



FOOD AND LAND RESOURCES: INCORPORATING WATERSHED- BASED APPROACHES FOR BETTER SUSTAINABILITY- PRODUCTIVITY BALANCE



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Dr. Lasya Gopal, Dr. Naba Kumar and TERI projects

LIST OF ABBREVIATION

ABSTRACT

AGY	Adarsh Gaon Yojana
CAPART	The Council for Advancement of People's Action and Rural Technology
DANIDA	Danish funded programme
DFID	Department for International Development
DAPs	District Agriculture Plans
DOH	Department of Horticulture
DDP	Desert Development Programme
DOLR	Department of Land Resources
DPAP	Drought Prone Areas Programme
DLD	Dry Land Development Board
ICAR	Indian Council of Agricultural Research
IGWDP	Indo German Watershed Development Programme
ISPWD-K	Indo-Swiss Participative Watershed Development-Karnataka
IWDP	Integrated Wasteland Development Programme
JFM	Joint Forest Management
KWDP	Karnataka Watershed Development
KAWAD	Karnataka Watershed Development Project
MKSP	Mahila Kisan Sashaktikaran Pariyojana
MIS	Management Information System
MHWDP	Mid-Himalaya Watershed Development Project
MoA	Ministry of Agriculture
MoEF	Ministry of Environment & Forests
MORAE	Ministry of Rural Areas and Employment
MORD	Ministry of Rural Development
NRLM	National Rural Livelihood Mission
NABARD	National Bank for Agriculture and Rural Development
NICRA	National Initiative on Climate Resilient Agriculture
NMSA	National Mission for Sustainable Agriculture

NRAA	National Rainfed Area Authority
NWDPRA	National Watershed Development Programme in Rainfed Areas
NNWP	Neeranchal National Watershed Project
NBA	Nirmal Bharat Abhiyan
WOTR	The Watershed Organisation Trust
PMKS	Pradhan Mantri Krishi Sinchayee Yojana
RKVY	Rashtriya Krishi Vikas Yojana
RAFTAA	Remunerative Approaches for Agriculture and Allied Sector Rejuvenation
RVP	River Valley Projects
RIDF	Rural Infrastructure Development Fund
SHG	Self Help Group
SAPs	State Agriculture Plans
SRLM	State Rural Livelihood Missions
UG	User Group
UDWDP	Uttarakhand Decentralised Watershed Development Programme
WDD	Watershed Development Department
WDF	Watershed Development Fund

INCORPORATING WATERSHED BASED APPROACHES FOR BETTER SUSTAINABILITY-PRODUCTIVITY BALANCE

ABSTRACT

India's integrated watershed approach and guidelines are very comprehensive and have yielded tangible results when implemented in the true spirit. There are several other programmes and schemes that also aim at natural resource management, water resource conservation, livelihood enhancement, and afforestation and biodiversity conservation amongst other things. There is scope for convergence of these schemes along with watershed programmes. This paper outlines the evolution of watershed approach

and the current national- and some state-level policies for watershed management. It explains the way in which watershed management contributes to Sustainable Development Goals (SDGs), and how other schemes could be dovetailed with watershed approach to thus enable better results. The paper also talks about cross-cutting issues such as gender and social equity in watershed management that are pertinent to address SDGs.



EVOLUTION OF WATERSHED APPROACH TO LAND MANAGEMENT

SECTION 1

Watershed management may be defined as a set of resource-management practices that are planned and implemented to provide sufficient source of quality water to sustain human society and natural ecosystems. The practice of watershed management is interdisciplinary, because it recognizes linkages between land and water resources, as well as seeks to balance the needs of society with the capacities of natural resources to meet them. For instance, all environmental, social, and economic concerns are combined to treat watersheds in an integrated manner (Mander 2008). Because of these multidisciplinary concerns, the development of watershed-management strategies usually involves complex scientific and public policy issues. Each watershed is unique in physiography, ecology, climate, water quality, land use, and human culture. Therefore, any generalized approach to watershed management must be customized to each setting when put into practice.

Since humans first settled along the banks of lakes and rivers, there has been great interest in the appropriate management of fresh water resources both as a necessity for life and to avoid potential health hazards. The flow rates and yields of rivers were monitored by the Egyptians as early as 3,800 years ago, and rainfall-measuring instruments were first utilized approximately 2,400 years ago by Chanakya—an Indian teacher, philosopher, and royal advisor (Hubbart 2008). Historically, most of India's water management has been at the community level, relying upon diverse, imaginative, and effective methods for harvesting rainwater in tanks and small underground storages (Briscoe and Malik 2006). Some researchers observe that these water management traditions extend back over thousands of years (Smyle et al. 2014). The Cheras, Cholas, and Pandyan Kings also constructed thousands of minor irrigation tanks over

1,500 years ago. Thus, watershed development is deeply rooted in the culture and social structure of India.

After India's Independence, watershed development (WSD) was included in the national programme in the 1970s to improve agricultural production and alleviate poverty in rain-fed regions. Essentially, the WSD programmes aimed to restore degraded landscapes in rain-fed regions to increase their capacity to capture and store rainwater, reduce soil erosion, and improve soil nutrient and carbon content so that they can produce greater agricultural yields for local consumption and income generation (Ahmad et al. 2011; Government of India 2011; Kerr 2002). Thereafter, the National Wasteland Development Board (NWDB) was set up in 1985 under the Ministry of Environment and Forests with the principal aim of bringing wastelands in the country into productive use through a massive programme of afforestation and tree plantations. In July 1992, NWDB was reconstituted and placed in the newly created Department of Wasteland Development under the Ministry of Rural Development (MoRD). Subsequently, the Department of Wasteland Development was renamed as Department of Land Resources vide Gazette Notification dated 09-04-1999 (Department of Land Resources). As a result, the Land Reforms Division and all land-based development programmes were brought under this department.

The Drought Prone Areas Programme (DPAP), launched in 1973–74, Desert Development Programme (DDP), launched in 1977–78, and Integrated Wastelands Development Programme (IWDP), launched in 1989–90, were the watershed management programmes implemented by the department during the initial days. These programmes focused on technical interventions to promote soil and water conservation measures in drought-prone areas and on installing water-harvesting

structures. In 1990–91, a fourth significant programme, based on the watershed concept, the National Watershed Development Programme in Rainfed Areas (NWDPR), was initiated by the Ministry of Agriculture. All these programmes shared a common objective of land and water resource management for sustainable production. However, they varied in their overall aim, budget sharing, cost norms, and approaches.

In 1994, the Hanumantha Rao Committee constituted by Department of Land Resources, Ministry of Land Resources, after viewing DDP and DPAP, opined that programmes have been implemented in a fragmented manner by different departments through rigid guidelines without any well-designed plans prepared on watershed basis by involving the inhabitants. Except in a few places, the achievements have been sub-optimal. Ecological degradation has been proceeding unabated in these areas with reduced forest cover, reducing water table, and a shortage of drinking water, fuel and fodder. In this backdrop, the Committee formulated a set of new Guidelines for Watershed Development from April 1, 1995 that included the objectives, strategies, and expenditure norms for all the watershed management programmes taken up by MoRD from 1995 to 2001. These

Guidelines for Watershed Development were revised in 2001 to make the programmes more participatory, sustainable, and equitable and yet again in 2003 under the nomenclature ‘Hariyali’, which aimed to integrate the community institutions and participatory aspects into DDP, DPAP and IWDP.

In 2006, The Parthasarathy Technical Committee, constituted by Department of Land Resources, Ministry of Land Resources, gave a review report on DPAP, DDP, IWDP Programmes and based on this report, National Rainfed Area Authority (NRAA) was established as per the decision of Cabinet in November 2006 as an expert body of the Ministry of Agriculture to provide the much-needed knowledge inputs regarding systematic up-gradation and management of country’s dry land and rain-fed agriculture. Further, the Common Guidelines for Watershed Development were revised in 2008 to promote a fresh framework to guide all watershed projects in all departments and ministries

Integrated Watershed Management Programme (IWMP) was launched in 2009 to restore ecological balance by harnessing, conserving, and developing degraded natural resources such as soil, vegetative cover, and

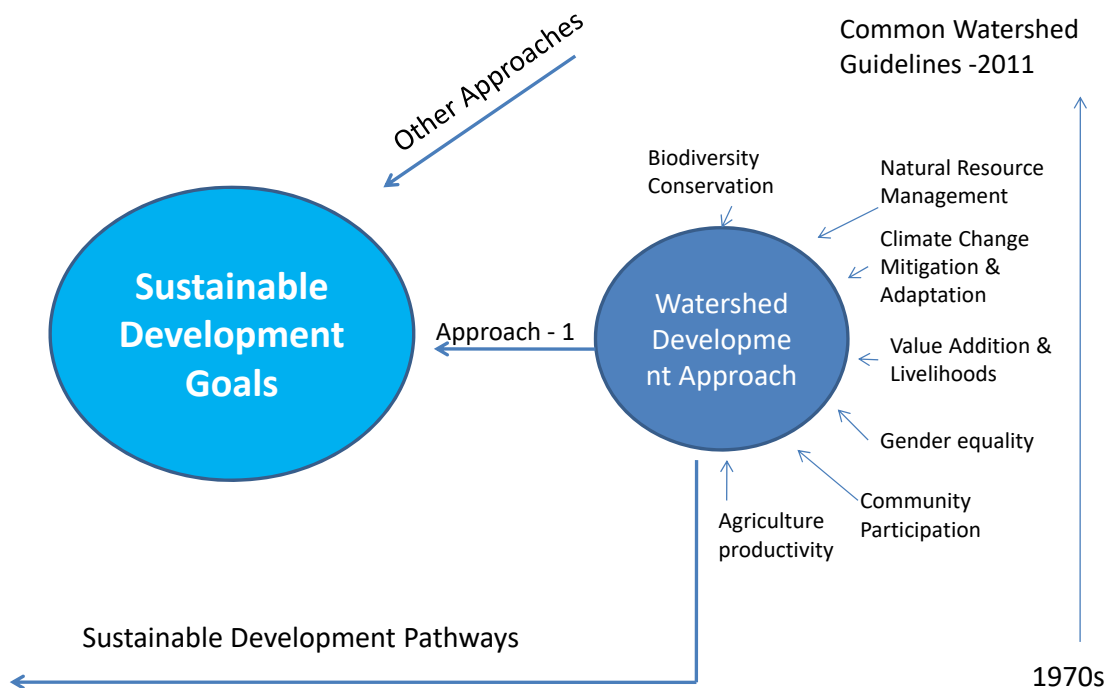


Figure 1: Conceptual framework
Credit: Authors' Compilation

water. This programme basically consolidated DDP, DPAP, and IWDP and focused on the development and management of a cluster of micro-watersheds comprising an area of 1000–5000 ha. The Revised Common Guidelines for Watershed Development in 2011 provided amendments to the 2008 guidelines based on clarifications and suggestions from concerned

ministries, departments, state governments, and Non-Governmental Organizations (NGOs). Subsequent to approval of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) in 2015, IWMP was subsumed as one of its components and termed as Watershed Development Component under PMKSY.

Table 1: Evolution of Watershed Programmes and Guidelines in India

Year	Program Policy/ Guideline	Major Objective	Relevant Institution
1973-74	Drought Prone Area Programme	Promote economic development and mainstreaming of drought-prone areas through soil and moisture conservation measures	MoRD
1977-78	Desert Development Programme	Minimize adverse effects of drought and desertification through reforestation	MoRD
1989-90	Integrated Wasteland Development Programme	Regenerate degraded non-forest land through silvipasture and soil and water conservation on the village and micro-watershed scale	MoRD
1989	Integrated Afforestation and Eco-Development Scheme	Restore and regenerate the ecological balance of degraded forests using a participatory approach	Ministry of Environment & Forests (MoEF) and State Forest Department
1990-91	National Watershed Development Project for Rainfed Areas	Promote suitable natural resource management, enhance agricultural production, restore ecological balance, reduce regional disparities, and create sustained employment opportunities in rain-fed areas	Ministry of Agriculture (MoA)
1992	Indo-German Watershed Development Programme	Rehabilitate micro-watersheds for the purpose of regeneration of natural resources and sustainable livelihoods, using a participatory approach	National Bank for Agriculture and Rural Development (NABARD) and The Watershed Organisation Trust (WOTR)
1994	Guidelines for Watershed Development	Provide common guidelines for WSD focused on watershed scale and having a participatory focus (represented around a third of the GOI's investment in micro-watersheds and sought to leverage the success of NGOs)	MoRD
1999-2000	Watershed Development Fund	Provide financial support to scale up successful participatory WSD projects in 100 priority districts	MoA and NABARD)
2001	Common Guidelines for Watershed Development (Revised)	Update the 1994 WSD guidelines to have a more participatory and project-specific focus with greater flexibility in implementation. Applicable to IWDP, DPAP, DDP, and other programmes notified by GOI.	MoRD

Year	Program Policy/ Guideline	Major Objective	Relevant Institution
2003	Hariyali Guidelines	Integrate community institutions more meaningfully in DPP, DPAP, and IWDP and simplify procedures	MoRD
2006	Parthasarathy Committee report	Parthasarathy Committee was established as a Technical Committee to evaluate the DPAP, DDP, and IWDP. The Committee's report serves as the basis of the Neeranchal Guidelines and the NRAA.	MoRD
2006	National Rainfed Area Authority (NRAA)	Create common guidelines for all WDS schemes under different ministries for development of rainfed farming systems	Planning Commission
2008	Common Guidelines for Watershed Development (Neeranchal)	Promote a fresh framework to guide all WSD projects in all departments and ministries	NRAA and Planning Commission
2009	Integrated Watershed Management Programme (IWMP)	Consolidated three programmes: IWDP, DPAP and DPP, adopted a cluster approach focusing on a cluster of micro-watersheds (1000 ha to 5000 ha scale)	MoRD
2011	Revised Common Guidelines for Watershed Development released	Provide amendments to 2008 guidelines based on clarifications and suggestions from concerned ministries, departments, state governments, and NGOs	NRAA and Planning Commission
2013	Revisions added to 2008 Common Guidelines (Neeranchal)	Add new features to 2008 Common Guidelines while strengthening its innovative features	MoRD
2015	Watershed Component - Pradhan Mantri Krishi Sinchayi Yojana	Effective management of runoff water and improved soil and moisture conservation activities. It also aims to converge with MGNREGS for creation of water source to full potential in backward rain-fed blocks including renovation of traditional water bodies	DoLR, MoRD

Source: Authors' compilation



The watershed approach has been accepted as a major theme for development of rain-fed areas with a view to conserve water, soil, and vegetation by mobilizing social capital. Various studies have pointed out the central preoccupation of watershed development projects with soil and water conservation and relative neglect of issues relating to balanced use of natural resources and livelihoods. Nevertheless, the many studies carried out by different national-level institutions such as Indian

Council of Agricultural Research (ICAR) Institutes, State Agriculture Universities, and National Remote Sensing Centre amongst others support the observation that in several watersheds, the implementation of the programme has been effective for natural resource conservation by increasing the productivity of the land, bringing additional area under agriculture, employment generation, and social upliftment of beneficiaries living in rural areas.

NATIONAL AND STATE LEVEL POLICIES AND PROGRAMMES IN INDIA

SECTION 2

Indian agriculture remains predominantly rainfed covering about 60 per cent of the country's net sown area and accounts for 40 per cent of the total food production. Thus, conservation of natural resources in conjunction with development of rain-fed agriculture holds the key to meet burgeoning demands for food grain in the country. Several schemes have been implemented by the Central Government while others are state specific.

National Level Initiatives

National Mission for Sustainable Agriculture (NMSA)

The National Mission for Sustainable Agriculture (NMSA), which is one of the eight Missions under the National Action Plan on Climate Change (NAPCC),

has been formulated for enhancing agricultural productivity especially in rain-fed areas focusing on integrated farming, water-use efficiency, soil health management, and synergizing resource conservation. NMSA seeks to address issues regarding 'Sustainable Agriculture' in the context of risks associated with climate change by devising appropriate adaptation and mitigation strategies for ensuring food security, equitable access to food resources, enhancing livelihood opportunities, and contributing towards economic stability at the national level. Under Rainfed Area Development component, NMSA adopts an area-based approach for development and conservation of natural resources along with farming systems. This approach may bring localized cluster-level results/impacts; however, a watershed approach, which is a more holistic and ridge to valley treatment method,



could bring in results at a larger scale with a marginally higher investment per hectare.

Rashtriya Krishi Vikas Yojana-Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RKVY-RAFTAAR)

Rashtriya Krishi Vikas Yojana scheme was initiated in 2007 as an umbrella scheme for ensuring holistic development of agriculture and allied sectors by allowing states to choose their own agriculture and allied sector development activities as per the district/state agriculture plan. To specifically cater to the needs and modalities for agribusiness promotion, a revamped ‘Rashtriya Krishi Vikas Yojana - Remunerative Approaches for Agriculture and Allied Sector Rejuvenation’ (RKVY-RAFTAAR) was launched in 2017–18 with a component for innovation and agri-entrepreneurship. The broad objectives of this revamped scheme are to make farming a remunerative economic activity by strengthening farmer’s effort, risk mitigation, and promoting agri-business entrepreneurship. Under RKVY-RAFTAAR, the major focus is on pre- and post-harvest infrastructure, besides promoting agri-entrepreneurship and innovations. RKVY does not specifically follow watershed approach that is more integrated in its design, wherein adequate stress is laid on building capacities and supporting the communities for better livelihoods. Adopting this approach into the design will give a fillip to the remunerative strategy of the scheme, especially for allied sectors.

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

Government of India is committed to accord high priority to water conservation and its management. To this effect, Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has been formulated with the vision of extending the coverage of irrigation ‘Har Khet ko Pani’ and improving water-use efficiency. The PMKSY has four components, namely Accelerated Irrigation Benefit Programme, Har Khet ko Pani, Per Drop more Crop, and Watershed Component.

PMKSY Watershed Component

While the components of the PMKSY focus more on creating water sources for irrigation to improve agricultural production, the focus of the watershed component is on treating an entire watershed area at the macro level, while addressing a larger gamut of issues including agriculture productivity, farm income, diversifying land use to adapt to consequences of climate change, capacity building of farmers, empowering the landless and women through supplementary sources of income generated through livestock and other income-generation activities. The approach is more holistic in nature and focuses on rain-fed areas where crops that require less water are grown and there are large numbers of small and marginal land owners. The focus is also on converging with MGNREGS for creation of water source to full potential in identified backward rain-fed blocks including renovation of traditional water bodies.

National Innovations in Climate Resilient Agriculture (NICRA)

The Indian Council for Agricultural Research (ICAR) initiated a major project titled National Initiative on Climate Resilient Agriculture (NICRA) in 2011. The project aims to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. The project consists of four components: Strategic Research, Technology Demonstration, Capacity Building, and Sponsored/Competitive Grants. NICRA’s focus is more on research on climate-resilient measures, where watershed approach is one of the approaches.

Neeranchal

The Neeranchal National Watershed Project (NNWP) is a World Bank-assisted project undertaken by the Government of India to support the Integrated Watershed Management Programme (IWMP) for the improvement and conservation of water resources. The project started in 2016 and will continue until 2022. The project is implemented in selected sites in eight states: Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, and Telangana.



It is a technical-assistance project primarily designed to provide technical capacity building support and improve the implementation efficiency of the existing - IWMP (Watershed Development Component of the PMKSY) programme to positively influence the outcomes of the ongoing WDC-PMKSY for better delivery and impacts through improved planning approaches, capacity building, coordination and convergence, supportive research, and development.

National Bank for Agriculture and Rural Development (NABARD)

NABARD entered into watershed development activities through KfW-assisted Indo German Watershed Development Programme (IGWDP) in 1992 in Maharashtra, wherein participatory approach of watershed development was launched in India on a pilot basis for the first time. Subsequently, in order to demonstrate effectiveness of these interventions, Watershed Development Fund (WDF) was set up in NABARD in 1999–2000 with an initial corpus of Rs 200 crore contributed by Gol and NABARD in equal proportion. The Fund has been augmented over the years from the interest differential earned under Rural Infrastructure Development Fund (RIDF) and interest

accrued on the unutilized portion of the Fund.¹⁸ NABARD has implemented/implementing IGWDP, Participatory Watershed Development Programme, Soil Restoration and Rehabilitation of Degraded Soils for Food Security (Climate Proofing Soil Project), Springshed Development in North Eastern Region and web-based monitoring of watershed projects on a pilot basis.

STATE GOVERNMENT INITIATIVES

MAHARASHTRA

Following the 1972 drought, the Employment Guarantee Scheme (EGS) was initiated in the state and subsequently Comprehensive Watershed Development Programme (COWDEP), in 1982, which saw the first steps in the direction of a systematic watershed development approach within government programmes. Ralegaon Siddhi and Adgaon in Maharashtra were the initial NGO successes that popularized these ‘model villages’ with watershed development as the central theme. State-supported programmes such as Integrated Watershed

Development Projects (IWDP), Adarsh Gaon Yojana (AGY) and bilateral programmes such as Indo-German Watershed Development Programme (IGWDP) were implemented besides a number of centrally sponsored schemes and projects being implemented by NGOs with financial support from local and international sources. Almost all these programmes have institutionalized the watershed approach to treating lands and water harvesting in association with people's participation to enhance the production potential of rain-fed farming.

Samuel, et al. (2009) in their review of watershed programmes in Maharashtra found that there has been a beneficial impact of watershed development on watershed ecosystems: soil erosion has been checked, land cover has improved, and groundwater recharge has increased. Employment during the project period remains the only important benefit to the landless with no clear and general evidence of sustained increase in work availability once the programme-related work has been completed. While the provision of the Watershed Development Fund (WDF) is a step forward in providing financial backing for the institutionalization of repair and

maintenance of the structures created in the watershed programmes, the challenge of operationalizing the fund lies largely unexplored as of now. Sustainability is an issue least articulated and operationalized.

KARNATAKA

Karnataka has been one of the forerunner states in the implementation of watershed development programmes, for over three decades. The government had set up a Dry Land Development Board (DLDB) in the early 1980s (which has now metamorphosed into the Watershed Development Department). The major activity has been under centrally sponsored programmes of the Ministry of Rural Development (MoRD) such as Desert Development Programme (DDP), Drought Prone Areas Programme (DPAP), Integrated Wasteland Development Programme (IWDP), and Ministry of Agriculture (MoA) sponsored River Valley Projects (RVP), and of the central Ministry of Agriculture's National Watershed Development Project for Rainfed Areas (NWDPA).



Several individual bilaterally or multilaterally funded special projects, such as the Swiss-funded PIDOW and Indo-Swiss Participative Watershed Development-Karnataka (ISPWD-K), the Danish-funded programme (DANIDA), the British Department for International Development's (DfID's) Karnataka Watershed Development Project (KAWAD) or the World Bank's SUJALA have been implemented. These programmes clearly ensure more attention to the process, viz. the bilaterally and multilaterally funded programmes. However, some specific measures, such as land

reclamation measures in KAWAD, appear to have achieved their objectives. Similarly, the attention to area treatments in these programmes (especially Sujala and KAWAD) has resulted in structures such as field bunds and farm ponds that have a lower failure rate as well as wider reach than big structures including check dams. And overall, bilateral and multi-lateral programmes do perform better in terms of perceived agricultural impacts, although the perception of improvement is still only in around 50 per cent cases found (Lele et al, 2009).

Karnataka Watershed Development Project (Sujala)

Between 2001 and 2009, KWDP (Sujala) used cutting-edge technology to plan, prioritize, monitor, and assess interventions over half a million hectares of land in seven predominantly rain-fed districts in Karnataka. The project was implemented by the Karnataka Government's Watershed Development Department (WDD) in partnership with several non-governmental organizations and the World Bank. The project developed a unique approach for monitoring and evaluation that fused remote sensing, GIS mapping and Management Information System (MIS) with conventional ground-based monitoring techniques to provide state-of-the-art information to track progress and assess impacts.

By the end of the project, crop yields and cropping intensity in these rain-fed areas increased significantly. This was also accompanied by a shift towards higher-value annual and permanent crops (especially horticultural crops such as mangoes). Runoff and soil erosion were reduced up to 21 cubic meters per hectare. The percentage of irrigated area increased between 6 per cent and 14 per cent across project sites. Household incomes increased by about 40 per cent for small and marginal farmers (less than 2 ha), more than 50 per cent for landless farmers, and close to 80 per cent for larger farmers (more than 2 ha), compared to control groups. Overall, the project improved the lives of 230,000 direct beneficiaries, contributing to a reduction of out-migration by about 70 per cent.

Started in 2013-14, Karnataka Watershed Development Project-II (SUJALA-3) was implemented by Watershed Development Department (WDD) and Department of Horticulture (DoH), Government of Karnataka. Supported by the World Bank, this programme aimed to demonstrate effective watershed management through science-based approaches, and strengthen institutions and capacities. The Land Resource Inventory developed under SUJALA-3, a watershed management scheme in Karnataka, empowers farmers with site-specific information to boost farm incomes. There is considerable awareness about the suitability of land for various crops, thus enabling the farmers to obtain better yield and income gradually. The state, through innovative ventures like SUJALA-3, has paved the way for increased crop yield and scientific management of watersheds.

Source: Karnataka Watershed Development Project, February 28th 2012 accessed at <https://www.worldbank.org/en/news/feature/2012/02/28/karnataka-watershed-development-project>

RAJASTHAN

The Soil conservation programmes in the state are being executed since the 1990s. Earlier it was done by the agriculture department and after 1991 by the Department of Watershed Development & Soil Conservation. In the early 1990s, the emphasis was given on participatory integrated watershed management for sustenance of the programmes and there was substantial increase in funds from the government under NWDPR, DPAP, DDP, and IWDP for integrated watershed development works. Works under various schemes are now being implemented through Gram Panchayat and is being supervised and monitored by Directorate of Watershed Development and Soil Conservation. The State's perspective plans to identify the need of dedicated institutions for the programme for successful implementation. Currently the state is implementing several watershed programmes such as PMKSY Watershed Component, Rajiv Gandhi Jan Sanchay Yojana, Rajasthan Agriculture Competitiveness Concept, National Adaptation Fund for Climate Change.

Reddy et al. (2012), in their impact assessment of the performance of the watershed programme in Rajasthan, found that bio-physical or environmental impacts are more pronounced in high rainfall and irrigated regions. Institutional or social impacts are stronger in better endowed regions, though it is generally believed that social capital is stronger in backward regions. This could be due to the interlinkages between institutional, economic, and bio-physical impacts. Stronger collective and participatory approach seems to hold the key for the overall success of the WSD.

ODISHA

In Odisha, the concept of watersheds was first introduced during the Second Five Year Plan and refined during the Fifth Plan through the Directorate of Soil Conservation. In the beginning of the Eighth Five-year Plan, three major projects— Integrated Watershed Development Project, National Watershed Development Project for Rainfed Area, and Indo – Danish Comprehensive Watershed Development Project were launched in the state. Apart from these, watershed development

projects were also implemented under other schemes including the Employment Assurance Scheme, DPAP, and IWDP.

Early indication of participatory development projects in Odisha can be found in the IFAD-supported Odisha Tribal Development Project in Indo–German Watershed Development projects. Participatory watershed development projects in Odisha evolved after the introduction of the revised of Rural Development (MoRD), Government of India and Janasahabagita Guidelines of the Ministry of Agriculture, Government of India. The Directorate of Water Conservation and Watershed Development is implementing the watershed schemes.

Positive developments have taken place in treated watershed areas such as change in the vegetation, soil moisture, ground water recharge, arrest of land degradation, changes in crop composition in favour of high value crops, changes in income and employment. Sahoo and Sahu (2020) found that the watershed development activities have made significant positive impacts on various bio-physical aspects such as soil and water conservation, soil and water erosion in the cropped area, changes in cropping pattern, cropping intensity, rise in the water table, perennality of water in wells, water availability for livestock, and other domestic purposes. Peoples' participation in watershed development activities, and training and capacity building of farmers have been found very effective in gaining technical knowhow.

NGO PROGRAMMES

Several NGOs across the country have been instrumental in implementing watershed programmes, especially the programmes funded by bilateral/multilateral agencies. They have also been the crucial bridge between watershed communities and government-implementing agencies. Organizations such as Watershed Organization Trust (WOTR) in Pune, Maharashtra, Mysore Resettlement and Development Agency (MYRADA) in Karnataka, Watershed Support Service and Activities Network (WASSAN) in Telangana, Atragamme in Odisha, Ralegaon Siddhi's and Tarun Bharat Sangh, Rajasthan have demonstrated many



innovations that have become best practices and learning for other watershed programmes.

The attention to process has been better in NGO- implemented programmes such as ISPWDK, PIDOW, KAWAD, SUJALA 2 regardless of the guidelines. Entry-point activities were more systematically implemented in NGO-implemented and donor-driven programmes, and this has some influence on the longevity of Watershed Development Committees. A further analysis of the post-1994 MoRD programmes alone reveals that the tendency to form WDCs is much higher where NGOs have been involved in the ‘software’ component (100%) as compared to where they were not involved (76%). This confirms the trend noticed above of the process quality being higher with NGO participation.

TERI's experience in Watershed Management

TERI has carried out monitoring, evaluation, learning, and documentation for several watershed programmes across the country for over 30 years including the pioneering innovative World Bank-assisted SUJALA 3. TERI has also implemented watershed programmes. For instance, the watershed project assisted by Council for Advancement of People's Action and Rural Technology (CAPART) under the aegis of Ministry of Rural Development, Government of India was implemented between 2004 and 2009 in Assam. As a result of this, there was an increase in surface and ground water and second crop area increased by 10–15% over the baseline situation and the year-round access to drinking water due to increase in ground water table.

The project mainly focused on soil and water conservation through different soil and water conservation methods along with biomass conservation approach. It also focused on capacity building and community mobilization methods considering the sustainability of the project.

The following are some of the impacts of the project:

- Increase in surface water and ground water availability
- Acquisition of skills by the communities in soil and water conservation
- Increase in soil moisture regime and water in the wells, which enabled the sowing of crops for at least two seasons
- Increase in biomass within the watershed and increase in horticultural tree species plantation on individual land
- Increased role of women in community-level decision-making process
- People's contribution for maintenance of common property resources and further developments **Contributed by Dr. Nabar Kumar Goswami, Senior Fellow and Area Convenor, TERI North East Centre, Guwahati**

THE WATERSHED APPROACH AND THE SDGs

SECTION 3

Watershed development in India, which has been part of the national approach to improve agricultural production and alleviate poverty in rain-fed regions since the 1970s, has also the potential to meet multiple SDG goals that are aimed at reducing developmental disparities in different parts of the world. Many of the watershed activities are intrinsically linked and linking them to SDG targets can greatly help in achieving the overall objective of ‘leave no one behind’ of the 2030 Agenda since action in one area benefits the other. For instance, interventions in watershed development will also influence other developmental outcomes such as improvement in agricultural outputs (SDG Goal 2), food security (SDG Goal 1), elevation in status of women (SDG Goal 5), better health outcomes (SDG Goal 3), and sustainable economic development through community participation (Goal 8).

The following is a qualitative assessment of Integrated Watershed Approach in terms of addressing respective SDGs, based on an assessment of the Common Guidelines and its potential to deliver multiple benefits relating to almost all of the SDGs. The analysis mainly looks at various schemes that are targeted at achieving respective SDGs and are also relevant and important in the context of watershed approach to enhance the expected outcomes.

NITI Aayog has done an elaborate mapping of various government schemes directly contributing to achieve the respective SDGs. The watershed approach and the Common Guidelines for Watershed Development Projects revised in 2011 (CWG) have a lot to offer and induce the synergy and sustainability of the outcomes from various schemes.



SDG 1 - End poverty in all its forms everywhere

The Common Guidelines recognize the need to promote equity in access to resources for poverty eradication. As provided in the Common Guidelines, specific schemes targeting skill development, support to Self-Help Groups (SHGs), and promotion of alternative livelihood programmes at the village levels have been supported over a period by the central government. National Urban Livelihood Mission, Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA), National Rural Livelihood Mission (NRLM) are some of the important centrally sponsored schemes identified by NITI Aayog in the context of addressing poverty issues.

Under Deendayal Antyodaya Yojana, Aajeevika - NRLM was launched by MoRD in 2011. The Mission aims at creating efficient and effective institutional platforms of the rural poor, enabling them to increase household income through sustainable livelihood enhancements and improved access to financial services. In addition, the poor are facilitated to achieve increased access to rights, entitlements, and public services. In states like Karnataka, convergence of watershed with NRLM is one of the strategies used to achieve the objective of poverty alleviation through income-generation activities, demonstrating integrated approach.

Through these efforts, India is addressing Target 1.1 to benefit BPL families, Target 1.2 to half the poor population, Target 1.3 to implement nationally appropriate schemes, Target 1.4 to have equity and rights for vulnerable population and also have access to microfinance, Target 1.5 induce resilience in natural ecosystems so that poor population dependent on the same get buffer against vagaries of climate.

Impact generated through interlinked activities like watershed and livelihood leads to achievement of poverty alleviation, generation of employment opportunities, development of micro-finance models along with inducing resilience in the natural ecosystems. The planning guidelines of these programmes including CWG also does not emphasize on such linkages and co-ordinations. Making use of watershed approach as

per CWG would not only enhance the sustainability of the interventions under respective schemes but also lead to optimal use of resources and more importantly efficient and equitable distribution of benefits to the extent possible.

SDG 2 - End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

Schemes such as National Food Security Mission, Mission for Integrated Development of Horticulture, National Mission on Sustainable Agriculture, National Oilseed and Oil Palm Mission, National Mission on Agriculture Extension and Technology, Rashtriya Krishi Vikas Yojana, National Livestock Mission, Livestock Health and Disease Control, National Programme for Bovine Breeding and Dairy contributing to achievement of SDG 2. The Common Guidelines advocate an integrated approach to agriculture and allied activities.

State Agriculture Plans (SAPs) and District Agriculture Plans (DAPs) are the most important documents in terms of confirming food security by ensuring proper and timely production from agriculture. To tackle the impacts of climate change, two major programmes have been launched by Central Government namely National Mission on Sustainable Agriculture and National Innovations in Climate Resilient Agriculture.

Integrated watershed development programmes sponsored by Central Government and initiated by various states such as PMKSY, Neeranchal, Uttarakhand Decentralised Watershed Development Programme (UDWDP), Mid-Himalaya Watershed Development Project (MHWDP) aim for enhanced water availability through which benefits are visualized by providing improved seeds, soil nutrient management, and integrated pest management to enhance agricultural productivity, that eventually will aid in improved productivity and help achieve SDG 2.

There are two major initiatives of the central government that directly benefit the agriculture sector, namely Rashtriya Krishi Vikas Yojana (RKVY) and Accelerated

Irrigation Benefit Programme (AIBP). RKVY provides opportunities for states to increase public investments in agriculture and allied sectors. AIBP mainly aims at completion of irrigation projects that are beyond the resource capability of states, delayed irrigation projects in the states at the advance stage mainly due to fund shortage. Such boost to the agriculture and allied sectors in a holistic manner is very important in the larger context of sustainable development.

Most of these programmes and activities directly contribute to Targets 2.3 and 2.4, which aim at increased food production and income of the small and marginal farmers, enhance climate resilience through diversified agricultural practices, and promote of suitable cultivars to tackle impacts of climate change. Also there are other activities that are in place through National Bureau of Plant Genetic Resources (NBPGR), safeguarding of traditional knowledge through Biological Diversity Act, 2002 and thus address Target 2.5. Watershed approach provides a strong basis for conservation of traditional cultivars and safeguarding of traditional knowledge.

SDG 5 - Achieve gender equality and empower all women and girls

The Common Guidelines recognize the fact that women are bearing the brunt of the consequences of resource degradation and that gender equity in sharing the benefits of watershed development is essential for its sustainability.

The committees formed for various natural resource management purposes such as Watershed, Joint Forest Management, Biodiversity Management, and JICA forestry in many states have identified norms for representation of women and also for the under privileged. A number of activities in watershed approach target reduction in drudgery of the women folk through alternative cooking energy and livelihood options, to optimize the available time saved due to other project activities.

Through the implementation of field-based projects using integrated watershed-approach SDG targets



namely 5.1 (addressing discrimination against women), 5.4 (addressing importance of unpaid and labourious domestic work), 5.5 (ensure equal opportunities and leadership roles), 5a (access to financial services through SHGs and microfinance). Watershed approach has been a milestone process to address gender equality and women empowerment along with specific programmes that address specific needs of rural women who are largely considered as underprivileged section of the society.

affordable drinking water), 6.4 (water-use efficiency), 6.5 (implementation of integrated watershed management).

The watershed approach provided by CWG is critical in terms of augmenting water resources, supplying clean and potable water, and providing sanitation facilities. CWG provides a common approach of end-to-end solution for water and sanitation and other similar schemes and missions can be benefitted from the approach and processes.

The Common Guidelines advocate a three-tier approach to issue of water, as indicated in the box here.

Multi-Tier Approach for water management

There would be a multi-tier ridge to valley sequenced approach, which should be adopted towards the implementation of the Watershed Development Projects. The higher reaches or the forests are actually where the water sources originate and would need to be addressed suitably.

The second tier is the intermediate tier or the slopes, which are just above the agricultural lands. In the intermediate slopes, the watershed management approach would address all the necessary issues by looking at all the best possible options including treatment, cropping pattern, horticulture, agro-forestry, etc.

As to the third level of the plains and the flat areas, where typically the farmers are operating, there would be a large concentration of labour-intensive works. The watershed development process would be synergized with the employment-generating programmes such as the MGNREGA, thus providing strong coordination.

The objective would be to recharge groundwater, create surface water storage structures, and improve water quality and quantity for potable and non-potable uses.

SDG 6 - Ensure availability and sustainable management of water and sanitation for all

National Rural Drinking Water Programme, Nirmal Bharat Abhiyan, Pradhan Mantri Krishi Sinchayee Yojana, National River Conservation Programme are the important centrally sponsored schemes contributing to SDG 6.

Various activities using Integrated Watershed Approach being conducted under PMKSY and watershed development projects such as Swajal in various states address targets namely 6.1 (access to safe and

SDG 7 - Ensure access to affordable, reliable, sustainable and modern energy for all

Integrated Watershed Approach addresses the renewable and affordable energy for rural and other relevant stakeholders. This approach has certainly contributed to conceptualization and deployment of programmes such as Unnat Chullah Abhiyan of the Ministry of New and Renewable Energy in the recent past, along with intensive efforts of research and development in Improved Cooking Technologies across India since the 1970s. The perceived need of access to



LPG-based cooking and deployment of programmes like Ujjwala Yojana may be credited as one of the outcomes of Integrated Watershed Approach, which has been evolved over a period of time. Through these activities, Targets 7.1 and 7.2 are addressed ensuring access to affordable, reliable, and modern energy services and also to have maximum share of renewable energy.

SDG 8 - Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

Skill Development Mission is one of the schemes aimed at achieving SDG 8 and has immediate relevance with watershed approach. The Common Guidelines refer to the need to increase livelihood opportunities as part of the watershed approach.³⁷

Construction activities such as water harvesting structures, improved land productivity, asset building activities like rural roads, of watershed management programmes have been successful in creating local employment opportunities. Such short-term job creation boosts the local economy where the underprivileged section of the society gets support to harness the benefits from these assets through agriculture and allied sector activities.

MGNREGS has been an important programme where integrated watershed approach has been used while creating assets such soil and water conservation, de-silting tanks, and other waterbodies are looked upon as a major source of employment through MGNREGS.

These activities mainly address Target 8.3 with growth of small-sized enterprises and access to financial services, Target 8.9, promotion of sustainable tourism, local culture and products in the form of a range of forest produce in raw or with preliminary value addition, and are only available locally.

The common approach for identification of skill development needs at the local level can benefit various programmes across the departments and ministries. CWG would need better linkages in this regard with other programmes intended at skill development in natural resources, agriculture, horticulture, and industrial sectors.

SDG 10 - Reduce inequality within and among countries

Backward Regions Grant Fund, Scheme for Development of Other Backward Classes and Denotified, Nomadic and Semi-nomadic Tribes are some of the schemes that have immediate linkages with the natural resource management and development where watershed approach becomes useful in the planning and implementation of these schemes.

Local Communities Below Poverty Line (BPL), Scheduled Castes and Tribes (SCs and STs), nomadic tribes (NTs) have been the target beneficiaries of watershed management programmes in the country through which social equity has been addressed at the local levels. Targets 10.1 and 10.2 are addressing inclusive development of bottom 40 per cent population along with social, political, and economic inclusion across gender, age, ethnicity through integrated watershed approach.

CWG do recognize socially and economically suppressed population but do not necessarily address nomadic communities sufficiently. Though needs of pastoral nomads are addressed in Himalayan states, the needs of non-pastoral nomads are seldom addressed through CWG. The integrated watershed approach is benefited due to non-pastoral nomads as they not only contribute to the local economy but also are responsible for influencing the harvesting of natural resources such as medicinal plants. But in most of the programmes, the institutional mechanism to address issues of nomadic tribes and other communities is lacking and that remains a major lacuna in addressing the inclusive developmental approach for these communities.

SDG 12 - Ensure sustainable consumption and production patterns

The watershed approach provides the flexibility to suit the outputs and outcomes as per agro-ecological conditions. Sustainable Consumption and Production are addressed under watershed approach for developing agriculture-based enterprises where enhancement of production is targeted and then additional production is commercialized, for developing alternative livelihood options mainly oriented at women. Under Joint Forest Management (JFM) programmes, value addition of minor forest produce has been often addressed by first carrying out sustainable harvesting of the forest produce. Targets mainly 12.2 and 12.b are addressed under watershed approach through activities of sustainable management and efficient use of natural resources where the status of resources is enhanced and responsible livelihood options including eco-tourism are developed and monitored.

SDG 13 - Take urgent action to combat climate change and its impacts

All the components of watershed management programmes are directly enhancing the capacities of the ecosystems and the associated local communities to tackle the impacts of climate change and also help in adaptation programmes. India has launched comprehensive programmes based on National Action Plan on Climate Change in mission mode with integrated watershed approach.

The activities mainly address Target 13.2 and Target 13.3 that ask for mainstreaming climate change measures in national policies along with awareness raising and capacity building of society and institutions to tackle impacts of climate change.

Every state in the country has also developed State Action Plan on climate change and climate proofing of agriculture, inducing climate resilience in the ecosystems and developing nature-based solutions can be effectively evolved through watershed approach.



At present, this potential of watershed approach is not effectively tapped across India. Through watershed approach, there is a process of inducing ecosystem resilience, and social and economic resilience to withstand climate vagaries. But at this point, the quantification of resilience building is not matched with the required intensities as defined by local climate models. CWG could incorporate such interaction and learning from the climate modelling exercise for resilience building of natural resources and social systems.

SDG 15 - Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

The Common Guidelines specifically address the issue of land degradation through a multi-tier approach. Over 23 million hectare forest lands have been jointly managed in such a manner through JFM in India since the 1990s. PMKSY all over India works in collaboration

with the State Forest Departments to strengthen forest cover. Forest department is managing structures such as check dams, contour-bunds to arrest the erosion and degradation of forests, which in turn, actually benefit the lower tiers. Through afforestation, assisted natural regeneration and plantations, watershed management programmes are contributing towards restoration and protection of terrestrial ecosystems and sustainable forest management. CWG largely addresses the technical aspects of natural resource management (NRM) where conservation of biodiversity is one of the co-benefits.

The other ministries such as Rural Development, Jalshakti, Agriculture, Tribal Affairs largely address NRM issues including land degradation, biodiversity conservation, etc. and there is a need to recognize the linkages of co-benefits generated due to variety of programmes addressing NRM at the local levels within and outside forest boundaries.

Targets 15.2, 15.3, 15.4, 15.5 are directly addressed through integrated watershed approach undertaken in varied ecosystems with major focus on controlling



land degradation and conservation and restoration of ecosystems including mountains. It also helps in achieving many other SDGs in a synergistic and cost-effective manner.

SDG 16 - Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

The Common Guidelines spell out the need for institutional support at all levels. Watershed programmes have developed local-level institutions that have been accountable, transparent, and formed on social inclusion and gender equity basis to implement the activities. Analysis of the link between CWG and developmental schemes shows that there has been a total compartmentalized approach observed across the state- and central-level schemes of rural development, natural resource management, and biodiversity conservation. Hence, the Common Guidelines on Watershed are mainly consulted only in the context of watershed projects. There has been a voluntary acceptance and adoption in a case-specific manner.

There is a strong need to communicate the importance and linkages of CWG in the larger context of natural resource management, climate action, social and ecosystem resilience building, halting land degradation, women empowerment and gender equity, and in the larger perspective of sustainable development. To do so, there is also a need to evolve CWG with revised version and objectives going beyond just watershed projects.



GENDER, SOCIAL EQUITY AND OTHER CROSS CUTTING ISSUES

SECTION 4

The success and sustainability of watershed programmes, which are recognized as a potential engine for agricultural growth and sustainable development in rain-fed areas, are directly related to collective action, community participation, gender sensitivity, and inclusion (Wani et al., 2008; Sreedevi and Wani, 2007, Behrman et al. 2014). Women are the key players and direct actors in managing natural resources in the watershed and addressing household water, food, and fuel security, and degradation of watersheds negatively affects the health, income, and the work burden of women and girls. Hence, increasing women's participation in watershed management projects is critical to the long-term sustainability of development efforts.

Watershed guidelines: gender perspectives

The use of a social- and gender-inclusive approach to watershed management ensures that both women's and men's unique needs, priorities, and knowledge are incorporated into management plans and policies. It also promotes more equitable relationships between stakeholders and local organizations. Over the last three decades, the

need to consider gender aspects in the watershed planning and management has been recognized especially to enhance the role of women in decision-making processes and their representation in the institutional arrangements.

The Watershed Guidelines, issued by the Ministry of Rural Areas and Employment (1994), encourage greater participation of women and marginal groups and state that an 'adequate' number of women should be included in the committee, although the actual

number is not specified. The Council for Advancement of People's Action and Rural Technology (CAPART) guidelines for Watershed Development Programme (1992) stipulate that at least one member of the committee should be a woman. The Hariyali Guidelines (2003) also emphasize on representation of women members in the watershed committee. Neeranchal Guidelines of 2003 have mandatory requirements of capacity building of watershed committee, user group (UG) and SHG members and laid emphasis on the preference of women candidates as secretary for watershed committee. WARASA Guidelines (2000) and Process Guidelines for Watershed Development Project (2002) mention that the watershed committee must mandatorily have at least 50 per cent members as women and adequate representations from SHG, user groups, SC/ST community, and landless/asset less poor, shepherds and agricultural labourers amongst other marginalized groups who are dependent on watershed for their livelihood. WARSA Guidelines further encouraged credit and thrift activities for women SHGs.

According to NWDPR Guidelines (1994), the watershed interventions should focus on activities for reducing drudgery and increasing efficiency of women through development of specific implements such as fuel-efficient stoves to promote healthy environment in homes and the kitchen. Women's groups would also be encouraged to take up income-generation activities like Mahila Mandal Nurseries from which the project would buy seedlings and other planting materials.

Neeranchal Guidelines (2006) directed UG to be preferably consisting of women who were likely to derive direct benefits from a particular watershed work or activity and they were to be responsible for the operation and maintenance of all the assets

created under the project from which they derived direct or indirect individual benefits. In addition, their responsibility included collection of user charges. The Guidelines also called for representation of women candidates in District Watershed Management Team. As per revised Watershed Development Guidelines (2001), every watershed project should establish UGs and SHGs that include women who are given training in their choice of business. Constitution of a State Watershed Development Committee with two prominent women representatives amongst range of other stakeholders was also recommended.

The Common Guidelines for Watershed Development (2008-2011) emphasized on the principles of equity and gender sensitivity indicating a fresh framework for the next generation watershed programmes. It clearly mentions that the watershed projects should be considered as levers of inclusiveness and Project Implementing Agencies (PIAs) or the Watershed Development Team (WDT) must facilitate the equity processes such as enhanced livelihood opportunities for the poor through investment in their assets and improvements in productivity and income. Other important aspects that PIAs must ensure is improving access of the poor, especially women to the benefits to all watershed development activities and enhance their role in decision-making processes and representation in the institutional arrangements. Safeguarding access to usufruct rights from the common property resources for the vulnerable and resource poor is another aspect that is highlighted in the Common Guidelines. Following the principles of inclusiveness, it is directed that no charge will be taken from landless, destitute, or disabled/widow headed households for work done on private or public land.

Initiatives like Mahila Kisan Sashaktikaran Pariyojana (MKSP), a sub-component of National Rural Livelihood Mission (NRLM), has developed convergence strategies to access existing government schemes such as Watershed Development Programme (MoRD 2011). This membership-based programme wherein women farmers become members of the SHGs at the village level and further the groups are federated at the block and the district levels have been successful in reducing poverty by enabling the poor to access

gainful self-employment and skilled wage employment opportunities in watershed programmes.

Moreover, Financial Year 2016–17 was declared as watershed year for ‘farm livelihoods’ component under NRLM–MKSP and some of the achievements include launch of a special fund for projects on value chain development, farm livelihood training and capacity building, facilitating State Rural Livelihood Missions (SRLM) in strengthening Krishi Sakhi and Pashu Sakhi. They were supported through structured trainings, engagement of technical support agency to support SRLMs in value chain projects, building partnerships with dairy services and Central Silk Board and strengthening of Management Information System (MIS) for capturing details of all the farm livelihood activities.

Good examples

Numerous watershed interventions have practiced social and gender inclusiveness. World Bank supported projects in Karnataka [Karnataka Watershed Development Project (2001)], Himachal Pradesh [Himachal Pradesh Mid-Himalayan Watershed Development Project (2005)], and Uttarakhand [Uttarakhand Decentralized Watershed Development Project (2004)] prioritized the inclusion of disadvantaged and vulnerable groups, especially women and the landless, from their inception. The projects organized the poor from marginalized households SHGs or common activity groups where the groups could access resources (financial, managerial, technical, market, information) needed to carry out income-generating activities, and inclusion in the development and management of common property resources (World Bank 2014). In Andhra Pradesh – Adarsha, Powerguda and Janampet watershed, women even without formal education worked collectively and managed watersheds efficiently to enhance crop productivity by 25 to 350 per cent and managed income-generating enterprises at community level to increase family income up to 77 per cent as a result of livelihood training, policy interventions, and with good women leadership. Increasing economic resilience of the poor by federating SHGs at mandal level helped women to explore new livelihood opportunities and

run commercial activities. This enabled them to realize their socio-economic potential and improve the quality of their lives. In Jetpur-Pavi and Chhotaudepur tribal belt of Gujarat, which are characterized by spatial and social marginalization, complementary innovations like watershed development along with implementation of MKSP, played an important role in innovation solution especially livelihood promotion activities in the area.

In Rajasthan and Tamil Nadu, Integrated Wasteland Development Programme (IWDP) resulted positively in reducing the workload of women in terms of fetching drinking water, collecting fuel wood and fodder for livestock. Likewise, in Assam women were involved in preparing the watershed plan and execution of work of IWPD. To ensure women's participation in the planning and decision-making of watershed development work, a woman volunteer was engaged in each watershed committee.

Missed opportunities

On the flip side, there are also various examples that illustrate missed opportunities in the watershed planning and implementation, failing to deliver the desired benefits to women. Though women share a major workload for managing natural resources, benefits of watershed programmes largely bypass them, except where targeted income generating and employment interventions have been undertaken (Sreedevi et al. 2009). Studies have indicated that most often, women and landless labourers are silently left out of watershed-related decision-making processes (Meinzen-Dick et al. 2004; Sreedevi and Wani 2007). Mere presence of women members on the watershed committee had no real impact as they were not effective in the decision-making process in the committee (Seeley et al. 2000). Too often, they play a passive role in decision-making processes because of their low educational levels, cultural practices, and economic dependence. Lack of property ownership also hinders investments and participation of women in watershed management activities; since independent decisions cannot be made (Josh et al. 2004). Various studies have highlighted the differentiated benefits of watershed development in terms of crop improvements on arable lands, increase in agricultural productivity, and other



technological improvements where the gains are usually appropriated by men and increased drudgery is disproportionately borne by women (Arya and Samra 2001, Visaria 1999).

In the Surguja district, watershed management committee did not take women's needs and priorities into consideration, and did not invite women to participate in the development of the watershed management plan. As a result, only men benefited from income-generating, soil conservation, and water management activities (Aguilar and Lara 2004). A study conducted by Arya and Samra (2001) covering 53 watershed projects in the Shivalik foothill region in Haryana found that on average, 6 to 22 men participated in meetings compared to 0.3 to 2 women. The watershed programme in Anantapur and Mahaboobnagar in Andhra Pradesh found many government and non-government agencies involved in the watershed programme continuing to believe that women should concentrate on domestic activities, such as education, health, thrift and credit, and non-land-based income-generation activities, without considering the equity impacts of such interventions (Adolph and Turton 1998). For watershed projects in the Keunjhar district of Odisha, the inclusion of women in the process of group formation has not been a priority. Their traditional knowledge of resource management and their efforts to save water was ignored by the project team (Dash, et al. 2001).

A comprehensive assessment of Rajasamadhiyala watershed in Gujarat revealed that women participated in livelihood activities but do not involve themselves in the community-level initiatives (Sreedevi, et al. 2006). In Parasai- Sindh watershed of Bundelkhand region, teak wood saplings provided to women based on felt need were sold off later to pay for dowry for the girls. Even when the interventions are targeted to support women according to their stated needs, they can still lead to reproducing gender relations of dependence despite being well intended. In the Neerancha project undertaken in the states of Maharashtra, Madhya Pradesh, Andhra Pradesh, Chhattisgarh, Gujarat, Odisha, Jharkhand, and Rajasthan, efforts to mobilize women of the area was not prioritized. Also state MIS of all the states did not have any system to track women empowerment-related indicators. In the absence of any support system, appraisal system and proper sensitization exercise, gender aspect of the programme was deemed to be weak.

Despite the well intentions of all the Guidelines, it is often noted that implementation continues to be a challenge since women are often not recognized as members of the watershed community in their own right, but are viewed as being there to fill the quota that the Guidelines outline (Seelay et al. 2000). The mandatory requirement of woman or an adequate number of women on committees encourages tokenism and does not demonstrate a committee effort to involve women in the decision-making. These interventions fail to take into consideration the existing imbalance between men's and women's ownership rights, division of labour, and incomes. What matters most for investment in watershed resources management is the degree of security in terms of ability to exclude others and enforce rights by the resource user (Ross 2009). So just ensuring quotas for women and other vulnerable and resource- poor groups, does not really help in changing the prevailing gender bias or socio-economic and political relations in the village. The implementing agency's efforts to involve women are often limited to 'awareness camps' or explanation of the concept of watershed development in women's meetings (Arya 2007). The Guidelines do not emphasize the importance of beginning the preparation of the watershed plans

with an understanding and analysis of women and men's differing use and dependence on both private and common lands.

Creating better support for gender and social inclusion

Scholarly work on gender and social inclusion have revealed that unless targeted income generating and employment interventions with market linkages are introduced for women, landless and the vulnerable groups, the economic resilience of the poor and meaningful participation may not be possible. Therefore, studies have advocated promotion of need-based income-generation commercial scale and value addition activities rather than traditional compartmental approach of rainwater harvesting and land development activities (Wani et al. 2014). And for land-based activities, it is important that women are included in decisions over land use and crop planning to ensure that household food requirements (vegetables, fruit and a variety of grains) are adequately considered.

Women SHGs along with credit and thrift have unlocked avenues for income-generating activities (Anantha et al. 2009). Study by IIED (2000) has clearly called for investment in non-land-based and land-based activities that are lucrative for women so that they will be seen as valued and equal members of the village community developing the watershed. It may also mean that they will see value in investing their time in watershed development programmes and projects. Bebbington (1999) also advocates the need to look at wider 'rural livelihoods' rather than just 'agrarian livelihoods' implying changing the way the watershed programme is viewed. Such multifaceted

avenues that take into account the diverse ways in which rural women make their livelihoods from both farm and non-farm-based activities to achieve socio-economic potential and improve the quality of life will also increase system sustainability.

Another important aspect raised in the scholarly work is the inclusion and mainstreaming of women, the poor and vulnerable groups into the decision-making processes that are regarded as crucial to the



sustainability of the project. It is advised that effective gender sensitization programmes must shift from the current emphasis on the number of women in the groups, or amounts saved, or separate schemes for women, to identifying and addressing strategic gender interests (workloads, access and control over productive resources, particularly common pool resources, economic interests in core activities). These vulnerable groups draw upon common pool resources for their survival and livelihoods and unless they are directly involved in decision-making and benefit from the development of these resources, they will have no incentive to protect or sustainably manage these assets. Lokur-Pangare and Farrington (1999) argue that to strengthen the participation of women in the watershed

programme, it is important to provide technical and social support including help with child care, so that they can fully play their role in watershed development. It is imperative to establish monitoring systems to assess how women's interests are being defended. Likewise, efforts to integrate small and marginal farmers, women and landless labourers into the process require conscious efforts right from the beginning. It is, therefore, necessary that need assessment of the stakeholders should be the precondition in designing and developing the watershed activities (Joshi, et al. 2008). Moreover, women need to be involved in planning and implementation at district, state, and national levels if they are to have any influence upon the programme as a whole.

WAY FORWARD

SECTION 5

The widespread deterioration of watersheds around the world is a threat to agricultural and livestock production, livelihoods and ecosystem health, strengthened by climate variability and change. Large scale restoration of degraded watersheds may require 10 to 20 years for full benefits to be realized in India. In this perspective watershed management and sustainable land and water management are key development areas which present a multiple win potential synergy between food security, climate adaptation and mitigation .

Since watershed development and management follows an integrated and multi-dimensional approach it has an impact on almost all aspects of environment and livelihood, including health and thus has the potential of achieving SDGs. The overall purpose of the watershed programmes is to enhance incomes, provide food security through sustainable agriculture and prudent management of natural resources. This directly corresponds to SDG 1 and 2, i.e. No poverty and Zero Hunger respectively.

Poverty Reduction

The soil and water conservation measures at the farm level, while improving the soil quality and water retention, help in better crop yields. In addition, treating soils with integrated nutrient management, mulching, organic farming and composting permits carbon sequestration. At the same time, the introduction of high yielding crop varieties, introduction of improved cropping practices help in higher and better quality yields, thus resulting in higher agricultural incomes.

Dryland horticulture is an integral part of all watershed programmes. Diversifying land use through the adoption of dryland horticulture enables farmers to adapt to the consequences of climate change and stabilizes the income from land. This contributes to reducing poverty which is SDG 1. Livestock is introduced as an

income generating activity in watershed programmes. Apart from generating income through regular sale of milk, milk products and eggs, livestock are an asset, especially for the landless. This is an important step in addressing migration of landless and also poverty reduction, which is SDG 1.

Food security

For instance, the homestead vegetable kits and promotion of horticulture enables the consumption of more fruits and vegetables at the household level which leads to better nutritive meals, thus contributing to SDG 3 as well on promoting good health and well-being.

Education

Awareness to school children on the importance of soil water conservation, tree plantations in school, vegetable gardens that provide vegetables to the mid-day meals, construction of toilets in school, especially for girls are also taken up in the watershed approach under community initiatives. These activities encourage children, especially girl children to attend school regularly, thus contributing to SDG 4 quality education for all.

Gender Equality

Community participation, especially women's involvement (through self-help groups) is encouraged in all stages of planning, implementation and monitoring in watershed programmes, including being a part of the Watershed Development Committee. Entrepreneurship development and skill training for women is an essential part of most watershed programmes. The capacity building and financial linkages are strong fundamental steps which enable women to become economically independent, apart from providing them the requisite knowledge, skill and linkages for a

sustainable livelihood option. This clearly indicates the contribution of watershed approach to SDG 5 on gender and equality.

Clean Water

The soil and water conservation structures at the watershed level such as bunding, nala bunds, check dams, drainage line treatment and community farm ponds among others facilitate water storage and arrest runoff, thus improving the micro environment, apart from recharging ground water and reducing soil erosion. This corresponds to the SDG 6 of providing clean water and sanitation for all.

Infrastructure and Clean energy

Entry point activities are the starting step in watershed programmes wherein activities which are useful to the community are taken up such as establishing a milk collection center, rejuvenation of water tanks, custom hire service centres that rent out agricultural machinery, construction of community marketing place and halls for common use, provision of renewable energy devices etc. For instance, TERI had partnered with the Karnataka Watershed Development Department to provide solar lanterns to watershed communities under the Integrated Watershed Management Programme during 2011-2015. This was a community need that was met and the usefulness and impact on their lives were discernable. Such initiatives contribute to SDG 9 industry, innovation and infrastructure and SDG 7 affordable and clean energy.

Economic Growth

It is a known fact that all activities in watershed programmes employ local labour force and revolve around improving their lives and livelihoods. This goes a long way in providing employment to the local communities thereby contributing to SDG 8 on decent work and economic growth.

Climate change

Since most watershed programmes are focused in drought prone and dry areas, the promotion of forestry

plantations as agro forestry on farmsteads as well as treating the common lands with forestry plantations that yield biomass for domestic use goes a long way in enhancing the vegetation and thus the biodiversity of the region. The forestry plantations server as carbon sinks, thus enabling sequestering carbon. This in turn helps in combatting climate change and desertification contributing to SDG 13 and SDG 15, i.e. climate action and life on land.

Water bodies

Development of common property resources is an important component of the watershed approach, wherein usufruct rights are given to the less advantaged, vulnerable women and landless persons, thus upholding SDG 10 on reduced inequalities. Tank desiltation and promoting fisheries as an income generating activity is taken up in many watershed programmes, which contributes to improving water bodies and indirectly contributes to SDG 14 of life under water.

Local institutions and Partnerships

The Watershed programmes have always worked through community base institutions. The participatory approach adopted elicits the engagement of all sections of the watershed community right from the planning stage in preparing micro plans, community monitoring and sustaining the efforts through Watershed Development Fund administered by the Watershed Development Community where there is mandatory representation of the vulnerable, women and marginalized communities. This approach is in consonance with SDG 16 which stresses the need for justice and strong institutions.

Most watershed programmes work on the principle of partnerships, collaboration and convergence with various funding sources, research institutes, academic institutes, non-governmental organizations and other relevant schemes and departments in the government. This shows the importance placed on partnerships in achieving the overall goal in a holistic manner. This is in line with the SDG 17 partnerships for the goals.



Watershed Approach as Key Strategy for Food security

India has a long history of tackling droughts and post-independence the nation has witnessed evolution of watershed management approaches. The evolution of schemes and programmes to address the various aspects of land degradation actually reflect the progressive acquisition of knowledge and development of improved packages of practice, as well as the shifts in focus based on national priorities. Adoption of watershed approach and planning based on micro watersheds using remote sensing data and spatial data is one of the key milestones in this process. This has resulted into drafting of Common Watershed Guidelines which have become a cross-cutting approach for most of the rural development activities related to natural resource management, soil and water conservation, alternative energy, livelihood and micro-level financial institutions across India. Apart from

achieving the objectives of watershed management through enhanced soil and water conservation, the other co-benefits demonstrated across various sectors of rural development by this approach are noteworthy.

Watershed approach is a key strategy and should be used for all land and water based activities in order to optimize outcomes for all SDGs. This is possible only if community institutions are empowered with the knowledge and skill to plan, implement and sustain the watershed approach. There is a need to recognize Watershed Approach beyond the parlance of rural development by the concerned stakeholders such as CSR programme implementers, allied Departments / Ministries involved for development, etc. At the same time there is a need for watershed approach to atune its outcome with respect to new knowledge of climate proofing interventions to ensure the sustainability of the impacts and at the same time have a co-ordinated approach for accounting with respect to national and international processes, targets and goals.

Achievements, Lessons and Way forward

Integrated Watershed Management has been recognised as one of the most effective models for watershed planning. There are many studies that have brought out the multiple benefits and impacts of watershed development activities. Nevertheless, there have been several lessons along the way which could be incorporated into the programmes to enhance the effective delivery and intended results. For instance Productivity enhancement activities in a watershed programme have a number of positive implications, out of which nutritional security is a major one. This is resonated laterally in the form of nutritional security with an increase in access to quality foods such as milk, meat, fruits and vegetables. However, the picture is not as bright as there were many children in the watershed villages who scored less anthropometrically. This suggests the need for nutrition-specific and nutrition-sensitive interventions on a watershed platform.

Bio-physical Aspects

As indicated by studies, the performance of watershed programmes was appreciable from the point of view of increase in disposable income with an increase in crop diversification and with an increase in employment through wage works. Watershed project have positive outcomes that strengthen the socio-personal and economic characteristics of the farmers and improve the biophysical environment of the farms. For example, as indicated by literature, the soil and water conservation efforts have increased the total cultivable area as well as improved the irrigation and drainage facilities in the micro-watershed units, thereby increasing the acreage and productivity of crops. Similarly, land cover has improved, and groundwater recharge has increased. Together with this, the number of wells, especially bore wells also have increased considerably although there is no corresponding social regulation of water use. In many watersheds, non-cropped area is brought under cultivation.

The assessment of the impact of watershed project on livelihoods of the beneficiaries showed that there

was marked increase in agricultural production and productivity in the study area compared to that of base year. Similarly, the beneficiaries have diversified agriculture with higher value crops. Further, the study also demonstrates that there is remarkable improvement in the income and socioeconomic status of the beneficiary farmers compared to that of non-beneficiary farmers of the project.

Livelihood for Landless

On the other hand, although agricultural production has improved in most of the watersheds, the available information fails to reflect the impact on different class of land and for different socio economic categories. The distribution of benefits has not always been even. Employment during the project period remains the only important benefit to the landless with no clear and general evidence of sustained increase in work availability once the programme related work has been completed. There is a need for the resource poor to be ensured a share of the increased resources that watershed generates.

One of the most neglected area, observed, is the development of common property land resources (CPLRs) and the potential of creating biomass based livelihoods and wherever biomass development has been undertaken it could not produce the desired results due to low survival rate.

Gender issues

Numerous watershed interventions have practiced social and gender inclusiveness and prioritized the inclusion of disadvantaged and vulnerable groups, especially women and the landless, from their inception. Increased awareness of gender has led to establishment of self-help groups (SHGs) that have helped women save, obtain credit, and become more active and visible. However, it is noticed that benefits of watershed programmes largely bypass them, except where targeted income generating and employment interventions have been undertaken and in some cases (women and landless laborers are silently left out of watershed related decision-making processes. It clearly

indicates that mere presence of women members on the watershed committee had no real impact as they were not effective in decision-making process in the committee.

Convergence and Linkages

There is scope for development of convergence system through institutional arrangement /process. There is potential for Putting up online monitoring system of all projects. Linkage with knowledge centers is completely missing hence new farming technologies and crop varieties developed by the scientific institutions do not get mainstreamed. These technologies could be up-scaled through watershed projects if linkages are established with the scientific institutes and financing and proper extension mechanism are developed for taking the new technologies to the villages .

Cost Norms

In terms of cost norms, most watershed programmes follow a single cost norm. Costs should vary within a broadband and all resources available from various schemes should be pooled together to fully treat the entire watershed. Capacity building is required for officials on planning, implementation of physical and social-economic schemes and for the people to improve their capability for managing farming systems

and credit-market link-up. This was found to be the weakest link in system for activity management at base as well as intermediate level. Risk management is another area that needs to be strengthened through appropriate training .

Sustainability

While the provision of the Watershed Development Fund (WDF) is a step forward in providing financial backing for the institutionalisation of repair and maintenance of the structures created in the watershed programs, the challenge of operationalising the fund lies largely unexplored as of now. Sustainability is an issue least articulated and operationalized .

The initial enthusiasm of a programme may not be sustained over a long period as the incremental benefits may not grow at the same rate as in the initial years unless innovative methods are applied to the whole chain of activities. Clearly, much greater attention has to be paid to the processes of implementation as well as to the quality and maintenance of structures required. If the better-funded programmes are generating better results, it may be necessary to invest greater funds into the mainstream programmes like PMKSY. But without the attention to process, quality and broad-based interventions, the benefits will be limited in their magnitude, distribution and sustainability.

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- 33 “The Watershed Committee shall constitute SHGs in the watershed area with the help of WDT from amongst poor, small and marginal farmer households, landless/asset less poor agricultural labourers, women, shepherds and SC/ST persons. These Groups shall be homogenous groups having common identity and interest who are dependent on the watershed area for their livelihood. Each Self Help Group will be provided with a revolving fund.”
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- 35 “Equity and Gender Sensitivity: Watershed Development Projects should be considered as levers of inclusiveness. Project Implementing Agencies (PIAs), must facilitate the equity processes such as a) enhanced livelihood opportunities for the poor through investment in their assets and improvements in productivity and income, b) improving access of the poor, especially women to the benefits, c) enhancing role of women in decisionmaking processes and their representation in the institutional arrangements and d) ensuring access to usufruct rights from the common property resources for the resource poor.”
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