



SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution Coimbatore – 35

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DEPARTMENT OF AGRICULTURAL ENGINEERING

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WATERSHED PLANNING AND MANAGEMENT





Problems and Prospects in Watershed Management



Problems:

Fragmentation: Watershed management involves multiple stakeholders, including local communities, government agencies, non-governmental organizations, and private entities. Coordination and collaboration among these diverse things can be challenging, leading to fragmented efforts and conflicting priorities.

Limited Awareness and Education: Lack of awareness and understanding about the importance of watershed management among communities can hinder effective implementation. Education and awareness campaigns are necessary to promote knowledge about sustainable water use, conservation practices, and the interconnections between land and water resources.

Land Degradation: Watershed areas often suffer from land degradation due to deforestation, soil erosion, improper land use practices, and unsustainable agriculture. These issues contribute to reduced water quality, increased sedimentation, and decreased water availability, adversely affecting both ecosystems and human populations.

Water Scarcity and Quality: Watershed management is crucial for ensuring adequate water supply and maintaining water quality. Climate change, population growth, and pollution pose significant challenges to water availability and quality within watersheds. Balancing competing demands for water resources and addressing pollution sources are critical aspects of effective watershed management.

Conflicting Land and Water Use: Watershed areas are often subject to competing land and water use demands. Agriculture, industry, urbanization, and hydropower projects can have conflicting interests and potentially impact water availability and quality. Resolving conflicts and promoting sustainable and equitable resource use requires careful planning, stakeholder engagement, and integrated management approaches.



Problems and Constraints in Watershed Management



- (a) Land degradation in rain fed areas due to soil erosion from runoff is one of the major problems. In India it was estimated that the soil erosion in the 1990s was almost double that of soil erosion in the 1980s. Rainfall uncertainty and poor economic conditions act as a major constraint and thus prevents the farmers in rainfed areas from making investments. This leads to improper watershed management.
- (b) Equitable benefit sharing of watershed management within the farming communities as well as within the different locations of watershed is a huge problem. Generally, women, marginal farmers and landless laborers gain very little or nothing at all from the watershed management activities. Several case studies in water scarce states of Gujarat and Madhya Pradesh in India have showed that overdevelopment of water harvesting structures in the upstream portion of watersheds had significantly reduced the inflows into the downstream reservoirs. On the other hand, it is also noticed that building of large reservoirs resulted in the submergence and hardship in the upstream parts and benefits for people in the downstream parts of the same watershed or a neighboring watershed generally having an urban or an industrial area.
- (c) Acute shortage of water in general and drinking water especially in summer has been observed in many watersheds with inadequate watershed management which may result in severe/ recurrent droughts. It may often result in limited and temporary food productivity gains.
- (d) Many a times, common lands do not get treated adequately and re-vegetation does not take place as expected in spite of the watershed management programs. As a result of this, domestic/ ecosystem water needs and livestock water/ fodder needs are either inadequately addressed or are made to suffer due to increased water withdrawals by other uses or due to overgrazing.



Problems and Prospects in Watershed Management



- (e) Problems exist or new problems crop up due to improper understanding of the interaction between biophysical and socio-economic processes in watershed management.
- (f) Conflict among various government ministries such as those related to agriculture [with emphasis on food production], rural development [with emphasis on employment generation & poverty alleviation], forests [with emphasis on maintaining biodiversity & wildlife], as well as conflict between government bureaucracy and elected representatives in their zeal to control funds, is a major problem in watershed management programs -which requires to be resolved on a priority basis.
- (g) It is hard to conduct meaningful impact assessment studies on watershed management programs for lack of baseline data for monitoring and comparison of the current conditions. The whole exercise of watershed management is undertaken without properly estimating the water supply scenarios under drought/ normal/ surplus years as well as without proper demand management especially during drought years.
- (h) Large areas inhabited with tribal population lack facilities to harvest water and to stabilize their food/ crop/ fodder production due to reduced forest yields, deterioration in land quality, lack of tribal agriculture policy and population pressure. This leads to a sustained misery, socio-political unrest and insurgency among the tribal population.



New Prospects and Opportunities Associated with Watershed Management

Community Engagement and Participation: Watershed management offers opportunities for community empowerment and participation. Involving local communities in decision-making processes, encouraging their active engagement in planning and implementation, and recognizing their traditional knowledge can enhance the effectiveness and sustainability of watershed management initiatives.

Integrated Approaches: Adopting integrated approaches that consider the interconnectedness of land, water, and ecosystems is vital for successful watershed management. Integrated water resources management (IWRM) frameworks provide a holistic perspective, encouraging collaboration among different sectors and stakeholders to balance competing interests and ensure sustainable water use.

Technological Innovations: Advances in technology, such as remote sensing, Geographic Information Systems (GIS), and hydrological modeling, can improve the monitoring, assessment, and management of watersheds. These tools facilitate data collection, analysis, and decision-making, supporting evidence-based approaches to watershed management.

Policy and Governance: Sound policies, effective governance structures, and legal frameworks are essential for promoting sustainable watershed management. Governments can play a crucial role in formulating supportive policies, providing incentives, and enforcing regulations that encourage responsible water use and ecosystem protection.

Partnerships and Collaboration: Building partnerships and fostering collaboration among stakeholders are key prospects in watershed management. Engaging with government agencies, non-profit organizations, research institutions, and private sectors can leverage expertise, resources, and diverse perspectives to address complex watershed challenges effectively.

Climate Change Adaptation: Watershed management can contribute to climate change adaptation by enhancing the resilience of ecosystems and communities. Strategies such as reforestation, water storage infrastructure, and implementing climate-smart agricultural practices can help mitigate the impacts of climate change on water resources.



New Prospects and Opportunities Associated with Watershed Management



In spite of the above-mentioned problems and constraints as well as some other problems and constraints, watershed management is associated with new prospects and opportunities. Some of them are listed below:

- (a) There is a need to produce more and better food without further undermining the environment/ ecology, especially the land, water, forests, wildlife and atmosphere. This may include adoption of best management practices (BMPs) such as organic farming, de-silting for reservoir capacity restoration as well as for crop productivity increase, sprinkler and/ or drip irrigation to avoid excess use of water, no tree felling policy, afforestation and arboriculture through high oxygen yielding & other medicinal plants etc.
- (b) There is a need to ensure that gains due to groundwater recharge are not dissipated by excess groundwater extraction. To achieve this, groundwater over-extraction should be avoided through public awareness and also through regulation.
- (c) There is a need to consider the downstream impacts of intensive upstream water conservation. For this, watershed associations with representations from all the stakeholders in the watershed should be made operational. These associations can take decisions in the best interest of all the people concerned.
- (d) Decreasing the costs at which the gains are achieved and thereby increasing the modest benefit-cost ratio should offer new prospect and opportunity in watershed management. To realize this, low cost technologies which may involve local materials, labour at practically no cost, technologies which are traditional and time tested should be employed to generate more benefits spread over the entire watershed among all the stakeholders.



New Prospects and Opportunities Associated with Watershed Management



- (e) Increasing all sections of people's participation beyond the project implementation stage to ensure sustainable watershed management should be a top priority. Only this can ensure progress on a sustained basis overcoming the hydro-geological, socio-political and other uncertainties.
- (f) Many successful watershed management programs -especially in India, have been implemented on a small scale in a few villages by collaborated efforts among the government departments, non-governmental organizations (NGOs) and research organizations. They represent sporadic BMPs. Hence there is a need to scale up the watershed management activities over large areas which could include remote and/or difficult terrains, so that many problems affecting our agricultural, rural and forest sectors can be effectively addressed
- (g) Since there have been no or very few institutions built for research & development on collective management of watersheds, there is a need to build centers of advanced learning employing the modern tools of remote sensing, geographic information systems, decision support systems, computer based planning tools, poverty & socio-economic analysis etc.
- (h) There is a need to preserve and improve common pool resources (CPRs) of land, water, fodder, forest, fisheries, wild life and agriculture which significantly contribute towards people's livelihood especially in the rural areas.
- (i) There is a need to minimize migration to urban areas by creating opportunities in agriculture, natural disasters like floods/droughts, forest/ mountain economies and by arresting fall in agricultural prices, gap in urban/ rural wages, gaps in urban/ rural employment opportunities.