Tracing the trajectory of watershed development in India: through the lens of watershed guidelines

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This paper tracts the development of watershed in India based on the governing guidelines of the watershed programmes. We explored the changes and modifications in the watershed guidelines, and categorized the developmental changes into distinct, however, interlinked six phases. We observed watershed guidelines were fine-tuned with emerging challenges of land degradation, livelihood security, gender and social equity, climate change mitigation and adaptations. Recently, the focus of watershed has shifted from production centric to income-centric by promoting enabling institutional settings. The experiences and learnings from the India’s watershed programmes are great source of insights for other developing countries implementing watershed programmes.

Key Words: Watershed Development, watershed Guidelines, India
Introduction

In the world, India has the largest area under rainfed agriculture both in terms of area and value of production\(^1\). Rainfed areas prone to land degradation, and facing challenges of low productivity, low investments, poverty, malnutrition, increasing pressure from human and livestock population and groundwater depletion, leading to food, water and livelihood insecurity\(^2\,-\,4\). Situation further aggravated as relatively less attention was paid to rainfed agriculture due to biased policies towards irrigated areas\(^5\,-\,6\). Furthermore, the benefits of the green revolution were largely confined to irrigated areas, resulting in increased regional disparities as rainfed areas could not reap much benefits of practices and technologies, which led the green revolution. Therefore, in early eighties in the backdrop of stagnation of productivity gains in irrigated areas\(^7\) and, to harness the full potential of the available land resources, prevention of their degradation and for sustainable development of wastelands were accorded greater importance for inclusive and overall economic development. However, sustainable management of degraded land is complex and multi-dimensional, needing a scientific, holistic and innovative approaches. Therefore, to sustain the natural resources and to overcome the regional disparities, the idea of watershed development was convinced at policy level\(^8\) as it was imperative to improve the productivity in the semi-arid and arid rainfed areas to sustain food security and agricultural growth\(^9\,-\,10\). Unless the nexus between drought, land degradation and poverty are addressed, improving the livelihoods of resource poor farmers dependent on natural resources was implausible\(^11\). For this end, watershed development programmes were recognized as key instruments for rural development through harnessing the potential of water resources for improving agricultural productivity\(^12\). In India, watershed development started in the 1950s to provide a framework for conserving soil and water to sustain agricultural production\(^13\). Moreover, to restore ecological balance and improve the economic conditions of the resource poor farmers, watershed development programs (WDP) were considered as key policy response to achieve overall sustainability in ecologically fragile rainfed areas\(^14\,-\,16\). Over the period of time, watershed programmes have witnessed changes in their implementation strategies and institution involved. Therefore, the aim of this paper is to understand and track the development of watershed programmes in India for drawing useful insights, which could be useful for policy planner, researchers and grass-root level functionaries working in India and other developing countries wherein the watershed programmes are being taken as unit of natural resources management for overall economic development.

Evolution of Watershed management policies in India

Initially WDP focused on improving natural resource base through restoration of ecological balance. However, with passes of time watershed management start expanding its domain by addressing the issue like sustainability and equity. Most importantly, people’s participation has got increasingly greater role not only in planning and implementation but also in post-watershed management activities. For ensuring equity, the most downtrodden section of society i.e., assetless people were also supported through provision of livelihood and income generating activities by forming self-help groups (SHGs), and thereby, additionally, due attention was also given to women participation and empowerment through watershed programmes. For making watershed management truly participatory, the involvement of women and resource poor farmers in all the phases (preparatory, work and consolidation) was crucial\(^15\). However, in spite of greater emphasis on women participation in watershed guidelines, the level of their participation and share in benefits
are skewed to men, where women participation is merely viewed as quota to fulfil the guideline requirements\textsuperscript{13,17}. Further, WDP were also viewed as an important strategy to mitigate/ moderate/ adapt to extreme weather events and climate change. Recently, integrated farming system also has been made a component of watershed to ensure livelihood security.

**Different phases of watershed programmes In India**

Time to time numerous changes and modifications were incorporated in the guidelines of the watershed programmes based on the experiences and learnings from the implementation of different watershed programmes, and to fine-tune with emerging issues. The watershed guidelines vary from each other in terms of broad objectives, approaches for project planning, implementation, cost norms, coverage, role and responsibilities of institution involved etc. To understand the evolution of watershed development programmes in India, the watersheds programmes can be broadly categorised into six phases based on the objectives, approach and guidelines followed for execution of watershed-based works (Figure 1 and Table 1).

**Phase-1:** WDP before the 1994 guidelines can be broadly classified as phase-1 watershed programmes having relatively narrow focus, primarily confining to structure-based soil and water conservation works. Watershed based treatment was implemented following a highly centralized, target-driven, top-down approach, under regulatory framework primarily focusing on technical soil and water conservation measures, wherein community participation was very limited, barring providing labour for implementation of soil and water conservation activities. WDP were being implemented in sectoral and piecemeal manner by different departments under their respective ministries in isolation (without convergence) in administrative boundaries following their own separate guidelines with no coordination among themselves\textsuperscript{2}. These programmes could not ensure equity as most of benefits biased towards large to medium farmers, and almost no incentives for community participation. Moreover, the transparency was lacking in watershed planning and execution. Then, it was realized that WDP should be used as an instrument for holistic development beyond merely improving natural resources, leading the conception of watershed plus approach\textsuperscript{16,18}. Moreover, these WDP were being more of target driven, highly centralized, following top-bottom and contractual approach, emphasizing merely on the physical achievement rather than qualitative and holistic improvement, and consequently could not halt the alarmingly increasing rate of degradation. These programmes also could not bring about any noticeable productivity gains and improvement in livelihood of the resource-poor farmers of the degraded areas\textsuperscript{2,19}. Considering the above discussed limitations of WDPs along with imbibing the learning experiences from successful participatory watersheds, a need to revamp the watershed programmes was realized\textsuperscript{20}. Additionally, it was also observed that WDPs implemented by NGOs or in collaboration between NGOs and government departments by
giving adequate attention to social organizations and peoples’ participation, performed comparatively better than that of solely implemented by government departments\textsuperscript{12,21}. In 1972-73, the Drought Prone Areas Programme (DPAP) having several ORPs (Operation Research Projects) was introduced, which was instrumental in tackling the problems faced by fragile areas witnessing frequent severe droughts. The work carried out under DPAP relating to soil and water conservation measures on both arable and non-arable lands, gradually evolved into watershed programmes\textsuperscript{19}.

**Phase-2**: During this phase, the objectives of the WDPs were broadened with emphasizing the need of achieving overall economic development by conserving natural resources. Up to 1994, the area development programmes namely DPAP, DDP (Desert Development Programme) and the IWDP (Integrated Wastelands Development Programme) were implemented according to their own separate guidelines, norms and funding pattern\textsuperscript{22}. Then, under the chairmanship of Prof CH Hanumantha Rao, a technical committee was formed to assess the performance of DPAP and DDP, and IWDP these programmes were brought into the watershed mode in 1987. The committee pointed out that these programmes were implemented in a fragmented manner following rigid guidelines; most importantly watershed plans were prepared without people’s participation. The impacts were also sub-optimal, and could not contain the land degradation and other environmental problems\textsuperscript{23}. 
Figure 1: Evolution of watershed programmes in India
### Figure 2 Changes in features and cost norms of watershed during different phases

<table>
<thead>
<tr>
<th>Phase</th>
<th>Farmers’ contribution (%)</th>
<th>Treatment Cost (Rs. ha⁻¹)</th>
<th>Scale of operation (ha)</th>
<th>Project Duration (years)</th>
<th>Cost Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase-1 (Before 1994)</td>
<td>-</td>
<td>4000</td>
<td>No</td>
<td>4.5</td>
<td>4.0%</td>
</tr>
<tr>
<td>Phase-2 (1994-2000)</td>
<td>5% (CL) &amp; 10% (PL)</td>
<td>4000</td>
<td>500</td>
<td>5</td>
<td>5.0%</td>
</tr>
<tr>
<td>Phase-3 (2001-2007)</td>
<td>5% (CL) &amp; 10% (PL)</td>
<td>6000</td>
<td>500</td>
<td>10</td>
<td>5.0%</td>
</tr>
<tr>
<td>Phase-4 (2008-2011)</td>
<td>NRM on PL: 10% NRP PL (SC/ST): 5%</td>
<td>120005000</td>
<td>10005000</td>
<td>3.5</td>
<td>4.7%</td>
</tr>
<tr>
<td>Phase-5 (2012-2020)</td>
<td>NRM on PL: 10% NRP PL (SC/ST): 5%</td>
<td>120005000</td>
<td>30007000</td>
<td>5</td>
<td>5.7%</td>
</tr>
<tr>
<td>Phase-6 (2021 onwards)</td>
<td>NRM on PL: 10% NRP PL (SC/ST): 5%</td>
<td>2200028000</td>
<td>30007000</td>
<td>3.5</td>
<td>4.7%</td>
</tr>
</tbody>
</table>

Therefore, in 1994 the MoRD (Ministry of Rural Development) came up with new set of guidelines for implementing its watershed programmes. With effect from April 1995, following the recommendation of Hanumantha Rao committee, all these three programmes (DDP, DPAP and IWDP) were brought under a single umbrella, and till 2001, the watershed were implemented as per 1994 guidelines. Similarly, programmes implemented by MoA (Ministry of Agriculture) such as NWDPRA (National Watershed Development Project in Rainfed Areas) and WDSCA (Watershed Development in Shifting Cultivation Areas) were also implemented on watershed basis. However, the watersheds implemented by MoRD were primarily focusing on development of areas having difficult terrain and prevalence of community resources, where programmes under MoA had focus on to increase productivity in the cultivated areas owned by farmers. During this phase, the scale of the operation was 500 ha, and treatment cost was Rs. 4000 ha⁻¹. To instil the sense of belongingness among the community, and to encourage the active participation of peoples, farmers contribution was made mandatory, which was 5 and 10% for treating community land and private land, respectively. Cost norms for allocation of funds within watershed were very general and broad in nature; and were divided into four categories viz., watershed development work (80%); watershed community organization (6%); institute and capacity building (4%) and administrative cost (10%).

Phase-3: In the third phase, the emphasis was on ensuring the livelihood security of people dwelling in watershed areas through implementation of soil and water conservation measures and other prioritized interventions. Achieving the livelihood security became the central objectives of the watershed programmes. The revised guidelines were formulated in 2001, basing the array of criticisms and limitations of the existing guidelines i.e., watershed guidelines of 1994. The existing guidelines were criticised on the following points: (a) poorly defined role and responsibilities of participating institutions; (b) lack of transparency in implementation of watersheds; (c) no set procedure for social inclusion; (d) poor representation of women; (e) lack of post-watershed management strategies for sustainability; (f) missing provision of foreclosure; (g) no or inadequate inter-departmental coordination and convergence. To overcome the identified limitations, in 2001, watershed guidelines were further revised to make them contemporary, transparent and greater flexibility was provided to suit local conditions, needs and social structures. Following were key features of the revised watershed guidelines: (1) infusion of greater flexibility in implementation, (2) introduction of well-defined exit protocol-each watershed development Project was expected to achieve some clearly defined milestones (completion of planned treatments, operation and maintenance of created assets taken over by panchayat; imparting of training and organization skills by watershed committee; formation of SHGs; increase in cropping intensity, productivity and farm income and rise in groundwater table) by the end of its period. (3) criteria for de-selection, that is, provision of foreclosure within one year if project cannot be implemented due to some
unavoidable circumstances and reasons, (4) formation of Self-help group (SHGs) and women empowerment: groups having common identity dependent on the watershed area such as agricultural labourers, land less persons, women, shepherds, scheduled castes/scheduled tribe’s persons, (5) twin track approach, that is, along with the long-term benefits, the need was felt to identify short term verifiable benefits of watershed management, (6) Panchayat Raj Institutions (PRIs) were entrusted to play an important role in watershed programmes in terms of implementation, review, monitor and convergence, (7) involved institutions should try to avail credit from financial institutions for further developmental activities in watershed areas, (8) use of remote sensing was promoted, (9) criteria for selection of forest land, which is part of watershed, for treatment through involvement of village forest communities, (10) ensuring women representation in decision making process, and inclusion of the weaker and underprivileged sections of the society, and (11) it was made mandatory that watershed action plan should be passed by Gram Sabha.

Again, in 2003, it was noted that there was further a need of simplifying the procedures, and to ensure a meaningful participation and involvement of PRIs in planning, implementation and management of economic development activities in rural areas. For decentralizing the watershed management, Gram Panchayats were made potential key players in the area of natural resource management. A provision was made for involving local unemployed youth from BPL families as “Van Rakshaks” for protecting plantations. As per the 73rd and 74th Amendments to the Constitution of India, the Panchayati Raj Institutions (PRIs) were mandated with a greater role in the planning and implementation of developmental programmes at grass-roots level. In watershed guidelines of 2001, role of PRIs in the implementation of watershed projects was encouraged. However, it was observed that there was a little coordination with PRIs in watershed planning and implementation. Then in 2003, the DoLR (Department of Rural Development) came with new guidelines called as ‘Hariyali guidelines’ to empower the PRIs in terms of financial and administrative power to implements WDP in the country. In the third phase, the almost same scale of operation and costs norms were followed as per earlier guidelines, till the year 2007.

Phase-4: It was observed that the prevailing guidelines failed to consider prevailing heterogeneity of topological structure and intra-community relationships. Therefore, for factor-in topological heterogeneity, the need of cluster approach was felt. Accordingly, in this phase, the scale of operation was enlarged from 500 ha to 1000-5000 ha for covering a cluster of watersheds, and treatment cost was also revised from earlier Rs. 4000 ha to Rs 6000 ha. Further, it was found that there was an inadequate impact at state and national levels, therefore, a need of fine-tuning watershed programmes for inclusive growth and improving the rural livelihoods particularly in rainfed areas were felt, and efforts made for mobilization and convergence of investments.
For fine-tuning the watershed programmes to meet the growing socioeconomic demands, and risk management, the guidelines were jointly prepared for the first time and released by both the Ministries (Agricultural & Rural Development); and, NRAA (National Rainfed Area Authority) was empowered to interpret and modify these guidelines to suit with emerging necessitates and demands. During this phase, emphasis was given on “inclusive growth” and to develop rainfed areas for improving rural livelihoods through participatory watershed development. The States were delegated more powers for managing the watershed programmes, and dedicated institutions for managing the watershed programmes were created with adequate financial assistance. The flexibility in the duration of watershed management programme from 4 years to 7 years was introduced to suit the cluster-based approach, and watershed programmes were also reoriented for ensuring the livelihood security of people dwelling in watershed areas. To simplify and incorporate the suggestions of the departments and NGOs in the existing guidelines, Ministries delegated power to state to sanctions and supervise watershed projects. Cell cum data centres were established, and Gram Sabha was entrusted to constitute watershed committee. The scope of the farmers’ contribution was also widened to cover horticulture and agro-forestry activities. For soil and water conservation measures, particularly relating to engineering-based interventions at private land farmers’ contribution was pegged at 5% for SC/ST and small and marginal farmers, and for other it was kept as 10% of the treatment cost. For horticulture and agro-forestry interventions, the contribution from farmers was 40% of the cost for private land for general and OBC, and the same was 20% for SC/ST farmers. Most interestingly, in this phase, there was an emphasis on three other important activities, namely livelihood activities for landless or assetless farmers for social equity, for that, 9-10% of the watershed budget was allocated. Further to improve the production system and, encouraging the micro-enterprises at watershed level 10-13% of total watershed budget was earmarked. To improve the sustainability of the watershed in post-watershed management period, the concept of the consolidation phase was introduced with allocation of funds to the tune of 5%. Moreover, exclusively funds were also allocated for entry point activities (4%), monitoring and evaluation (2%) and DPR (detail project reports) preparations (1%). However, for the core activity i.e., watershed development works, the allocated funds, as per the cost norms, was 50-56%.

Phase-5: The watershed programmes were entrusted to fine-tune their activities to promote the climate change adaptation strategies to cope up with the emerging issue of climate change, and moderate their detrimental effects on crop productivity and increased rates of soil erosion. Moreover, rainwater harvesting structures and judicious use of rainwater was promoted as it was viewed as an opportunity with increasing chances of high intensity rainfall due to climate change. The existing guidelines were also strengthened by addition of new and innovative features. For instance, in watershed wherein more than 50% area is under forest, in such cases forest department was allowed to become the PIA. Gram Panchayat was entrusted to review the physical and financial progress of watershed works. During this phase, some other prioritized
activities were also included, for instance, promotion of seed bank and village seed capital assistance for groups, alternative food systems and agro-processing and marketing management. During this, the scale of the operation was further widened to the extent of 3000-7000 ha, and there was a substantial increase in treatment cost to the level of Rs. 12000 and 15000 ha$^{-1}$ for plain and hilly& difficult areas, respectively$^{31}$. Most interestingly, with the aim to provide greater flexibility in watershed development, 25% of the allocated fund for each watershed kept as flexi-fund to meet areas specific requirements and, to encourage mitigation efforts in event of natural catastrophe in PMKSY-WDC (*Prime Minister Krishi Sinchayee Yojna* -Watershed Development Component)) guidelines since 2014-15. However, as per PMKSY guidelines, watershed programmes were made a sub-component of PMKSY. In PMKSY-WDC the emphasis is on timely execution of the watershed development projects along with optimal utilisation of budgetary support, focus on convergence with relevant schemes of State and Central Government, and ensuring the prioritization of project activities.

**Phase-6:** This phase of the watershed development starts with commencement of the new generation watershed guidelines by DoLR, MoRD in 2021 to fine-tune the watershed management with emerging challenges such as steep decline in the average soil organic carbon (SOC) content in soils, around 30% area is facing environmental challenge of desertification and land degradation, increasing numbers of the dark zones due to groundwater exploitation, increasing adverse impact of the climate change etc. The emphasis was laid on transforming the rainfed area, which are facing incidence of poverty, malnutrition, water scarcity and severity of land degradation, to achieve the sustainability by ensuring economic efficiency, ecological security and social and gender equity. It is also envisaged that new generation watershed will also help to achieve commitment towards Sustainable Development Goals (SDGs), 2030, Nationally Determined Commitments (NDCs) and Land Degradation Neutrality (LDN) to the tune of 26 million ha.

As springsheds in Himalayan region have suffered ecological degradation, around 4-5 million springsheds have dried up of almost 50% of their capacity, therefore, a special emphasis was given on rejuvenation of the springsheds. There is a paradigm shift from production centric watershed management to income-centric by promotion of farmers producers’ organization (FPO) and subsidiary institutions, strengthening market linkages to increase the sustainability and efficiency of the watersheds. For effective utilization of the resources, emphasis is given to convergence and integration with other on-going schemes are department for sharing knowledge, information and building capacity of the stakeholders. The cost norms have been revised upward to the extent of Rs.22,000 ha$^{-1}$ for plain areas, and Rs.28,000 ha$^{-1}$ for hilly & difficult areas (desert areas) and up to Rs. 28,000 ha$^{-1}$ for LWE/IAP (Left Wing Extremism/Integrated Action Plan) districts$^{32}$. 


**Conclusion**

In India, watershed programmes have extensively evolved to embrace all the facets of overall economic development and environmental security. Watershed development programmes have become an engine of sustainable and inclusive growth by promulgating community-based approach through providing the local- and nature-based solutions to emerging concerns of climate change and land degradation. The watershed guidelines vary from each other in terms of broad objectives, approaches for project planning, implementation, cost norms, coverage, role and responsibilities of institution involved etc. The guidelines were modified for suit the changing requirements of the community, and to advocate and propagate strategies for adaptation, mitigation and resilience to crop production system in wake of climate change and increasing frequency of droughts in different parts of the country. At present, the objective of the watersheds has shift from production centric watershed management by conserving natural resources to income-centric by promoting enabling institutional settings such as farmers producers’ organization (FPO) and subsidiary institutions, strengthening market linkages to increase the sustainability and efficiency of the watersheds. Most importantly, these programmes has helped creating a host at grass-root level institutions for managing the natural resources. These programmes also address the issue of social and gender equity by providing means of livelihood security to assetless sections of the society in watershed areas, and by encouraging the women participation in decision-making. Experiences and overview of the watershed programmes is great source of learnings for other developing countries particularly for African and south Asian nations, wherein natural resources management works are being undertaken through watershed programmes.

**References:**


