and practitioners. As a result, most of the studies at that time did not look at distributive equity as an important aspect in project assessment.

Things have, however, changed over the years. More and more people are now talking about equity and the term, in general, has acquired some acceptability among practitioners, researchers, policy makers, and donors. The importance of the concern is also reflected in the watershed guidelines. The revised guidelines of the Ministry of Rural Development (MoRD) list one of the objectives of watershed development as promotion of overall economic development and improving the socio-economic condition of the resource poor and disadvantaged sections residing in the programmes area. Selection criteria for watersheds also highlight the importance of selecting villages with a preponderance of resource poor and SC/ST families. The Eswaran Committee, which looked into the question of training and capacity building in the context of watershed development, especially after the 1994 Common Guidelines, has been quite forthright in expressing its concern for equity as one of the goals of watershed development programmes. To quote from the executive summary of the report:

"There is need for undertaking activities for the benefit of the rural poor, namely landless and other weaker sections. It should be clearly provided that the landless and other weaker sections of the Watershed Community have equal rights of access and use of resources available in the form of agricultural products, namely, fruits, fuel, fodder etc., in the village common lands. Wherever community assets are created in the form of community water resources, fishponds etc., a mechanism of sharing it with the rural poor, namely the landless and other weaker sections, should be worked out along with sharing of usufructs from the village common lands. Some of the benefits, which would accrue from watershed projects, would be in the form of greater and equitable rights like generation of employment, higher agricultural production and availability of greater biomass, especially fuel wood and fodder. This helps in better opportunities for non-farm employment for the rural poor and an increase in the general wage level due to increase in opportunities." (Joy, Paranjape et.al, 2005).

The report of the technical committee on watershed development under the chairmanship of Shri. S. Parthasarathy also highlights the importance of addressing the issue of equity.

"Discrimination against women, Dalits, Adivasis and the poor in resource-use and access is widespread. Any development programmes based on local initiative need to be necessarily accompanied by effective social mobilization in favour of these socially and economically disadvantaged groups. Detailed agreements on sharing water and other benefits need to be worked out well before any construction activity is started. Otherwise, all the water harvested will be cornered by the

dominant elite. And this is what happened in all watershed programmes in India. It must be recognized that the benefits of public investments on public land must be seen as a public good, to be shared with equity amongst all sections.' (From Hariyali to Neeranchal, Report of the Technical Committee on Watershed Development, 2006).

Our review of the watershed experience illustrates that there is a wide range of understanding of what is meant by equity and how it manifests itself in particular watershed contexts. Addressing equity concerns in the watershed context, therefore, requires problematising equity itself and explicitly highlighting what is meant by equity. Watershed development, by its own logic, often promotes inequitable outcomes. This is so because the nature of benefits is often based on one's spatial location within the watershed and upon the location of one's assets such as land, well etc., and on pre-existing inequalities of caste, class and gender. In areas where it is being promoted, it has to cope with this context of inequitable resource endowments and find ways and means to promote equity in processes and outcomes.

This chapter examines how questions of equity are being addressed within watershed development projects. The major part of the chapter focuses on the spatial and socio-economic inequities that exist within watersheds, the manner in which these are being addressed in design and practice, and the success and failures of such initiatives. We also look at what is revealed in the scant literature on watershed and equity. A small section analyses the issue of gender in watershed development.

5.2 Watershed Development: Existing Inequities

The increased awareness about equity issues in watershed development is an acceptance, at one level, of the fact that watershed development per se does not promote equity. The nature of the project has a lot to do with it. Since watershed development is a land-based activity, the primary beneficiaries will be landholders, as benefits will mostly follow the contours of existing inequalities, resource ownership and property rights. Because there are significant inequities in terms of ownership and access to resources and assets, watershed development could potentially reinforce existing inequalities. Thus strategies of addressing the issue of equity on one hand has to see that existing inequalities are not widened as a result of the intervention, but that benefits of interventions are more or less equitably distributed among different socio-economic and historically disadvantaged sections.

Since watershed development is an area-based development implemented in a specific geographical unit, the biophysical issues also impinge on equity in outcomes. The location where one owns land, the capability of the land based on the extent of slope, depth and structure of soil, nature of erosion, underlying geology and a host of other factors influence the extent of benefits/ outcomes and its distribution in different parts of the watershed. Most often, the outcomes always favour the valley portion as compared to the upper reaches and the transitional zones in the watershed. Conservation in the ridge portion helps in percolation and accumulation of water in the lower reaches. This issue is very important in the context of watershed-related equity, since the people on the upper reaches really do not have any control on such geo-hydrological processes even though they are conscious about the fact that the outcomes are unfavourable to them. The emphasis on converting all the rainfall into groundwater results in people in the valley gaining most of the benefits. The upstream-downstream inequality in outcomes/benefits is observed as a point of contention amongst people (based on their spatial location) in a given watershed, such as not agreeing for conservation in the upper reaches, demanding a share and the lifting of water from common harvesting structures at downstream or through disinterest in maintenance and upkeep of conservation measures.

Conservation measures on the upper reaches also create problems for those families who own these lands due to rules of restrictions in use and access. It is generally observed that these lands are poor in quality, degraded and denuded and most often owned by the resource poor such as dalits, small and

marginal farmers. In other instances, it may be a common property land resource (CPLR), traditionally used by the herders, landless and the poor. Protecting such lands from erosion hazards requires vegetating the landscape, which, in turn, means placing restrictions on grazing and firewood collection. Many programmes have such conditions where people are expected to enforce a ban on free grazing and clear felling of trees for regenerating these lands either collectively or as individual owners. The irony of a watershed development project is that the cost involved in such restrictions is often to be met by the poor which is beneficial for the farmers at the lower end of the watershed. Inhabitants of the upper reaches, therefore, provide an unpaid environmental service to the lower reaches (Kerr, 2002).

Another set of possible losers in such a scenario of social restrictions is the community of herders and pastoralists, especially those who rear small ruminants. It is noted that (Kerr et al., 2000), in some cases in Maharashtra, the closing of the commons for regeneration has denied herders their traditional rights. Herders, in fact, complained that even where regeneration had already taken place, the commons have remained closed to them, threatening their livelihood interest. It is often noticed that herders are often forced to take their livestock to other areas outside the watershed.

Another issue, which reinforces and accentuates spatial inequality is the location of water harvesting structures such as check dams, percolation tanks, larger nala bunds etc. These structures are often constructed on the lower reaches of the drainage system (where the nala is wide, comparatively deep and less sloppy), which is also the valley portion of the watershed area. Plots closer to these structures benefit more as compared to lands located in other parts of the watershed. In this situation too, the spatial issue of inequality is closely linked to other socio-economic aspects such as caste, class etc., because most often the landholders in the lower reaches are better off farmers with quality land and access to irrigation sources such as wells. Thus we could conclude that watershed development has to engage with a whole lot of negative externalities and existing inequalities and traverse towards equity in outcomes, which is not as easy as it looks. It is often realized that existing inequalities in terms of land holding, location and quality of land etc., are difficult to overcome through a watershed activity, but some kind of equity in benefits can be achieved through ensuring access to augmented resources, that are direct outcomes of watershed interventions. For this to happen, it is necessary that equity as a principle is integrated into the watershed development strategy, design, rules and regulation and processes of implementation.

It is important that concerns of equity and strategies to reduce the vulnerability of the resource poor are part of the project from the initial stages of designing and planning. Unfortunately watershed development, with its emphasis on an area-based approach and land-based interventions/ development, has very little to offer to the resource-poor, (especially the landless and women) in the planning stage and most often their concerns do not get any space in the planning, except may be as wage labourers in watershed work. Even where such concerns find a place in the plan, it is in terms of non land-based activities and not in terms of building a stake in the regenerated ecosystem resources. In such situations, one can always say that such a strategy of addressing the issue of equity and vulnerability reduction can be achieved even outside the watershed framework and intervention. Another argument that often emerges is that watershed development is undertaken in areas where everyone is poor and addressing this concern of generic poverty is more important than addressing the issue of inequity in resource allocation and access. This however, ignores the relative vulnerability of certain sections, especially the asset-less, and their high chances of falling into distress as compared to those with some assets to tide over a crisis. It is more important in the context of sweeping changes happening in the rural economy together with disappearance and erosion of traditional safety nets.

5.3 Addressing the Issue of Equity

As mentioned earlier, watershed development is implemented in an unequal socio-economic space and the watershed community is divergent in its composition and relation/access to the resources. Thus the first step in the process of addressing the issue of equity is understanding the structure and composition of the community and the ways in which different sections depend on watershed ecosystem resources for their livelihoods. Watershed development, which is aimed at regeneration and augmentation of ecosystem resources, in many ways impacts the livelihood systems of these different social sections and they include the landless and agricultural labourers, poor and marginal farmers, middle and rich farmers, women, sedentary and migrant livestock herders etc. Understanding their relation with the resources and planning the intervention in such a way that their livelihood concerns (especially of the resource poor) are built into the intervention is necessary so that watershed development becomes more equitable and livelihood-oriented. New-generation projects have realized the importance of this aspect to a small extent and have incorporated strategies such as stakeholder analysis and livelihood analysis as important aspects of watershed development. Before going into the details of these aspects, let us see how this issue is addressed by watershed projects in India. Kerr (2002) has worked out a detailed typology of approaches used by different projects to address the issue of equity. They include: a) working in particularly poor areas; b) employing poor people in watershed works; c) counting on trickled down benefit to reach the poor; d) being sensitive to poor people's' needs during implementation; e) undertaking non land-based income-generation activity for the poor and the landless; f) giving poor people decision-making power; g) using other subsidies in their favour; and h) guaranteeing poor people usufruct right to the resources whose productivity the project enhances. However, it should be noted here that this typology does not explicitly talk about equitable access to water or equitable sharing of water resources. This may be because these are the issues on which the programmes can have an influence and make it part of the conditionality or facilitate it in the watershed, as compared to equity in access to surface and groundwater. In some projects a certain quantum of the fund is meant for creating livelihoods for the resource-poor, as is the case in NWDPRA where 7.5 per cent of the project cost is earmarked for the landless, or as in IGWDP where five per cent of the project cost is given to women's self-help groups (SHGs) for undertaking different socio-economic activities. There is also a provision of revolving fund for SHGs in the MoRD/Hariyali projects. Now we will look how these different systems/mechanisms, either as part of project design or as part of facilitation and implementation, could address the issue of equity and create livelihoods for the resource poor.[33]

5.3.1 Operationalizing Equity through Design/Strategy and Implementation

In order to address the issue of equity in outcomes, watershed development projects have adopted certain strategies in design and the method of implementation. These may be through strategies of biophysical interventions, institutional arrangements and mechanisms (including systems of rules and regulations, resource/usufruct sharing mechanisms etc). However, we should keep in mind that most of these strategies are incorporated as part of the project design where the funding/ facilitating organizations have a direct control in decisions regarding implementation. An important but often un-addressed issue in the context of ensuring resource access to the resource-poor is the issue of 'rights' over resources. In most watershed programmes it is often considered as something the community can facilitate and ensure. To an extent this is true, but in the absence of legal and administrative frameworks and pronunciations, ensuring rights may face problems for resources located in different property regimes. Besides, ensuring 'new rights' on resources may be in conflict with the traditional/ customary rights and other forms of accesses outside the framework of moral/legal view- points (for example pilferage of resources from commons and others partly contributed to the livelihoods of the most poor and socially excluded sections).

[33] *However there are some programmes like IGWDP and MYRADA-implemented watersheds where villages with high incidence of landlessness are excluded from watershed implementation. These programmes give preference to villages with fewer landless people. More than anything else, it is a frank admission by the implementing agencies of the limitations of the watershed programmes to address the livelihood issues of the resource-poor sections, especially in situations where the proportion of the landless is very high and projects do not have budgetary allocations to undertake livelihood activities for them*

On addressing the issue of equity, the technical committee observes that, "the bottomline has to be that benefits from any resources created through the project must be equitably shared." The report also suggests certain mechanisms to address the issue of equity, such as conflict-resolution trough democratic means; beneficiary selection giving priority ranking to dalits, adivasis, poor farmers, women-headed households, etc; working out detailed agreements on benefit-sharing and providing employment to those in dire need. In what follows, we consider specific interventions and how they have addressed the questions of equity.

Land-based activities

Most project measures in watershed development predominantly revolve around land-based activities. Hence the benefits also will be in favour of the landed section and within the landed sections, most benefits may accrue to the rich and large farmers in particular. Project design with the area as the unit of investment, may also result in large investments for farmers with large holdings as compared to small and marginal farmers. Except for NWDPRA, and some bilateral and multilateral projects implemented by the government, there has been no financial allocation or investments in favour of the resource-poor and landless.

The ridge-to-valley approach is designed as an attempt to address the issue of equity to an extent in many projects. Besides the technical objectives of arresting soil erosion and siltation of downstream structures, the ridge-to-valley approach is a strategy to give preference to marginal farmers and their lands located in the ridge areas, so that investments are not completely cornered by well to do valley farmers. This is commonly known as equity in coverage (Soussan and Reddy 2003). This need not mean that equity in coverage means equity in investments as people with more land get higher investments and maybe higher returns, even in a ridge-to-valley approach. This pattern is strictly followed in IGWDP villages evaluated as part of this study. Here the emphasis is on full coverage of the village starting from the upper reaches with high investments on these areas. This system is followed in quite a few projects being implemented by NGOs in the state. Many of these projects have also attempted to regenerate the fallow lands in the foothills, either as cultivable lands or as dryland horticulture plots. Most often, these poor quality lands belong to the poor and they are unable to invest on their own and reclaim it for cultivation. As compared to this one could observe fewer investments in land-based activities in government-supported projects, as revealed in the evaluation of 115 watersheds in Vidharba by Dharamitra. This may be because farm bunding as an activity was not preferred in DPAP villages. However, there were attempts to dig contour trenches and undertake plantation even though achievements in plantation are only around 15 per cent of what is being proposed. The emphasis is on water harvesting structures mainly on the common nala and, in some instances, in private lands. However one could conclude that ridge-to-valley is not clearly followed as a strategy in these projects.

The ridge-to-valley approach with its high emphasis on area coverage may not always result in equity in outcomes and indeed often has many shortcomings. First of all, while the ridge-to-valley approach helps in treating the marginal lands of the resource-poor, this does not guarantee them any share in the improved water resource, which generally is appropriated by farmers in the lower reaches. In the absence of water resources and other investments/inputs required for cultivation of reclaimed lands, the resource-poor often fail to make any substantial returns from these lands. Even in marginal lands where plantation is undertaken (either of dryland horticulture or of timber species), the results are not very encouraging because of low survival rates, poor growth and high gestation time required to get benefits in case of forest and timber species. This is due to multiplicity of factors, and one of the major reasons observed is non-availability of water for some amount of protective irrigation, especially during peak summer. Where the soil depth of such plots is good and the rainfall is better, the results are, to an extent encouraging. Otherwise, most often

investments in these lands fail to create sustainable livelihood assurance for the resource poor and defeat the purpose of ridge-to-valley in terms of ensuring equity in outcomes. There are also short-term costs the marginal farmers and landless have to bear in terms of treatment in the upper reaches. Protecting these (common as well as private) lands often creates problems for them with regard to livestock grazing, and in places where they resist the ban, certain social sanctions are also brought to bear upon them. To an extent we can say that in the ridge-to-valley approach, the marginal farmers and the poor are bear a certain portion of the cost to provide increased groundwater to the valley farmers. However, we are able to say that some investments are reaching out to the poor in a ridge to valley approach, as compared to treatments undertaken on demands of the farmers.

Analysing the issue of equity in an IGWDP[34] project, Srinivasa Reddy Srigiri notes that:

"although the overall impact of the project on the livelihood of the people of the project area has been remarkable, there have been significant differences in the benefits accrued between marginal farmers and landless labourers. While the marginal farmers benefited from the improved natural resource base directly by increasing productivity and adopting economically favourable cropping patterns, the landless could not derive their full share of benefits from the project due to lack of access to land. Other institutional building efforts did less to strengthen their voice and bargaining power to articulate their interests. Hence equity and poverty issues (in relation to landless) could not be addressed effectively." (S. Reddy, 2003).

The same concern has emerged in an analysis of equity issues in the Hivre Bazar project. In her study of the village, Priya Sangamemeswaran notes that landed sections are the main beneficiaries from the improved resources, even though certain benefits have accrued to the landless (such as drinking water and benefits from other subsidies); on both class and gender lines the equity in outcomes (project benefits/improved resources) is found to be very weak. (Sangameswaran, 2005). Some NGOs in Maharashtra like AFARM (villages in Nandurbar and Solapur districts) and Social Center (in Beed district) have tried to address the issue through the targeted approach of developing marginal lands belonging to the resource-poor[35]. Though this initiative may not be watershed development in the strict sense of the term, they do contour and soil surveys, and uses several watershed measures such as farm bunds, farm ponds, gully stabilization works etc. together with dryland agricultural techniques. AFARM has also started a grain bank and implement bank. The implement bank, together with sharing of work, helps in timely agricultural operations. However there is not much information regarding the impact of these initiatives on livelihoods of the resource poor and marginal sections.

Common lands

The development of the CPLR is often strategized as a mechanism to provide certain benefits to the resource-poor in a watershed. Development of CPLR improves the availability of fodder and fuel, and if proper strategies in terms of allocation of rights and institutional arrangements for management are evolved in favour of the resource poor, it can possibly address the issue of equity to an extent. However, experience shows that this is not always the case, and the reasons are many.

Although most watershed projects aim at regenerating the CPLR through soil and water conservation measures, planting and protection, we find that by and large the performance is not always encouraging, except maybe for fodder where open/free grazing is banned. However, the ban on open grazing has its negative impact on people especially for those who own small ruminants such as goats. In many villages in Maharashtra where watershed development has taken place, dalits and agricultural labourers who have small ruminants have been affected by grazing bans (Kerr et al. 1998). The case of Agadgaon is worth citing here. People here were forced to get rid of their goats and this affected their livelihoods. Nearly a hundred women from the village were taken to the Mahatma Phule Agricultural University at Rahuri to be 'sensitized' on the environmental hazards of keeping

[34] There is no budgetary allocation for any livelihood activity for the landless in the IGWDP.

[35] Deccan Development Society (DDS) has also undertaken such measures with the objective of addressing the issue of equity. For some details see a joint publication of DDS and WASSAN- On the Margin -- Poor and their Lands: a case for comprehensive public investments, August 2004.

goats. Despite this sensitization exposure the local people were angry when they have to find alternatives and nearly 5,000 of their goats were to be sold or to migrate to other areas. The Asthayi Samiti (ad-hoc committee) had to bear the brunt of their rage. The ban on grazing is always presented as a ban on goats and the difficulties the goat owners have to undergo is also reported from IGWDP villages (Vaiju Babulgaon and Ambewadi). Most often it is noticed that a ban on open grazing has polarized villages and the powerless such as shepherds, landless and poor women have to bear the cost for the general 'public good'. Converting small ruminants to stall-fed milch animals is not always feasible for the landless and marginal farmers due to a variety of reasons.

It is also noticed that in lots of instances the CPLRs are not taken up for treatments. Administrative bottlenecks, encroachments and existing conflicts are some of the reasons for this. Unlike private lands, treatment of commons poses a lot of problems for the PIA. There are many pre-existing claims and conflicts to be resolved, besides working out common and consensually evolved strategies for developing these lands. PIAs often find these tedious and conflict creating. Getting administrative clearance to treat commons is also found to be a problem, except, may be for lands under the Gram Panchayat. In places where commons are treated, the degree of benefit-sharing and allotting rights in favour of the landless or the resource-poor has not been very encouraging. Most often the entire village community shares the benefits from the regenerated resources. This is observed in the IGWDP villages under review, where common lands are treated under the watershed projects.In many instances administrative/legal allocation of user rights is found as a problem due to resistance from respective revenue/administrative bodies responsible for the CPLRs.

In many watersheds there are lot of forestlands and most often the forest department does not give permission to treat forest lands. An exception is in the case of IGWDP where VWC, in collaboration with the forest department, implements joint forest management (JFM) where the community is assigned the rights on non- timber forest produce (NTFPs) such as grass, dry branches of trees and other minor forest produce. In Vaiju Babulgaon, where JFM is implemented, people have reported availability of grass to cut and carry. However, under JFM too, rights over resources are assigned to all households living in the village, rather than to any specific group.

Water

Water is among the critical components for increased productivity and livelihoods, and the major objective of any watershed development is enhancement of this resource to optimize productivity. Since water is crucial to any livelihood activity, its availability and access is very important for those inhabiting the watershed, especially the resource-poor. But in respect of equity, water is a troublesome issue. The issue becomes more complex if the augmented water resource is in the form of groundwater, as often happens in watershed development. In such a situation water is treated strictly as a private resource and rights over water are tied to land rights. Since water rights and land rights are so closely tied, the location and the size of one's holding generally determines who gets how much water. By and large there are very few attempts to prioritize water use or create strategies and norms for its distribution. People who have lands in the valley and close to water harvesting structures are locationally in a favourable position to gain the most. In recent times one has observed attempts by NGOs to decentralize the construction of water-harvesting structures (farm ponds, water pits etc., at the upper reaches) to address the issue of equity. But one cannot say for sure whether such attempts bear the intended outcomes.

Certain attempts have been made to work out a more equitable system for the distribution of water, such as that undertaken by the Pani Panchayat. In the Pani Panchayat effort, only group schemes are undertaken and schemes for individual farmers are discouraged, besides this, access to water is on the basis of the number of persons in the family and not in proportion to the size

of the landholding of the family. A per capita provision of half-an-acre of irrigation, not exceeding 2.5 acres per family is the agreed norm for water distribution. Water intensive crops like sugarcane are not supposed to be grown in the project area and the preference is for seasonal crops with protective irrigation. The landless also have water rights. However, a study on Pani Panchayat shows that even though the intention behind the formation and content of rules to get water to the landless, was equity-based it could not be translated into or achieve outcomes due to many reasons[36] . Another watershed project implemented in the village Hivre Bazar attempted to ensure the sustainable use of water through the ban on borewell digging and cultivation of water-intensive crops, even though water rights are linked to land rights and ownership and access to open wells. This is the case in projects like IGWDP where there is 'rule formation' with reference to a ban on cultivation of water-intensive crops. In Ralegaon Siddhi only group wells are promoted in the watershed area. The objective of such strategies, in water stress areas, is to ensure at least drinking water for all the watershed dwellers through restraining overexploitation of groundwater resources. But in all these initiatives there are hardly any attempts at distribution and rights of the augmented water in favour of the resource-poor. Most often practitioners feel that it is a very sensitive and difficult issue to handle at the village, and if at all there is a possibility it can be done only through legislation and state intervention. Unequal access to water also has its impact in generating water markets in rural areas. People with access to a considerable amount of water sell it to farmers for a share in the crops. There are also instances where outsiders buy land in the watershed area, particularly those watersheds which are well connected, and lift the water for other uses such as brick kilns and small enterprises.

Wage employment

Employment-generation is one of the stated objectives of many of the watershed programmes and it is being highlighted in all the major guidelines. It is also assumed that besides creating employment opportunities during the implementation, watershed development has the potential of generating more employment opportunities in the post project phase, due to increased agricultural activities. In a previous section we have analysed the wage employment created by watersheds in detail and our analysis shows that watershed development projects have been able to generate considerable employment opportunities for agricultural labourers and other resource-poor families. In the Dhramitra analysis of 115 watersheds too, except for one instance where machinery was used, all other works were executed through wage labourers. In a project like IGWDP the wage is based on outputs and a labourer generally earns more than Rs 60/- a day for seven to eight hours of work. Besides, women and men are given equal wages in project work. Generally full employment opportunities are created in the project period and preference is given to landless and marginal farmers. There are instances where landless and marginal farmers have created assets through savings from watershed work. The NABARD evaluation of Rajani watershed reports a landless person buying land with the savings from watershed work. The same is reported for Adgaon project where full employment is created during implementation and during the post-project period. However, higher wages in watershed work and equal wages for men and women are not always easily accepted by the community, especially the rich farmers, fearing that this would lead to an increase in the general wage rate in the village and they would find difficulty in getting labourers for agricultural work. To overcome this problem, some PIAs slacken watershed activities during the peak agricultural season.

There are some PIAs who argue in favour of use of machinery for watershed implementation due to: fast implementation; more robust and quality construction (compacting of soil); greater output as compared to labour etc. It is noticed that big farmers also prefer to adopt machinery because it will not affect the local wage rate and availability of labour. However, it should be noted that use of machinery results in a fair share of funds going out of the

[36] *For a detailed analysis on issues of equity in water with reference to three water-related initiatives in Maharashtra see Priya Sangameshwaran, 2005.*

village to contractors and owners of machinery instead of creating employment and livelihoods for the resource-poor.

There are also arguments that watershed development creates increased labour opportunities through increased agricultural activities. This is cited as the trickle down effect of watershed development having an impact on the equity. Change in cropping pattern and cropping intensity has the potential of generating more employment in rural areas but evidence shows that there are regional and seasonal variations in availability of labour, depending on agro-climatic factors and the cropping pattern. Increased mechanization is also observed with increased agricultural activity. It is also noted by many implementation agencies that watershed development results in an increased wage rate (at least nominally) for agricultural activity, due to the increased bargaining capacity of the labourers having the option of working at a watershed site. However, these issues need further investigation and comparisons with non-watershed villages in the area. Most often changes occurring in the wage rate are observed for a larger area rather than for a particular village. Another important aspect is the seasonality of labour availability, and it is often noticed that labourers are finding it difficult to get work in the summer season when there is not much agricultural activity. There are also instances in which seasonal migration reappears once the watershed work is over.

Non-land based activities

Non land-based income generation activities are often strategized as an attempt to address the issue of equity and livelihoods of the resource-poor. Certain projects have even a budget allocation for the same. The NWDPRA guidelines have earmarked 7.5 per cent of the project cost for livelihood activities for the landless and the resource poor. There is also a provision for a Revolving Fund for resource-poor SHGs in the Hariyali guidelines. Most often these are termed as 'watershed plus' measures. There are also attempts by some NGOs to facilitate other subsidy-oriented development activities in favour of the poor. There are instances of small income-generation activities undertaken by the resource-poor in IGWDP watersheds in Hivre Bazar etc. These are in the form of diary activities, petty shops, tailoring, flour milling etc. Most often these activities are channeled through SHGs. WOTR reports a total of 174 income-generation activities with SHGs (WOTR, 2004). However it is difficult say whether these activities are undertaken with the resource poor SHGs benefiting mostly the poorest of the poor. In the case of Hivre Bazar, the benefits received by the landless and marginal farmers are in the form of livestock, housing and small shops. Other benefits such as wells were often given to medium and small farmers. Table 5.1 below show different subsidy-oriented schemes and the respective beneficiaries in Hivre Bazar.

[37] Source: Priya Sangameshwaran, (2005) Equity in community-based sustainable development: a case study in Western Maharashtra, Ph. D thesis University of Massachusetts, Amherst.

Source: Household interviews, village records

Table 5.1
Beneficiaries across Different Class Categories[37]

Scheme	Landless	Marginal Farmers	Small Farmers	Semi-Medium Farmers	Medium Farmers	Large Farmers	Total
Housing	6 (60)	2 (13.33)	1 (5.56)	1 (3.45)	0 (0)	0 (0)	10
Animals	3 (30)	1 (6.67)	0 (0)	1 (3.45)	1 (5.56)	0 (0)	6
Wells	0 (0)	0 (0)	4 (22.22)	3 (10.34)	3 (16.67)	0 (0)	10
Other	2 (20)	1 (6.67)	2 (11.11)	2 (6.9)	1 (5.56)	2 (25)	10

N.B.: 1. Figures in brackets show beneficiaries as a percentage of each specific landholding class. 2. The category 'wells' also includes schemes for pipelines, motors etc. 3. Other schemes provide a variety of assets such as agricultural implements, cycles, a small tin shop to supply candy, toilets, etc. 4. Schemes for fruit orchards have not been included because complete data about them is not available. However, the beneficiaries of these schemes have typically been medium and large farmers.

Most often the non land-based income-generation activities are conventional in nature and very little assessment has been done on the market potential of such activities. Hence a lot of problem is observed regarding its sustainability. In the absence of proper forward and backward linkages, many of these programmes fail to survive after the withdrawal of the facilitating agencies. The sustainability of such programmes is also depending on the capacity of the entrepreneur and the skills imparted as part of the project activity. Most often group activities are not as successful as individual activities, due to lack of group coordination and proper management structures.

The bigger problem is that these non-farm activities have very little direct linkage to watershed activities. Non land-based activities for the resource-poor and landless, without a direct linkage to the watershed activity, most often creates a situation where they feel isolated and without any stake in resource management. This may also sometime lead to their exclusion from any claims on renewed resources arguing that they have been given their share (through labour and income generating activities) and any other demands and claims are unjust and unfeasible.

5.4 Gender issues in Watershed Development

Before we venture into understanding gender concerns in the watershed context both at the policy and programme level we need to understand some of the debates that have influenced policies around gender and natural resources.

Since the early 1970s there has been considerable theoretical interest in the relationship between women, particularly poor, rural women, and the natural environment. The 'Women in Development' discourse emerged as a response to the growing awareness that women had a significant role to play in development and, it was assumed, that if their energies were channelized, development efficiency would increase.

Debates on Women in Environment and Development (WED) were influenced by the growing body of literature that questioned the process of modernization on the one hand and the eco-feminist view that linked the destruction of women and the destruction of nature. Most of the debates around this time portrayed women as victims of the development paradigm. Gradually the debate shifted from viewing women as mere victims, to recognizing that they had a particular role to play in natural resource management because of their local/ traditional knowledge and privileged experience gained from working closely with their environment. In this new scenario women came to be seen as privileged knowers and therefore the solution to the problem (Leach 1992).

At the programmatic level we find this translating into extending women's reproductive roles to the community arena by seeking their participation in local resource management initiatives. Not only was this largely unpaid or poorly paid and often tedious work, but it rested on the assumption that women had free time and a positive, indeed voluntary inclination, towards protecting their deteriorating environment. Such increased responsibility without commensurate gains in control over resources, knowledge and decision-making systems is beset with problems.

It was around this time that we also see an emergence of critiques of this approach. Feminist political ecology (Rocheleau et al. 1996) and feminist environmentalism (Agarwal 1992), see the relationship of women and environment as being located in larger social and political structures and cultural practices, and in the symbolic construction of power. These discourses believe that a two-way relationship exists between gender and the environment. Gender relations have an impact on how environments are used and managed, which in turn impacts a change in ecological patterns over time. Similarly, environmental changes also have a significant impact on gender relations by altering the gender distribution of resources (Leach, Joekes and Green 1995).

The shift from the Women in Development (WID) approaches in the early 1970s to the more recent feminist environmentalism or feminist political ecology approaches has not necessarily been one of a linear progression where

WID is viewed as the old approach to be discarded. In fact what we see today in natural resource programmes is the domination of the WID approach, which seeks women's participation for efficient and effective implementation of programmes, rather than empowerment. Prescriptions are often based on the current understanding about gender relations and roles and unfortunately this does not seem to have changed despite the wealth of understanding provided by gender studies. So whether it is the watershed or any of the programmes in the area of Natural Resource Management most of them are oriented along the WID approach.

5.4.1.Operationalizing gender in watershed policy and practice

It would be rare to find a state-led or donor-supported resource development programme that is silent on gender equity concerns these days. The watershed programme is no exception to this rule. However, there is a vast gap in statements made and in the realization of these statements. Often the statements themselves are problematic leading to solutions that rarely have a lasting impact on the question of gender equity. The questioning therefore needs to be done both at the level of content, the tenor, motivation as well as what translates into action.

Equity in general and gender equity in particular are less understood aspects in the context of watershed development. The few studies that do say something on gender equity are those where gender equity is just a subtext in the larger canvas. Others have been more evaluatory in nature where a few stray recommendations mention the need for improving women's participation. But we find little that actually analyses the policy and the experience of the watershed programme from a gender perspective. The few studies (Vaze and Abraham 2004;, Seeley and Sarin 2000) that have looked at the actual experiences of watershed in the context of gender equity point to a great lack in terms of addressing power relations, improving the overall entitlements and participation in decision-making of women. D'Souza (1997) highlights a number of tangible benefits arising out of watershed development in favour of women. They include: a) increased employment because of the physical treatments of the watershed also because of the extension of the agricultural period (it can also be a negative aspect in the sense that it increases the workload); b) income and skill-development through nursery raising and allied activities; c) income-generation through dairy, stall-fed goat rearing and poultry keeping; d) improvement in health and life style of women; e) increased access to credit and, as a consequence, improved status both within the household and in the village.

We feel that for understanding positive gender outcomes it would be important to look at a few critical areas, which can broadly form our framework of analysis. But before that it might be worthwhile to dwell a little on what we mean by positive gender outcomes. Broadly speaking (and this is certainly not an exhaustive understanding of gender equity) an understanding of positive gender outcomes would include an equitable access to goods and resources and a sharing of productive and reproductive roles. Apart from that it would be important to look at the underlying cultural beliefs, which include ideas, perceptions, behaviour, skills, abilities, attitudes, aspirations etc. of men and women.

Gendered content of the watershed policy and programme still rests on the assumption that women need to be visible but not necessarily change their existing work patterns or their roles.

5.4.2.Division of work and responsibility

The NWDPRA Guidelines say:

"This project will focus on activities of women both for reducing their drudgery and increasing their efficiency, and will plan and provide for development of specific implements suited to women, provide fuel efficient stoves to save energy and also promote healthy environment in homes and the kitchen. Special training courses would be arranged to train women in processing and handling of bio-fertilizers in order to develop a cottage industry which will be able to supply bio-fertilizers to the entire block where these micro watersheds are located. The state government and

project authorities would endeavour to develop location specific strategies to involve women in their areas in activities meant for women".

What one sees in these guidelines is that the preferred role for women is the extension of their domestic roles and skills. There is little effort to get women out of their current modes. To this effect, as far as present and past literature is concerned, one fails to come across even few references or studies, which have documented the impact of watershed development in terms of generating or disseminating technologies other than agriculture. The rural production system is a multi-enterprise system requiring a wide range of technologies/matching skills and other factors to improve overall productivity of land and labour. However, this has remained more in the domain of the male rather than the female.

It has been observed from the experience of even the most successful watershed management projects that women's participation is synonymous with their training in sewing and embroidery, carpet weaving and other art and craft activities, broadly clubbed together as non land-based activities. Even in nursery training women are used more as labour and rarely allowed to contribute to the selection of the species to be raised in the nursery. Knowledge and skills determine an individual's position in the organizational hierarchy set up to implement project activities. Unfortunately, training programmes in watershed management target men rather than women. Experience also shows that women are preferred for physical tasks because women are far easier to 'manage'. It is often easier to handle the 'hassle free' 'accommodating' women than the highly politicized men.

Thus women's participation in the watershed programme is merely an extension of their domestic roles with very little space for enhancing their participation in other areas. Even if this space were provided women would not be in a position to participate on equal terms because of the reproductive work that women engage in. Unless there is a shared responsibility of domestic work, women's participation in the public sphere would be restricted.

Some studies have shown that watershed development increased the workload of women and continuity of the existing division of labour. A case study of Adgaon by Marathwada Sheti Sahaya Mandal (MSSM) who facilitated the projects, notes:

"What emerges is a sexual division of labour, where men's role involves a great deal of coordination, planning, implementation and monitoring of farm activities. Women's domain of work is more in areas which are preparatory in nature supportive of work that men perform. What is striking is the strategic location of the entire range of technological aids to improve the work of men in fields. Technology and modernization have left their work untouched. Strange as it may sound, the only work implements that women continue to use are the traditional hand sickle, dibbling tool and baskets. The entry of milch animals and increased farm productivity has had a multiplier effect on women's work in the household. For women in Agadgaon, cattle care implies cutting, collection and transportation of fodder, cleaning and caring of animals, an additional chore in their lives. Men milk and transport the milk to collection centers and collect payments, disbursed once every ten days." [38]

5.4.3 Property rights

Most activities undertaken under watershed management projects are land-based. The major portion of the budget provision, accounting for about 70 per cent or more of the work component, is spent on land development (Soussan and Reddy 2003). This is very well-known and documented that women control a very small fraction of all agricultural land. In the absence of land title and ownership of cattle, women do not have access to credit. Despite the new guidelines, which look beyond the landowners, we continue to find that the watershed programme still largely focuses on soil and water conservation works that are on private lands. As a result of this focus women see little role for themselves. Interestingly the socio-cultural constraints that prevent women from coming into decision-making do not usually prevent them from actively engaging in agricultural labour. More

[38] Research study made available by MSSM. However the copy did not have any details, including title, author, date etc.

than 80 per cent of rural women are involved in agricultural activities and yet we find that their presence hardly matters when it comes to resource-planning.

It is stated in the Watershed Development Project Guidelines that private landowners shall contribute 10 per cent of their land development cost, either through cash or through voluntary labour, and the contribution towards the works done on common lands shall be five per cent. There is, however, little clarity on who would contribute this five per cent. This lack of clarity has often meant that commons get excluded from the watershed programme and it is the landless and the women who depend largely on these commons for their fuel and fodder needs. In fact some experiences show that where the commons were developed 5% of contribution was charged from people using the land, such as gatherers of fodder and fuel. These are mostly women from poor and landless households who are usually unable to contribute in cash and give it in the form of labour. Even if they do so, they may not benefit greatly from such labour, in the absence of institutional arrangements for the priority access to these women.

Most gains, whether they are of increased productivity or water are usually in the control of men and rarely benefit women even in an indirect way. In fact these productivity gains usually result in increased workloads for women.

A less studied area in this regard is how the changing land-use patterns and enhanced productivities have changed the land and resource ownership patterns in the community. Improved resources always dislodge women from ownership and men take over. This is an area that may require a further enquiry.

5.4.4 Institutions

Property rights issues also link with the more general analysis of institutions: importantly, how positioning in the households, communities and other institutions involved in decision-making in watershed programmes, is gendered.

We see a small representation for women in watershed committees, but the SHGs which seem to have no organic link with the watershed programmes, are considered as the 'women's programme'. So, in all decision-making positions we see a small representation which is compensated for by the formation of the SHGs -- the recognized and legitimized institutional form for women's empowerment. In fact, the watershed programme makes it mandatory to form SHGs, which according to Abraham and Vaze's study have become more of thrift or credit groups rather than actual self-help groups and lack integration/ organic linkage of the SHG as an institution with the dominant development agenda of watershed rehabilitation. Often these SHGs cease to function on completion of the watershed programme and as long as they live they are basically functioning as thrift and credit groups. The watershed committee, the main decision-making body, has a very nominal representation of women. In the evaluation conducted by Abraham and Vaze in the Indo-German Watershed Development Projects the male members of the watershed committees on being asked why women are needed at all in the watershed committees said "because the project requires it so" or, "because women are sincere".

5.4.5 Ecology

Soil and water conservation measures taken up under watershed management programmes on common property resources such as village common lands, forest and water, change the state of natural resources, especially that of water, soil and vegetation. This, in turn, impacts the way the women use resources. A piece of land allocated for reforestation can appear to be a sound conservation measure. However, if for example, this was grazing land for goats and cows kept by women, then women will suffer as they have to graze the goats elsewhere, probably further away. The imposition of access restrictions on commons and forest land has led to successful regeneration of resources in watershed development areas. Experiences from different places indicate that women, however, rarely benefit from this regeneration, mainly because they are unable to pay for the right to cut and carry fuel and

fodder. As a result, many women have been forced to reduce or sell their livestock. Furthermore, women have to go longer distances to fetch fuel wood, increasing the time spent in collection. Thus, without understanding or showing sensitivity to the dynamics of gender relations in the use of natural resources, such CPR development efforts often curtail, rather than increase women's access to resources. These changing ecologies have a negative impact on gender equity outcomes.

5.5. Conclusion

Addressing the issue of inequity is one of the most difficult aspects of watershed development. Watershed "plus" and livelihood approaches have emerged as a means to tackle this concern. However, in these approaches too the emphasis is on non land-based measures for the resource poor. This in turn denies them the opportunity to get a share in the renewed resources, such as fodder, fuel, water etc., which are the very basis for livelihoods in rural areas. This is not to deny the importance of non-land income-generation activities. Quite often it is heard that a watershed project cannot and nor it is equipped to address the issue of inequity, given the limited time frame of the project and the inequalities that already exist in rural areas. In our opinion, it is important to assert that at least the augmented resources that are generated through public funds and collective efforts must count as common pool resources, subject to collective decisions in respect of their allocation. There is need to assert this principle, though there would still be a long way to practically realize it on the ground. However, if the community accepts the principle as a desirable norm, it will evolve its own methods and strategies to realize it. It may work out different mechanisms based on the imagination and ingenuity of its members. It is the initial acceptance that is the most crucial issue and the facilitating institutions have to play a crucial role in this regard.

Integrating poverty and gender concerns in watershed is very important and without addressing these issues, the sustainability of the efforts may also be in jeopardy. Planning, resource-allocation and monitoring has to factor these issues. As willingness to participate is considered a precondition for undertaking watersheds, a community's commitment to earmark a share of the augmented resource for the resource-poor should also be a basis for initiating watershed development. The issue is not regarding redistribution of existing resources, but creating certain entitlements for the disadvantaged and resource-poor in the augmented resources. To realize this it is necessary that social arrangements and institutional mechanisms for resource-sharing be in place before the actual implementation and augmentation starts. It is often noticed that resource-regeneration/augmentation especially in CPLRs, without working out the details of access and sharing mechanisms, have excluded the poor in a latter stage, who otherwise had some access to these areas/resources informally or through pilfering. Working out the details of institutional and resource-sharing mechanisms and evolving a commitment are time consuming and conflict-ridden and often PIAs are in a haste to start implementation citing that the community looses patience and the desire to participate in the absence of "real action". A policy of 'arrangements first, augumentation later' calls for patience and flexibility. It means that one is prepared to go slowly, to spend much more time in resolving conflicts and bringing people together. It calls for different skills and capacities for the watershed development team (WDT) especially in facilitation, understanding of and sensitiveness to issues of poverty etc. Projects also need to be more flexible and process-oriented, moving away from the target-oriented straitjacketed approach.

Although women have come out of their houses participated in the labour work, attended meeting and melawas and have been thus empowered, their participation in decision-making and their access to newly-created resources does not seem to have altered. This is true of most programmes which have an empowering effect on women in a certain sense of the term. To a person never exposed to the public sphere this exposure itself becomes empowering. Perceptions around empowerment would change when the arena of possibilities increases and when choices are presented before them. In

the present mode of the programme there is no threat posed to the current gender division of labour and neither is anything stated on the question of rights over scarce resources. These non-threatening agendas usually go down well with the patriarchal state as well as the household and the community. For women this is nonetheless empowering, as this is a reality that they would perhaps have never been exposed to otherwise. So what sense does one make out of this? The experience certainly cannot be negated. The space that has been created for women to participate needs to be acknowledged for whatever its worth but not uncritically. The question often is how we look at these experiences critically from a gender perspective. Developing and designing policies has never been a participatory process. People, civil society or the NGOs are often the recipients of these with a mandate to implement. Participation is often sought to seek legitimacy to the predefined agendas. Thus, gender equity is one such area where only a paragraph or section is added without understanding the various constraints under which women operate.

It is possible to begin with a long list of recommendations as a corrective for the present policy and programmes developed by the state. However, that often remains a long wish list without a perspective and a strategy to make change possible. A major lacunae in the watershed policy is that it speaks about women in the absence of a gender perspective. We therefore recommend that a well-defined gender policy for the watershed programme be developed which not only lays out the goals but also lays out a detailed strategy of how these goals would be realized[39]. The policy will have to begin with an understanding of gender issues and have a detailed plan for implementation, monitoring and evaluation. Here it would be important to understand and document women's perspective on livelihood. Programmes would have to be such that bring women's skills to the fore. The entire programme will have to be backed by a financial commitment, which is organically linked to the larger watershed development programme.

[39] WOTR has developed some attempts in this regard and a strategy known as Gender-oriented Participatory Operational Pedagogy is being developed for capacity building of women. In IGWDP there is also a financial provision made for undertaking different 'women development' activities

Chapter 6

Watershed Development: Processes and Participation

6.1 Context

Participation has been a buzzword in developmental discourse, practice and policy guidelines since the mid 1980s, and the success or failure of a development intervention is often judged on the basis of this component. It is assumed that projects that have a sound participatory approach and strategy result in better efficiency, effectiveness and sustainable outcomes/ results. Even though the operational contours of participation vary from project to project, it is endorsed as a normative principle by all development actors and projects alike, and across various fields. In watershed development projects participation has become an important ingredient and social processes have become as important as those of the biophysical intervention. This realization is an outcome of the reported success of projects that followed participatory processes as against those which were techno-centric and where top-down approaches were the pattern.

Many factors have contributed in bringing forward the issue of community participation in natural resource management. One of the major factors, as mentioned above, is the deficiency inherent in the centralized and top-down approaches resulting in their failure to deliver the desired result. Neo-liberal philosophy of government/state managed development being costly and inefficient has also contributed to the growing preoccupation with community participation. The increasing trend, especially since the nineties, of social capital and self-help as a panacea for overcoming developmental shortcomings, has also played a crucial role in bringing the issue of community participation in natural resource developmental projects, to the forefront.

Even though participation is a desired strategy and goal, one has to be conscious about certain aspects in its application especially in the context of natural resource projects. These aspects include the degree and extent of participation envisaged and facilitated in project processes (nominal, or decision-oriented and emanicipatory), the issue of who participates (inclusion/ exclusion based on existing inequalities in the 'community'), nature and representative'ness' of institutions created as part of participatory measures etc. However, these issues are often overlooked and participation is operationalized outside these ramifications, which works toward preserving the status quo. Most often, the notion of 'community' in community participation is assumed as a uniform and egalitarian entity without placing it in the local context of prevalent inequalities based on the economy, land-holding, caste, gender etc., i.e. the existing power inequalities. Understanding these issues and operationalizing participation within this context is very important in watershed development projects because the unit of 'community' is complex and all those residing in the watershed have a certain stake in the resources available in that area. In the context of watershed development the issue of community participation can be judged from the role the watershed community plays (as an aggregate, as different socio-economic sections and as individual/family) in the entire process of watershed development, i.e. having an active role and decisive say in issues related to planning, implementation, technology choice, institution formation, evolving rules, norms and regulation, financial management, monitoring and evaluation, ensuring transparency and accountability, capacity-building, management and maintenance of assets etc. This chapter is an attempt to understand the issues of participation in different processes and in specific functions, by the local community and by individual actors, taking into consideration the multi-dimensionality of participation and multi- layeredness of 'community'. The attempt is to contextualisze participation in different aspects of project administration and to

understand the strategies and methods adopted in different programmes to operationalize participation.

6. 2. 'Participation' in Watershed Guidelines

Community participation is institutionalized in all watershed guidelines after the Hanumantha Rao Committee's report, viz., the Ministry of Rural Development (MoRD) guidelines of 1994 and its revised version in 2001 and the Hariyali guidelines issued in 2003, MoA's (NWDPRA) WARSA- Jan Sahbhagita guidelines issued in 2001, guidelines of NABARD and CAPART and all other major programmes being implemented in the country. Participation is envisaged through special provision (finance and activities) for community-mobilization; institution formations and entrusting responsibilities to these institutions/ organisations (such as watershed association (WA), watershed committees (WC), user groups (UGs) and self-help groups (SHGs)); provision for capacity building for management functions; participatory planning systems; provision for local volunteers and secretary; adoption of indigenous technologies etc. In the Hariyali guidelines, however, the institutional arrangements at the local level are considerably diluted and the provision of watershed associations and watershed committees are being done away with. Almost all guidelines also mention that a watershed will be selected where the community is ready to participate and contribute towards project implementation and achieving project objectives. Parameters for judging the willingness of the community to participate are contributions in cash, kind or labour, popularly known as shramdan (or voluntary contribution) and willingness to form a local organization consensually and as a representative of different sections in the watershed areas. To quote NWDPRA guidelines "the beneficiaries were too often merely passive recipients rather than active participants in the development of their watersheds (in first generation projects). The restructured second-generation watershed projects have kept people's participation centre stage. It is now mandatory for watershed development to be planned, implemented, monitored and maintained by the watershed community itself. One of the objective of Hariyali guidelines is: "encouraging (the) village community towards sustained community action for operation and maintenance of assets created and further development of the potential of the natural resources in the watershed." In both guidelines the major assumption is that community participation and collective action ensures sustainability of assets and resources, besides opportunities for better implementation of the project. Taking a closer look at the guidelines, however, one gets the feeling that participation is used more in an instrumental sense, the willingness of communities to undertake specific tasks related to project implementation.

In projects outside the government structure, especially those operated by NABARD, NGOs and in most bilateral projects, participation is envisaged more or less on the same lines, like the formation of community-based organizations (CBOs), willingness to contribute shramdan and adopt social fencing, participation in planning, implementation and monitoring, willingness to take up responsibilities of post-project maintenance of assets etc. Some of these projects have also introduced a probationary or capacity-building phase to prepare the community for active participation and to judge/gauge the community's willingness to participate in watershed activities. But one can conclude that community participation is clearly delineated, although in an instrumental manner, in both government-supported and other projects, and the degree and extent of its application depends much on how it is being facilitated in the watershed processes, the social and institutional spaces created for the purpose, and the philosophy and ideology of the facilitating institutions and personnel.

6.3 Implementing Participation: Watershed Processes and Practice

From the mid-nineties, and especially after the emergence of the 1994 guidelines for watershed development, a set of processes have been designed to improve the participation of the

community and watershed dwellers in project implementation and management, starting from the project selection and initial awareness-generation/community mobilization to post-project management of resources. The assumption is that, if these process steps are followed in their true spirit, a genuine community-managed watershed and resource management system can be created, leading in the long run, to resource governance at the community level. In the following sections we will look into the major processes in practice to see the degree and levels of participation based on evidence from a cross-section of projects.

6.3.1 Watershed selection and initial mobilization

Ideally speaking new-generation projects are expected to be demand driven ones, where the community has a keen interest in undertaking watershed activities and is willing to participate in resource-mobilization and management. The demand based selection of watersheds (as against the target driven approach) is used as a parameter to judge a community's initial interest and future participation in all project activities. However, it is often noticed that target selection is still prevalent and this is especially true for projects implemented by government departments. Most often the decision to include a village in a watershed programme is taken at Zilla Parishad or DRDA level and, in certain cases, prioritized villages are selected. In the same way, the watershed community has no say in the kind of PIA they want to work with. From the environmental perspective and the genuine need for rehabilitation of the watershed, it is necessary that highly degraded watersheds in drought-prone areas be selected even though the community is not in a position to put forward their demand. In an assessment done by Dhramitra, of 115 state supported projects implemented in Vidharbha region , it was learnt that with the exception of a few cases, the community generally learnt about the inclusion of its village in a watershed programme much later than when the village was actually selected. And of these cases, in quite a few, this was surprisingly after the planning process was over.

In most of the NGO- managed watersheds it is noticed that they select villages where they have already have a rapport and relationship with the community, or undertake watershed activities based on their experience of their association with the village and on the villagers' demand. Improved participation in NGO villages can be in part attributed to this. IGWDP in Maharashtra has a concept called 'self-selection' by communities, where after the initial series of interactions with watershed dwellers, each family in the village is expected to contribute four person-days of voluntary labour on any resource conservation activity. The facilitating NGO is expected to mobilize and motivate the villagers for this. This is to judge the villagers' interest/keenness in undertaking project activities, as well as to assess the NGO's rapport and relationship with the villagers. This system is used as the initial qualifying criteria in all IGWDP projects.

In most situations the community does not participate nor is expected to participate on its own, unless it is provided with sufficient information and knowledge about the project, the methods and strategies of operationalisation and intended benefits that will accrue to it etc. To ensure that the community has the necessary information it is imperative to have sufficient interaction between the community and PIA/WDT, besides exposure (study tour), access to literature (summary of guidelines in local language) etc. In most projects supported by NGOs, IGWDP, AGY, NABARD-supported WDF etc., these activities are compulsory for the project to move further. Dharamitra evaluations show that some kind of awareness activities were undertaken only in 49 per cent cases, but not in a concerted and coherent manner and exposure visits were organized only in 9.6 per cent of watersheds. Only in two cases were information dissemination, awareness-generation and mobilization judged as good. Even though provisions have been made for this and the awareness phase is considered as crucial and a prelude for enhancing further participation in the project period, it is often a much-neglected aspect in most government-supported projects.

Resource degradation and poverty are

two criteria for the selection of watersheds under different programmes. However, there are instances where a higher incidence of landlessness makes a village ineligible for the programme. For example, the IGWDP gives preference to villages with less landless people or landlessness not exceeding the Block level average. MYRADA also has a similar criterion. More than anything else, this is a frank admission by the implementing agencies of the limitations of the watershed programme or the absence of a project component to address the livelihood issues of the resource-poor sections, especially in situations where the proportion of the landless is very high.

6.3.2 Village-level institutions/ community based organizations

Watershed projects organize a number of village-level institutions such as watershed associations/gram sabhas (WA/GS), watershed committees (WC), user groups (UGs), self-help groups (SHGs) etc. Community organizations are formed with the objective to give better and inclusive representation for all watershed dwellers, including marginalized sections, as well as to ensure responsibility and concomitant authority for decision-making. The nomenclature of institutions may vary from project to project, but essentially these kinds of organizations are established in all watershed projects.

Watershed Association /Gram Sabha

According to the guidelines (of different programmes) the watershed association or gram sabha is the ultimate decision-making body. When the watershed boundary coincides with the village boundary[40], the gram sabha (consisting of all adult members in the village) is the watershed association. When the watershed boundary does not match with the village boundary the PIA is supposed to constitute a watershed association. All major decisions -- such as the decision to take up a watershed programme, decisions regarding the approval of an action plan, on shramdan, social disciplne etc. -- regarding watershed development have to be taken in the meeting of the watershed association or gram sabha.

The constitution and functioning of the watershed association or gram sabha is not clearly formulated as is that of the other watershed institutions. In almost all projects under review it is more an informal body without any specific membership system and 70 per cent attendance of adult members is considered a sufficient quorum for the meetings to be conducted. In many NGO projects such as Dornali and IGWDP, at least four meetings are conducted on an annual basis, but it is noticed that the number of people attending the meeting reduce as the watershed work progresses. However, many of these projects have not set up a separate watershed association. There are very few experiences of a gram sabha (as part of the PRI) being the decision-making body for watershed development, hence it is difficult to compare the effectiveness of these two systems

If the watershed association is an informal organization of watershed villagers, how far its decisions are legally valid and stand scrutiny is also a point of concern. At the same time who has the authority to call meetings also is not very clear. In the Dharamitra evaluation of 115 watersheds, such associations were formed by the PIA with farmers whose land was being planned for some watershed-related activities in almost all watersheds (since this is a project condition) but in more than 60 per cent cases the watershed association is at present inactive, except for few a individual members in other institutions such as the watershed committee. Only in seven per cent cases has community participation been found to be good, and in 27 per cent cases it appears to be satisfactory. Meetings are also not conducted periodically. In 51.8 per cent cases the watershed association is registered under the Societies Act.

However it should be very clear that the existence of a gram sabaha, or formation of watershed associations in themselves do not guarantee the emergence of a participatory village community. It has to be facilitated and members educated about their rights and duties. It also requires a system of membership and clarity of functions[41]. In the absence of proper formation and clarity of responsibilities any watershed association/gram sabha will have the

[40] This would be the situation in most cases because of restrictions on 500 ha. in Govt projects or if one goes clearly by the hydrological aspect of watershed demarcation there is high chances that some part of a village get excluded or areas from other villages becomes part of the watershed. It is not necessary that hydrological and administrative boundaries coincide.

[41] In ISPWDK and DANIDA supported projects in Karnataka, instead of a watershed assocaition a village development society (VDS) is organized with two members (a man and a woman) from each household with a nominal membership fee. They are involved in almost all development activities and an Apex Governing Council is nominated from this VDS to manage the affairs. The VDS is a registered body. The VDS nominates other institutions such as the watershed committee, cattle breeders committee etc.

same fallacies as generally seen in gram sabhas under PRI. It is also necessary that the voice and opinions of the marginalized such as landless, women, and dalits among others are also facilitated in the functioning and decision-making processes of the watershed associations/gram sabhas. It appears that where the PIA has taken extra effort to facilitate the organization and functioning of the watershed associations/gram sabhas, the participation of the village community is found to be good. This is clearly observable in watersheds facilitated by PIAs which have been involved in rejuvenating gram sabhas (such as the Mahila Rajsatta Andolan etc.) and is part of their mandate and philosophy.

Watershed committee

The watershed committee is a very central and crucial institutional arrangement at the local level and is expected to perform a large number of functions related to planning, implementation, monitoring, financial management, repairs and maintenance etc. In projects like IGWDP- and NABARD-supported watersheds it is known as the village watershed committee (VWC) even though the designed responsibilities and functions are more or less the same. Generally the membership of a watershed committee varies between 12 to 20. However in the new Hariyali guidelines, this committee is done away with and its responsibilities entrusted to the Gram Panchayat. The watershed committee is expected to function as the executive arm of the watershed association and is answerable to it.

Strategies and efforts are made to ensure representation of all sections of society. Not only is there increasing awareness that various sections should be represented in the watershed committee, but detailed norms and procedures are also laid down in various guidelines and programmes as to how to constitute a watershed committee. According to the 2001 guidelines the watershed committee is to be nominated at a meeting of the watershed associations with representatives of UG (four or five members), SHGs (three to four members), Gram Panchayat (two to three members) and a member of the WDT. As per the guideline there should also be 30 per cent representation of women and also 'adequate' representation of SC/ST. In almost all NGOsupported projects and IGWDP , different sections of the watershed community such as SC, ST and landless are given representation . In these projects committee members are nominated with the objective of also giving spatial representation to different hamlets/settlements that fall within the watershed. Increasing awareness about women's representation in a watershed committee is reflected in revised guidelines that have created space for representation of SHG members in the watershed committee. In IGWDP one-third of the membership is reserved for women. However, the issue needs further analysis: does representation given as part of design really translate into active and decisive participation in day-to-day functioning? For example, in the Dhramitra evaluations, only in three villages out of 115 was participation of women found to be good (in previous chapter on gender we have analysed this issue in detail). The roles and responsibilities of watershed committees are also elaborated in many projects. These roles are prescribed by the projects and and the community has very little say in its formulation. In IGWDP different portfolios are assigned to different members in the committee such responsibility to enforce social discipline, wage disbursement, mobilizing farmers etc. The Jan Sahbhagita guidelines elaborate on the roles and responsibilities of office bearers of the watershed committee and suggest that the committee be constituted only after the proper constitution of UGs, SHGs and the watershed association. This is to ensure that active and interested members are represented in the watershed committee and its functions streamlined. In some projects the office bearers work on a rotational basis. In most projects under review meetings are usually held on a monthly basis and it is generally observed, as mentioned above, that as the project progresses the attendance at meetings reduces. The Dharamitra evaluation notes that attendance at watershed committee meetings is poor and in almost 80 per cent cases a couple of members are only active on a day-to-day basis. Generally members who are office bearers and are responsible for finance are reported to

be active in many cases.

Given the centrality of this committee, it is critical to see how well they are financed and how much financial autonomy they have. In government-supported programmes and in IGWDP, the money under the work component goes directly to the watershed committee account and in government projects a paid secretary is supposed to keep the accounts. However, it is noticed that often the PIA/WDT member who is a joint signatory to the account takes the decisions regarding financial matters. The local contribution is also deposited in the watershed committee account, and is allotted to repairs and maintenance. The general observation is that there is quite a lot of money in the hands of watershed committees as in the form of the maintenance fund and there is very little information about it after the withdrawal of the PIA. Most projects have made efforts to register the watershed committee in order to create certain accountability structures in this regard in the post-project phase. Whether the watershed association or the watershed committee should be a registered body in order to ensure transparent financial functioning, is debated in many platforms. It is generally proposed that the watershed association be the registered body with watershed committee members as office bearers. In Dharamitra evaluations there are 17 instances in which the watershed committee is registered, as against 59 watersheds in which the watershed association is registered. In IGWDP the VWC is the registered institution. In many NGO-supported watersheds the financial responsibility and management lies with the NGO and the watershed committee is consulted and informed about financial matters. In some cases it is due to the problems involved in FCRA regulations and problems of transferring FCRA money into the non-FCRA account of the watershed committee [42].

At this point we have insufficient information on the process of formation, functioning and performance of the watershed committee; and wherever this information does exist and is documented it generally is about cases that have been successful. Documentation also lacks methodological vigour, and institutional analyses are often quick-fix studies; intensive and alternative methods such as those available in social science research for e.g. interpretive hermeneutic approaches are required at least for certain samples. It is generally observed that quite a few members, who may be active in the initial stages, lose interest when they realize the voluntary nature of the work or once their interests are fulfilled. Money also brings its own associated power equations (watershed development being a high capital-intensive activity) and it would be interesting to analyse and look into the dynamics of power issues in the context and functioning of watershed committees with financial responsibilities. Dharamitra evaluations often note that the signatories for financial management -- the WDT leader and watershed committee member -- exercises excessive domination in the watershed activities. Another issue is that of autonomy in the functioning of the watershed committee. Often projects are designed at a higher level and the watershed committee is an arm to facilitate and execute those designs but have little say in many of these meta-design issues. In certain situations it is also noted that the PIA/ WDT is very skeptical about an autonomous and empowered committee fearing that it may affect the 'smooth' implementation of the project. Another issue is whether the watershed committee is capable enough to function autonomously or sensitive enough to function as a representative institution taking care of the concerns of all villagers. Instances of negotiations among watershed committee members to get structures built near their land or wells, have also been observed. Hence it is important to analyse whether formal representations to different spatial and social groups really translate into decisive representation of all sections and whether the representatives are voicing the concerns of the section they represent. Instances of buy-offs of representatives through internal negotiations have also been noted.

Self-help groups

The formation of self-help groups (SHGs) has been made a precondition in all watershed programmes, irrespective of the agency or mode of implementation. This condition has emerged as the result of the perceived

[42] In ISPWDK and WOTR supported non-IGWDP projects the money meant for work is given as an advance to the watershed committee account and detailed bills and vouchers, including copies of muster are submitted to the NGO. Funds in the case of IGWDP, due to the bilateral status of the project can be directly disbursed to a non-FCRA account.

positive experiences generated by organizations like MYRADA, especially in the PIDOW-Gulbarga project where the NGO was responsible for social mobilization working in collaboration with government projects. Later, the SHG movement emerged in different parts of the country and substantiated the relevance of this institution as a strategy for mobilizing the community, especially the women, and became part of the lexicon of watershed guidelines. All guidelines have elaborate sections on the need for and importance of SHG formations in watersheds.

SHGs are self-affinity groups often functioning as thrift, savings and lending groups. The SHG movement, at least during its initial stages of evolution, was intended to provide representation and organizational space for the resource-poor and disadvantaged sections of women. However, this objective of the SHGs needs to be revisited critically, given the hype created around it and the co-option of the institution by other interests and agencies.

Overall, it could be said that SHGs have functioned quite well in terms of savings and lending, and the economic agenda and incentives have worked favourably enough for the institution members to continue this sphere of activity. In fact, SHG activity is one area in which the members seem to have greater control over processes and decisions. But some important decisions, such as setting of interest rates for lending or accessing bank loans, are taken by the PIA or NGO or with their concurrence. The SHGs also provide a space for women to come together and interact.

A vast majority of SHGs are organized around women in most watersheds. In NGO-supported projects, IGWDP and NABARD-NWDF projects, special emphasis is given on promoting women-SHGs in terms of capacity building, training and SHG-oriented activities[43]. In most projects SHGs find representation in the watershed committee and in case of government supported-projects it is assumed that SHGs are organized prior to watershed committee-formation and SHG members (three to four) are inducted in the watershed committee. But field realities show that the linkage between SHGs and watershed activities is either not very clear or is not facilitated. In an assessment of ten IGWDP watersheds[44] (in all the ten watersheds 30 to 70 per cent of adult women are organized into SHGs) it was noted that except in one case, where a woman SHG/ watershed committee member is a co-signatory for finances, there is very little role the SHGs have played in watershed development decisions, even though they have contributed voluntary labour regularly and have worked as labourers in watershed activities. The Dharamitra evaluation shows that in 42 per cent cases (i.e., 48 watersheds) have no SHGs organized and in another 27 cases have only one SHG per watershed. As mentioned earlier women's participation in watershed activities is found to be fairly good only in three watersheds. Watershed development related decisions and functions still remain in the domain of men even though the organization and project staff are making attempts to have it otherwise. In quite a few instances the PIA is also not clear about how to involve SHGs in watershed-related activities.

Most often it has been noted that SHGs remain in the sphere of savings and credit and pay very little attention to social and gender issues, even though there are a couple of instances in the IGWDP review, where women have successfully stalled the production of liquor in their villages. Crossing the threshold of savings and credit and taking up social issues often does not get the support of men in comparison to savings and credit-related activities. Men view savings and credit and opportunities for small loans favourably, since it contributes towards meeting the family's needs, and it is observed that men often influence decisions regarding loan access. It is also important to understand who in the group accesses loans, is it the powerful members? Experiences show that there are hardly any issues discussed at SHG meetings, other than savings and lending, and most often the PIA staff lack the capability or understanding to facilitate gender issues in the day-to-day functioning of the SHGs. Issues related to SHG autonomy, with the advent of micro finance and insurance activities through SHGs, needs further analysis.

The SHGs have not always functioned well. For example, in Dornali (AFARM),

[43] In case of IGWDP certain financial provisions have been made for SHGs to undertake different socio-economic activities to improve the quality of life and reduce drudgery. Five per cent of the project cost is earmarked for SHG-managed activities. In mainstream government-supported projects provisions are made for a revolving fund for SHGs .

[44] Unpublished report 'Women and watershed development' by Vrunda Vaze and Abraham Samuel, a study conducted for the Programme Coordination Unit IGWDP-Maharashtra.

out of the four SHGs started initially, only two continued to function. The remaining two dissolved due to internal conflicts. AFARM also started a Kishori Vikas Ghat (Adolescents Girls Group) which ceased to function because there was no lady social worker. The withdrawal of the woman social worker leading to SHGs becoming dysfunctional is reported in some IGWDP villages too.. Similar stories of SHGs closing down were also reported from some other villages like Bhavathan (Manavlok). The most common reasons for such closure are internal conflicts, poor attendance in meeting, non-repayment of loans, dissolving after taking loans from banks, lack of money to save once watershed wage work is over especially for the poor group, continued migration once project work is over etc.

The SHGs are generally associated with non land-based livelihood activities and in watershed context also, it seems that is the major activity they are occupied with. Thus they manage Revolving Funds or take up certain income-generation activities as is being observed from the field, but their reach in watershed-related activities is very negligent. On the whole SHG activity has been peripheral to the watershed programme and most often runs parallel to mainstream watershed activities despite being represented in watershed committees and meant to be involved in the watershed. There are recent, arguments that SHGs together with UGs should be the main implementing institutions for watershed activities, and the watershed committee should only be a management and coordinating agency.

User Groups

Another institutional arrangement at the local level to enhance participation of the beneficiaries User Groups (UGs) have been formed around certain specific interventions (especially for large structures and interventions) which are expected to involve more than one individual farmer or person, and its benefit is shared by a group of people. Generally UGs are formed for interventions on common property resources such as plantation and fodder, or for medium and large structures such as nala bunds, check dams, gabion structures etc. The main functions of such institutions are supervision of construction, collection of contribution, resolving conflicts if someone is negatively affected for instance, due to loss of land through submergence. Guidelines also stipulate that UGs are responsible for the operation and maintenance of structures/ assets. They are also responsible for working out benefit-sharing mechanisms.

However, there seem to be a number of limitations in the UG model in watershed development prescription and practice. At one level UGs are a misnomer because they do not carry out any functions normally associated with such user groups like the water users group or the forest protection committee. It is also not clear from various guidelines as to what will be the mandate/status of UGs after the project period and implementation of biophysical activities. There is also confusion regarding the role of UGs in the post-project phase in the sense that, after the withdrawal of PIA it is the watershed committee in consultation with the Gram Panchayat which is responsible for maintenance and repair of assets and structures as elaborated in the revised MoRD guidelines of 2001.

It is observed that UGs are formed because forming them is a laid down condition, and decisions concerning the location of structures, their design and cost estimation, technology and materials used, and so on are taken by the WDT or the technical staff of the PIA and not by UG members. Most often it is noticed that UGs are formed after construction is over. Besides, among the benefits arising out of construction of structures is improved groundwater which is an individual/ private resource without any issues of social control or group action on its use and management. If the resource is surface-harvested water, there are instances in which water users have come together to manage resources, including the levying of nominal water charges[45] The UGs also have a role in case of development of common lands such as village pastures or community managed forests.

The Dharamitra evaluations show that of the total of 115 watersheds, UGs are organized in 72 per cent of the

[45] In a couple of watersheds (Devgaon, Shelvihire under IGWDP) in the tribal areas of Akole block, group irrigation is done through surface water of check dams. However in IGWDP projects there are no UGs except for a forest protection group in areas where watershed work is undertaken as part of JFM.

watersheds. In some villages the number of UGs is as high as 30 to 40 even though major structures may be around 10 to15! Some UG members do not even know that they are in the groups and most often there are no systems for the UGs functioning as is the case with watershed committees. The evaluations often note that the groups do not have any capacity to perform their expected functions and that there is no group cohesiveness. It is often noticed in many projects that UGs exist only on paper. The future of any group, especially that of UGs, depends a lot on its capacity, clearly-defined mandate, agenda and responsibilities, availability of resources and the real and perceived benefits arising out of the assets around which collective action is solicited.

Experience shows that a lot of rethinking is required to make the UGs an effective institution in watershed development. Some practitioners propose that UGs be the planning and implementation agency with financial responsibilities related to their sphere of activity. Local contribution from beneficiaries and a regular system to collect user charges needs to be worked out and the group should be entrusted with the responsibility of managing it.

6.3.3 Other organizations

The other organizational structure involved in watershed development that has a direct impact on the participatory processes at the local level is the PIA and WDT. This is not to say that the coordinating agencies such as District Rural Development Agency (DRDA) or Agricultural Department do not have a direct stake in the watershed processes. PIA is selected at the district level by the coordinating and sanctioning agency and on which the watershed community does not have any say. Since 1993, a support and resource organization called Mother NGO[46] has also been introduced in watersheds projects in Maharashtra. Generally, a PIA is responsible for six to ten projects ranging between 4000-5000 ha and are expected to constitute a four-member WDT consisting of a subject specialist in engineering/forestry, agriculture, community mobilization and livestock etc. The team is supposed to be exclusively for the projects and ten per cent of the project cost is earmarked for project administration. In NGO projects it is generally observed that the staff performs other works besides the watershed works. In IGWDP, a four-person team manages a project and generally the area ranges between 1000 to 1500 ha.

At the outset it can be said that a project is as good as the people involved in it. The PIAs' approach and philosophy and the WDT's commitment to participatory processes can make a big impact in empowering the community. It can influence the space provided for the democratic functioning of the CBOs, their capability enhancement, role in decision-making and finance management, inducing values etc. However, the Dharamitra evaluations show that most often the WDT works in isolation involving only a couple of people and this is quite common for WDT leaders who are retired government staff. It is often noticed that WDT plays a dominating role rather than that of facilitation. Another issue that emerges in evaluations is the high turnover of WDT members due to problems of fund release which results in irregular salaries. This is also reflected in irregular visits of the staff to the site. If people are not paid regularly it can also result in financial irregularities. Staff turnover, especially women staffers, is also noticed in interior IGWDP villages because of other difficulties. However, the high turnover of trained staff is a problem which most watershed projects face. Bringing in new staff and providing training takes considerable time and always negatively impacts the processes that are set in motion.

For participation to be realized in the true spirit of the term, it is important to have the right PIAs at the helm of affairs. But is there a proper system for the selection of PIAs in watersheds, especially in programmes supported by the government? It can be said that PIA selection is shrouded in mystery and most often quality is compromised for other considerations. Even though there are instances of 'blacklisting' of PIAs, one can't say for sure that such exercises are objective. Besides, there are no objective systems for monitoring the work of the WDT. During our field visits we heard a number of complaints against PIA staff, suggesting that a

[46] Mother NGO is a district level support organization responsible for supporting the PIA and the watershed institutions in planning, capacity building, monitoring etc. It is also responsible to oversee that participatory processes are followed by the PIA in the project implementation and also to provide support in areas related to that.

significant gap still exists in what is prescribed in the guidelines and what is often seen in practice.

Often the PIAs say that they are pressurized to complete the physical work, and social mobilization and facilitating participation needs comparatively more time, but the issue is what are the milestones achieved in participation in the given time of four to five years. In certain cases it is observed that the WDT is inexperienced and lacks basic skills of relating to the community; in some instances it is noticed that they are skeptical of involving the community and CBOs, fearing a reverse domination. The issue is that one needs confident community facilitators to build a confident watershed community.

Participation remains a word with an elusive workable meaning. Most government agencies such as the Agriculture Department remain poor at even initiating participation. In fact, two villages out of six visited in Vidarbha had been earlier rejected by the Agriculture Department on the pretext that there was no cooperation from the village after it was taken up for watershed development. In one such village, Pimpalgaon Bainai, most villagers said that they were not even aware that their village had been taken up under the watershed development programme by the Agriculture Department. In contrast, at Bairwadi, where the project was also implemented by the Agriculture Department, good participation was noted from all strata of the community. When asked about this, Mr. Bala Athare, Agriculture Assistant and the person chiefly responsible for the successful implementation of the programme said that it was his approach to participation and the attempts to motivate the people through special incentives and measures that was responsible for this. In another example the village itself approached the NGO with the proposition of a watershed development project after it had heard of a successful programme being implemented in a neighbouring village

Quite often, in spite of successfully enlisting the cooperation of the people in the initial stages of the project, these ties were later corroded due to the delay in disbursal of funds by the DRDA. This angered the labourers who had been assured work under the programme by the PIA before the start of programme and also led to a slackening of work by the VWC head, secretary etc., who could not be paid a regular salary. The NGOs often voiced the concern of being sandwiched between the villagers' expectations and the DRDA's casual attitude.

Thus modes of participation varied widely. In one case the watershed community was as much if not more active than the PIA regarding the watershed issues and prospects and put in additional efforts to make their programme[47] a success. In another case the PIA tried to motivate the entire community, including children and women, to become actively involved with the programme. In another case, though the wider watershed association played only a passive role, the watershed committee consisted of well-informed and active members. There was also a case where only the chairman and the secretary were actively involved. In one case the NGO worked only as an 'outside' agency -- making links with only a few strategic people in the village and implementing the programme through their assistance with benefits being concentrated in the hands of the privileged few. In fact, the good performance or achievements on their fields is now being showcased by the NGO. Mr. Khadse of Dharamitra feels that it is very important therefore to attempt a functional definition of the word 'participation' so that it does not remain merely on paper or limited to a chosen few, leaving out the concerns of the marginalized groups.

6.3.4 Participation in Planning, Design and Technology Choice

Participatory planning has emerged a major thrust area in new-generation watershed projects in the same way that other participatory issues found their place through experiences generated from certain projects. Before the emergence of participatory planning methods, the major assumption was that planning, design and choice of technology etc., were technical issues and that it was better that these issues were decided by the experts. Thus we have experiences of construction of contour bunds by experts and ploughing/or levelling it immediately after construction by farmers.

[47] At Ahmatwada, taluka Murtzapur, Akola even in a acute drought-prone situation people took special efforts to provide water to plantations manually from a river nearby. At Sanglud, Akola people donated labour worth Rs 2 lakhs to construct a hall for conducting watershed meetings and activities, which would value at Rs 3 lakh today. At Adsool village a vanrai bandhara was constructed with 2500 empty cement bags through shramdan and no expenditure was incurred. This helped water to stay till January-February which solved some of the fodder problems in the village.

Participatory planning also assumes that the technologies and measures of conservation, which are demanded by farmers, have a high chance of sustaining, because they are convinced about its benefits. If we summarize different guidelines in respect to participatory planning the picture that emerges is -- WDT members along with farmers/users will document details such as survey numbers, name of the owner, exact nature and extent of problem/ opportunity and indigenous technical innovations, farmers'/users' concerns and constraints, farmers' suggestions on technical solutions, etc., identified through PRA exercises. Guidelines also say that indigenous technical knowledge (ITK) emerging through informal research carried out by innovative farmers may also be considered while developing the action plan of the watershed.

Even though the intentions behind the guidelines are good they are very rarely put into practice in the watershed villages. Dharamitra evaluations show that plans are often prepared by the WDT with very little consultation with farmers and if the WDT leader happens to be a government employee he does draws up plans through his experience of working in soil-conservation activities. Often, farmers get to know the kind of activities planned on their field only when these are implemented. The evaluations show that in more than 60 per cent of the cases (out of 115 watersheds) there was no consultation or it was very poor and casual, while only in five per cent of cases were good consultative and participatory strategies adopted in action plan preparation. In 15 per cent of the watersheds beneficiary participation was average and in 14 per cent cases the action plans were revised after consultation with the community and watershed associations -- a good sign that reflects the pressure exerted by the community.

Very little importance is given to farmers' interests and demands while technologies of conservation are selected.. Most programmes have a pre-determined set of technologies. These sets are often implemented regardless of whether the beneficiaries demand it or whether they doubt its benefits. High-cost, high external input-oriented technologies are seen being overemphasized rather than the adoption of low-cost, locally available materials and technical know-how[48]. At certain times the technology may be low-cost, but farmers are really not interested nor convinced about its efficacy. This is observable in the Dahramitra evaluations. For example in almost all cases where vegetative bunding and grass filters were introduced, they failed to survive even the project period. Most often farmers are also reluctant to undertake bund plantation fearing that it creates shade and adversely affects crops. Many conservation measures had to be altered and adapted according to farmers needs and requirements in IGWDP too. It is interesting to note that when IGWDP commenced operations there were hardly eight to ten technologies, but over the course of programme evolution many technologies were incorporated from experiences that emerged from locations and farmers. Today, there are more than 25 technologies. Most of these technologies have emerged from the local experiences of farmers[49]. It has also been observed at many watersheds that an overemphasis on cement and large non-cement structures has drawn contractors and external players into watershed development.

It is also important to note that consultation and the resultant choice of technology opted for by farmers need not always generate better results or be technically adaptable. For example, most often farmers suggest a boundary bund on plots even though the slope and general layout of the plots suggest construction of intermediary bunds to cut the slope and reduce erosion. The same problem is observable in the layout and location of bund outlets, where little consideration is given to the impact of flowing water on the neighbour's field. There is always a collision of interest and priorities between farmers and the facilitating experts, especially in the context of consultation on technological options. Historically, it is observable in the context of working with farmers, whether it is on issues related to agronomical practices or activities such as contour bunding on croplands. Farmers are often interested in individual and rapid returns and livelihood creation, whereas the facilitators are traditionally more

[48] This is very important from the perspective of not only ensuring that the money meant for watershed activities remains or is spent in the village as wages, but also from future maintenance and sustainability. Realizing this, certain projects like DANIDA-supported watersheds in Orissa, IGWDP etc. have made it part of their strategy and conditions. In DANIDA only local materials and locally manageable technologies are promoted with good results. In IGWDP the emphasis is also on local materials and creating local employment and only 15 per cent of the project cost is allowed for taking up drainage line treatments.

[49] Some of them are a) bodi bund, adopted from the adivasi experiences of water harvesting and protective irrigation in Chandrapur district, b)construction of low cost dams using empty drums of tar used for road works, c) modification of gabion structures in order to harvest water etc.

concerned about controlling erosion, improving the environment and issues of sustainability etc. However a meaningful discussion and consultation allows both concerns to be part of the developmental agenda and strategy, at least to an extent.

The methods and tools adopted for planning also play a crucial role in ensuring farmer and community participation. All major watershed programmes now use Participatory Rural Appraisal (PRA) as a tool for planning and enlisting people's participation. Today, almost all watershed programmes insist on conducting different tools of PRA exercises, especially because funding agencies also make it a condition for funding programmes. Like people's contribution or the organization of community into groups, PRA too is taken as an indicator of people's participation. If PRA is taken as the benchmark, however, many of the early generation 'successful' projects like Ralegaon Siddhi, Agadgaon etc., which were more rooted in the community, would prove to be non-participatory or all the projects which uses PRA should be truly participatory. However, the reality is different as evident from the Dharamitra evaluations where PRAs were conducted in many villages but quality of participation is poor in most villages.

At present, however, most implementing agencies use PRA as a means to enlist people's participation and capture local development priorities. The guidelines clearly say that PRA exercises should be conducted to analyse problems and propose solutions, making it the tool for planning with the community for watershed measures. The priorities coming out of the PRA exercise are often taken to represent the priorities of the whole community or taken as the common opinion. This is problematic because they often represent only the opinion of the dominant, vocal and resourceful sections of the village. Also, as Kerr and Kolavalli (2002) argue, bureaucracy often reduces the PRA merely to a prescribed procedure that has to be followed more in the letter than in spirit. Many organizations treat the outcomes of a one or two-day PRA with ten or twenty people as reflecting legitimate community priorities. PRA methods give an impression of having achieved a consensus, which may not actually exist, as very often people do not (or cannot) intervene and give their opinion. Many times the realities are not expressed in a public space or 'over the ground' because of the existing relations and networks.[50] In PRA methodology there is an element of oversimplifying complex socio-economic realities.

Besides these methodological issues of PRA, it is necessary to look critically at its effectiveness as a planning tool for watershed development. It can give certain approximations but to get reliable data on issues of degradation, problems associated with land, issues and problems related to soil, resource access and use pattern, land-use pattern of different communities etc., is found be very difficult. Since the philosophy behind PRA is based on validating the experiential knowledge of the 'community', it looks upon any outside or expert knowledge as an imposition, thus PRA techniques leave little scope for any fruitful mutual interaction between the local people and their knowledge systems and the outside 'modern' system of knowledge. However, it is often noticed that farmers are interested in modern technical knowledge if it is demystified and presented in a language they understand. Insistence on a PRA may restrict people's option of using different techniques, and also their access to other methods of enquiry. Also a PRA fails to provide reliable and comparable data to assess impacts. AFARM, which has used PRA extensively in its watershed projects, recommends detailed baseline surveys prior to the programme so that the impact of the programme can be quantified.

IGWDP and NABARD-supported projects use a different system known as 'participatory net planning' (PNP) for watershed planning and based on the outcomes of PNP and individual household surveys, prepare a detailed watershed plan known as the 'Feasibility Study'. PNP is a detailed plot survey done jointly by the facilitators and the farmer family where each individual holding is assessed to understand the land capability, land-use and problems and a set of conservation measures and proposed land-use

[50] *A number of path breaking studies have emerged in social and cultural anthropology, which highlight the issues of peasant behaviour and how hierarchies and social relations influence interpretations and understanding of issues and the way they vary according to the socio-economic categories based on caste, class, ethnicity, gender etc. One of such interesting analysis is by James C Scott's 'Weapon of the Weak: Everyday Forms of Peasant Resistance, a study of a Malaysian village called Sedaka'. Even Clifford Geertz's studies on irrigation systems, agriculture etc., in Indonesia and Bali is also worth looking into.*

systems are arrived at. It also provides detailed baseline information and an implementable plan. It is noticed that even though it is time consuming and relatively costly, it ensures interaction of different viewpoints, consultation/ consensus-building and participation from the beginning. The efficacy of the system is acknowledged by different practitioners and is adopted in a large variety of watershed projects in the country.

6.3.5 Process of Implementation, Local contribution/Cost sharing and Participation

There is a lot of debate at present whether watershed implementation should strictly follow the ridge-to-valley principle or whether it should be undertaken wherever (within the watershed) the farmers are willing to participate and are ready to implement as per the project conditionalities. The ridge-to-valley proponents also acknowledge the fact that, while implementing different measures from ridge to valley, this is not at the cost of participation and others feel that better participation is ensured if there is a genuine demand from the farmers. Leaving aside the technical advantages/ disadvantages of both systems, we have to look at it from the perspective of participation. Most often, the village commons, forest and marginal lands are located in the ridge and adjacent areas and these are either owned by resource-poor families or they are dependent on these lands for a variety of needs. These are the lands which require rehabilitation on a priority basis. However it is noticed that the resource-poor are skeptical and suspicious of the intentions and outcomes as compared to the better off who are comparatively well-informed and often enter into/have initial contacts with the PIA. Generally, the interaction of the PIA is with the 'centre' (in the spatial and power-related sense) and peripheries get ignored or excluded due to this approach. Having a ridge-to-valley approach and project condition, especially in multicaste complex villages, where the peripheries are occupied by the adivasis, dalits, nomads etc., creates a situation for them to participate and compels the PIAs towards enlisting their support. The ridge-to-valley approach needs to be viewed as a social technology for ensuring participation, especially of the resource-poor and marginal sections. A non ridge-to-valley implementation process, where willing farmers are provided priority will create a situation where benefits are amassed by a few and make the work easier for the PIA. If that be the case then what is the role of the project facilitators? There are other dimensions too which we cannot ignore, such as the lack of permission to treat forest land, hence difficulty in following the principle and delays in project implementation due to the uncompromising attitude of funding/ supporting organizations with respect to the ridge-to-valley approach. In certain watersheds, especially in rice cultivating areas, it is noted that farmers like the water and silt to flow into the fields rather than arresting them at the ridge. In private lands in ridge areas, which are relatively less productive, farmers may not be willing to share the cost[51]; hence it becomes difficult to enlist participation and follow ridge-to-valley implementation.

Peoples' contribution/cost-sharing is another commonly used indicator of participation and the willingness of the farmers to share a certain part of the cost is considered their willingness to participate. The guidelines say that peoples' participation should be ensured through voluntary donations in terms of cash, labour, raw materials, etc., for developmental activities as well as for the operation and maintenance of assets created. The main purpose behind this is to build a stake and a sense of ownership in the project and, in turn, to elicit greater enthusiasm for other activities such as the maintenance of assets. Cost sharing also serves as an indirect indicator that people have been part of the decision-making process. Maintenance of assets has been found to be positively associated with the share of costs borne by community/beneficiaries (Kerr and Kolavalli 2002). However, it is difficult to say that cost sharing alone is a dominant factor in ensuring maintenance, especially for assets on common properties. It may also be true that cost-sharing will ensure selection of appropriate and useful techniques besides ensuring quality of implementation.

Different projects have different

[51] Often the land in the ridge is more degraded and may require more conservation measures as compared to better managed and less sloppy lands in the valley. More measures means higher costs and a correspondingly higher contribution.

quantum (percentage contribution) and systems for cost-sharing. For example, in government-supported projects this falls in the range of five to ten per cent. In IGWDP and NABARD-supported WDF it is 16 per cent. In most NGO projects it ranges between ten to 20 per cent. Even within one project there are different contributions for different activities/measures. For example in IGWDP, for horticulture (budded saplings) development on an individual plot it is around 50 per cent. Area treatment like bunding in class III and above it is 16 per cent of the cost and in case of classes I and II it is 25 per cent. For cement structures the beneficiaries have to contribute unskilled labour. This differential contribution emerged later after a few years experience of having a common contribution system. There was continued resistance on the part of NGOs which cited practical difficulties in convincing farmers and problems related to computing the differential contribution. In some places, the villagers also expressed their protest maybe at the behest of the NGOs. It is interesting to note that during the consultative stage, different meetings and workshops were organized to find out systems for a differential contribution system based on expected benefits, involving all project partners such as NGOs, VWCs from a representative set of watersheds etc., and many VWC members agreed that there should be such a system, but those who were in favour of the changed system were from villages which had either completed their watersheds or had watersheds that were nearing completion.

In government-supported projects the difference in contribution is based on social categories and not in the kind of measures and is five per cent for SC and ST families and ten per cent for the general categories of beneficiaries.For common resources and structures it is 5 per cent. In the Dharamitra evaluations of 115 watersheds, in 22 per cent cases either there was no contribution or the details were not known, whereas in 75 cases (66 per cent) the contribution was to the tune of five per cent. In the remaining watersheds local contribution ranged between five and ten per cent. In IGWDP villages local contribution and project progress is linked and an excessive backlog of contribution may affect project progress by withholding finance release till matters are amended.

Another major issue in relation to local contribution is the method in which it is collected. Not only from Maharashtra, but also from the country as a whole, there is evidence that often in the name of local contribution the, 'the poor are subsidizing the rich' in the sense that the method adopted by PIAs and watershed committees is to cut the wage of the labourers' working at watershed sites. Generally, the argument put forward in such a scenario is that the wage rate in watershed work is much higher (due to SSR rate and based on outputs) than what they usually get locally, hence they are not losing much. Personal experiences show that the support and monitoring organisations have to play a very proactive role for this not to happen, by organizing and educating the labourers (by informing them about the unit wage rate for different kinds of work and displaying the scheduled rates in public places etc.) besides facilitating the process with the PIA and watershed committees. For example in the Dharamitra evaluations the system/ method of collection is not known, nor are there any receipts given to those who made the contribution. The accounting procedure and recording of contribution is one of the weakest areas in most projects. In some other instances, where work is executed through the landowners, the system is more interesting. In such instances, after planning and cost-estimation the farmer either using his own labour or together with hired labour executes the task. After measurement the wage is paid to the farmer deducting the required contribution. In such instances it is often possible that the farmer hires labour at the local wage rate and also makes some money out of the differential. Whatever be the method, there is still a lot of transparency required in methods of collecting the local contribution.

Another argument is over what the quantum of contribution should be, and is it necessary to have a high amount given the fact that watershed projects are implemented in the most degraded and poorest areas in rainfed tracts which are generally left out with regard to development and investments, as

compared to irrigated areas and places where green revolution packages were implemented. The crux of such an argument is that it is the responsibility of the state to invest in land and water resource development[52] and peoples' contribution dilutes the responsibilities of the state, a neo liberal agenda. Cost-sharing should be seen in the wider context of resource allocation and political economy. Presently, the state spends more than a lakh of rupees to provide irrigation to one hectare of land in the irrigated belts, besides other incentives through different subsidies and assured prices such as in the case of sugarcane. In the context of watershed development, the cost generally ranges from Rs 6000/- and up to Rs 10-12000/- in some bilaterally assisted projects. The Parthasarathy Committee has proposed a ceiling of Rs 12000/- per hectare. When the relative spending on watershed is so little, asking people to share the cost -- that also to up to 30 to 40 per cent - seems unfair. Moreover, local organizations need to play a greater role in deciding the volume of contribution and there should be flexibility based on local situations. Experience shows that other issues such as rights, access and entitlements in water and common property resources especially for the resource-poor ensures a major stake and higher participation, rather than making contribution the yardstick.

6.3.6 Capacity building for Participation

Capacity building and training of community-based organizations (CBOs) and the community at a large is considered an important aspect and prerequisite for effective participation. Access to information, skills and knowledge helps in better understanding the pros and cons of the work in hand which is a precondition for participation in any activity. Capacity building, training and awareness-generation are considered important activities in the guidelines, and budget provisions are made available for the same. However, in the Hariyali guidelines the budget for capacity building and community mobilization has been reduced by half to five per cent from ten per cent[53]. The general argument cited for reducing the training budget was that, most often the sanctioned budget is not being utilized by the PIAs and the CBOs. This component is by and large handled by the NGOs and in certain cases the support of resource organizations is also enlisted. To improve effectiveness, Mother NGOs are currently entrusted with the responsibility of training and the impact of this can be judged only in the course of time, as these projects where Mother NGOs are involved are only two or three years in implementation. Generally, training and capacity building include exposure visits to 'successful' projects, training in administrative matters like systems and procedures, records and book-keeping and on certain aspects related to watershed management. CBOs and watershed secretaries are being provided training. The WDT is also expected to undergo certain training modules related to their respective areas of responsibilities. However, in most government projects this aspect is not taken very seriously and most often the budget allotted is not at all utilized effectively. This is corroborated by some reviews. The Kerr and Kolavalli (2002) study shows that the time spent by the PIA in social organization efforts prior to taking up biophysical activities ranged from a few weeks (in GOI projects) to several years in (in some NGO-run projects). The projects covered in the study were divided into two categories: those which spend more than six months in social organization and capacity-building and those which spend less than six months. The projects, which spent more than six months in social organization efforts, consisted of all eight NGO projects studied and 57 per cent of the seven jointly implemented projects. Significantly, none of the sixteen government-funded/implemented and five bilateral/multilateral funded, government-implemented projects under the study spent more than six months.

A major lacuna observed is that there is no plan or system (as in case of biophysical activities) to implement capacity building activities and it is not integrated with the project progress and processes. There are no set milestones on the expected capacity of the project actors. This is reflected in the Dharamitra evaluations. Only in 42 per cent of cases (48 out of 114) has the WDT undergone some training. In 38 per cent of cases there was no information available and 20 per cent

[52] Historically speaking the state or the rulers played a crucial role in development of water resources. This is being corroborated by many political economic analysts and anthropologists. The concept called Asiatic Mode of Production developed by Karl Marx, based on anthropological evidences especially from India, highlights the fact that states played a crucial role in developing the water resources and organizing the societies around hydrology. In Maharashtra some of the popular rulers were actively involved in developing water resources through state investments. This trend could be seen till the late 1970s and in the following decades one could observe the slow withdrawal of the state from these responsibilities to a large extent. At present Maharashtra is one of the experimental states for "sectoral reforms" in the water sector funded by the World Bank and other multilateral organizations.

[53] This is in spite of the fact that a committee was

[53] *contd... set up to understand the issues related to training and to evolve strategies and identify training needs for different CBOs and personnel involved in watershed development projects under the chairmanship of Mr. V.B. Eswaran and the recommendations of the Committee, in favour of improving the training and budget allocation for need-based training.*

there was no training at all. The capacity enhancement of WDT is not only important from the perspective of effective functioning, but is also important for CBO and community capacity building. In case of watershed committees only 37 per cent had some training; no information was available for another 37 per cent; and 26 per cent had no training. In case of watershed secretaries only 33.3 per cent had some training. This shows the abysmal state of affairs as far as training and capacity building are concerned. It was noted at the NGO workshop that even if the PIAs (at least the NGO PIAs) are serious about capacity-building the sanctioned budget is not received or released by the DRDA when it is required.

The IGWDP projects start with a capacity building phase lasting around one-and-a-half years. This is the community mobilization/institution building and capacity-enhancement phase. At least 70 per cent of households of the watershed community are exposed to successful watershed projects, and orientation training organized for project personnel. Village volunteers are also selected and SHGs and VWC organized during this phase. Village volunteers known as 'Panlot Sevaks' are given training in watershed management, area treatment, taking measurements and wage calculation, including documentation. The VWC and SHGs are also given detailed training in areas related to their functions. A separate exposure visit is organized for women from the watershed. Biophysical work is undertaken in a small area of around 100 ha for education and demonstration purpose. The crux of this phase is induction through participatory operational pedagogy (POP) and learning by doing. The phase helps people understand aspects of watershed planning and development, besides building up consensus around issues like voluntary labour, social fencing and other conditions. Close monitoring is done involving CBOs and farmers with the objective of ensuring the quality of work as well as transfer of monitoring skills. Successful completion of the phase is followed by the complete treatment of watersheds. During that phase too a series of training and capacity-enhancement activities are organized for the CBOs and project staff. The training and capacity-enhancement activities are integrated into the project cycle and failure to conduct different capacity building activities in the stipulated time frame attracts certain sanctions such as withholding of NGO administration. Ten to 12 per cent of the project cost is spent on training and exposure. This is not part of the project cost but is in addition to what is being planned for the project.

In many watershed related capacity building strategies very little effort is made to educate people on issues related to resources and their sustainable use, such as community-based water balance assessment. It is also true for issues of equity and benefit sharing mechanisms. Even though training programmes are conducted for all-women SHGs, little effort is made to integrate these with watershed development. There are also few attempts at developing participatory experiments and technologies involving innovative farmers. However one should be aware of community fatigue and the time that people can devote for training and capacity building. The methods and systems of training and teaching also are very important and participatory learning systems can create conditions for participation of the community.

6.3.7 Participation in Monitoring and Evaluation.

Community participation in monitoring and evaluation can be considered as an indicator of a high level of participation and of the empowerment of the community and their representative institutions. However when the issue of monitoring is elaborated in the guidelines or when it is put into practice, it is always in the sense of higher-level agencies doing 'surveillance' of activities at the local level with the objective of setting things right. It is more like Bentham's Panopticon of surveillance and observation to instill fear that they are always under watch and deviations will be severely punished. The interesting aspect is that such surveillance has also not succeeded in preventing malpractices. This is not to say that monitoring is not necessary to ensure accountability but the best option is always to ensure the participation of the

stakeholder in the process and create conditions for self-monitoring. But the community can participate in monitoring if conditions and systems are created. If people do not know what is planned and what are the allocations for different components what will they monitor? Thus the precondition to create effective systems for community monitoring is access to information on various aspects of the intervention. Kerr and Kolavalli (2002) see community monitoring in terms of information flow, and talk of the need to devise innovative, transparent mechanisms to facilitate an objective flow of information from communities to donors and programme managers. According to them such a flow of information could potentially change power relations within communities and between communities and development organizations. Transparency in project administration is a key factor in ensuring participatory monitoring at the community level. The second important aspect is availability of detailed information in a language the people can understand. And the related important component is the willingness of the PIA to involve the community in understanding and monitoring the progress and outcomes. Equally important is the development and application of easy to use, cost effective and simple monitoring systems and tools. Even though many NGOs involved in watershed projects talk about participatory monitoring there is very little documented evidence in the state. However, it is noticed that many NGOs use different PRA tools to monitor the progress and impacts. Watershed Organization Trust, the support and capacity-building organization for IGWDP has developed certain participatory monitoring tools and is applied periodically in all the projects supported by the organization (Lobo and Samuel 2005). In these projects, the community regularly undertakes participatory monitoring on its own, as well as joint monitoring involving the community/CBOs, NGOs and the supporting organization. There is also a special effort through training programmes to enhance the capacity of the local community to undertake self-monitoring.

However, it is often noted that community and CBOs understand the process and methods of monitoring very well and are able to interpret the information and outcomes, but the information generated is often narrative/ qualitative and most often approximations and not in terms of quantifiable and comparable data. However one should not expect research data from the community; the spirit and purpose is more important.

Periodic monitoring and evaluation by facilitating and external agencies are also necessary, but is always good to involve the CBOs and interested community members in the process. There may be many issues an outsider can locate, which the community may not have noticed/ignored due to different reasons. Sometimes the perspective on issues also may vary and it helps in bringing new learning and different experiences. This may also help the community in looking at issues differently.

Participatory monitoring is closely related to reliable benchmarks and a clearly elaborated plan. Participatory plan development, which also includes measurable outputs, inputs and outcomes, is necessary for effective monitoring. To an extent planning based on the logical framework approach is very helpful. Benchmarking and baseline information using a combination of PRA and other scientific methods of data collection is also required. It is also necessary to develop a set of indicators related to sustainability, equity and other project objectives and to build a consensus around them within the community so that monitoring leads to corrective action and improvement.

6.3.8 Financial Transaction, Issues of Transparency and Participation

Control over financial matters is an important indicator of local participation. By and large local organizations do not seem to have much say in decisions regarding fund allocation, expenditure and management even though the work-related funds are routed through watershed committees in almost all government-supported projects. Generally one or two members of the watershed committees together with the WDT leader operate the account and it is often reported that decisions are taken by these people. Because of this provision at least these few members

know how much money is available for the project and how it is being spent on different activities. However, often decisions regarding financial matters are taken by the PIA with the consent of the signatories and the watershed committee as an institution mostly acts as a conduit for channelling funds. Besides these people the watershed secretary may be having some information about financial issues because he is a paid employee and is expected to keep books, accounts and records of the details of activities undertaken. In quite few watersheds generally the secretary is also a watershed committee member and is entrusted with the responsibility of the joint signatory, often by the PIA.

As said earlier in many NGO-run programmes funds are directly managed by NGOs. Since most NGOs work in a participatory manner, they may be consulting watershed committees in matters related to planning and allocation of funds for different activities. In IGWDP and NABARD-supported WDF projects the VWC is involved in decisions regarding fund matters and the account is jointly operated by the VWC members (two signatories) and the NGO head. In IGWDP there is no fixed cost for watershed measures as compared to government projects, and the cost of a watershed is based on the plan estimation and area proposed for the treatment. Once the planning is over and estimations are decided it is ratified in the watershed committee and Gram Sabha and sent to the supporting organization for sanction. It is followed by a filed verification by the support organization and proposed changes if any are discussed in the village meeting and consensus is evolved there itself[54]. During project sanction, both the PIA and two to three representatives of the VWC attend the Project Sanctioning and Steering Committee (PSSC) meeting and details of the sanctioned project are explained and discussed. The committee also gets a copy of the sanctioned project.

Financial issues, transparency and participatory monitoring are closely linked and play a crucial role in ensuring active participation. For better project administration all these aspects require to be part of the implementation strategy. Guidelines also in some way try to link these. For example, it is expected that action plans and the proposed budget be approved by the Gram Sabha and periodical social auditing conducted to ensure transparency in implementation and expenditure. It is also expected that wages be disbursed in a public place, and together by the watershed committee and the WDT. Wherever possible, wages and other expenses are to be paid through cheques. The Gram Sabha has the right to scrutinize the financial transactions. However in most government projects these things do not happen. The Dharamitra evaluations observe that in 38 watersheds out of the 144, there were some problems in the way funds are being managed. There are discrepancies in certain cases, whereas in some cases, proper accounting and bookkeeping is not followed. In most cases the watershed committee in particular, and the WA in general, are ignorant about the financial transactions. In quite a few cases the sanctioned budget is also not released entirely. Problems related to fund release from the district authorities are often reported from all parts of the country. Generally, money is released by the end of each financial year, which in turn always impacts the mobilization and participation of the community. PIAs often find it difficult to keep the community's interest and enthusiasm high due to these delays. In the workshop of practitioners held in Vidharbha this issue was prominently highlighted. The poor interaction with the government machinery and the failure to get funds released at the appropriate time was the major bottleneck expressed by almost all implementing agencies. Frequent transfers of officials and a basic lack of interpersonal trust between government officials and NGOs, the two institutions committed to the cause of rural development, seem to be at the root of most delays and snags.

There is no separate department or even official appointed to look at the disbursement of funds[55]. There are multiple dimensions to the problem of fund release. It could be that the funds for social organization have not been completely delivered, or that the release of funds for treatments is considerably delayed. This has two repercussions:

[54] For details see the Operations Manual of the Indo-German Watershed Development Programme (IGWDP), published by WOTR. 1997.

[55] In one case, when the responsible officials of DRDA were out of office, no further disbursement happened till their return (Prakash Wanare, in NGO Workshop).

first, there are possibilities that the community, which has begun to be motivated through community organization work, might lose interest in the programme; second, since the time that watershed treatments can be undertaken on the field is limited, work may get delayed in spite of release of funds. This is true especially in the Vidharbha region where the large portion of treatments are undertaken on private lands after the crop has been harvested and the fields are empty. Many heads of implementing agencies felt that it is the government officials who stand in need of training, especially regarding the significance of the timetable of farmers and the schedule of watershed development activities[56].

It was reported that about 15 to 20 per cent of the sum granted to projects is usually never released by the DRDA. Prakash Shirke of the College of Social Work, Yavatmal, whose proposal for two adjacent watersheds was for Rs 36 lakh, was able to get only Rs 22 lakh by the end of the project period. Another Rs 4 lakh was spent from the watershed development fund to complete certain treatments. Thus, an amount of Rs 14 lakhs was never released. Due to delay in fund release the programme went on for over nine years from 1995-6 to 2004. Recently, Vanrai, an NGO has filed a lawsuit in this respect and has been able to get the DRDA to part with the rest of the money. The practitioners also complained that they were often not able to recover the funds that covered remuneration for the NGO's staff and its services. Madhukar Das of the NGO Dilasa was of the opinion that to run any project in association with DRDA was in itself a frustrating task. After four months of the experience of implementing a DPAP programme, he gave up due to the inability to cope with the bureaucratic and indifferent approach of the DRDA. He later worked on projects funded by the Aga Khan Foundation and CAPART (Department of Science and Technology) under which he found funds-disbursement as wells as monitoring of work and accounts much more efficient and prompt.

Vishnu Sarkate, of Varhad Vikas Seva Pratishthan, Akola felt that the government followed a dual policy. While people's participation and other technical norms were strictly monitored for the NGOs, these norms were slack in the government-implemented watersheds. A common complaint was also the problem of repeated arbitrary checks and surprise visits by various officials from different government departments and additional documentation (like getting a certificate from the people's representative for completion of work) that was required from time to time by NGOs. The frequent transfer of officials and the consequent re-iteration of earlier procedures added to these problems[57].

Many NGO participants in the workshop expressed a lack of adequate statutory provisions to address the grievances of these scattered NGOs. They felt that there should be an effort to come together to form an association, which would have a greater voice with the DRDA[58]. The government officials on the other hand could make a common cause and also had the power to register complaints with the office of Commissioner of Charitable Trusts against the concerned PIA. It was suggested in the workshop that a few detailed case studies could be undertaken and publicized to illustrate the problems that the implementing agencies faced with state machinery in programmes such as DPAP.

Even after two decades of implementing participatory watersheds and several recommendations by eminent committees still watershed projects are suffering from these maladies. Finance-related issues are still plaguing projects and an efficient community managed system where people have a decisive say in village development could not be established. As compared to this the NGO programmes do comparatively better. In IGWDP has adopted a proactive system for the release of money in instalments (generally two instalments in an year). When 60 per cent of an instalment is utilized the VWC through the NGO can apply for the next instalment. On receiving the application NABARD conducts a two-day monitoring involving CBOs and the NGO and money is released. Availability of 40 per cent of the fund allows continuity of work in the interim period. Work progress and expenditure are regularly updated and displayed at a public place and a cadastral map is used to display the progress of the work.

[56] Another complexity noted was that due to the increase in the water table after the first year's intervention, an additional crop is generally taken and the labour/farmer get involved with it and is not free for watershed work. In Amravati, where the first year's work began in December and in the second year the period available for treatment was further reduced, as labour was not free from agricultural operations till end of March (workshop discussion).

[57] This problem gets further compounded if Mother NGO also adopts a surveillance-oriented attitude (NGO workshop).

[58] Certain NGOs that are politically motivated and have some clout might be indifferent to the prospect of such coalitions, which only discourages the others.

6.3.9 Participation in Operation, Maintenance and Resource Management

Over the years institutional mechanisms and financial provisions have been made for the operation and maintenance of watersheds. Watershed committees and UGs are expected to take up the responsibilities of maintenance and the Watershed Development Fund (local/beneficiary contribution) is expected to serve this purpose. This is a very commendable development, as compared to the situation that existed earlier. For example, in early efforts at soil and water conservation through the bunding programme in Maharashtra, it was taken for granted that even after the completion of the project, the implementing agency, mainly the government department, would be responsible for repair and maintenance. Hence, no institutional or financial arrangements were made. Even though the institutional and financial mechanisms are put in place, that in itself may not ensure participation of the community in operation and maintenance (for greater detail please refer to discussion on operations and maintenance in the fourth chapter on 'Watershed Development and Sustainability'). The active participation of the community in other processes and in decision-making is required for them to take the responsibility of maintenance. At the same time issues of technology, user rights etc., also influence the process of participation in operation and maintenance. If the measures planned and implemented are not in consultation with the people and they do not perceive or receive any benefits from it there is very little chance that those assets are properly maintained. The sustainability of the institutions designed and promoted is crucially linked to the operation and maintenance of assets. Most often it is noticed that these organizations become dormant in the post-project phase and slowly lose relevance. Progressive empowerment of the community in different stages of project implementation is necessary for them to take full responsibility for governance of resources and assets in the future. However, our analysis is not fully leading to this direction which would have enabled us to come to a firm conclusion. In most projects the community and the CBOs are often seen playing a peripheral role and only time will tell how they embrace their responsibilities and actively participate in conserving and maintaining resources.

The most crucial component to judge participation is the systems and procedures adopted by the community in regulating resource-use and its sustainable management. Emergence, formulation and application of regulatory mechanisms shows the maturity and coming of age of the community and their representative institutions, and one can say that it is at this stage that a genuine watershed community has come into existence. There are very few instances to substantiate the argument, however it is prudent to say that participation is a means to work out socially acceptable and scientifically informed social regulation measures that lead to sustainable use of resources and their governance. In the absence of such socially accepted regulations, competitive extraction of resources becomes the order of the day and people who have resources and clout often exploit the resultant benefits whether it is water or biomass. This is observed in many of the 'successful' projects such as Agadgaon, Pimpalgaon Wagha etc, where in summer months, especially in a year of drought, they fall into the previous situation of even getting drinking water through tankers. Certain projects have made conditions like non-cultivation of water intensive crops part of their design, but it is noticed that after the withdrawal of the PIA people are opting for the same. Regulations should emerge from society through informed choices, negotiations and democratic processes. As an example, in Ralegaon Siddhi, there was an understanding amongst the people that nobody would go in for an individual well. They decided to have community wells near each check dam on the major stream in the watershed with a clear understanding as to how much water each one would receive. Each water user was given a card, something like a ration card, in which the details of the irrigation rotations, etc., were recorded. They also decided not to grow water-intensive crops like sugarcane with this

water (however, they laid down no such restrictions the use of water received from Kukudi irrigation canal). As a result the village stayed self-sufficient for drinking water in even in acute drought years (Paranjape et al. 1998). In another project in Ahmadnagar district, Kasare, after the implementation of watershed and increased availability of water people went in for sugarcane cultivation, but the drought and resultant shortage of drinking water during 1995-97, forced the community to rethink about planting water intensive crops and over exploitation of resources. This resulted in a decision not to cultivate sugarcane in the watershed[59].

6.4. Watershed Development and Panchayat Raj Institutions

Panchayat Raj Institutions (PRIs) are constitutionally designed institutional mechanisms for democratic participation at the micro/village level. However, there seems to be a sharp division of opinion amongst researchers and practitioners with regard to the role of PRIs in watershed development. This issue becomes increasingly important in the context of the 73rd amendment of the Indian Constitution aimed at devolving more powers to the PRIs and the emergence of Hariyali guidelines for watershed implementation. The issue in contention is whether it is the PRI, which is well equipped to handle watershed development, or is it better handled by the CBOs, as is the general practice. Those who are in favour of PRIs argue that they are constitutionally valid bodies and are more accountable and will have continuity as compared to CBOs, which are more informal and do not have sufficient statutory powers. There is another section, which argues that PRIs should function as statutory bodies and watershed developmental functions should not be their responsibility, because they are already burdened with a lot of work and watershed development requires considerable time for facilitation and implementation. There is also a middle path that feels that it is necessary that CBOs are responsible for watershed development, but they can function as a sub-committee (like many other committees functioning under the Gram Panchayat such as education, health, sanitation etc) under the PRI.

The new guideline gives priority to PRIs as implementation agencies, and in the state, projects implemented through the PRIs have only started since 2003, hence it is difficult to say which institutional mechanism is better equipped to handle watershed development and ensure community participation. It is observed that earlier projects had no active links with the Gram Panchayat (GP) except to gain the consent of the gram sabha and passing the resolution for initiating watershed development in the village. In case of IGWDP at least one Gram Panchayat member is expected to be a member of the VWC and it is observed in Vaiju Babulgaon and Ambevadi projects were there were common members who were part of VWC and GP. In case of Dornali (AFARM), Chale (DPAP) also, we could find common members. CBO members are also often observed contesting and getting elected to the GP.

At a practitioners workshop organized as part of this review certain observations emerged in relation to the new Hariyali guidelines. There were mixed feelings, while some NGO and GO members felt that it was an attempt to marginalize the NGO's role in watershed projects which would only impact the programmes adversely, others felt that it was the right move in the direction of enabling village-level institutions to take the responsibility of development in their own hands. Prakash Shirke (College of Social Work, Yavatmal), supported the new guidelines saying that till now the NGO had been made the scapegoat between Government departments and village-level bodies such as the VWC, with the, "government firing its gun placed on the NGO's shoulder". However, now the NGO could render technical/ organizational assistance on a contractual basis. Mr. Khadse of Dharamitra was sceptical of the Hariyali guidelines, which might mean less dedication and more confusion in implementation. He felt that the emphasis should instead be on identifying the right NGOs. In a discussion held in the village Sanglud, the VWC chairman was pessimistic about Hariyali as he felt there would be increased scope of bribery and delays. He felt that the programme would be hampered by political concerns as most

[59] Discussion with project staff of the Social Centre, Ahmednagar, the NGO worked in Kasare watershed in Ahmednagar taluka.

villages are anyway split into two electoral factions and conflicting interests. The NGO on the other hand being a third party had a greater scope of getting the village to participate without necessarily inviting direct confrontations. Also, the village Sarpanch (president) and Sachiv (secretary) might not be able to give enough time given their other duties and commitments. Mr. Chaudhari, project director of DRDA felt that unless village-level institutions were better trained, it was difficult to expect efficient handling of funds around Rs 25-30 lakhs involved in the projects. The watershed communities constituted presently under the DPAP projects usually include one or two GP members in spite of this not being mandatory in the earlier guidelines. However, selective NGOs seemed to work entirely through the participation of the gram sabha while others approached the gram sabha only if there were any issues which coud not be resolved within the watershed committee. There seemed to be no major power conflicts in any of the villages visited between the GP and the watershed committee. The secretary of the VWC in the area of the Chandrapuri Maharaj Trust commented that when the watershed treatment work was happening, at that time the watershed committee was seen as the more active institution and considerable importance was given to the committee head as against the Sarpanch. In another instance at Vastapur, the PIA with the Sarpanch's support constructed toilets that were later shown as being funded by GP funds! Another drawback in the Hariyali guidelines was pointed by Madhukar Gharad of Vanrai Mitra Mandal who commented that most of the important decisions were taken at the Mantralay (ministry) level which were not made clear for those working at the district and taluka level. In fact, the PIA often did not understand the role and duties that they had to undertake as a PIA.

The workshop observed that the guidelines also encourage the involvement of UGs and SHGs. But subsidies available to such groups under other schemes -- like Sampoorna Gram Rojgar Yojana -- are not available under Hariyali's watershed development efforts. Hence, the groups are often formed to satisfy Hariyali's requirements, but do not play any meaningful role; their composition is simply to satisfy a checklist and get the funds rolling. Similarly, for facilitating implementation of Hariyali, either the DRDA or the Zilla Parishad selects a programme implementation agency -- usually an NGO that is floated politically and serves private interests more than the programmes. It is now being suggested that instead a District Watershed Committee of technical experts should be appointed to select the implementers -- so that the selection would not smack of politics but would be purely on merit and technical grounds.

6.5. Observations

Participation in the processes and practice of watershed development is considered the key to implementing an effective and sustainable watershed development and during the course of evolution of watershed development one could observe certain decisive steps in this direction by both government-supported projects and those of the NGOs. Even though there are qualitative differences in the way participation is initiated and realized in different projects, there is increasing acceptance and consensus among different actors about the importance of community-participation and its role in resource conservation and management. However our review shows that participation is often very nominal and operationalized instrumentally without much consideration shown to local conditions or factors that influence participation of different sections and power groups. Besides, the agenda and rules of participation are decided by higher level agencies such as the funding organizations and coordinating institutions, and villagers are expected to participate in their agenda and terms without having any creative role. Consent of the 'community' is taken as the indicator of participation, even though many practitioners are aware that such so called consent may not reflect the actual reality of the village communities which are a conglomeration of alliances and conflicts based on different socio-economic factors. It is also common that participation often takes the view

and consent of the powerful, and minority views and non-vocal sections get ignored in the process. The philosophy, approach and culture of the facilitating PIAs play a crucial role in preparing the community for participation and creating space for it to engage in decisive participation in project management. Ideally speaking, participation should lead to empowerment of the community and their CBOs, which in turn will enable them to take up responsibilities of governance, and in the context of watershed development governance related to resources. Another aspect is that most often many project-related decisions are taken at the higher level of stakeholders (such as coordinating and funding organizational level) and the community seldom has any say in such matters. However, certain trends and the direction of project implementation point towards the increasing community participation and consultation in project-related decisions and this should be considered a welcome step.

Chapter 7

Issues, Concerns and Research Needs

Watershed development has emerged as a key strategy for rural development in the state of Maharashtra since the early 1990s. This paradigm shift in rural development was facilitated by some pioneering examples of watershed development being undertaken in the state by motivated individuals and organizations in villages like Ralegaon Siddhi, Agadgaon, Pimpalgaon Wagha, Hivre Bazar etc. Even though the state had undertaken different conservation activities such as farm bunds and nalla bunds since the early 1970s, the concept of integrated biophysical treatment of a watershed with the involvement of the community as the driving force came into existence with the emergence of these villages in the drought-prone areas of the state. More than half the state being drought-prone and agriculture activities determined by the vagaries of nature, these villages came as a ray of hope for development practitioners, policy makers and village communities at large. And the 1990s witnessed a large number of watershed projects being implemented throughout the state supported by government agencies, bilateral organizations/ agencies, NGOs etc.

As projects reached a critical scale and varieties of experiences got accumulated through interactions among the community of practitioners, researches and evaluations, newer problems and critical concerns started emerging. The concerns are multiple, as is evident from our review; most often interlinked and touching on different aspects related to policy and practice such as project organization and management, micro- and macro-level strategies, objectives and outcomes, technologies of conservation and production, issues related to equity in benefits, sustainability, participation and devolution, downward accountability etc. Addressing these issues require changes in policy, approaches and implementation strategies. It is also necessary that sufficient information and knowledge be generated on different aspects of watershed development through interdisciplinary and intensive researches and studies, action-research projects and piloting of experiments. As the review shows, currently there is a dearth of information on major issues of concern and most often the information and knowledge available are not based on rigorous methodology and analytical frameworks.

There are a number of programmes being implemented in the state, involving different agencies and with different implementation strategies. Based on the information available more than Rs 22,5176 lakhs was spent on different projects during 1992-2002 and still more than 145 lakh ha remains to be treated. Even though so much is invested in drought-proofing and enhancing the productive potential of rainfed areas, our review shows that on-ground achievements are not very laudable or effective, barring certain projects and villages. This is not to deny the importance of watershed development as a rural development strategy, but to initiate a critical look at the experiences, so as to reformulate strategies and approaches to improve the efficiency, effectiveness and outcomes of watershed interventions.

The problem with a 'watershed development programme' or WDP begins with the fact that the notion of development that underpins the concept of 'integrated watershed development' is rather narrow, i.e., focused on production or income gains. At present, the main goals of WDPs do not include equity, sustainability and participatory democratization or, if they are included in the guidelines at all, it is in a very narrow sense without being properly articulated. For example, sustainable water use is not thought through clearly -- the thrust is on water resource augmentation. Similarly, participation is simplistically assumed to ensure democracy (Joy et al. 2006).

The long-term possibility of ensuring sustainable livelihoods and resource augmentation and use would depend a lot on how these goals are articulated and how they are incorporated in watershed development practice. Some of the key concerns that emerged in our review, and which have a bearing on what we have stated above, are discussed in the following section.

7.1 Change in Approach and Strategy

7.1.1 Project Planning

All most all projects have more or less the same objectives viz., improving socio-economic conditions of the community, conserving and developing the natural resource base, generating employment, community empowerment etc. Even though the objective of watershed development has moved to an extent from simple conservation to creation of rural livelihoods (GoI 2001), still the approach, strategies, methods of implementation and financial allocations are more in terms of simple conservation of soil and water. Watershed development still is not strategized in terms of creating sustainable livelihoods by improving the productive potential of the ecosystem. Unlike other conservation strategies (for e.g., forest and species conservation), the philosophy and practice of watershed-based conservation is not at loggerheads with livelihoods of the community inhabiting the watershed area. In fact, the very objective of watershed development should be sustainable productivity enhancement and, consequently, increased livelihood options and support. To achieve this, a critical shift is required in the way watersheds are being planned and implemented. Most often conservation measures planned and implemented are independent of the farming systems and livelihood strategies of the local community. They stand as individual measures, independent of the production potential of the ecosystem resources as a whole. Planning should look into the livelihood strategies of different sections living in the watershed, and their relation/dependence to ecosystem resources. The dominant practice currently followed is to identify a set of treatment measures, assuming that implementation of those measures will automatically lead to improved resource management, enhanced production and livelihood options. Neither a farming system approach nor a livelihood system approach is followed for planning of watersheds. This is very important not only from the perspective of creating sustainable livelihoods, but also from sustainability and equity concerns. If different sections identify a livelihood stake in watershed development, the very sustainability of the intervention is more likely ensured. Planning from a livelihood perspective, involving all households and sections in a watershed may create chances for bringing equity concerns to the center stage of watershed development. Currently the 'real planning' where investments are involved is with the landholders; even though PRAs are conducted, they fail to elicit different concerns in relation to conservation, resource-regeneration and livelihoods. This may be the reason for livelihoods becoming non-farm income-generation activities. This may lead to change and flexibility in fund allocation for different measures.

7.1.2 Watershed Development Unit

Another issue with respect to planning, which has a policy bearing, is related to the size of the 'unit of planning' and currently it is micro-watersheds generally of just more than 500 ha. Most often, such a small unit may not reflect macro issues and concerns, especially those related hydrology and other externalities. Small basins and catchments as units, with an integrated perspective of resource management may be necessary without ignoring the micro concerns. This also will mean integrating the micro and macro concerns in the planning details. Saturation of a larger area is also important from the point of impacts, resource efficiency and evolving mechanisms for regulation of regenerated resources.

7.1.3 Project Implementation and Community Participation

Another important concern is related to the methods and strategies of project administration. Increased devolution of authority to the community is required. At present, the community is expected

to participate in a set of agendas on which they do not have much control, even though projects are called participatory. The community should have an increased say/role in project-related issues such as finance management, allocations for different aspects, local contribution etc. More devolution of authority should occur in congruence with strategies for increased democratization of the community or it may preserve the status quo. This may also require increased flow of project-related information to the community and different sections, especially the resource-poor such as labourers in the watershed site, women and other disadvantaged sections. Downward accountability from the higher levels of hierarchy to the local level is also very important. Currently, the community is asked to undertake a lot of responsibility in relation to the project implementation, without sufficient devolution of authority, even though most state-supported projects have systems to transfer the project money to the watershed committee jointly operated with the WDT. However, most often it is the WDT which takes major decisions regarding its allocation and use.

Effective and empowered participation also requires strategies for democratization and decision-making at the community level. Our review shows that most often a couple of watershed committee members are involved in decision-making and other institutions promoted as part of watershed development seldom have any role in decisions. Even though formation of SHGs and UGs are considered a precondition for watershed development and formation of watershed committees, they hardly have a role in decisions regarding project administration. In states like Andhra Pradesh attempts are made to increase the involvement of SHGs and UGs by getting different watershed activities implemented by them with the watershed committee working as a management and coordinating body. This creates a stake and say for these institutions in watershed-oriented decisions. Beside these responsibilities related to project administration there are also wider issues related to regulation of resources at the local level. In our opinion it is necessary that these responsibilities be entrusted with the Gram Sabha/ Watershed Association which is more equipped to handle such issues. However there should be sufficient attention paid to involving and creating space for the powerless and disadvantaged sections such as dalits, adivasis, women, landless etc .It may not be an easy task given the culture of exclusion and silence traditionally prevalent in our society. Community organization and institution building at the local level requires more attention and an increased time frame. Implementation of conservation measures should start only after achieving this objective. Negotiations and arrangements for resource augmentation and sharing may also be part of institution-building. Most often the institution (read members) does not see a stake in the project and the resultant benefits hence become dormant and inactive. Related to this is also the issue of capacity building of relevant stakeholders. A capacity building strategy should be integral to project management, resource-augmentation and management. It needs to be embedded with the project strategy and project duration. In most government-supported projects, as the review shows, it is a one-time effort and progressive induction in improving the capacity based on different requirements of the project is not visible. With the new Hariyali guidelines, even the fund allocation for community organization and capacity building has also been reduced to five per cent as compared to ten per cent available earlier. Bringing in the concept of 'Mother NGO' as a resource organization in improving community organizations, capacity building and participation also need to be analysed for their effectiveness in bringing changes in these areas.

7.1.4 Conservation and Production Technology

Related to this is the issue of watershed technology and the role of the community in selecting relevant and appropriate technology. Most often the tendency is to choose conventional technologies, like cement masonry structures. It is also noticed that the better-off farmers who have lands in the valley often put pressure on the PIA to opt for such measures. How ever technologies should be a god mix of

low cost (using local material and skills) with some components of conventional measures. Efforts are needed in identification and upgrading of local technologies the farmers are using. Technologies should have scope for easy comprehension and acceptance by the local community. The issue of technology has an implication for livelihoods, equity in investments and sustainability of watershed measures. Besides conservation technologies, the kind of production technologies promoted under watershed are also conventional and external-input oriented. Since increase in production is one of the major goals of watershed development the facilitators, especially those from the government departments tend to choose such methods. At present there are not many incentives in favour of switching to low-external input sustainable agriculture, in terms of the subsidies available or pricing of the product. Watershed development has the scope of bringing such incentives, especially for medium and small farmers. There should also be scope for participative experimentation with farmers in developing conservation and production technologies. Addressing these issues will call for increased allocation and rearrangements in budget allocation for different components. It will also mean improved capacity of the WDT and exposures and capacity building of farmers.

7.1.5 Common Property Land Resources

Regarding development of common property land resources (CPLR), both the forest and community lands have also emerged as an important issue in our review. It has its implication on issues related to livelihoods of the resource-poor. Most often these lands are not developed under the watershed programme due to practical and administrative reasons. In places where they are developed, this has not succeeded in ensuring the usufructs to the resource poor. Ensuring rights over augmented resources in favour of the resource-poor is essential. To an extent it can be facilitated at the community level, but the necessary administrative and legal provisions (in relation to different common property regimes) are required to ensure this. There are no enabling policy frameworks to provide user rights to the community and resource-poor, except may be for the JFM resolution. Most often the developed commons fail to ensure some returns, except for grass in some instances, due to improper technology and plant species. However, development of commons and allocation of certain rights in favour of the resource-poor is necessary in the watershed development programmes to address the issue of livelihoods of the resource-poor. Increased investments, resolving administrative bottlenecks, interdepartmental coordination and policy formulation for user rights are required to achieve this.

7.1.6 Equity

Related to this is the issue of equity in access to augmented resources. While there could be an enabling environment and legal provisions which can further equity, equity in and of itself cannot be legislated. A greater awareness of and sensitivity to equity issues and their implications are a precondition, if one has to even explore various possibilities. There are many possibilities. Equity can be achieved through social arrangements for increased access to rejuvenated resources such as biomass, water etc. Creating surface water resources (in a conventional watershed, the tendency to convert all water into groundwater requires rethinking) and biomass and access to it in favour of the resource-poor is very important. Increased allocation of project-related finance for developing such measures, besides other biomass related income-generation activities, are also important. Equity can also be addressed through increased investments in labour-oriented conservation measures ensuring that the labour goes to the resource-poor and they get the 'real' wage as factored in the project. It is also important that labourers receive equal wages and are not paying the contribution for the landholders as a 'wage cut'. Facilitating equity concerns require 'out of the box' thinking, a different set of capacities and sensitivity with the WDT.

7.1.7 Operation and Management of Assets

Sustainability of project measures and ecosystem resources are a major concern in most programmes under

review. Lack of strategy is observed in maintaining and repair of measures and assets created under the project. Even though a watershed development fund (WDF) is created and PIAs are expected to chart out an exit protocol, the operation and maintenance of watershed measures is in disarray. Communities are found lacking a vision or systems in respect of post-project management of assets. In many places the WDF is neither utilized nor is there much information about its status. A clear strategy for management of WDF and systems for operationalizing asset maintenance are required.

7.1.8 Management of Groundwater

The review also shows that the use of water for irrigation is expanding and receiving greater priority in watershed projects. In most projects for which information is available, the number of water extraction sources such as open wells and borewells have increased after watershed implementation. Even though there is increased groundwater recharge as a result of water conservation, the extraction is often outpacing the amount of recharge, creating a water shortage during the summer months. The water situation in most watersheds during summer months is almost the same as what it was earlier, with water tankers supplying water for drinking and household use. Most often the scarcity is explained as a result of poor rainfall, ignoring issues related to over-extraction, lopsided prioritization of water use etc. A simple but scientific system of analyzing the water balance at the community level is also lacking. Overexploitation is leading to extraction of water from the deep aquifers with serious implications not just for long-term sustainability of agriculture, but also for the quality of water for the domestic sector. There are a few examples where the community has introduced self-regulation on groundwater extraction and use, such as a ban on borewells for agriculture and on cultivation of water-intensive crops. These examples are far and few. However, it is very important to set up regulatory mechanisms within the community that will ensure priority to domestic water use and will also monitor and regulate groundwater extraction. The self-regulation by communities can be made a precondition to grant watershed development projects. Besides community-initiated regulation, it might also require certain enabling policy initiative and legislation on the part of the state to enable Gram Sabhas to regulate water use.

7.1.9 Project Management

A major concern that has emerged as part of the review is the overall management (including issues related to finance) and delivery systems in watershed development. Reforms in the institutional arrangement are required to streamline delivery systems of watershed development. Currently, the Zilla Parisad/DRDA is responsible for district-level project management and has a number of other mandates of which watershed development is one. A dedicated Project Support Unit with subject matter specialists in community organization, capacity building, gender, monitoring and evaluation, GIS/MIS is required to bring professionalism into the watershed management and delivery mechanism. Such a system is also required at the state level. There is a need to organize empowered committees with experts from state and civil society to provide overall steering and monitoring support. Financial allocation is also required for undertaking embedded and periodic monitoring and evaluations, issue-based studies and research. Flexibility in project administration is required so that findings from such activities can be incorporated to improve the efficiency and effectiveness of the project.

A lot of problems are observed in relation to fund disbursement. Most often money is released at the fag end of the financial year, affecting the quality of biophysical activity and community mobilization. A performance-related and transparent system of fund disbursement is required for improving the efficiency of the projects. This may also require the creation of commonly agreed systems and procedures, including indicators for performance assessment. There should also be systems for redressal in cases where decisions are found to be arbitrary. An overall transparency is required in project administration and details of financial allocation and status of different projects should be available in the public domain.

7.1.10 Baseline/ Benchmarking

Another concern is the absence of reliable baseline data/information on biophysical resources and sociological aspects of watersheds. Such a baseline and benchmarking is very important to understand changes and impacts of watershed development. In the absence of such information, impacts and processes are assessed on the basis of estimations and recall, as is evident from our literature survey. Financial allocation and development of easy-to-use scientific tools for information collection and management is required in watershed development.

7.2 Some Strategies for Improving the Efficiency and Effectiveness of Watershed Development

Selection and prioritization of watersheds: eligible blocks may be prioritized based on additional parameters (such as groundwater situation, status of biomass etc.) other than those prescribed in the guidelines. Delineation to be done at milli-watersheds/contiguous area of more than 5 to10000 ha and at micro-watershed level for the entire block. The strategy should to bring the prioritized Milli-watersheds, sequentially under minimum soil and water conservation measures, and one PIA should be made responsible for that. Selection to be more objective and transparent. Assessing community's willingness.

Selection of resource organization/ project support unit at district level.

Selection of PIA: objective criteria, proven record, capacity-assessment, ideology and commitment to participatory processes, non-political selection etc.

Planning: moving away from conservation planning to livelihood and land-use/ production (farming) system planning.

Baseline and planning tools: natural resource and biophysical benchmarking, sociological details, mix of participatory and scientific planning tools.

Extended project period: eight to ten years.

Phasing of projects: capacity-building and community mobilization phase (social and institutional arrangements for augmented resources, capacity building of WDT and villagers); implementation phase (biophysical, production and livelihoods) and consolidation phase (sustainable productivity enhancement, handing over all responsibilities, consolidating livelihoods of resource poor etc.). Progressive entry to the next phase based on performance.

Increased allocation of funds: Rs. 12,000 ha from the current norm of Rs 6000[60]. Fund to be earmarked for database and monitoring information, targeted allocation for resource-poor.

Monitoring and evaluation: development of systems and tools, MIS, systems of transparency, participatory end-phase evaluations, monitoring of process and outcomes.

Enlisting the support of resource organization and individuals for support services in technology development, livelihood promotion, participatory resource budgeting/ plan and use etc.

Creation of transparent processes and systems for assessment, scrutiny and fund release.

Embedded capacity-building plan in relation to capacity requirement in different phases.

Strategy for increased devolution of authority and responsibility to the community.

Formation of nested institutions: to address issues above the village level, for backward and for ward linkages in production, marketing etc.

7.3 Research Needs

It is evident from our literature review that, there is a 'knowledge gap' in some critical areas related to participatory watershed development. Barring a few examples, there is very little in-depth and holistic information on different

[60] Parthasarthy Committee report also suggests an increased allocation (Rs 12000/ha) and an increased project period.

aspects of watershed development, covering the biophysical, social/ anthropological and institutional aspects of watershed development. This has its impact in evolving sound strategies for improving the efficiency and effectiveness of watershed development. Most often these studies are very limited in scope and objective, and are mostly done immediately after project implementation, covering a few biophysical and social aspects. Watershed development is a complex, multi-sectoral intervention and a host of factors influence its outcomes. Some outcomes take longer to register/ manifest their visibility and immediate evaluations fail to capture them. Most issues that need critical analysis and understanding require time-series data. The human, ecosystem resource and livelihood interaction also undergoes changes due to external factors such as changes in production system (means and methods), variations in climatic conditions (drought), larger political economic policies and processes etc. Understanding these in the context of watershed development is also very important and may require long-term studies. Watershed being a combination of biophysical and social intervention, researches and studies need to adopt inter-disciplinary approaches and methods to capture the outcomes in a holistic way. Resource utilization is also determined by the cultural habits and economic behaviour of the community and economic/cultural anthropological analysis is required to understand these aspects.

Some areas in which research studies and action research projects are required are[61]:

Study of the cumulative impact of watershed development taking a larger unit area, something like a sub-basin (contiguous micro-watersheds of more than 10,000 ha or so) saturated by watershed activities to understand the impacts on hydrology (both surface and groundwater), interaction amongst different locations in the watershed (for example ridge and valley interactions), resource conflicts, institutions and governance and intra- and inter-watershed sociological and economic issues.

Conservation/development measures/technologies and their impact on soil, water and vegetation/biomass in different rainfall and geophysical conditions.

Grazing, resource-management, livestock and livelihoods in the watershed context.

Watershed development, mobilization of ecosystem resources and livelihood issues in different socio-ecological regions.

Common property resources, watershed development and its impact on livelihoods of the resource-poor. Issues related to user rights/access on rejuvenated common property resources.

Comparison of tribal and non-tribal watersheds.

Time-series studies of selected watersheds over a period of time covering issues of resource use, sustainability, equity in access etc.

Process studies of different projects or modes of implementation (government, NGO, bilateral) in terms of project-management systems, approaches and strategies, participatory processes, devolution, monitoring and evaluation systems, withdrawal/exit strategies etc.

Institutions, social capital and its impacts on participation, equity and sustainability.

Watershed development and its scope and limits in livelihood generation in heterogonous units and resource-poor areas.

GIS-based change detection and impact analysis.

Impact of support organization (mother or support NGOs/ organizations) in project management, participation, capacity building, community mobilization and institution-building.

Watershed development, employment generation, trickle-down effect: the resource-poor and their stake in watershed

[61] *The priority focus areas for research grouped under three broad areas, namely, hydrological, land-vegetation-water interactions, and socio-economic aspects, are also discussed in Joy and Paranjape (2004).*

development.

Action research on community-based water balance assessment, budgeting and monitoring. Developing robust models for this is important.

Action research on participatory technology development (PTD) for soil and water conservation and agricultural/biomass production keeping the land capability classes so that interventions especially in land classes

The newly formed Forum for Watershed Research and Policy Dialogue (ForWaRD), Pune, a collaborative effort of the Society for Promoting Participative Ecosystem Management (SOPPECOM), Pune, the Gujarat Institute of Development Research (GIDR), Ahmedabad and Centre for Interdisciplinary Studies in Environment and Development (CISED), Bangalore are currently involved in some of these research areas and questions discussed above in the three states of Maharashtra, Madhya Pradesh and Karnataka respectively. Some of the broader aspects that ForWaRD would like to address in its research efforts are productivity/livelihoods and other benefits, downstream impacts, cross-sectoral allocation of water and democracy in implementation.

7.4 Reorienting the Watershed Programme[62]

ForWaRD is aware that mere rigorous research is not going to deliver; also mere tinkering with the existing guidelines and policies will not help in actualizing the full potential of WDP. The review clearly shows that the programme needs to be restructured significantly, if the watershed development approach has to deliver what it promises. Such a restructuring must clearly embrace a normative framework that treats livelihoods, productivity, sustainability, equity and decentralized governance as its central concerns, and must be based on strategies that respond to the varying socio-ecological contexts and past experiences with implementation.

What is needed is a radical restructuring and reorientation of the programme -- a reorientation that might be best captured as a shift from "integrated and participatory watershed management" to "integrated and decentralized resource governance". This entails:

Adopting productivity, livelihood assurance, sustainability, equity, and democracy as basic values or goals.

Integration across all resources and related sectors (forest, livestock, drinking water and sanitation, minor irrigation, etc.) and across scales (micro to milli to sub-basin).

Moving towards a statutory system to regulate resource use beyond the life of the watershed programme.

Moving towards greater downward accountability.

Clearer separation of roles at different levels, with central and state agencies focusing on funding, district agencies focusing on provision of information, training, technical support, and monitoring, a milli-watershed level institution handling implementation and some regulatory aspects, and micro-watershed level institutions handling planning and long-term regulation.

Looking at drought not as a purely hydrological drought but as a social phenomenon triggered by it, and therefore requiring the incorporation of the notion of dependability.

[62] This section is drawn from Joy et al. (2006), Reorienting the Watershed Programme in India, Occasional Paper, Forum for Watershed Research and Policy Dialogue, Pune.

Table A 2.1:
Land Utilization Statistics (2000-02)
(Figures in percentage unless specified)

Division	Konkan div.	Nashik div.	Pune div.	Kolhapur div.	A'bad div.	Latur div.	A'wati div.	Nagpur div.	State total
Reported area for land utilization statistics ("00"ha)	29,790	41,653	47,518	26,955	28,489	35,945	45,967	51,266	307,583
Forest	19.70	24.44	7.63	12.43	3.54	3.52	15.30	38.67	16.96
Barren and unculturable land	17.65	7.50	7.12	7.51	1.86	1.70	2.78	1.97	5.59
Land under non agri-use	7.26	1.82	2.88	4.14	4.42	3.09	4.58	7.53	4 .47
Culturable waste	9.21	0.72	2.02	3.31	2.54	3.97	1.44	2.80	2.97
Permanent pastures	3.71	2.70	3.35	5.07	3.56	3.33	3.84	6.48	4 .07
Land under misc. trees and grooves not included in net area sown	2.69	0.16	0.48	0.96	0.61	0.77	0.50	0.81	0.80
Current fallows	2.22	2.22	4.78	2.56	7.22	7.93	2.38	3.16	3.95
Other fallows	10.09	1.29	5.57	4.76	4.25	4.71	1.62	1.56	3.87
Net area sown	27.48	59.19	66.17	59.26	71.97	71	67.57	37.01	57 .32
Area sown more than once	2.42	15.04	14.21	20.01	23.14	30.57	19.06	4.41	15.52
Gross cropped area	29.90	74.23	80.38	79.27	95.11	101.57	86.63	41.42	72.84

Source: www.agri.mah.nic.in/agri/stat/Lus-main

Table A 2.2:
Distribution of Drought-prone Areas and Extent of Irrigation in Maharashtra

Source: GoM, Agro-climatic zones, 2003

District	Geographical area ('000 ha)	Net cropped area	Irrigated area	Irrigated area (%)	Drought-prone area ('000 ha)	Drought-prone area (%)
Thane	972	244,600	12,375	5		
Raigad	687	188,500	9,600	5		
Ratnagiri	816	245,400	1,950	1		
Sindhudurg	504	140,200	23,550	17		
Konkan div.	**2,979**	**818,700**	**47,475**	**5.80**		
Nashik	1,563	886,600	170,250	19	1,563	100
Dhule	1,438	734,700	77,400	11	1,062	74
Jalgaon	1,164	850,500	132,750	16	651	56
Nashik div.	**4,165**	**2,471,800**	**380,400**	**15.39**	**3,276**	**79**
Ahmadnagar	1,702	1,145,600	253,425	22	1,261	74
Pune	1,562	977,200	213,000	22	1,500	96
Solapur	1,488	1,037,700	192,900	19	1,327	89
Pune div.	**4,752**	**3,160,500**	**659,325**	**20.86**	**4,088**	**86**
Kolhapur	776	424,600	93,450	22		0
Satara	1,058	577,800	166,275	29	436	41
Sangli	861	591,700	109,275	18	719	83
Kolhapur div.	**2,695**	**1,594,100**	**369,000**	**23.15**	**1,155**	**43**
Aurangabad	1,008	702,500	141,600	20	802	80
Jalna	773	603,200	82,425	14	188	24
Bid	1,069	778,200	188,250	24	823	77
Aurangabad div.	**2,849**	**2,083,900**	**412,275**	**19.78**	**1,813**	**64**
Latur	716	534,400	29,325	5	488	68
Osmanabad	749	507,500	91,050	18	317	42
Nanded	1,033	710,600	55,575	8	470	46
Parbhani	1,097	825,700	83,325	10	126	11
Latur div.	**3,595**	**2,578,200**	**259,275**	**10.06**	**1,401**	**39**
Buldhana	967	692,900	37,725	5	684	71
Akola	1,056	818,500	23,475	3	1,056	100
Amravati	1,222	752,000	58,800	8	680	56
Yavatmal	1,352	849,900	47,400	6	1,034	76
Amravati div.	**4,597**	**3,113,300**	**167,400**	**5.38**	**3,453**	**75**
Nagpur	986	547,600	101,175	18	83	8
Chandrapur	1,092	459,600	83,400	18	349	32
Gadchiroli	1492	178,800	43,575	24	306	20
Bhandara	928	358,600	165,975	46		0
Wardha	629	366,500	33,450	9		0
Nagpur div.	**5,127**	**1,911,100**	**427,575**	**22.37**	**738**	**14**
Maharashtra	**30,758**	**17,731,600**	**2,722,725**	**15.36**	**15,923**	**52**

Table A 2.3:
District/ Division-wise Distribution of Watersheds

District	Number of watersheds			
	Major-	Sub-	Mini-	Micro-
Thane	34	140	288	789
Raigad	17	91	220	678
Ratnagiri	20	82	116	504
Sindhudurg	11	68	191	650
Konkan div.	**82**	**381**	**815**	**2,621**
Nashik	80	283	501	2,518
Dhule/Nandurbar	65	302	589	1,600
Jalgaon	66	278	678	1,328
Nasik div.	**211**	**863**	**1,768**	5,446
Pune	71	303	637	3,290
Ahmadnagar	80	225	835	3,466
Solapur	64	185	415	1,296
Pune Div.	**215**	**713**	**1,887**	**8,052**
Satara	50	217	446	1,361
Sangli	38	202	400	1,005
Kolhapur	40	193	366	1,621
Kholapur div.	**128**	**612**	**1,212**	**3,987**
Aurangabad	52	226	0	1,190
Jalna	52	191	385	1,299
Beed	48	104	322	2,132
Aurangabad Div.	**152**	**521**	**707**	**4,621**
Latur	39	117	211	8,06
Osmanabad	41	151	291	9,35
Nanded	49	123	256	1,307
Parbhani/Hingoli	51	246	506	1,541
Latur div.	**180**	**637**	**1,264**	**4,589**
Buldhana	57	250	514	1,471
Akola	65	155	261	6,65
Washim		131	243	5,87
Amravati	63	228	450	1,341
Yavatmal	64	439	732	1,503
Amravati Div.	**249**	**1,203**	**2,200**	**5,567**
Wardha	39	144	0	1,162
Nagpur	54	206	0	1,792
Bhandara	54	157	0	1,416
Chandrapur	58	154	0	2,174
Gadchiroli	83	182	0	2,758
Nagpur Div.	**288**	**843**	**0**	**9,302**
Total	**1,505**	**5,773**	**9,853**	**44,185**

Table A 2.4:
DPAP Projects Sanctioned in Maharashtra

District	Number of projects sanctioned[1]										
Batch	1st	2nd	3rd	4th	5th	6th	7th	8TH	Har-I	Har-II	Total
Year	95-96	96-	97-	98-	99-00	00-01	01-02	02-03	03-04	04-05	
Installments	7	7	7	7	7	6	5	4	2	1	
Nashik	78(5)	0	0	0	0	0	26(1)	52(1)	26(1)	26(1)	208
Dhule	41(7)				41(1)	20(1)	14(1)	0	6(1)	6(1)	144
Nandurbar		0	0	0					8(1)	8(1)	
Jalgaon	38(4)	0	0	0	0	20(2)	14(2)	35(2)	14(1)	14(1)	135
Nashik div.											**487**
Ahmednagar	60(5)	0	0	0	0	85(1)	20(1)	0	20(1)	20(1)	205
Pune	72(4)	0	0	0	0		24(2)	48(2)	22(1)	23(1)	189
Sholapur	59(6)	0	0	0	0	84(2)	20(2)	0	20(1)	21(1)	204
Pune div.											**598**
Sangli	35(7)	0	0	0	35(2)	15(2)	12(2)	0	14(1)	15(1)	126
Satara	23(7)	0	0	0	23(2)	11(2)	8(2)	0	8(1)	8(1)	81
Kolhapur div.											**207**
A. Bad	35(6)	0	0	0	35(2)	15(2)	12(2)	0	12(1)	12(1)	121
Beed	34(5)	0	0	0	0	54(2)	12(2)	0	12(1)	12(1)	124
Jalna	11(5)	0	0	0	0	25(1)	4(1)	0	4(1)	4(1)	48
Aurangabad											**293**
Nanded	23(6)	0	0	0	23(3)	15(3)	8(3)	0	8(1)	8(1)	85
Osm'bad	18(7)	0	0	0	18(3)	21(**3**)	6(3)	0	6(1)	7(1)	76
Parbhani	24(5)	0	0	0	0	39(1)	8(1)	0	4(1)	5(1)	80
Hingoli		0	0	0	0			0	4(1)	5(1)	9
Latur	24(6)	0	0	0	0	38(3)	8(1)	0	8(1)	8(1)	86
Latur div.											**336**
Akola	56(4)	0	0	0	0	0	26(2)	52(1)	14(1)	14(1)	186
Washim									12(1)	12(1)	
Amravati	47(4)	0	0	0	0	0	18(1)	36(1)	18(1)	18(1)	137
Buldhana	46(6)	0	0	0	0	61(2)	18(2)	27(**2**)	18(1)	18(1)	188
Yavatmal	44(7)	0	0	0	44(2)	25(2)	24(2)	36(1)	24(1)	24(1)	221
Amravati div.											**732**
Chandrapur	22(4)	0	0	0	0	20(2)	6(2)	9(2)	6(1)	6(1)	69
Garchiroli	20(5)	0	0	0	0	40(1)	6(1)	0	6(1)	7(1)	79
Nagpur	8(2)	0	0	0	0	0	2(1)	5(1)	2(1)	2(1)	19
Nagpur div.											**167**
Total	818	0	0	0	219	588	296	300	296	303	**2,820**

The average size of a watershed project is 500 ha. The total project cost is released in seven installments over a period of five years

Table A 2.5:
Progress of DPAP in Maharashtra from 1995-96 up to 2003

			Progress of watershed development in DPAP, 1995-96 to June 2003 (Rs in lakhs)										
	District	**No. of** w.s.	**Govt.**		**N.G.O.**		**Project**	**Releases (1995-96 TO 30.6. 2003)**			**Others**		**Grand Total**
			P.I.A.	W.S.	P.I.A.	W.S.	Cost	CENTRAL	STATE	TOTAL	Interest	Receipts	
1	Nashik	78	14	52	5	26	1,361.84	624	624	1,248	13.47	0	1261.47
2	Dhule	41	2	18	4	23	814.89	410	410	820	1.04	0	821.04
3	Jalgaon	40	7	34	1	6	723.19	304.50	304.5	609	7.85	0.98	617.83
	Nashik diiv.	159	23	104	10	55	2,899.92	1,338.50	1,338.5	2,677	22.36	0.98	2,700.34
4	Ahmednagar	60	4	19	7	41	1,100.74	465	465	930	5.14	27.79	962.93
5	Pune	68	1	6	11	62	1,109.39	468	468	936	5.19	8.13	949.32
8	Solapur	59	1	29	12	30	1,093.00	539	539	1,078	1.44	7	1,086.44
	Pune div.	**187**	**6**	**54**	**30**	**133**	**3,303.13**	**1,472**	**1,472**	**2,944**	**11.77**	**42.92**	**2,998.69**
6	Satara	23	1	4	3	19	460.00	230	230	460	1.67	7.4	469.07
7	Sangli	35	1	19	6	16	700.00	350	350	700	0.34	3	703.34
	Kolhapur div.	**58**	**2**	**23**	**9**	**35**	**1,160.00**	**580**	**580**	**1,160**	**2.01**	**10.4**	**1,172.41**
9	Aurangabad	35	1	2	5	33	695.43	352.98	336.88	689.85	2.62	1.43	693.9
10	Jalna	11	1	9	2	2	177.49	85.25	85.25	170.5	0	0	170.5
12	Beed	36	4	31	2	5	540.44	267.53	267.53	535.06	0	0	535.06
	Aurangabad div.	**82**	**6**	**42**	**9**	**40**	**1,413.36**	**705.76**	**689.66**	**1,395.41**	**2.62**	**1.43**	**1,399.40**
11	Parbhani	24	2	24	0	0	457.71	186	190.3	376.3	0	0	376.3
13	Nanded	23	2	5	2	18	460.00	221.38	221.38	442.75	0.24	0	442.99

Table A 2.5: contd...

14	Osmanabad	18	0	0	2	18	333.76	162.00	178.1	340.1	1.12	4.62	345.84
15	Latur	24	1	6	2	18	477.12	216.00	216	432	0	2.88	434.88
	Latur Div.	**89**	**5**	**35**	**6**	**54**	**1,728.59**	**785.38**	**805.78**	**1,591.15**	**1.36**	**7.5**	**1,600.0**
16	Buldhana	48	1	2	4	46	1,210.87	402.02	449.52	851.54	0.57	17.91	870.02
17	Akola	63	2	5	12	58	1,199.04	409.50	409.5	819	10.02	0.6	829.62
18	Amravati	48	5	26	6	22	1,119.04	302.00	302	604	1.11	3.01	608.12
19	Yavatmal	68	1	24	8	44	1,137.79	440.00	440	880	0	0.21	880.21
	Amravati div.	**227**	**9**	**57**	**30**	**170**	**4,666.74**	**1,553.52**	**1,601.02**	**3,154.54**	**11.7**	**21.73**	**3,187.9**
20	Nagpur	7	0	0	1	7	101.14	9.65	26.53	36.18	0	0	36.18
21	Chandrapur	24	1	15	3	9	311.46	107.25	107.25	214.5	0.75	0	215.25
22	Gadchiroli	23	1	4	2	19	360.55	116.25	153.75	270	0	0	270
	Nagpur div.	**54**	**2**	**19**	**6**	**35**	**773.15**	**233.15**	**287.53**	**520.68**	**0.75**	**0**	**521.43**
	TOTAL	**856**	**53**	**334**	**100**	**522**	**15,944.9**	**6,668.30**	**6,774.48**	**13,442.78**	**52.57**	**84.96**	**13,580.**

Table A 2.6:
District-wise Details of IWDP Projects Sanctioned from 1995-96 to 2002-03
(as on 31.3.2003; Rs in lakhs)

Districts	Phase	Project period	Total area (in ha)	Total cost	No. of instalments		Amount due	Amount released	% of re
					Due	Released			
Thane	I	99-00 TO 03-04	10,246 (15)	409.84	4	1	266.40	61.48	15
Raigad	I	99-00 TO 03-04	12,138 (22)	486	4	1	315.90	72.90	15
Ratnagiri	I	99-00 TO 03-04	11,320 (12)	452.8	4	2	294.32	105.37	23
Sindhudurg	I	98-99 TO 2002-03	11,320 (22)	452.8	6	4	407.52	295.95	65
	II	99-00 TO 03-04	11,775 (19)	471	4	3	306.15	205.65	44
	III	2000-01 TO 04-05	11,886 (7)	713.16	2	1	196.12	98.06	14
Konkan div.			68,685 (97)	2,985.6	24	12	1,786.41	839.41	28
Jalgaon	I	2001-02 TO 05-06	8,241 (15)	494.46	1	1	67.99	67.99	14
Nasik div.			8,241 (15)		1	1	67.99	67.99	14
Pune	I	2001-02 TO 05-06	6,428 (16)	385.68	1	1	53.03	53.03	14
Pune div.			6,428 (16)	385.68	1	1	53.03	53.03	14
Aurangabad	I	2000-01 TO 04-05	12,180 (9)	730.78	2	1	200.96	100.48	14
Beed	I	2000-01 TO 04-05	12,295 (17)	737.7	2	1	202.87	101.43	14
Aurangabad div.			24,475 (26)	1,468.48	4	2	403.83	201.91	14
Sangli	I	2000-01 TO 04-05	12,308 (12)	738.48	2	1	203.08	101.54	14

Table A 2.6: contd...

Satara	I	2000-01 TO 04-05	12,487 (20)	749.22	2	1	206.04	103.02	14
Kolhapur	I	99-00 TO 03-04	12,496 (15)	499.87	4	2	324.92	120.98	24
Kolhapur div.			37,291 (47)	1,987.57	8	4	734.04	325.54	16
Latur	I	2000-01 TO 04-05	12,500 (9)	750	2	1	206.25	103.12	14
Hingoli/	I	97-98 TO 2001- 02	9,540 (16)	381.6	7	3	381.60	171.27	45
Parbhani	II	98-99 TO 2002-03	11,395 (10)	455.78	6	3	410.20	200.09	44
Latur div.			33,435 (35)	1,587.38	15	7	998.05	474.48	30
Amravati	I	98-99 TO 2002-03	11,424 (29)	456.96	6	4	411.26	291.34	64
Yavatmal	I	2001-02 TO 05-06	7,001 (9)	420.06	1	1	57.76	57.76	14
Amravati div.			18,425 (38)	877.02	7	5	469.02	349.10	40
Nagpur	I	2000-01 TO 04-05	10,558 (24)	633.48	2	1	174.21	87.10	14
Wardha	I	2001-02 TO 05-06	5,605 (14)	336.32	1	1	46.25	46.25	14
Nagpur div.			16,163 (38)	969.8	3	2	220.46	133.35	14
Total			213,143 (312)	10,755.99			4,732.84	2,444.81	23

Source: Commissionerate of Agriculture, Pune

Table A 2.7:
Progress of Watershed Development in 50% EAS 1995-96 to June 2003
(Rs in lakhs)

District	Watersheds		GOVT.		N.G.O.		Release (95..96.to 30.6.2003)				Others		Grand Total	Exp.
	Selected.	Completed	P.I.A.	W.S.	P.I.A.	W.S.	Project Cost.	CENTRAL	STATE	TOTAL	Int.	Receipts		
Nasik	130	130	13	105	6	25	2035.30	1850.25	490.50	2340.75	0.49	0	2341.24	1213.30
Dhule	98	98	2	28	16	70	1817.93	991.84	262.58	1254.42	0.77	1.03	1256.22	1278.16
Jalgaon	63	63	2	16	5	47	1144.86	620.50	148.92	769.42	5.8	3.93	779.15	789.55
Nasik div.	**291**	**291**	**17**	**149**	**27**	**142**	**4998.09**	**3462.59**	**902.00**	**4364.59**	**7.06**	**4.96**	**4376.61**	**3281.01**
Ahmednagar	95	95	10	56	10	39	1781.26	1464.29	389.90	1854.19	0.00	61.04	1915.23	1101.36
Pune	155	155	1	73	14	82	2469.86	1434.20	413.47	1847.67	2.61	31.26	1881.54	1806.20
Solapur	108	108	1	64	13	44	2012	1326.19	369.56	1695.75	1.84	66.67	1764.26	1429.69
Pune div.	**358**	**358**	**12**	**193**	**37**	**165**	**6263.12**	**4224.68**	**1172.93**	**5397.61**	**4.45**	**158.97**	**5561.03**	**4337.25**
Satara	40	40	1	26	3	14	767.58	529.79	144.10	673.89	1.73	4.20	679.82	681.75
Sangli	107	107	1	102	2	5	2248.00	784.14	199.72	983.86	0.20	14.06	998.12	905.18
Kolhapur div.	**147**	**147**	**2**	**128**	**5**	**19**	**3015.58**	**1313.93**	**343.82**	**1657.75**	**1.93**	**18.26**	**1677.94**	**1586.93**
Aurangabad	107	107	3	71	5	36	1915.69	972.26	267.01	1239.27	0.00	1.40	1240.67	1371.29
Jalna	28	28	1	12	2	16	452.20	257	73.99	330.99	1.36	0.00	332.35	344.63
Beed	42	42	4	42	0	0	641.81	675.75	171.92	847.67	0.00	6.88	854.55	710.44
Aurangabad div.	**177**	**177**	**8**	**125**	**7**	**52**	**3009.70**	**1905.01**	**512.92**	**2417.93**	**1.36**	**8.28**	**2427.57**	**2426.36**
Parbhani	47	33	1	6	4	41	878.96	596.20	167.06	763.26	2.67	3.14	769.07	766.47

Table A 2.7: contd...

Nanded	68	68	1	8	6	60	1360.00	612.34	182.44	794.78	3.70	0.00	798.48	879.87
Osmanabad	27	27	3	27	0	0	615.21	303.63	95.38	399.01	6.83	3.69	409.53	413.37
Latur	40	40	0	0	4	40	800.00	489.7	136.57	626.27	0.00	2.30	628.57	653.14
Latur div.	**182**	**168**	**5**	**41**	**14**	**141**	**3654.17**	**2001.87**	**581.45**	**2583.32**	**13.20**	**9.13**	**2605.65**	**2712.85**
Buldhana	81	81	0	0	8	81	2397.28	695.69	191.48	887.17	0.00	10.24	897.41	886.91
Akola	51	18	3	51	0	0	1254.58	1185.31	296.35	1481.66	26.28	0.00	1507.94	842.51
Amravati	79	79	3	24	11	55	1679.97	791.56	218.85	1010.41	2.49	3.69	1016.59	996.15
Yavatmal	158	158	1	49	26	109	3297.04	1969.41	582.72	2552.13	8.35	0.00	2560.48	2685.07
Amravati div.	**369**	**336**	**7**	**124**	**45**	**245**	**8628.87**	**4641.97**	**1289.40**	**5931.37**	**37.12**	**13.93**	**5982.42**	**5410.64**
Nagpur	13	13	1	11	1	2	135.75	53.83	14.19	68.02	0.00	0.00	68.02	81.96
Chandrapur	19	19	2	19	0	0	768.50	232.61	60.87	293.48	0.00	0.00	293.48	230.45
Gadchiroli	26	26	1	26	0	0	375.12	142.73	35.91	178.64	0.33	7.63	186.60	77.01
Nagpur div.	**58**	**58**	**4**	**56**	**1**	**2**	**1279.37**	**429.17**	**110.97**	**540.14**	**0.33**	**7.63**	**548.10**	**389.42**
Total	1582	1535	55	816	136	766	30848.90	17979.22	4913.49	22892.71	65.45	221.16	23179.32	20108.02

Source: Commissionerate of Agriculture, Pune

Table A 2.8:
Details of Watersheds Programmes in Maharashtra
(up to 2002)

	DPAP		EAS		AGY		IGWDP		RVP		NWDPRA		WGDP		IWDP		CA
District	No. of Ws started	% com	No. of Ws started	% com	No. of Ws started	% com	No. of Ws started	% com	No. of Ws started	% com	No. of Ws started	% com	No. of Ws started	% com	No. of Ws started	% com	No. Ws sta
Konkan div.	0		0		61	20	3	100	11	100	69	51	23	48	1870	19	4
Nashik div.	159 (55)	45	294 (142)	24	85	26	3	0	55	42	124	74	23	43	2845	46	2
Pune div.	212 (133)	19	383 (165)	18	105	25	37	46	16	69	102	71	24	25	5959	9	27
Kolhapur div.	71 (35)	15	143 (19)	17	46	17	3	33	0		100	70	27	59	1502	24	8
Aurangabad div.	79 (40)	23	164 (52)	18	47	15	28	11	0		101	78	0		2133	49	11
Latur div	110 (54)	23	196 (141)	4	152	13	12	8	32	44	134	78	0		2824	63	13
Amravati div.	206 (170)	1	345 (245)	6	62	5	6	33	0		186	71	0		3103	35	9
Nagpur div.	72 (35)	10	24 (2)	0	87	3	10	20	0		101	60	0		2066	28	4
Maharashtra	**909 (522)**	**19**	**1549 (766)**	**14**	**645**	**16**	**102 (102)**	**28**	**114**	**52**	**917**	**70**	**97**	**44**	**22302**	**32**	**78(**

Note Figures in brackets refer to programmes implemented through NGOs; % com = per cent completed
Source: Commissionerate of Agriculture, GOM, Pune

Table A 3.1:
General Features of Four River Valley Projects

Dams	Damanganga	Nagarjun Sagar	Pochampad	Sardar Sarovar
River concerned	Damanganga	Krishna	Godavari	Narmada
Dam, location, district	Valasad	Nandi Konda	Pochampad	Rajpila
Catchment area (sq.km)	1,777	215,185	9,1751	88,000
Year of construction	--	1,974	1,983	Continuing
Maximum discharge cum/sec	20,930	53,450	--	62,296
Gross storage capacity thousand cubic meter	567,000	11,550,000	3,172,000	9,500,000
Gross irrigated area (ha)	55,070	895,000	230,000	1,782,000

Source: Large dams in India, CBIP, 1987

Table A 3.2:
NWDPRA Watersheds Selected for Impact Evaluation Study
Source: AFC study, 1998-99

Village	**Taluka**	**District**	**Zone**	**Average Rainfall (mm)**	**Study Period**
Kudawale	Dapoli	Ratnagiri	Southern Konkan Coastal Zone	3750	Nov. 15-18, 1998
Khandas	Karjat	Raigad	Northern Konkan Coastal Zone	3281	Sep. 14-16, 1998
Tambulwadi	Chandgad	Kolhapur	Western Ghat Zone	2684	Oct. 11-14, 1998
Wadivarhe	Iagatpuri	Nashik	Western Ghat Zone	2137	Sep. 9-12, 1998
Nune-gavadi	Satara	Satara	Western Maharashtra Plain Zone	791	Oct. 8 -14, 1998
Kanhur-mesai	Shirur	Pune	Scarcity Zone	450	Aug. 18-21, 1998
Phuldhaba	Aundha	Parbhani	Central Maharashtra Plateau Zone	983	Oct. 28-30, 1998
Khandwa	Motala	Buldhana	Central Vidarbha Zone	883	Sep. 28-30, 1998
Chatgaon	Dhanora	Gadchiroli	Eastern Vidarbha Zone	1462	Dec. 10-13 1998

Table A 3.3:
Impact of Watershed Development on Irrigation in the NWDPRA Watersheds
B.P- Before Project, A.P-After Project, Inc.-Increase
(Source: AFC study, 1998-99)

Name of watershed	Total geo. Area (ha.)	Area under cultivation (ha.)	Number of irrigation wells			Water table in mtrs.			Area under irrigation		
			B.P	A.P	% inc.	B.P.	A.P.	% inc.	B.P.	A.P.	
Kudawale	2,887	1,183	50	62	24.00	13.50	11.50	2.0	10	18	
Khandas	3,694	1,168	23	30	30.00	9.20	7.80	1.40	25	75	
Tambulwadi	3,594	2,169	276	350	26.80	9.10	7.20	190.00	921	1001	
Wadivarhe	3,166	1,800	41	127	210.00	10.70	9.10	1.60	60	190	
Nunegavadi	4,059	2,665	138	162	17.00	7.64	5.36	2.28	337	575	
Kanur-mesai	4,009	3,075	153	430	181.00	7.60	6.70	0.90	179	379	
Phuldhaba	4,082	2,089	66	86	30.30	7.79	6.73	1.06	162	243	
Khandwa	2,902	2,553	35	118	237.00	9.20	7.10	2.10	75	201	
Chatgoan	7,114	1,181	53	97	83.00	9.20	8.10	1.10	251	495	
Total	35,507	17,883	835	1,462		83.93	69.59	14.34	2,020	3177	
Average	3,945	1,987	93	162	75.00	9.31	7.73	1.58	224.44	353	

Table A 3.4:
Improvement in Crop Yield (q/ha) in the Khed Watershedin Maharashtra
Source: TERI, 2001

Crop	Pre project	Post project
Kharif		
Local cotton	6	6.9
Hybrid cotton	7.2	10.0
Jowar	11.4	14.2
Rabi		
Wheat	14.0	22.5
Gram	10.0	12.1
Orange orchard	250 per tree	400 per tree

Table A 3.5: Six Watersheds Selected for ISRO Study
Source: ISRO study, TERI, 2001

Watershed	Block/District	Area (ha)	Characteristics
Karanjgavan	Malegaon block, Nasik district	11,766	The watersheds under Nashik Parbhani and Kolhapur districts fall under the Central and Western Maharashtra plateau: a hot, moist, semi-arid, agro-ecological sub-region. The average rainfall is 500-676 mm. The watershed has a dendritic drainage pattern.
Warshi	Kalwan block, Nasik district	8,500	
Sawarde	Kagal block, Kolhapur district	5,180	
Nagazari	Parbhani district	2,840	The watershed under the Wardha district belongs to the Eastern Maharashtra plateau: a hot dry sub-humid, agro-climatic sub-region. The average rainfall is 1070 mm. The watershed under Osmanabad district falls under the Southwestern Maharashtra plateau: a moist, semi-arid, agro-ecological sub-region. The average rainfall is 600mm.
Pipari	Samudrapur block, Wardha district	4,006	
Sawargaon	Paranda block, Osmanabad district	6,372	

Table A 3.6:
Yield Improvement (qn/ha) of Major Crops in Karanjgavan Watershed

Crop	Pre- treatment	Post-treatment
Sorghum	11.5 (26.5)	15 (18.5)
Maize	13 (40.5)	19.5 (220.3)
Wheat	10.1 (110.6)	19 (201.5)
Gram	5 (60)	6.5 (102.3)
Onion	125 (60.5)	185 (150.5)
Pomegranate	80.0 (25.8)	100 (450)
Sugarcane	80.0 (8.5)	110 (25.6)

Source: ISRO study, TERI, 2001

Table A 3.7:
Change in arable land in ISRO study

Village	Pre-treatment (ha)	Post-treatment (ha)
Karanjgavan	2,646	3,443
Warshi	2,206	2,430
Sawarde	2,264	2,275
Pipari	2,671	2,694
Sawargaon	3,461	3,918
Nagazari	887	971

Source: ISRO Study, TERI, 2001

Table A 3. 8:
Percentage Change in Satellite-based Indicators in Selected Watersheds in Maharashtra

Watershed (district)	Agri-crop	Fallow land	Wasteland	Forest vegetation	Plantation	Water bodies	Total
Pipari (Wardha)	+5	-4	-1.60	+1.27	-	+0.05	+6
Warshi (Nasik)	+3	-1	-3	+2.28	+1	+0.54	+7
Sawarde (Kolhapur)	+6	-5	-0.40	+0.06	+0.15	+0.06	+6
Nagazari (Parbhani)	+2	+1	-7.57	+0.18	+0.18	-	+35

Source: ISRO Study, TERI, 2001

Table A 3.9:
Change in Water-table in Shedashi-Wavoshi Watershed

Reach	1996			1997			1998		
	Jan	Mar	May	Jan	Mar	May	Jan	Mar	May
Upper	0.80	0.40		1.20	0.70	0.30	1.20	0.80	0.60
Middle	3.70	2.40	0.50	3.90	2.80	0.90	0.90	3.00	1.20
Lower	3.30	1.50		3.60	2.40	0.50	0.50	2.70	1.20

Source: IGWDP, 1999

Table A 3.10:
Details of Forest Plantation in Shedashi-Wavoshi Watershed

Treatments	Forest land		Private land		Total	
	Area (ha)	Plants (No.)	Area (ha)	Plants (No)	Area (ha)	Plants (No)
Terrace Bund Improvement	23.83	5,957	383.24	70,790	407.07	76,747
Grassland with trees	10.24	3,072	15.2	4,560	25.44	7,632
Reforestation	464.49	871,514			464.49	871,514
Mix forestry	36.64	91,600	65.92	164,800	102.56	256,400
Total	535.20	972,143	464.36	240,150	999.56	1,212,293

Source: IGWDP, 1999

Table A 3.11:
Change in Cropping Pattern in Shedashi-Wavoshi Watershed

Crop	Pre 1993		Post 1998	
	Area (ha)	%	Area (ha)	%
Paddy (Kharif)	383	100	407	89.65
Vegetables (R)			36	7.93
Pulses (R)			8	1.76
Wheat (R)			3	0.66
Gross Area	383	100	454	100

Source: IGWDP, 1999

Table A 3.12:
Change in Net and Total Incomes in the Shedashi-Wavoshi Watershed

	Pre-Development			Present Development		
Crop	Area (Ha)	Net income per Ha (Rs.)	Total income (Rs.)	Area (Ha)	Net income per Ha (Rs.)	Total income (Rs.)
Paddy	383	4,500	1,723,500	407	7,520	3,060,640
Finger Millets	12	700	8,400	20	1,500	30,000
Minor millets	3	525	1,575	8	1,075	8,600
Vegetables				36	21,800	784,800
Pulses				8	2,850	22,800
Wheat				3	2,760	8,280
Total			1,733,475			3,915,120

Source: IGWDP, 1999

Table A 3.13:
Water Table in Dug Wells in Rajani Watershed
(in meters)

Reaches	1993			1998		
	Jan	March	May	Jan	March	May
Upper	4.30	4.20	3.90	6.50	6.35	5.80
Middle	3.95	3.90	3.50	4.95	4.80	4.55
Lower	3.50	3.50	3.42	5.20	5.15	4.85

Source: IGWDP, 1999

Table A 3.14:
Change in Net and Total Incomes in Rajani Watershed

Crop	Pre-Development		Present Development	
	Yield (Qn/ha)	Net income (Rs)	Yield (Qn/ha)	Net income (Rs)
Paddy	7	3,050	12	7,050
Wheat (R)			10	4,250
Jowar	5	1,250	10	3,750
Tur	3.5	3,575	5	5,675
Gram (R)	2	725	2.5	1,125
Soybean			9	6,550
Cotton	4.5	5,950	7.5	11,950

Source: IGWDP, 1999

Table A 3.15:
Irrigated and Un-Irrigated Land Before and After the Intervention
(in percentage)

Name of village	Earlier			At Present			
	Irrigated	Un-irrigated	Fallow	Irrigated	Un-irrigated	Fallow	Change in irrigated land
Hivre Bazar	29	61	10	64	25	11	35
Nagunichi Wadi	63	25	12	64	25	11	1
Asarkheda	48	33	19	57	25	18	9
Patnadevi	30	67	3	55	42	3	25
Borda	9	83	8	35	59	6	26
Murukute	22	40	38	23	68	9	1
Bhalgudi	0	56	44	15	42	44	15
Ganeshwadi	5	88	7	22	72	6	17
Mendha	5	91	5	5	91	5	0
Shedashi		75	25		75	25	0

Source: DROP Study, 2003

Table A 3.16:
Change in Land Cultivated During Rabi

Village	% Increase in area under Rabi crops
Patnadevi	29
Hivre Bazar	23
Borda	18
Ganeshwadi	17
Bhalgudi	13
Asarkheda	5
Mendha	4
Nagunichi Wadi	3.5
Murukute	3

Source: DROP Study, 2003

List of Abbreviations

APRA	Abolition of Proprietary Rights Act
AGY	Adarsh Gaon Yojana
AFARM	Action for Agricultural Renewal in Maharashtra
AFC	Agricultural Finance Corporation
BAIF	Bharatiya Agro Industries Foundation
CISED	Centre for Interdisciplinary Studies in Environment and Development
CPLR	Common Property Land Resources
CBO	Community Based Organisation
COWDEP	Comprehensive Watershed Development Programme
CCT	Continuous Contour Trench
CBA	Cost Benefit Analysis
CAPART	Council for Advancement of People's Action and Rural Technology
DFID	Department of International Development
DoLR	Department of Land Resources
MoA	Ministry of Agriculture
DDP	Desert Development Programme
DROP	Development Resource Organisation through Planning
DRDA	District Rural Development Agency
DPAP	Drought Prone Areas Programme
ERR	Economic Rate of Return
EGS	Employment Guarantee Scheme
EAS	Employment Assurance Scheme
FRR	Financial Rate of Return
ForWaRD	Forum for Watershed Research and Policy Dialogue
GOI	Government of India
GCA	Gross Cropped Area
GSDA	Ground Water Survey and Development Agency
GIDR	Gujarat Institute of Development Research
HYV	High Yielding Variety
ICAR	Indian Council for Agriculture Research
ICRISAT	International Crop Research Institute for Semi-Arid Tropics

IJAE	Indian Journal of Agriculture Economics
ISRO	Indian Space Research Organization
IGWDP	Indo-German Watershed Programme
INM	Integrated Nutrient Management
IWDP	Integrated Wasteland Development Programme
IWDP	Integrated Watershed Development Project
IPM	Integrated Pest Management
IRDP	Integrated Rural Development Programme
IWRM	Integrated Water Resource Management
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
LEISA	Low External Input Sustainable Agriculture
LPG	Liquid Petroleum Gas
MSSM	Marathwada Sheti Sahaya Mandal
MoRD	Ministry of Rural Development
MoEF	Ministry of Environment and Forests
MIS	Management Information System
NABARD	National Bank for Agriculture and Rural Development
NCMP	National Common Minimum Programme
NWDPRA	National Watershed Programme for Rainfed Areas
NPK	Nitrogen, Phosphorus and Potash
NGO	Non Governmental Organisation
NRM	Natural Resource Management
NWDF	National Watershed Development Fund
PNP	Participatory Net Planning
POP	Participatory Operational Pedagogy
PRA	Participatory Rural Appraisal
PTD	Participatory Technology Development
PIA	Project Implementing Agencies
PSSC	Project Sanctioning and Steering Committee
RVP	River Valley Project
SC/ST	Scheduled Caste/Scheduled Tribe
SHG	Self Help Group
SL	Sustainable Livelihoods
SOPPECOM	Society for Promoting Participative Ecosystem Management
SWC	Soil and Water Conservation
SSR	Scheduled Standard Rate
TERI	The Energy Resources Institute
UPA	United Progressive Alliance

UG	User Group
VWC	Village Watershed Committee
WAT	Water Absorption Trenches
WUA	Water Users Associations
WA/GS	Watershed Association/Gram Sabha
WDF	Watershed Development Fund
WDPSCA	Watershed Development Projects in Shifting Cultivation Areas
WDT	Watershed Development Team
WGDP	Western Ghat Development Programme
WHS	Water Harvesting Structure
WID	Women in Development
WED	Women in Environment and Development
WOTR	Watershed Organisation Trust

List of Tables

List of Figures

References

AFARM. 1998. "*AFARM CA-WSD package programme: 1992-97* ." Final Evaluation Report, Action for Agricultural Renewal in Maharashtra, Pune.

AFARM. 1999. "*Participatory Watershed Development Programme (PWSDP), Mid-Term Assessment Report on Dornali Project* ".Action for Agricultural Renewal in Maharashtra, Pune.

AFARM Web Site http://www.afarm.org/waters

Anonymous. 2001. Completion Report of Kolwan Valley Project: Drought-prone Area Programme. Gomukh Trust, Mulshi, Pune

Anonymous. Undated. "*Adgaon at a glance* ". Marathwada Sheti Sahayak Mandal, Aurangabad.

Batchelor, Charles ,M. Rama Mohan Rao and K.Mukherjee, " *Watershed development or should it be water management*" paper presented in electronic workshop on land water management in rural watersheds" organised by FAO, Rome,18th Sept. 27 October.

Chopra, K. 1999. "*Evaluations of Watershed Management Programmes in India -- A Review* ", in John Farrington, T. Cathryn, and A. J. James ,Eds., Participatory Watershed Development: Challenges for the Twenty-First Century. Oxford University Press, New Delhi.

Dabholker, S.A. 1997. Plenty for All. Mehta Publishing House, Pune.

Deccan Development Society and WASSAN. August 2004. " *On the Margin -- Poor and their Lands: A Case for Comprehensive Public Investments*". Hyderabad.

Deshpande, R. S. and V. R. Reddy. 1991. "*Differential impact of watershed-based technology: some analytical issues*", Indian Journal of Agricultural Economics, 46(3): 261.

DNRM. 2002. "*Panchayati Raj and Natural Resources Management: How To Decentralize Management Over Natural Resources* ", in Proceedings of the Overseas Development Institute (London) Social and Economic Research Associates (London), TARU Leading Edge (New Delhi and Hyderabad), Centre for Budget and Policy Studies (Bangalore), Centre for World Solidarity (Hyderabad) and Sanket (Bhopal), New Delhi.

DROP, Pune, 2002-3, Study of Water Sector Projects in Maharashtra - Case studies of Selected Villages, for Groundwater Survey and Development Agency (GoM).

D'Souza, M. 1997. "*Gender and watershed development* " Agricultural Research and Extension Network Newsletter, 36.

D'Souza, M. 2001. "*Participatory Watershed Development: Impacting Under-nutrition in Rural India* ". Study report --accessed from www.wotr.org.

Erappa, S. 1998. " *Sustainability of watershed development programmes (WDPs), to dryland agriculture in Karnataka: A study of two sub-watersheds*", Agricultural Development and Rural Transformation (ADRT) unit, Institute for Social and Economic Change (ISEC), Bangalore.

Farrington, John, Cathryn Turton and A.J. James (Eds). 1999. *Participatory Watershed Development: Challenges for the Twenty-First Century*, Oxford University Press, New Delhi.

GOI. 1994. "*Guidelines for watershed development* ", Department of Land Resources, Ministry of Rural Development, Government of India, New Delhi.

GOI. 1997. Report of the Committee on Training for Watershed Development. Easwaran Committee Report, Department of Land Resources, Ministry of Rural Development, Government of India, New Delhi

GoI. 2000. WARASA-Jan Sahabhagita: Guidelines for National Watershed Development for Rainfed Areas (NWDPRA). Department of Agriculture and Cooperation, MoA, GoI, New Delhi.

GOI. 2001. Guidelines for watershed development (Revised-2001). Department of Land Resources, Ministry of Rural Development, Government of India, New Delhi.

GOI. 2001. Hariyali guidelines for watershed development 2003. Department of Land Resources, Ministry of Rural Development, Government of India, New Delhi.

GOI. 2006. "*From Hariyali to Neeranchal: Report of the Technical Committee on Watershed Programmes in India* ," Parthasarathy Committee Report, Department of Land Resources, Ministry of Rural Development, Government of India, New Delhi.

GoM. 2004. Soil Conservation and Watershed Development, Annual Report 2003-04. Soil and Watershed Management Department, Commissionerate of Agriculture, Pune, 2004 (Marathi).

GoM. 2006. "*Agro-climatic zones in Maharashtra"* http;//agri.mah.nic.in/agri/stat/map/clazone.htm

GoM. 2006. "*Land-use classification in Maharashtra* "

http;//agri.mah.nic.in/agri/stat/Lus_ Main/luslink.htm

GoM. 2006. "*Evaluation of NWDPRA Watersheds*" (by AFC, 2001) http;//agri.mah.nic.in/agri/soil/ html/nwdp_eva.html

GoM.2006. "*Evaluation of RVP Watersheds*" http;//agri.mah.nic.in/agri/soil/html/rvp_eva.html

GoM. Commissionerate of Agriculture. Pune, Status and statistics of different watershed programmes implemented in Maharashtra, (personally accessed), 2003-05.

GoM. , "*Human Development Report"*2002, Government of Maharashtra, Mumbai.

GoM. 2003. "*Report of the high-level committee on Action Plan for Agriculture for 25 years* ", Dr. M.S. Swaminathan Committee Report, chapter 3, Commissionerate of Agriculture, Pune.

Hazra, C. R. 1999. "*Biophysical Results of Watershed Rehabilitation in Khana Nala* ", in C. T. a. A. J. J. John Farrington (Ed.) Participatory Watershed Development: Challenges for the Twenty-First Century, Oxford University Press, New Delhi.

Joy, K.J. and Suhas Paranjape. 2004. Watershed Development Review: Issues and Prospects, CISED, Bangalore.

Joy, K.J., et.al. 2006. "*Reorienting the Watershed Development Programme in India* ", Occasional Paper, Forum for Watershed Research and Policy Dialogue.

Kakade, B. K., et al. 2001. "I*ntegrated drinking water resource management: impact study of watersheds in different geo-hydrological and socio-economic situations in India* ", BAIF, Pune.

Karanth, G. K. and A. Abbi. 2001. " *Participative Integrated Development of Watershed (PIDOW): Report of Participatory Impact Assessment*", Participatory Impact Assessment, Swiss Agency for Development and Cooperation, New Delhi.

Kerr, J. 2002. "*Sharing the benefits of watershed management in Sukhomajri, India* ", in Stefano Pagiola, et.al (eds), Selling Forest Environmental Services: Market-based Mechanism for Conservation and Development, Earthscan, London.

Kerr, J. and K. Chung, 2001. Evaluating Watershed Management Projects, Water Policy August, 3 (6).

Kerr, J., G. Pangare, V. L. Pangare and P. J. George. 2000. " *An evaluation of dryland watershed development projects in India*", EPTD discussion paper no. 68, Environment and Production Technology Division, International Food Policy Research Institute, Washington, D.C.

Kerr, J et.al. 1998. "*The role of watershed projects in developing rainfed agriculture in India* " Study Report submitted to ICAR and World Bank, ICAR, New Delhi.

Kolavalli, Shashi and John Kerr. 2002. " *Mainstreaming participatory watershed development* ." Economic and Political Weekly,1 January 37(2).

Kolavalli, Shashi and John Kerr. 2002. " *Scaling up participatory watershed development* ." Development and Change, 33(2).

Landell-Mills, N. 1999. "*Economic Evaluation of Watersheds: Methodological Issues*", in John Farrington C. Turton. a. A. J. James. eds. ,Participatory Watershed Development: Challenges for the Twenty-First Century, Oxford University Press, New Delhi.

Leach, Melissa, Susan Joekes and Cathy Green. 1995. " *Gender relations and environmental changes*" IDS Bulletin, 26(1).

Lobo. C and Gudrun Kochendorfer. 1995. The Rain Decided to Help Us: Participatory watershed management in the State of Maharashtra, World Bank. Washington D.C.

Lobo, C and Abraham Samuel. 2005. Participatory monitoring and evaluation systems in watershed development: case studies of applied tools, WOTR, Ahmadnagar.

MANAGE. Undated. " *Economic Evaluation of Manchal Watershed Development Project: A Study* ", MANAGE, Hyderabad.

National Bank for Agriculture and Rural Development. 1995. Guidelines for participating in IGWDP-Maharashtra, NABARD, Mumbai.

National Bank for Agriculture and Rural Development. 1999. Evaluation of Mendhwan Watershed Project under IGWDP - Maharashtra State, NABARD, Pune.

National Bank for Agriculture and Rural Development. 1999. Evaluation of Shedashi-Wavoshi Watershed Project under IGWDP, Maharashtra State, NABARD, Pune

National Bank for Agriculture and Rural Development. 1999. Evaluation of Rajani Watershed Project under IGWDP-- Maharashtra State, NABARD, Pune.

Narain, S. 2003. "*A Movement to Value Water*" The Hindu Magazine.

Ninan, K. N. 1998. "*An assessment of European-aided watershed development projects in India from the perspective of poverty reduction and the poor*". CDR Working Paper no. 98.3, Centre for Development Research, Copenhagen, Denmark.

Ostrom, Elinor. 1990. Governing the Commons: The Evolution of Institutions for Collective Action, CUP, Cambridge.

Pangare, Ganesh. 1996. The Good Society: The Pani Panchayat Model of Sustainable Water Management, Indian National Trust for Art and Cultural Heritage, New Delhi.

Paranajpe, S., K. J. Joy, S. Kulkarni and R. Samantray. 1997. "*Evaluation Study of the Community-based Eco-regeneration in Dhar and Bagdunda Areas of South Rajasthan* ", Ubeshwar Vikas Mandal, Udaipur.

Paranjape, S., V. Gore, K. J. Joy and A. Singh. 2001. " *Status of Small Water Harvesting Structures in a Sub-Basin in Udaipur Region* ", Society for Promoting Participative Ecosystem Management (SOPPECOM), Pune.

Paranjape, S. and K. J. Joy, 2003, " *The Ozar Water User Societies: Impact of Society Formation and Co-management of Surface Water and Groundwate* r", Society for Promoting Participative Ecosystem Management (SOPPECOM), Pune.

Paranjape, S., K. J. Joy, T. Machado, A. Varma and S. Swaminathan. 1998. Watershed- based Development -- A Source Book, Bharat Gyan Vigyan Samithi, New Delhi.

Reddy, Bakka and A. Ravindra, 2004, " *Watershed Development -- Understanding Investments and Impacts: Report of Study of Impacts in Five Watersheds in Andhra Pradesh*", Mission Support Unit, AP Water Conservation Mission, Hyderabad.

Reddy, V. R., M. G. Reddy, S. Galab and O. Springate-Baginski. 2001. " *Watershed development and livelihood security: An assessment of linkages and impact in Andhra Pradesh, India* ". This is a first draft which has been sent for comments and review. Centre for Economic and Social Studies, School of Geography, University of Leeds, Hyderabad and Leeds.

Sangameshwar, Priya. 2005. Equity in Community-based Sustainable Development: A Case Study in Western Maharashtra, Ph. D thesis, University of Massachusetts, Amherst.

Shah, A. 1998. " *Watershed development programmes in India -- Emerging issues for environment-development perspectives*", Economic and Political Weekly, 33(26): A-66.

Shah, M., D. Banerji, P. S. Vijayshankar and P. Ambasta. (1998), India's Drylands: Tribal Societies and Development through Environmental Regeneration , Oxford University Press, New Delhi.

Sharma, S. 2002. " *Watershed Development: No Cure for Drought*", The Hindu Survey of the Environment.

Srigiri, Srinivasa Reddy. 1993. " *Equity and Poverty Issues in Watershed Development*", Dissertation http://www.tropentag.de/2003/abstracts/full/214.pdf

Soussan, J. and V. R. Reddy. 2003. "*Andhra Pradesh: Evolving Appropriate Watershed Policy* " Economic and Political Weekly, 38(1): 24.

Venkatachalam, L. and S. Lele. 2002. Economic Valuation of Watershed Services: A Review of Methodologies and Findings, Bangalore.

Second Irrigation Commission (GoM). 1998. Techno-economic Evaluation of Watershed Development Project - A Case Study of Kamini Sub-watershed. Gomukh Trust.

Vaswani, R.S.1995. Micro-Watershed Development: Three Success Stories from Maharashtra, State Institute of Rural Development, YASHADA, Pune.

Vaze, Vrunda and Abraham Samuel. 2004. " *Report of the Study* " Women and Watershed Development: Indo-German Watershed Development Programme", Pune.

Watershed Organization Trust. 1997. Operations Manual for Indo-German Watershed Programme, WOTR, Ahmadnagar.

Watershed Organization Trust. 2001, 2002, and 2003. Annual Reports, WOTR, Ahmadnagar.

Watershed Organization Trust. Undated. " *Impacts of watershed development projects*", accessed through http://www.wotr.org