

Tracing the trajectory of watershed development in India using watershed guidelines: policy insights

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This study traces the development of watersheds in India based on the governing guidelines of the watershed programmes. We explore the changes and modifications in the watershed guidelines and categorize the developmental changes into six distinct yet interlinked phases. We observed that the 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 watersheds has shifted from production centric to income-centric by promoting enabling institutional settings. The experiences and learnings from India's watershed programmes provide insights for other developing countries implementing such programmes.

Keywords: Climate change, governing guidelines, land degradation, sustainable growth, watershed development.

INDIA has the largest area under rainfed agriculture in the world, both in terms of area and value of production¹. Rainfed areas are prone to land degradation and face challenges of low productivity, low investment, poverty, malnutrition, increasing pressure from human and livestock population and groundwater depletion, leading to food, water and livelihood insecurity²⁻⁴. The situation has 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 many benefits from the practices and technologies, which led to the Green Revolution. Therefore, in the early eighties, in the backdrop of stagnation of productivity gains in irrigated areas⁷ and to harness the full potential of the available land resources and prevent their degradation, sustainable development of wastelands was accorded greater importance for inclusive and overall economic development. However, sustainable management of degraded land is complex and multi-dimensional, requiring scientific, holistic and innovative approaches. Therefore, to sustain the natural resources and overcome regional disparities, the idea of watershed development was convinced at the policy level⁸, as it was imperative to improve productivity in rainfed areas to sus-

tain food security and agricultural growth^{9,10}. Unless the nexus between drought, land degradation and poverty is addressed, improving the livelihoods of resource-poor farmers dependent on natural resources is not possible¹¹. Thus watershed development programmes (WDPs) were recognized as the key to rural development by harnessing the potential of water resources for improving agricultural productivity¹². In India, watershed development started in the 1950s to provide a framework for conserving soil and water to sustain agricultural production¹³. Moreover, to restore ecological balance and improve the economic conditions of resource-poor farmers, WDPs are considered the key policy response to achieve overall sustainability in ecologically fragile rainfed areas¹⁴⁻¹⁶. Over a period of time, WDPs have witnessed changes in their implementation strategies and the institutions involved. The aim of this study is to track the development of watershed programmes in India for drawing insights which could be useful to policy makers, researchers and grassroot-level functionaries working in the country and other developing countries, wherein watershed programmes are being implemented for natural resources management.

Evolution of watershed management policies in India

Initially, WDPs focused on improving the natural resource base by restoring of ecological balance. However, with time, watershed management started expanding its domain by addressing issues like sustainability and equity. Most importantly, people's participation plays an increasingly greater role not only in planning and implementation, but also in

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post-watershed management activities. For ensuring equity, the most downtrodden section of society, i.e. asset-less people, were supported through the provision of livelihood and income-generating activities by forming self-help groups (SHGs). Additionally, due attention was also given to women's 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) is crucial¹⁵. However, in spite of greater emphasis on women's participation in watershed guidelines, the level of participation and share in benefits are skewed towards men, with women's participation merely considered to fulfil the guideline requirements^{13,17}. Further, WDPs are also viewed as an important strategy to mitigate/moderate/adapt to extreme weather events and climate change. Recently, an integrated farming system has been made a component of the watershed to ensure livelihood security.

Different phases of watershed programmes in India

Numerous changes and modifications have been incorporated into the guidelines of the watershed programmes based on the experiences and learnings from their implementation and to fine-tune them with emerging issues. The watershed guidelines vary in terms of broad objectives, approaches for project planning, implementation, cost norms, coverage, role and responsibilities of the institutions involved, etc. To understand the evolution of WDPs in India, they can be broadly categorized into six phases based on the objectives, approaches and guidelines followed for the execution of watershed-based works (Figures 1 and 2).

Phase-1

WDPs before the 1994 guidelines can be broadly classified as phase-1 watershed programmes having a relatively narrow focus, primarily confined to structure-based soil and water conservation works. Watershed-based treatment was implemented following a highly centralized, target-driven, top-down approach under a regulatory framework primarily focusing on technical soil and water conservation measures, wherein community participation was limited, barring providing labour for the implementation of soil and water conservation activities. WDPs were being implemented in a 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 them². These programmes could not ensure equity as most benefits were biased towards large to medium farmers with almost no incentives for community participation. Moreover, transparency was lacking in watershed planning and execution. It was realized that WDPs should be used as an

instrument for holistic development beyond merely improving natural resources, leading to the conception of watershed-plus approach^{16,18}. Moreover, these WDPs were more target-driven and highly centralized, following a top-bottom and contractual approach, emphasizing just the physical achievements rather than qualitative and holistic improvement. Consequently, they could not prevent the alarmingly increasing rate of degradation. These programmes also could not bring about noticeable productivity gains and improvement in the livelihood of the resource-poor farmers in the degraded areas^{2,19}. Considering the above-discussed limitations of WDPs and imbibing the learning experiences from successful participatory watersheds, a need to revamp the watershed programmes was realized²⁰. Additionally, it was also observed that WDPs implemented by non-governmental organizations (NGOs) or in collaboration between NGOs and Government departments by giving adequate attention to social organizations and people's participation, performed comparatively better than those solely implemented by Government departments^{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 and severe droughts. The works carried out under DPAP relating to soil and water conservation measures on both arable and non-arable lands gradually evolved into watershed programmes¹⁹.

Phase-2

During this phase, the objectives of WDPs were broadened, emphasizing the need to achieve 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 pattern²². Then, under the chairmanship of C. H. Hanumantha Rao, a technical committee was formed to assess the performance of these programmes. They were brought into the watershed mode in 1987. The committee reported that these programmes were being implemented in a fragmented manner following rigid guidelines; most importantly, watershed plans were prepared without people's participation. The impacts were sub-optimal and could not reduce the land degradation and other environmental problems²³.

Therefore, in 1994, the Ministry of Rural Development (MoRD), Government of India (GoI), came up with a new set of guidelines for implementing its watershed programmes¹³. With effect from April 1995, following the recommendations of the Hanumantha Rao Committee, all the three programmes (DDP, DPAP and IWDP) were brought under a single umbrella, and till 2001 were implemented according to the 1994 guidelines. Similarly, programmes

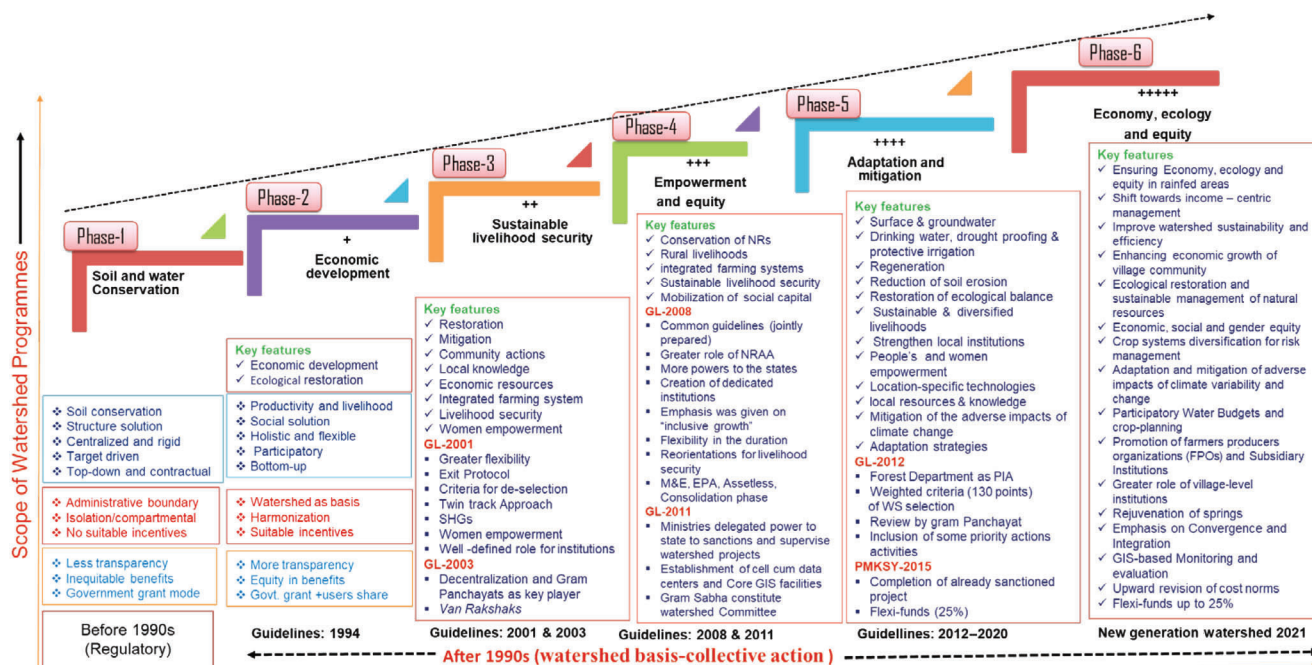


Figure 1. Evolution of watershed programmes in India.

Cost Norms	Phase-1 (Before 1994)	Phase-2 (1994-2000)	Phase-3 (2001-2007)	Phase-4 (2008-2011)	Phase-5 (2012-2020)	Phase-6 (2021-onwards)
Professional HRD					10.0%	
Flexi-funds					25.0%	25.0%
Consolidation phase				5.0%	1 to 2.25%	3.0%
Production & ME				10.0 to 13.0%	7.0 to 7.50%	15.0%
Livelihood (Landless)				9.0 to 10.0%	6.75 to 9.0%	15.0%
M&E				2.0%	1.5 to 2.0%	2.0%
DPR				1.0%	0.75 to 1.0%	1.0%
Entry point activities				4.0%	3.0 to 4.0%	2.0%
I & CB		4.0%	5.0%	5.0%	5.00 to 3.75%	3.0%
Watershed CO		6.0%	5.0%	-	-	2.0%
Watershed works		80.0%	80.0%	50.0 to 56.0%	42 to 55%	47.0%
Administrative cost		10.0%	10.0%	10.0%	5.0 to 7.5%	10.0%
Project Duration (years)	No specific	4-5	5	4 to 7	5 to 7	3 to 5
Farmers' contribution (%)	-	5% (CL) & 10% (PL)	5% (CL) & 10% (PL)	NRM on PL: 10% NRM PL (SC/ST and SF): 5% AH on PL: 40% AH on PL (SC/ST): 20%	NRM on PL: 10% NRM PL (SC/ST and SF): 5% AH on PL: 20% AH on PL (SC/ST): 10%	NRM on PL: 10% NRM PL (SC/ST and SF): 5% AH on PL: 20% AH on PL (SC/ST): 10%
Treatment Cost (Rs. ha-1)	-	4,000	4,000	6,000	12,000 to 15,000	22,000 to 28,000
Scale of operation (ha)	No	500	500	1,000 to 5,000	3,000 to 7,000	5,000

Figure 2. Changes in features and cost norms of watershed during different phases. CO, Community organization; I&CB, Institution and capacity building; DPR, Detailed project report; M&E, Monitoring and evaluation; ME, Micro-enterprise; PL, Private land; CL, Community land; NRM, Natural resource management; AH, Agro-forestry and horticulture.

of the Ministry of Agriculture (MoA), GoI, such as NWDPRA (National Watershed Development Project in Rainfed Areas) and WDSCA (Watershed Development in Shifting Cultivation Areas), were also implemented on a

watershed basis. However, the watersheds implemented by MoRD primarily focused on the development of areas having difficult terrain and the prevalence of community resources, while programmes under MoA focused on

increasing productivity in the cultivated areas owned by farmers. During this phase, the scale of the operation was 500 ha and the treatment cost was Rs 4000 ha⁻¹. To promote a sense of belongingness among the community and to encourage active participation of people, farmers' contribution was made mandatory, which was 5% and 10% for treating community land and private land respectively. Cost norms for allocating funds within watersheds were general and broad in nature. They 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 this phase, the emphasis was on ensuing livelihood security of the people dwelling in watershed areas through implementing soil and water conservation measures and other prioritized interventions. Achieving livelihood security became the central objective of the watershed programmes. The revised guidelines were formulated in 2001 since the 1994 guidelines had the following limitations: (a) poorly defined role and responsibilities of the 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, and (g) no or inadequate inter-departmental coordination and convergence. To overcome the identified limitations, in 2001, the watershed guidelines were revised to make them contemporary and transparent and greater flexibility was provided to suit the local conditions, needs and social structures²⁴. The key features of the revised watershed guidelines were: (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 the panchayat; imparting of training and organization skills by the 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 the project cannot be implemented due to unavoidable circumstances and reasons. (4) Formation of SHGs and women's empowerment: groups having a common identity dependent on the watershed area such as agricultural labourers, landless persons, women, shepherds, scheduled caste (SC)/scheduled tribe (ST). (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, monitoring and convergence. (7) The involved

institutions were encouraged to avail credit from financial institutions for further developmental activities in watershed areas. (8) Use of remote sensing was promoted. (9) Criteria for selecting forest land, which is part of the watershed, for treatment through the involvement of village forest communities. (10) Ensuring women's representation in decision-making and inclusion of the weaker and under-privileged sections of society. (11) It was made mandatory that the watershed action plan should be passed by the Gram Sabha. Again, in 2003, it was noted that there was further a need to simplify the procedures and ensure meaningful participation and involvement of PRIs in planning, implementation and managing economic developmental activities in rural areas. Gram Panchayats were made potential key players in natural resource management to decentralize watershed management. A provision was made to involve local unemployed youth below poverty level (BPL) families as 'Van Rakshaks' for protecting plantations^{11,25-27}. According to the 73rd and 74th Amendments to the Constitution of India, the PRIs were mandated with a greater role in the planning and implementation of developmental programmes at the grass-roots level²². In the watershed guidelines of 2001, the role of PRIs in the implementation of watershed projects was encouraged. However, it was observed that there was little coordination with the PRIs in watershed planning and implementation. In 2003, the Department of Rural Development (DoLR), MoRD, GoI, came up with new guidelines called 'Hariyali guidelines' to empower PRIs in terms of financial and administrative power to implement WDPs in the country^{22,28}. In the third phase, almost the same scale of operation and cost norms were followed according to earlier guidelines till the year 2007.

Phase-4

It was observed that the existing guidelines failed to consider the prevailing heterogeneity of topological structure and intra-community relationships. Thus to factor in topological heterogeneity, the need for a cluster approach was left. Accordingly, in this phase, the scale of the operation was widened from 500 to 1000–5000 ha for covering a cluster of watersheds, and treatment cost was also revised from Rs 4000 ha⁻¹ to Rs 6000 ha⁻¹. Further, it was found that there was an inadequate impact at the state and national levels. Therefore, it was necessary to fine-tune WDPs for inclusive growth and improve rural livelihoods, particularly in rainfed areas and efforts were made for mobilization and convergence of investments.

For fine-tuning WDPs to meet the growing socio-economic demands and risk management, the guidelines were jointly prepared for the first time and released by both MoA and MoRD, GoI and NRAA (National Rainfed Area Authority) was empowered to interpret and modify these guidelines to suit the emerging needs and demands. During this

phase, emphasis was given to 'inclusive growth' and to develop rainfed areas to improve rural livelihoods through participatory watershed development. The States were delegated more powers for managing WDPs, and dedicated institutions for managing these programmes were set up with adequate financial assistance. The flexibility in the duration of watershed management programmes from four to seven years was introduced to suit the cluster-based approach, and these programmes were also reoriented for ensuring the livelihood security of people dwelling in watershed areas. To simplify and incorporate the suggestions of the various departments and NGOs in the existing guidelines, the ministries delegated power to the state to sanction and supervise watershed projects. Cell-cum-data centres were established and Gram Sabhas were entrusted with constituting watershed committees. The scope of the farmers' contributions was also widened to cover horticulture and agroforestry activities. For soil and water conservation measures, particularly relating to engineering-based interventions on private lands, farmers' contributions were pegged at 5% for SC/ST and small and marginal farmers, while for others it was 10% of the treatment cost. For horticulture and agroforestry interventions, the contribution from the farmers was 40% of the cost for private land for the general category and OBC, while 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, while 9–10% of the watershed budget was allocated. Further, to improve the production system and encourage micro-enterprises at the watershed level, 10–13% of the total watershed budget was earmarked. To improve the sustainability of the watershed in the post-watershed management period, the concept of the consolidation phase was introduced with an allocation of funds to the tune of 5%. Moreover, exclusively funds were allocated for entry-point activities (4%), monitoring and evaluation (2%), and DPR (detailed project report) preparation (1%). However, for the core activity, i.e. watershed development works, the allocated funds according to the cost norms were 50–56% (refs 29, 30).

Phase-5

The WDPs were entrusted to fine-tune their activities to promote climate change adaptation strategies to cope 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 were promoted to harness runoff water in the event of high-intensity rainfall, which are likely to increase due to climate change. The existing guidelines were also strengthened by adding new and innovative features. For instance, in a watershed wherein more than 50% area is under forests, the Forest Department was allowed to become the project implementing agency (PIA). Gram Panchayats were entrusted to review

the physical and financial progress of watershed works. During this phase, some other prioritized activities were also included; e.g. promotion of seed banks and village seed capital assistance for groups, alternative food systems and agro-processing and marketing management. 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 12,000 ha⁻¹ and 15,000 ha⁻¹ for plain, hilly and difficult areas respectively³¹. Most interestingly, with the aim to provide greater flexibility in watershed development, 25% of the allocated funds for each watershed was kept as flexi-funds to meet areas-specific requirements and to encourage mitigation efforts in the event of any natural catastrophe in the PMKSY-WDC (Prime Minister Krishi Sinchayee Yojna – Watershed Development Component) guidelines since 2014–15. However, according to the guidelines, watershed programmes were made a sub-component of PMKSY. In PMKSY-WDC, the emphasis was on timely execution of the watershed development projects along with optimal utilization of budgetary support, focusing on convergence with relevant schemes of State and Central Governments, and ensuring the prioritization of project activities.

Phase-6

This phase of the WDP began with the new generation watershed guidelines by DoLR, MoRD, GoI, in 2021 to fine-tune the watershed management with emerging challenges such as a steep decline in the average soil organic carbon (SOC) content in soils, around 30% area facing environmental challenges of desertification and land degradation, increasing numbers of dark zones due to groundwater exploitation, increasing adverse impact of climate change, etc. The emphasis was on transforming the rainfed areas, which are facing of poverty, malnutrition, water scarcity and severity of land degradation, to achieve sustainability by ensuring economic efficiency, ecological security, and social and gender equity. It is also envisaged that the new generation watershed guidelines will help achieving commitment towards Sustainable Development Goals (SDGs) 2030, Nationally Determined Commitments (NDCs) and Land Degradation Neutrality (LDN) to the tune of 26 million ha. Spring sheds in the Himalayan region have suffered ecological degradation; around 4–5 million spring sheds have dried up to almost 50% of their capacity. Therefore, a special emphasis was given to the rejuvenation of spring sheds. There is a paradigm shift from production-centric to income-centric watershed management by promoting farmer producer organizations (FPOs) and subsidiary institutions, strengthening market linkages to increase the sustainability and efficiency of watersheds. For effective utilization of the resources, emphasis is given to convergence and integration with other on-going schemes of different departments for sharing knowledge, information and building capacity of

the stakeholders. The cost norms have been revised upwards to the extent of Rs 22,000 ha⁻¹ for plain areas, and Rs 28,000 ha⁻¹ for hilly and difficult areas (desert areas) and up to Rs 28,000 ha⁻¹ for LWE/IAP (Left Wing Extremism/Integrated Action Plan) districts³².

Conclusion

In India, WDPs have evolved extensively to embrace all facets of economic development and environmental security. They have become an engine of sustainable and inclusive growth by promulgating a community-based approach by providing local and nature-based solutions to emerging concerns of climate change and land degradation. The watershed guidelines vary in terms of broad objectives, approaches for project planning, implementation, cost norms, coverage, role and responsibilities of institutions involved, etc. The guidelines have been modified to make them suitable to changing requirements of community, and to advocate and propagate strategies for climate change adaptation, mitigation and make crop production system resilient in the wake of climate change and the increasing frequency of droughts in different parts of the country. At present, the objectives of the watersheds have shifted from production-centric management by conserving natural resources to income-centric management by promoting enabling institutional settings such as FPOs and subsidiary institutions, strengthening market linkages to increase the sustainability and efficiency of the watersheds. Most importantly, WDPs have helped to set up a host at grassroot-level institutions for managing natural resources. These programmes also address the issue of social and gender equity by providing livelihood security to assetless sections of society in watershed areas, and by encouraging women's participation in decision-making. Experiences and overview of WDPs are a good source of learning for other developing countries, particularly African and South Asian nations, where natural resources management works are being undertaken using watershed programmes.

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GENERAL ARTICLE

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Received 25 July 2022; accepted 20 August 2022

doi: 10.18520/cs/v123/i8/968-974
