

Post Independence, several approaches were adopted by the GOI for sustainable rural development. The main objective was to alleviate poverty by stabilizing farm production at higher levels and provide more employment and income to the rural poor as also to conserve natural resources. Watershed management is one such approach which addresses all the above problems of rural India. In the 1980s and 1990s, agricultural scientists and planners aimed to promote rain fed agriculture through watershed programme. Many developing countries including India have adopted watershed development as a part of their rural development strategy for achieving sustainable rural development. Watershed management programmes typically adopt integrated natural resource management approaches with a focus on upland areas where they target the twin objectives of resource conservation and poverty reduction. The combination of environmental costs and socio-economic impacts has prompted investment in watershed management in many developing countries of Asia, Africa and Latin America.

Watershed management programmes have emerged as an appropriate strategy to manage natural resources (land, water and forests) and to provide sustainable livelihood to the rural poor. It is a holistic concept which tries to integrate several components like soil and water conservation, forestry development, agriculture, horticulture, livestock development etc. It has led to several dimensions of sustainable development, e.g. ecological sustainability (check in soil erosion, check in rate of silting, groundwater recharge etc.), economic sustainability (increase in crop intensity and crop productivity, milk production, etc.) and social sustainability, (equitable distribution of common property resources like water, forest produce and ensuring peoples' participation).

WSM is not simply anti-erosion approach but also a comprehensive, integrated approach of land water resource management. The approach is preventive, progressive, corrective as well as curative. It is thus the rational utilization of land and water resources for optimum production with minimum hazard to natural resources. It essentially relates to soil and water conservation in the watershed which means proper land use, protecting land against all forms of deterioration, building and maintaining soil fertility, conserving water for farm use, proper management of local water for drainage, flood protection and sediment reduction and increasing productivity from all land uses.<sup>1</sup>

Over the last 60 years, there have been many variations in conceptual models, objectives and implementation models of watershed programmes. The initial protection oriented approach got enlarged to restoration of degraded areas then to protection-cum-production oriented objectives of related natural resources and eco-restoration. Watershed management is a single window, integrated, participatory and sustainable area development programme.

Performance management is a performance measurement tool that helps in better service delivery, decision making, evaluating programme performance and result and improving programme

effectiveness. It is an essential component in the effective management of a programme or policy. It is a systematic and holistic approach to identify critical dimensions of performance and to carry out activities necessary to ensure that the mission, objectives, goals, vision and values of the organization/programme are being met in an effective and efficient manner.

Performance management is thus a means of getting better results from the organization/programme, teams, and individuals by managing performance in line with organizational/programme strategy. It thus consists of a series of integrated steps where an organization defines key priorities, identifies objectives to be realized, strategy to reach objectives, measures progress towards these goals and analyses and communicates results to stakeholders. By linking strategy with execution in this way, they can more effectively monitor and improve performance. Effective decision-making is another important key to creating an accountable, cost effective, and productive organization that delivers on today's government performance requirements.

Thus, in the changed context of increasing importance for watershed management, it is the need of the hour to study performance management of watershed programme for effectively realizing the objectives of the programme. The performance of watershed programme in a setting such as India needs to be assessed on several dimensions and this includes studying the performance of watershed programme in economic, social, ecological and political dimensions.

The researcher in the course of the present study has identified various problems which constraints the effective implementation of the watershed programme in general and Anantapuram district in particular. The identified problems are discussed below:

## **Sustainability of the Programme**

The former president of India, K.R. Narayana said “To achieve our national goal of sustainable development and growth, it is vital to create more widespread awareness among the people on the need to preserve and protect ones natural habitats and environment”. Thus proper management of watersheds is a major issue in the sustainability of watershed programme. However there is no arrangement for handing over of structures and maintenance of plantation after the project is completed. Many projects failed to develop strategies to maintain assets once project support ended. Departmental agencies pay scant attention in the maintenance of completed works or monitoring their impact either on their own or through local community-based institutions.

The guidelines says that, local community has to maintain the soil and water conservation structures constructed under watershed programme and maintain the plantations after the Project Implementing Agency (PIA) withdraws itself from the watershed village on completion of stipulated time period. Only then, it is possible to obtain the expected benefits from the programme on a sustained basis. But practically, at the field level, the soil and water conservation structures and plantations are not maintained properly. The structures are left to fall apart and plantations are not watered and no tree guards to protect the plantations allowing them to die. Thus sustainability of the programme is depended on the active participation of the local communities. The unfortunate truth today is that most projects have failed to generate sustainability because of the failure of government agencies to involve the people.

Since inception to Tenth five year plan, Rs 19,251.22 crores was spent on watershed programme in India on rain fed, degraded regions, treating an area of 508.99 lakh Hectares under various schemes. However, this has not resulted in bringing more land under cultivation. The Net Sown Area has remained almost stagnant at around 142 million hectares for the last 45 years. This indicates that

there was no sustainability of efforts made though crores of money was pumped into the programme by central and state governments.

This lack of sustainability can be ascribed to a number of practices followed by the Government in the implementation of the watershed development programmes. Strict orientation to achieve physical and financial targets discourages the project authorities to promote people's participation. The authorities are under pressure to spend resources in a time bound manner leaving no space for following participatory approaches. It is essential for the successful implementation of the watershed projects that people participate in the planning and execution of the project right from the beginning. This inculcates a sense of ownership among the people which will certainly go a long way in ensuring the success of watershed programmes.

### **People's Participation**

The experiences and studies indicate that success and sustainability of watershed management is possible only with effective participation of the local communities who depend directly or indirectly on the watershed. It has to become a people's movement if it has to be sustained as people are key and inseparable component of agro ecosystems.

Participation is possible only when the rural community is well informed and well educated of the benefits they accrue from watershed development. The community is to be convinced that they can derive visible benefits from the programme. The problems and the needs of the community must be identified before taking up the project with the help of local people.

The project should be planned and implemented locally by the rural community with external expert help (from government and non-governmental agencies) as required. Planning for watershed development requires data on the nature, conditions and use of land and water resources at the micro watershed level where local people's feedback is very much required. The project plans should be

thoroughly discussed with the villagers before starting watershed activities; the Project Implementing Agency (PIA) should instill confidence and trust among the local people through their entry point activities, the villagers are to be involved in identifying the place for construction of check dams and other constructions as local people have close knowledge of the field realities which foreign technicians and government bureaucrats do not have. Also once the Project Implementing Agency (PIA) withdraws itself from the watershed village on completion of stipulated time period; it is local people who play a crucial role in the maintenance of soil and water conservation structures so as to obtain the expected benefits on a sustained basis. But they do not have knowledge and time to think about the programme.

However, after more than three decades of planning and implementation, the governments are not successful in securing local villagers participation in the watershed development and in ensuring collective action though Non Government Organizations were successful to some extent due to various reasons. People's participation is very low. Leadership in the villages is party oriented which discourages full participation of the people. Villages are divided on party basis and the leadership is party oriented. There are numerous instances where one section of the village belonging to one political party wants watershed programme and other section of opposite political party does not want the programme. And also the party in power tries to distribute the benefits of the programme to its own supporters leaving out the actual beneficiaries. This is not individual effort but it is collective effort. The benefits will travel out the jurisdiction where almost all people are gaining.

Indian society is a plural, caste based stratified society. The society is divided on the basis of class, gender, caste, region and religion, and socio-economic and political status. Ensuring participation of all sections in development programme like watershed programme becomes a major task. Often class and caste are barriers

to people's participation in the watershed programme and that rich are benefiting more from this projects and are cornering the fruits of the project thus increasing inequities at the village level. There is provision for SC, ST and women representation in watershed committees in Watershed Guidelines. But most of the time, representation is seen just on papers.

Low income groups, landless labourers and SCs and STs are reluctant to participate in the watershed management programme as the programme mainly benefits the agricultural land holders. Landless low income groups, Scheduled Castes and other backward groups and marginal farmers often benefit only marginally or not at all. Studies reveal that many farmers and landless benefited from watershed projects only through obtaining short-term paid labouring work during construction of check dams, Rock fill dams, plantation and other soil and water conservation works. Also because of their lack of knowledge and time, their participation is not upto the mark.

Sometimes farmers/locals of watershed area are not conscious of intangible benefits of soil and water conservation and environmental improvements. Hence often they refuse to adopt the recommended practices. Also while framing the participatory strategies by the government agencies and NGOs, no concern for peoples indigenous knowledge and agricultural practices that are interwoven into the local culture is shown. Regional strategies are not followed for specific agro-climatic regions and specific soil types while implementing watershed management programme. This obviously discourages people's participation. Also people perceived the project activities as purely governmental programme and hence least bothered. A lack of awareness of potential impacts, the low visibility of watershed projects, and the long-term nature of such projects are acting as hindrances for people's participation.

### **Women Participation**

Women play an important and significant role in natural resource management through watershed development activities. The

natural resources which are directly concerned with rural poor women are drinking water, fuel wood and fodder. The objectives of the watershed project should be framed based on the needs of women. They should be involved in planning and implementation of watershed activities at all stages if the programme is to be successful. Women have to play a vital role in identification, prioritization and execution of all works through participatory approach involving all sections of people like women, men, farmers, landless and wage labour in the village.

Their involvement in watershed management had been limited mainly due to restrictions such as lack of land ownership (entitlements), credit and capabilities, low literacy, less awareness, lack of productive skills and suitable technologies, less capacities, social customs, and economic dependence etc. Though there is compulsory provision for women representation in watershed committees in Watershed Guidelines, enabling greater participation of women, they are not recognized in their own right; they were just viewed as 'quota women', being there to fill the quota required under the guidelines. These 'quota women', mostly uneducated, restricted by social customs and traditions, lack self confidence; though involved in watershed committees and other village institutions are often not given a chance to voice their opinions. Many times they don't attend meetings as they are busy with domestic work or meeting timings are inconvenient or due to social restrictions. Many studies in India revealed that male members on committees take all decisions and send the final resolution to the women members for their signature/thumb impression. They just sign/give thumb impression without knowing what they have agreed to.

Watershed development in India is gender insensitive as all the benefits gained from the programme are being cornered exclusively by men. The programme is basically a Land-based programme. Hence men, the title holders of land are perceived to be the natural target-group for watershed work, excluding women from the programme.

'Participation' is thus reduced to contributing voluntary labour which in most of the cases done by women. Again women are involved only in Self-Help Groups and not in User Groups which are the domain of males, the title holders.

Many times women are the sufferers of the programme as they lose the access to village common resources such as forests, village common lands, and water resources in the name of conservation. For example forests, village common lands are closed for plantation purposes under watershed programme. This closure leads to the loss of grazing lands which affects landless poor, especially poor women and they may have to travel a greater distance to collect their daily requirements of fuel and fodder and for water. They may sometimes even lose their little livelihoods may lose income from selling forest produce as forests are closed. Women's water needs for household purposes, drinking water supplies, livestock etc are ignored by the programme. Hence women may see no meaning in the programme unless their needs are recognized and realized.

### **Inequalities**

Property regimes in rural India contradict the requirements of watershed management guidelines. Land in India is inequitably distributed. Much land is concentrated in few hands and rights over groundwater are bundled with landownership. The water below the land belongs to the land owner. Hence if the water table raises or water availability increases in tanks, wells etc in the watershed village because of the programme, the immediate beneficiaries are farmers with farms near the tanks, wells, check dams etc who generally belong to OBCS and Upper Castes.

Most watershed development projects have a clear hierarchy of benefits and beneficiaries. Farm households benefit most, with improved irrigation due to water availability followed by farmers who receive on-farm treatments such as field bunds, removing pebbles and stones from the farms etc. The landless and those who do not own livestock benefit the least only by being paid for contributed labour.

Certain groups capture water resources often at the expense of the poor. They literally have missed out on many of the potential gains. These issues are seen as inevitable and hence not taken seriously.

As planning is done at the village-level, a range of wider issues such as upstream-downstream equity, inter-village equity, flood protection, drought preparedness, pollution of water courses, biodiversity and protection of rare habitats are ignored. Watershed projects basically benefits downstream habitats. Landholders in the downstream capture most of the improved water resources created by investments in good land management practices by other stakeholders upstream. One group bears the costs and another reaps the benefits. For example, upland rehabilitation and reforestation may be the responsibility of landowners and a forest agency, but major beneficiaries of erosion control may be an energy (hydropower) agency and water resource (irrigation water) users downstream. The other side of the coin is successful water harvesting and subsequent overexploitation of groundwater for irrigation in upper catchments is leading to the failure of tanks and water supplies downstream. This is because watershed projects are taken up without systematically estimating how much water is received in through various sources, how much is stored where, and how much can be used under different scenarios (drought, normal, surplus years). Alteration of flow paths in a particular watershed will not only affect the neighboring downstream watersheds but it will also have impact on the whole basin. However, lands in the upper catchment areas must always be rehabilitated first.

Conflicts arise between the beneficiaries and non-beneficiaries, which was the result of the in-built violation of 'equity' norms by the project as it intended to give access to water only to a small section in each village and rendering nearly the remaining 75 per cent as non-beneficiaries. Project did not directly benefit various groups of non-beneficiaries. This in built bias generated dissatisfaction among the

non-beneficiary group which threaten social sustainability of the programme. Equity and sustainability are directly related.

If a farmer do not favour, cannot manage, or do not see acceptable benefit from some recommended practice, they are unlikely to implement or maintain it.

### **User Contribution and Revolving Fund**

The prescribed concept of user contribution and user stake in the programme is not followed in practice. Users' participation is usually limited to supervising the works in the owner's field. In many cases, contributions are accounted for by cutting the wages of the labourers. In other words, labourers were paid lower than standard wage rate and the difference between the standard rate and that actually paid is used to pay the farmers contribution. This indicates that the indirect beneficiaries are being exploited. Also according to the guidelines, Revolving Fund has to be maintained by opening a separate bank account. All villagers are to contribute to the Revolving Fund/Watershed Fund (to be used for repairs and maintenance works) which is not done in most of the watershed. Instead some amount is kept aside from the watershed project fund and is shown as Revolving Fund which kills the very spirit behind Revolving Fund (inculcating a sense of ownership). Farmers expect the PIAs to maintain and repair structures.

### **Water Policies**

The water laws in India lack clarity. This lack of clarity pervades from the fundamental issues like who owns the water resources (the Union government, State government or the local bodies) to important questions such as water as a fundamental right to equitable entitlement of water. Ground water is under the control of the land owner and there is no control on the amount of water extracted. The government can play an important role in detaining the water exploitation by the strict water policy and strong water regulation which is not done creating water conflicts in the society.

### **Multiple Stakeholders Lead to Friction and Competition**

Watersheds are inhabited by a range of different people, undertaking different activities, and with different aims and objectives. In India the most visible problems occur at the watershed level, between members of different castes, class, religion, region, men and women, and between land-holders and the landless, between upstream and downstream areas, between inter village of watershed basin.

Owing to the mutually conflicting interests of different groups constituting our rural society, building up institutions and evolving leadership for rallying the rural community around common interests with adequate stake for weaker section and sustaining the momentum is a painstaking and time-consuming task.

### **Size of the Watershed**

Watershed development technology requires large areas cutting across entire villages for its adoption. Hence, its adoption and success depends on inter and intra village cooperation. The guidelines specify that the size of the micro-watershed should be approximately 500 ha, but since the watershed is a geographical unit, depending on the intensity of degradation, there needs to be more flexibility in defining the size of the micro-watershed to be treated. Treatment of the different micro-watersheds must also be coordinated across the macro-watersheds. In the absence of such coordinated planning, treating patches of micro-watersheds differently within a macro-watershed is unlikely to be very successful in the long term. Forest lands, non-forest pastures, wastelands and crop lands must be looked at in an integrated manner.

Watershed management is complicated by the fact that watersheds rarely correspond to human-defined boundaries. Most of the successful watershed programmes in India have been implemented on a small scale in a few villages and through the collaborative and concerted efforts of research institutes, non-governmental organizations and government departments. The

experiments like Ralegaon Siddhi, Pani-Panchayat in Maharashtra, Sukhomajri in Haryana, Alwar experiment in Madhya Pradesh etc., have exemplified as model watershed development done by both government and non-governmental agencies.

The issue is can the success result be replicated in large watershed basis which comprises of many micro-watersheds.

### **Finances**

The existing rate for developing a watershed is Rs 6000/- which can go up depending on the watershed status. The watershed programme requires a continuous flow of funds in the implementation phase, while DRDA releases the funds in installments. This has an adverse effect on the smooth functioning of the programme, due to frequent cash flow problems.

The projects are faced with financial problems due to non release of funds on time by the funding agencies. The delay in the release of funds is resulting in the escalation of expenditure on watershed works.

Huge funds are sanctioned and spent on the programme since inception without really assessing the impact of the programme. Since lots of money is involved, it is seen as lucrative job by the NGOs which are not really service oriented. Also the government agencies like DWMA's in various districts are involved in misappropriation and misuse of funds.

Given the scale of corruption that exists in our system, it is not surprising that money meant for watershed programme get blocked or siphoned off at the Zilla Parishad and Taluk levels, and seldom reaches the Grama Panchayat level which is the watershed level. There are reports of misuse of funds by the PIAs.

Another problem is large release of funds in the last minute (March Rush) has resulted in speed up of works leading to less attention paid to quality of the work.

## **Human Resource Problem**

Effective watershed development calls for a great deal of knowledge and understanding of the relation between rainfall, surface flow and infiltration into the ground; different ways in which surface flow can be reduced and recharge increased; the manner in which they contribute to greater conservation of rainfall individually and in combination; the mix of interventions appropriate to specific locations; the kinds of structures, materials and designs for different works which are technically sound and cost-effective; the measures needed to ensure that the works have the maximum, sustained impact on water availability, soil erosion, and biomass production. Knowledge on these aspects is expected from the people responsible for implementation of the watershed project which is rarely present. The deficiency of skilled and trained personnel is another major problem faced by the watershed programme, insufficient manpower, at all levels, especially at the professional level.

So many agencies are involved in implementation of various watershed programmes without sufficient technical manpower. They require fundamental technical training on watershed management. They may be expert in any one subject but watershed requires multi disciplinary expertise, at least in basic streams. Also the field staff have very less mobility and are less in number to meet the demands of the programme.

## **Interferences**

The villages today are divided on party lines. The village leaders try to influence the officials in the selection of beneficiaries so that their party supporters get maximum benefits. Officials also try to be in the good books of the village leaders for their own reasons.

The process of project implementation proceeds smoothly if the elected leaders are both locally influential and sincere. In the case of weak leadership there are complaints and allegations, especially regarding the secretary, who is the key individual.

Bureaucratic interferences are also seen in the implementation of the programme. Many times no transparency is seen in the selection of the beneficiaries.

Often prescribed guidelines had to be deviated to fulfill the political demands against the wishes of officials. Often official and non official confrontations come in the way of efficient implementation of the programme. The other extreme is, there are criticisms that politicians and bureaucrats have formed fictitious nexus just to grab the projects with an aim of making money.

### **Selection of Project Implementing Agency (PIA)**

Selection of Project Implementing Agency (PIA) to implement watershed project at project level is crucial for the success of the project. The success of the watershed programme depends on the integrity, commitment and honesty of the PIA. There are cases where PIAs have abandoned the works and absconded after receiving the initial payment. On the other hand, some of the established PIAs, such as Deccan Development Society (DDS) in Medak, and RDT in Anantapuram, express a lack of enthusiasm to continue, due to the difficulties in dealing with excessively bureaucratic procedures and the inflexibility in the implementation process. PIA's performance is to be monitored regularly, and that better-performing PIAs are to be recognized and non-performing or non serious PIAs should be blacklisted.

The PIAs do not have that much infrastructure to implement the programme successfully. Hence, the number of watersheds provided to an individual should be optimized on the basis of the potential of PIA.

Also there is lack of coordination and cooperation among the PIAs. If the PIAs cooperate and share the information, the programme would go a long way.

### **Evaluation Process**

Inadequate monitoring and impact assessment of watershed programmes is a major concern. Benefits derived from watershed

practices must be valued in terms that are meaningful to decision makers. Some benefits from watershed management practices cannot be readily valued as marketed goods. When such elements are identified, they should be discussed in qualitative terms such as social/cultural benefits or environmental/ecological benefits in project documentation.

Both NGOs and government projects are not adopting scientific, systematic evaluating process for evaluating the progress of the watershed management programme. There is no systematic mechanism for storing baseline data and making it available at a later date for conducting meaningful impact assessment studies. Moreover, these data collected for the purpose of planning are often discarded once the project work comes to a close. There is a strong need to develop common guidelines for collecting baseline and monitoring data, which would not only help in analyzing the impacts of current and future activities but also plan corrective measures after mid-term evaluation.

Evaluation should be done regularly by the beneficiaries, the implementing agencies, the officials and the non officials to get maximum results. The beneficiaries are the best evaluators of the programme as they know better what they are getting from the project. But the beneficiaries are not involved in performance evaluation. Also little evaluation of the programme is done after it has run for a couple of years as it is taken for granted that once money has been spent, physical progress automatically results. But, this is far from the truth. Regular evaluations in regular intervals of time should be conducted.

The challenge, therefore, is to put in place an institutional mechanism for research and monitoring in the field of watershed development by involving reputed national institutions and international organizations for upgrading the quality of monitoring and impact assessment.

## **Government and NGO Collaboration**

NGO and government collaboration in watershed management works very well as it is understood that the government agencies focused mainly on technical aspects, while the NGOs focused more on social organizations and peoples participation. The collaborative projects of the government and NGOs tried to draw on the strengths of both approaches. Fixed guidebook and physical target-driven approaches pursued by technocratic, hierarchical organizations are poorly suited to sustainable watershed management programmes. Various studies reveal that local people are happier and satisfied with the NGOs approach. They feel that NGOs officials/staff are more friendly and approachable.

The technocratic government project officials who oversaw top down approaches for many years are now expected to increase the level of local participation in the new government projects which is essential for the success of the programme. Expecting them to transform their mindset overnight from supervisor to facilitator is unrealistic; it will take time, orientation, training where required, and encouragement. This calls for a collaborative approach of watershed development, which capitalizes on the synergies of the government machinery and the capabilities and advantages of research institutes and non-governmental organizations. Given the less number of NGOs working in watershed projects on the one hand, and the massive need and ambitious plans for watershed development on the other, implementation capacity poses a serious challenge.

## **Institutional and Capacity Building**

A major challenge in the traditional watershed management approach was the assumption of technology transfer instead of development of technology on peoples land and their surroundings. Another important weakness was regarding the training and research where the major responsibility for training has been given to agricultural research institutions and agricultural universities, which are sound in technical aspect of watershed but are weak in social

science aspects of that institution building as well as forging links with non-farm sector to generate value added products.

Skill enhancement programmes and other training programmes on natural resources management, livelihood aspects and leadership aspects should be imparted to all the stakeholders in the watershed village- women, SC, ST, OBC, and other upper castes, landless and land holders.

In the present form, schemes are planned and executed by district level officers who have very limited capacity to do so. So, there is a need to train both the government officials and functionaries of agencies, which take up watershed projects. These kinds of loopholes in the process of implementation are leading towards dead end of road of development and growth of watershed programmes and sustainable development and hence need for training.

Capacity building for watershed development through training encompasses wide-ranging tasks such as awareness building or imparting resource –literacy, development of technical skills; and reorienting motivations and attitudes of officials and political functionaries at all levels towards the need for empowering the people through decentralization. While a number of measures have been taken for strengthening training at various levels since the adoption of new guidelines experience so far strongly suggests the need for (a) broadening these programmes with a view to imparting training to bureaucracy at all levels as well as to political functionaries from panchayat level to parliament; (b) improving the content and quality of training programs with due priority given to the process of empowerment of the people of decentralization; (c) intensifying training by adequately taking care of the changing requirements in the field; and (d) ensuring the autonomy of training institutions and their uninterrupted functioning on the required scale by entrusting this task to an independent nodal agency at the national level and by guaranteeing adequate funding.

The development of institutional capacity at all levels has been highlighted as an priority particularly the development of capacity at the community level to take an active and meaningful role in water resource management. In the conventional approach people's participation often limited to project implementation stage and no focus on institutional building for long term collective management of resource.

Overall the institutions must ensure good interaction to bring the formal and informal together for planning and implementation. These features need to be clearly incorporated in the government guidelines and the institutional structures and systems involved in watershed development programmes to improve their impact on productivity, livelihoods and poverty alleviation.

### **Conflicts Among the Departments**

Different Ministries, Departments, Organizations and institutions with divergent interests working at different levels have been implementing watershed programmes, giving rise to innate contradictions and conflicts. Such conflicts may be at the federal level between different Ministries (agriculture, rural development, forestry, environment, water resources etc.), each following its own guidelines, interests, approaches and resource allocation protocols. At the state and district level the conflicts are observed between government bureaucracy and elected representatives. Both struggle to exercise control over the development funds from state or federal sources.

Watershed projects usually affect more than one governmental body, institution and administrative level. There is rarely a single administrative unit that is solely responsible for watershed management in a given project area. Usually, resource management and development programmes for forestry, water resources and agriculture are the responsibility of several independent agencies or institutions. Vertical and horizontal linkages between various implementing agencies are very weak. There is poor Co- ordination among different government departments. The District Forest Offices

may not work along with District Agriculture Officer who may not team with District Soil Conservation Officers.

### **Other Issues**

Properly executed watershed projects lead to increased availability of water resources. Retaining water that would otherwise become runoff improves soil moisture availability for crops and other plants, it can recharge groundwater aquifers thus raising Ground Water table. Plus the management approaches that reduce the speed of runoff through physical structures (bunds, check-dams etc.) and/or enhanced vegetation can significantly improve water quality, most obviously by reducing sediment loads.

The greater water availability from watershed activities is quickly nullified by increased use of water for irrigation and other purposes. The implication is that watershed management alone cannot satisfy increasing needs, and that at some point allocation and demand management must be dealt with as well.

The results of watershed development programmes can be divided into two stages. In the first stage there is an increase in the availability of water and hence an increase in irrigated area and biomass production, on forest land and crop land, increased productivity leads to greater profits from land-based activities. In the second stage, however, increased prosperity leads to further investments in water-intensive crops resulting in increased use of groundwater. Thus several watershed development projects, which showed first stage impact of increased availability of water and biomass production, lead overtime to a worsening of the groundwater situation. Again this is not the irrational decision by farmers.

The observation that water tables have risen in wells that are immediately adjacent to check dams is often recounted as an indicator of success of watershed development programmes. The reality is that check dams and other such water-harvesting structures usually have only localized impacts on the water table for a short period and aquifers rarely behave like underground lakes (i.e. that localized

recharge in one place leads to an immediate rise in groundwater levels at another place many hundreds of meters away).

Also, changes in irrigation due to watershed development may have been minor; for example, water levels might have been slightly higher in wells under watershed projects, but the difference may have been too small to affect irrigated area or cropping patterns.

Dry land areas are characterized by greater agro climatic diversity than the traditional irrigated areas which necessitates location specific research for evolving viable technologies and practices. However, the dry land areas have not received so far the priority they deserve in respect of agricultural research as Green Revolution areas did. Dry land areas need water- saving enterprises and practices which optimize output per unit of scarce water. New technologies need to be developed for optimum utilization of the precious water. In spite of water scarcity and other uncertainties (yield uncertainty as well as price uncertainty), farmers are going for water intensive crops like paddy which has to be discouraged out rightly.

Further, pricing of electricity for pumping water at a flat rate or even supplying it free instead of on a volumetric rate has led to the over-exploitation of scarce ground water resources.

Modern Information and Communication Technologies (ICTs) which facilitate flow of information and knowledge to masses, Geographical Information Systems (GIS), Advances in Remote Sensing Technology increases benefits from the programme. But these latest technologies are not readily accepted and implemented by most number of watershed projects.

With the above observations made and problems identified, the researcher gave some valid suggestions for improving the performance of watershed management programme which are detailed below,

### **SUGGESTIONS**

- The major weaknesses of the projects are sustainability, inequity and weak people's participation. There is no sustainability because of weak people's participation which is

again due to, inequity in sharing of benefits reaped through the programme. Hence right measures were to be taken to empower the landless poor, weaker sections of the society like BCs, SCs, STs and women and other marginalized groups through various pro-poor and pro-ecological development programmes which ensure their participation. Inequalities should be minimized. Caste, region, religion, gender and politics should be kept aside for the success of the programme. Upstream-downstream inequity issue should be addressed. No undue political and bureaucratic interferences should be entertained.

- The villagers and beneficiaries should be encouraged to use watershed techniques. They should be informed and convinced that watershed programme benefits all directly or indirectly
- The decisions relating to selection of beneficiaries should be done in a transparent manner. This inculcates a sense of confidence in the villagers. The village leadership should act in a impartial manner to equitably distribute the fruits of the programme.
- The success of WSM mainly depends upon whole hearted participation of people in an organized way like for example User Groups, Watershed Associations, and Self Help Groups etc. Hence projects should concentrate on forming more and more such associations and groups.
- A blend of indigenous knowledge and traditional practices with modern and efficient water management practices is the need of the hour in order to conserve and utilize the water resources in an efficient and sustainable way. Respect for people's indigenous knowledge systems and agricultural practices that are inter woven into the local culture should be an essential value premise of participatory strategies.

- Regular awareness campaigns should be conducted both by Government Organizations and NGOs, through cultural programmes, workshops, gatherings, meetings and discussions focusing on problems associated with natural resources degradation, importance of conserving natural resources, rainwater harvesting, importance of forests, trees, the concept of watershed, cropping patterns, cultivation practices, importance of livestock and the problem of overpopulation. People should be educated of potential benefits of collective action in conserving and managing natural resources. The awareness should be generated in a systematic and phased manner to provoke people's thinking and reflection in a holistic manner, in general covering all the groups in the project area.
- To bring in gender equity, more women SHGs should be formed, net working them into User Groups or watershed committees, increasing access to resources, granting ownership of assets created, imparting leadership skills to resourceful women and new skill development, equal wages and opportunities to be given, sensitizing the women with respect to health education, nutrition, literacy, girl child education and social evils like dowry, child marriages, violence etc., encouraging them to participate in community programmes in spite of social and cultural restrictions. Women's water needs for household purposes, drinking water supplies, livestock etc are to be addressed by the programme.
- There should be an arrangement for handing over of structures and maintenance of plantation after the project is completed. The villagers should be motivated to maintain the structures and plantation. Tree guards should be arranged to all the plantations planted in order to protect them from grazing animals. A strict account of number of plantations made and number of plantations survived should be maintained to measure the success of the programme. Watershed Fund/

Revolving Fund which is intended to create a sense of ownership among the villagers should be maintained seriously. Enough money should be maintained in the Watershed Fund/ Revolving Fund so as to maintain the structures and plantation after the project is completed.

- The government's paternal approach has killed people's initiative and sense of responsibility. People believe that development is the duty of the government. This sort of negative attitude should be broken and encourage participation in the development process.
- The PIAs along with villagers, officials and non-officials connected with watershed programme should visit other watersheds to see similar projects being implemented/already implemented. This helps to understand the things in a comparative and comprehensive manner and to understand practically where they themselves stand.
- There is need to bring a sense of commitment and accountability among those connected with the implementation of the programme. They should be rightly motivated towards achieving the noble objective of conserving natural resources through watershed programme.
- Water saved is water earned. Hence it should be understood that proper use of water without misuse and wastage is as important as water conservation.
- Measures to increase groundwater recharge through RWH (Rainwater harvesting) in both rural and urban areas are vital. It is time that the governments at various levels-Centre, State, Local, make RWH structures (e.g. percolation pits etc) compulsory for buildings construction approval. There is no account for water used in apartments and hence there is every need to install water meters especially in apartments to check water wastage.

- The traditional perspective of water as a free good is to be replaced with the view that it is very scarce precious thing which should be guarded with at most care. Government and NGOs must educate people towards this perspective.
- Convergence with the National Rural Employment Guarantee Scheme, Integrated Watershed Development Programme, Backward Area Region Grants programme, Xllth Finance Commission Grants and other programmes, is very important for promoting rain water harvesting and conserving natural resources.
- Watershed committees and village level elected institutions at the local level, government departments and Non-Government Organizations as the Project Implementing Agencies, and upstream and downstream inhabitants within the village/ watershed have different perceptions and expectations from the project which can lead to conflict. The conflicts can be resolved by ensuring universal but flexible guidelines at higher levels of governance and the necessary flexibility and adaptability at the grassroots level to manage inherent contradictions and conflicts through adequately designed resolution mechanisms.
- Water is an all-encompassing resource, cooperation between different user parties is essential for optimum and judicious use of the water. Inter-regional, Inter-State, Intra-State, as also inter-sectoral disputes in sharing of water, strain relationships impede the optimal utilization of water through scientific planning on basin/sub-basin basis.
- A strong environmental law is necessary to save the world from water pollution and water scarcity. The government can play an important role in arresting the water exploitation and degradation of natural resources by making strict water and environmental policies. Public controls 97% of water distribution in poor countries like India and private investments in water supply in these countries can have a negative impact

on the living status of poor people. Private investments in water sector have to be made with utmost care.

- Groundwater, though part of hydrological cycle and a community resource, is still perceived as an individual property and is exploited inequitably and without any consideration to its sustainability leading to over-exploitation in several areas. The number of barren lands, dried wells, tanks, depleting aquifers, list of over exploited villages is ever increasing. Natural water bodies and drainage channels are being encroached upon, and diverted for other purposes. Groundwater recharge zones are often blocked. All this should be arrested with iron hand by the Government.
- By ensuring quality and timely supply of electricity, over-pumping of precious groundwater can be minimized. Different crops need to be watered differently. If watering is done after the stipulated time due to power cuts or any other reasons it only results in more water absorption by the parched crop leading to over-pumping of precious groundwater. Sanction of electricity connection for new bore wells especially in over exploited villages should be denied.
- The immediate remedy is efficient irrigation management through efficient irrigation systems, pricing electricity, regulating the use of electricity for groundwater extraction, using efficient pumps and crops that use water efficiently. The concept of water-energy-agriculture nexus needs to be adopted for rational and sustainable use of water. It is a very common phenomenon especially in villages, when a bore well fails; the farmer without second thoughts go for digging new bore even though the water is as deep as some 800 - 900ft. Hence no permission should be given for digging new bores especially in water stressed regions. Registration of new bores should be made compulsory.

- In spite of water scarcity, farmers are going for water intensive crops such as paddy as they find them to be more remunerative, putting even more pressure on ground water. Discouraging water intensive crops is a real challenge as it is a conflict between economics and environment. Farmers are to be persuaded to change the cropping patterns towards less water intensive crops such as oilseeds, ragi, jowar, maize etc which are to be supported by the government by giving minimum price support.
- Farmers are to be encouraged to use environment friendly methods such as bio-fertilizers, bio-pesticides, bio-gas, solar energy, roof-top rainwater harvesting, and kitchen gardening, drip irrigation, sprinkler irrigation etc. On the other hand Government can supply drought, pest and disease resistant varieties of seeds, providing subsidies for seeds, fertilizers, pesticides, financial assistance for drip irrigation, sprinkler irrigation machinery, soil and conservation practices.
- Multiple use of water, i.e., not only for irrigation of traditional crops but also for more efficient use through low consumptive high value systems and non-consumptive productive use can achieve maximum water use efficiency. This increases farm productivity/production without any net increase in water consumption.
- The key to manage any resource is the ability to monitor its status and then make management decisions which are enforceable. All the necessary baseline information for monitoring water resources at all levels (lower, intermediate and upper levels) should be gathered and new technologies such as Geographical Information Systems (GIS) can be used by the managers of watershed project to study and use the baseline information as the basis for management strategies.

- Water and resource assessment procedures adopted in the country are old. All applications of modern tools and methods of assessment have by and large remained academic exercises, conducted at institutions that are not the management authority of water resources. The old assessment methods give rise to erroneous estimates, which unfortunately form the basis of design. The resource assessment agencies must upgrade their assessment methodology to get a realistic assessment of the water resources.
- On the spot inspections by higher officials are very much required to ensure quality of watershed works. District level officials should visit the watershed areas once in a month, at least. More visits help more. The visits should not be aimed at finding faults, but to correct the mistakes and providing guidance.
- Proper monitoring of works, as also the expenditure, is vital. Monitoring and evaluation should be an inbuilt wing of project Management. Evaluation is an audit of both works and expenditure. For impartial evaluation and constructive suggestions, a third party involvement in evaluation is always helpful and beneficial.
- The local people should actively be involved in the programme formulation, implementation and also in the evaluation of the programme. The beneficiaries are the best evaluators of the programme. The effects of the programme are felt by the beneficiaries and hence they are in a better position to evaluate its merits and demerits and suggest the required changes in the programme. Social Audit is a remedy to political and bureaucratic corruption. Monitoring and evaluation are essential for assessing new, innovative approaches to watershed management programme.
- Vast budgets are allocated for watershed projects and hence a proper performance assessment would go a long way towards

cost-effective government investment. Procedures, rules and regulations have to be formulated for effective performance assessment. Funds should be released in time to the PIAs which go a long way in increasing the performance of the programme. Every penny should go into the programme without misuse. Transparency should be maintained in all aspects.

- According to various studies, NGO and NGO-government collaborative projects are more successful in promoting collective action. The government projects focused largely on technical improvements, the NGO projects focused more on social organizations and the collaborative projects tried to draw on the strengths of both the approaches. Hence more and more NGOs should be involved in watershed programmes and collaborative projects should be taken up in large numbers. Also there is need for undertaking the research and exchange of information between the NGOs, NGOs and the government for the success of the programme.
- Regional strategies need to be evolved by the NGOs and the government agencies for specific agro-climatic regions, with a team approach emphasizing co-ordinated efforts by multiple actors, in order to effectively resolve issues affecting the poor in rain fed regions.
- Advances in remote sensing technology give more of location specific data. Universities and research institutions should be encouraged and supported to make use of the technology for effective watershed implementation.
- ICT-enabled Farmer-centered Learning Systems for Knowledge Exchange should be setup. Modern information and communication technologies (ICTs) facilitate flow of information and knowledge to masses which increases benefits from the programme. Advances in information technology must be introduced to create a modern information system promoting free exchange of data among various agencies.

- There is lack of adequate trained personnel for scientific planning; utilizing modern techniques such as ICT, GIS etc and analytical capabilities incorporating information technology. Hence it is important that the personnel be trained adequately and their capacities enhanced. Regular training and academic courses in water management and conservation which are regularly updated should be promoted.
- As proposed by Water Policy 2012, a national campaign for water literacy can be started for capacity building of different stakeholders in the water sector. Also professional, technical and field staff should be adequately employed them only success achieved.
- Syllabus on soil and water conservation, importance, methods can introduce at all levels of education- Primary, Secondary and Higher. Study center on soil and water conservation can be started in Universities to conduct research,
- Watershed projects have not been clearly and convincingly shown to be economically sound, socially acceptable, and politically attractive. Hence, there is every need to project the projects in a positive way.

## **CONCLUSION**

To conclude, India is predominantly an agriculture based economy. Agriculture forms the backbone of the Indian economy and despite concerted industrialization in the last six decades, agriculture occupies a place of pride. Being the largest industry in the country, agriculture provides employment to around 65 per cent of the total workforce in the country directly and indirectly. According to 2011 census, 66.2 per cent of rural males and 81.6 per cent of rural females are engaged in agriculture as cultivators or labourers. The Central Statistical Organization data reveals that the share of agriculture in Gross Domestic Product ranges between 55 to 52 percent in 1950-51 though there is a sharp decline to 14 percent in

2010-2011. In spite of this, it is a fact that the development in agriculture is an essential condition for the development of the national economy. But India's agriculture is gamble with monsoons and India's rainfed areas (65% of arable land) is characterized by low productivity, high risk and uncertainty, low level of technological change and vulnerability to degradation of natural resources, mass illiteracy, extreme poverty, ecological imbalance and power scarcity. The 1980's saw the so called miracles of the green revolution vanishing, but not before it had left permanent imprints of its negative effects on Indian agriculture. Stagnation and decline of yields in irrigated lands, increased use of mineral fertilizers and chemical pesticides, rapid rate of land degradation and over exploitation of ground water rendering larger areas vulnerable to drought, have all contributed to crisis in food security and environmental degradation.

Degradation of Natural Resources is another major problem faced by rural India. Negative trends in resource degradation are a challenge that must be tackled to meet poverty alleviation goals and ensure ecosystem resilience. Natural Resources Management and Poverty alleviation should be considered as two-sides of the same coin. Conserving the natural resources lead to improved agricultural productivity. Agriculture is a key driver of development and poverty reduction in rural areas. Growth in agriculture usually generates the greatest improvements for the poorest people. The experiences gained over the last 16 years amply proved that the livelihoods link local people to watersheds and the natural resources. Finally realization has dawned upon that productivity and livelihood opportunities increases only through natural resource conservation.

The watershed management approach was adopted by the Government of India with the twin objectives of poverty alleviation and conserving the natural resources there by achieve sustainable rural development. India is probably the world's largest advocate of watershed management and Anantapuram district of Andhra Pradesh occupies first place in the state in terms of area coverage. Various

studies and the present study have revealed that the availability of water in different watershed villages and ground water table has increased atleast to some extent in most of the watershed villages. The measures taken by various agencies running the programme have proved successful in checking soil erosion and natural resource degradation. But social component of watershed programme i.e involving local communities is still to be realized. Though some significant progress has been made there is a long way to go. The fruits of the programme can be realized only by the sincere and committed efforts of the beneficiaries, officials and non- officials connected with the programme and by the Government at Central and State levels.

Watershed Management Programme has emerged as a panacea for India's rainfed areas. Problems of rainfed agriculture in semi-arid areas, which are characterized by low productivity, degraded natural resources due to deforestation and desertification. Widespread poverty due to livelihood in security, acute water scarcity can be adduced effectively by Watershed Management Programme.

Hence, Watershed Management Programme must get the foremost priority among the various objectives, in our National Rural Development Policy for the overall development of rural areas.