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POLICIES AND PROGRAMMES FOR DEVELOPMENT OF DRY LAND FARMING IN INDIA

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ABSTRACT

Dry land farming in Karnataka contributes significantly to the state's agricultural output, especially in coarse cereals, pulses, and oilseeds, which form the backbone of rural food and nutrition systems. However, water scarcity remains a critical limitation. High evapotranspiration, low soil moisture retention, and extensive runoff due to undulating terrain contribute to soil erosion and nutrient loss. Even in regions receiving higher annual rainfall, irregular rainfall patterns often result in moisture stress and drinking water shortages. Such uncertainties lead to high yield fluctuations, recurrent crop failures, increased indebtedness, and reduced risk-bearing capacity among small and marginal farmers.

Keywords : Agriculture, Dryland, Land farming, Land Crops

INTRODUCTION

The development of dry land farming in India has been closely intertwined with the evolution of area development and watershed-based policies over the last five decades. Large tracts of the country's cultivated land—roughly 55–60 per cent of the net sown area—continue to depend primarily on rainfall, and are characterized by low and unstable yields, land degradation, fodder scarcity and high incidence of rural poverty (Ministry of Agriculture & Farmers Welfare [MoA&FW], n.d.; National Watershed Development Project for Rainfed Areas [NWDPRA], n.d.). In response, the Government of India progressively moved from sectoral drought-relief schemes to integrated watershed development programmes**,** emphasizing soil and water conservation, livelihood security and ecological restoration in rainfed regions.

The earliest generation of interventions, represented by the Drought Prone Areas Programme (DPAP) launched in 1973–74, was designed primarily as a drought-proofing and asset-creation programme in chronically drought-affected blocks (Asutosh College, 2020; GKToday, 2011). Subsequent initiatives such as the Integrated Wasteland Development Programme (IWDP) in the early 1990s extended this approach to degraded and wasteland areas, with an emphasis on afforestation and soil–moisture conservation (Tamil Nadu Agricultural University [TNAU], 2016).

A major conceptual shift occurred with the launch of the National Watershed Development Project for Rainfed Areas (NWDPRA) in 1990–91, which explicitly adopted integrated watershed management and sustainable farming systems as its guiding principles (MoA&FW, n.d.). Guided by successive watershed guidelines (1994, 2001, 2008), these

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programmes gradually converged into the Integrated Watershed Management Programme (IWMP) in 2009–10, and later into the Watershed Development Component of the Pradhan Mantri Krishi Sinchayee Yojana (WDC–PMKSY) (Department of Land Resources [DoLR], 2021).

For dry land agriculture in states such as Karnataka, these policy and programme shifts are critical. They shape water availability, land productivity, crop diversification and livelihood opportunities for rainfed farmers, and directly influence the performance of dry land crops assessed in the present study. This article, therefore, examines the evolution, design features and implementation performance of key programmes for dry land and watershed development, with a particular focus on DPAP, IWDP, NWDPRA and the later watershed-development paradigm for rainfed areas.

EVOLUTION OF DRY LAND FARMING PROGRAMMES

India's policy response to the challenges of dry land agriculture has followed a distinct evolutionary trajectory. The earliest initiatives were conceived as drought-relief and area-development programmes in the 1970s, largely implemented in a sectoral and dispersed manner. Critical evaluation in the early 1990s revealed that this approach had limited impact on long-term productivity and resilience, leading to a re-orientation towards watershed-based, participatory development (Asutosh College, 2020).

Over time, several centrally sponsored schemes—DPAP, the Desert Development Programme (DDP), IWDP and NWDPRA—were brought under common watershed guidelines (1994, revised 2001) and later aligned with the Common Guidelines for Watershed Development Projects, 2008, issued by the National Rainfed Area Authority (NRAA). These guidelines standardised the ridge-to-valley approach, community institutions (User Groups, Self-Help Groups, Watershed Committees), and project cycles across programmes (DoLR, 2008; Wani, Venkateswarlu, & Sharda, 2011).

Table 1 summarises, in broad terms, the evolution of the main watershed-based programmes relevant to dry land farming.

Table-1: Evolution of major watershed and dry land development programmes in India

Programme/ scheme	Year of launch/key phase	Nodal ministry/ department	Primary focus	Later status/ convergence
Drought Prone Areas Programme (DPAP)	1973–74	Ministry of Rural Development	Drought-proofing, area development in drought-prone blocks	Shifted to watershed approach from 1995; merged into IWMP in 2009
Integrated Wasteland Development Programme (IWDP)	1989 (NWDB); expanded 1992	Ministry of Rural Development / NWDB	Afforestation, soil & moisture conservation in wastelands	Merged with DPAP & DDP into IWMP in 2009
National Watershed Development Project for Rainfed Areas (NWDPRA)	1990–91	MoA&FW, Department of Agriculture & Cooperation	Integrated watershed management in rainfed farming areas	Subsumed under Macro Management of Agriculture; implemented under common watershed guidelines

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Integrated Watershed Management Programme (IWMP)	2009–10	DoLR, Ministry of Rural Development	Unified watershed programme for degraded/rainfed areas	Recast as WDC–PMKSY from 2015–16

Source: Asutosh College (2020); TNAU (2016); MoA&FW (n.d.); DoLR (2021)

The following subsections discuss each of the core programmes in greater detail.

CONTEMPORARY AGRICULTURAL STRATEGIES

Over the last two decades, India's agricultural policy has progressively shifted from isolated, scheme-based interventions to a more convergent, mission-mode strategy that combines water management, crop diversification, productivity enhancement and market reforms. For dry land regions, this shift is particularly significant: contemporary flagship programmes such as the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), the National Food Security Mission (NFSM), the Rashtriya Krishi Vikas Yojana (RKVY) and institutional innovations like Farmer Producer Organisations (FPOs) and digital market platforms (e-NAM) together shape the enabling environment in which dry land farmers make production and marketing decisions (MoA&FW, 2023; NABARD, 2023). This section reviews the design and implementation of these strategies, with a particular emphasis on pulses, coarse cereals and rainfed crops, which are central to the present study.

INSTITUTIONAL FRAMEWORK AND STAKEHOLDER PARTICIPATION

Sustainable development of dry land agriculture in India depends not only on technical and agronomic interventions, but crucially on institutional capacity, stakeholder participation and governance structures. Given the complexity of watershed-based natural-resource management (soil, water, vegetation, community livelihoods), a multi-actor institutional framework is considered essential for planning, implementation, maintenance and long-term sustainability. The institutional architecture typically involves: a financing / apex agency; implementing agencies (state, district, NGOs, community organisations); and local self-governance institutions (PRIs, watershed committees, user groups). This section analyses the roles of key stakeholders — NABARD, NGOs / community-based organisations, and Panchayati Raj Institutions — in shaping dry land agriculture outcomes.

STATE-WISE AND REGIONAL EVALUATION OF PROGRAMME PERFORMANCE

The large-scale expansion of watershed development and dry land–oriented programmes across India since the 1980s has generated a substantial body of impact evidence at national, state, and regional levels. Programmes such as DPAP, IWDP, NWDPRA, IWMP and, more recently, the Watershed Development Component of PMKSY, have been evaluated in terms of their influence on agricultural production, productivity, soil–water conservation, farmer income, and wider livelihood outcomes. The performance of these programmes is not uniform across states; it reflects differences in agro-ecology, institutional capacity, community participation, and quality of implementation. This section synthesises state-wise and regional evidence from meta-analyses, national evaluations, and state-/project-level case studies, with a particular focus on semi-arid regions comparable to Karnataka's dry zones.

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COST–BENEFIT AND SOCIO-ECONOMIC IMPACT ASSESSMENT

The assessment of dry land and watershed development programmes in India requires not only agronomic evaluation but also a rigorous socio-economic impact analysis. Sustainable agricultural transformation in rainfed regions fundamentally depends on improved resource productivity, income enhancement, employment generation, and asset accumulation among rural households. Numerous studies—commissioned by national agencies such as NABARD, NITI Aayog and ICRISAT—have attempted to quantify the economic returns and social benefits accrued from watershed-based dry land interventions (Joshi et al., 2008; Wani et al., 2014; NITI Aayog, 2022).

The following subsections discuss major socio-economic benefits observed across states, focusing on employment generation, cropping pattern changes, and asset formation.

KEY ISSUES IN POLICY IMPLEMENTATION

Despite substantial investment and an increasingly sophisticated policy architecture for dry land and watershed development, on-ground outcomes continue to be uneven across regions, programmes and social groups. Evaluations by government agencies, multilateral institutions and independent researchers consistently highlight three cross-cutting implementation challenges: (i) regional and intra-state imbalances in coverage and quality of interventions, (ii) fund-related constraints, including delayed releases, under-utilisation and diversion of resources, and (iii) weak and fragmented monitoring and evaluation systems. These issues directly affect the effectiveness of dry land farming policies in improving productivity, incomes and resilience, and are particularly relevant for drought-prone states such as Karnataka.

BEST PRACTICES AND SUCCESS MODELS FROM INDIA

The evolution of dry land farming and watershed development in India has been shaped by a set of widely documented "model" initiatives that demonstrate how integrated natural resource management, community institutions and appropriate technologies can transform fragile rainfed landscapes. These experiences offer practical lessons for design and implementation of policies in Karnataka's dry zones, particularly in terms of soil and water conservation, livelihood diversification and institutional sustainability.

One of the earliest and most influential examples is the Sukhomajri watershed project in Haryana. Initiated in the late 1970s, the project combined contour trenching, check dams, vegetative measures and strict regulation of open grazing within a small catchment to arrest soil erosion and enhance groundwater recharge. A Hill Resource Management Society was formed to manage common resources and distribution of irrigation water, while a payment-for-environmental-services mechanism linked downstream beneficiaries to upstream conservation efforts. Evaluations show that these interventions led to higher agricultural productivity, increased fodder availability, improved tree cover and enhanced household incomes, and the model was subsequently replicated in many other watersheds across India.

A second widely cited success story is Ralegan Siddhi in Ahmednagar district of Maharashtra. Here, integrated watershed treatment—through contour bunding, percolation tanks, terracing, afforestation and strict social regulations on tree cutting and free grazing—transformed a drought-prone, resource-degraded village into a model of ecological restoration and rural development. Studies and field reports indicate substantial increases in groundwater

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levels, year-round drinking water availability, a shift towards higher-value cropping, reduction in seasonal migration and improvements in income and social indicators, all driven by strong local leadership and community participation.

Hiware Bazar, also in Ahmednagar district, represents a more recent model of "water-budgeted" development. After decades of deforestation and land degradation, the village adopted watershed measures, strict water-use norms and a cropping strategy aligned with hydrological realities. Case studies document dramatic increases in irrigated area, cropping intensity and dairy production, alongside a sharp reduction in poverty and migration. The experience underlines how transparent water budgeting, strong Gram Sabha decisions and integration of livestock, horticulture and crops can deliver sustainable rural livelihoods in semi-arid regions.

The Adarsha watershed at Kothapally in Telangana, developed by ICRISAT and partners, illustrates the potential of science–farmer partnerships. Interventions included soil and water conservation structures, improved varieties, balanced nutrient management, integrated pest management and livelihood-support activities. Research reports show reductions in surface runoff and soil loss, improved groundwater levels and yield increases of 13–29 per cent in sorghum and 20–39 per cent in maize with appropriate soil amendments. Remote sensing and farmer-participatory evaluation confirmed substantial gains in vegetative cover, cropping intensity and household incomes, making Kothapally a benchmark model for integrated watershed management.

The Kadwanchi watershed in Jalna district of Maharashtra, developed under the Indo–German Watershed Development Programme, offers another instructive case. Impact assessments report a significant shift from fallow and wasteland to cultivated area, diversification into high-value horticulture (especially grapes), increased water availability and a doubling of crop production during both kharif and rabi seasons. Cropping pattern changes, enhanced soil and water conservation, and strong local institutions contributed to sustained economic gains beyond the project period.

Table-2: Illustrative best-practice models in dry land and watershed development in India

Model/location	Key interventions	Reported impacts
Sukhomajri, Haryana	Contour trenches, check dams, vegetative measures, PES, user group	Reduced erosion, higher crop yields & fodder, improved tree cover, PES uptake
Ralegan Siddhi, Maharashtra	Percolation tanks, bunding, afforestation, social regulation	Raised groundwater, diversified crops, lower migration, higher incomes
Hiware Bazar, Maharashtra	Watershed works, water budgeting, cropping aligned to water	Expansion of irrigation, higher cropping intensity, poverty reduction
Adarsha watershed, Kothapally	NRM structures, improved seeds, balanced nutrients, IPM	Lower runoff, higher sorghum & maize yields, improved groundwater
Kadwanchi watershed, Maharashtra	SWC measures, farm ponds, horticulture promotion	Doubling of crop production, shift to grapes, improved economic status
Sujala watershed, Karnataka	GIS planning, participatory NRM, capacity building	Increased water availability, land productivity, crop diversification

Source: Compiled from ICRISAT, World Bank and case-study documentation

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For Karnataka, the Sujala watershed projects provide a state-specific success model. The Karnataka Watershed Development "Sujala" Project, supported by the World Bank, combined scientific planning, remote sensing, GIS-based monitoring and participatory implementation in several drought-prone districts. Project notes and evaluation reports indicate higher water tables, improved land productivity, expanded irrigated area, shifts towards higher-value crops and rising incomes for smallholders. The project is also notable for institutional innovations in monitoring and evaluation and for integrating line departments, research institutions and community-based organisations.

These models provide a repertoire of best practices—such as hydrologically coherent planning, village-level institutions, equitable benefit-sharing, cropping strategies tuned to water availability and continuous technical backstopping—that can inform future programmes for dry land farming in Karnataka.

POLICY SUGGESTIONS & FUTURE STRATEGIES

In light of the evidence reviewed in this article, the future policy agenda for dry land agriculture in India, and for Karnataka in particular, needs to move decisively towards climate-resilient farming systems, digitally enabled extension mechanisms and robust value chains for dry land crops, especially millets.

SUMMARY

This article has examined the evolution of policies and programmes supporting dry land farming in India, with particular attention to watershed development initiatives and contemporary strategies relevant to rainfed agriculture. It traced the trajectory from early area-development and drought-relief schemes to integrated watershed approaches and more recent climate-resilient and market-oriented interventions. Through a review of best-practice models such as Sukhomajri, Ralegan Siddhi, Hiware Bazar, Adarsha watershed, Kadwanchi and Sujala in Karnataka, the article highlighted how context-specific combinations of soil and water conservation, community institutions, appropriate technologies and supportive policies can transform degraded dry lands into productive and resilient farming systems.

At the same time, the article underscored persistent implementation challenges, including regional imbalances in programme coverage, fund-flow constraints and weaknesses in monitoring and evaluation. These issues limit the aggregate impact of otherwise well-designed schemes and contribute to uneven development across and within states. The discussion on policy suggestions and future strategies therefore emphasised the need to deepen climate-resilient farming practices, harness digital extension tools for timely and localised information delivery, and systematically strengthen millet and dry land crop value chains through procurement, processing and market development.

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