

Water balance-based tool for drought proofing agricultural watersheds

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(a) Purpose of study or research hypothesis

Increased incidence of climate change induced water related risk of droughts is a threat to global agriculture. Drought proofing agriculture to minimize adverse impact of droughts is thus critical to ensure food and livelihood security. With water availability being the key limiting factor for crop growth, water management interventions are central to drought proofing. This study proposes the development of simple tool to plan and prioritize water management interventions for drought proofing agricultural watersheds.

(b) Key issue(s) or problem(s) addressed

Planning and prioritizing water management interventions in a watershed requires proper assessment of water availability and demand. Additionally, information is required on effectiveness of different interventions to mitigate drought as they come with varying costs and economic impacts. However, for micro and macro watersheds where watershed development projects are often planned, this information is often limited or missing. Also, most of the currently available tools and models are data intensive and involve subject matter expertise thus making them difficult to be used by field practitioners and staff. This study develops a simple and robust water balance-based drought proofing tool to analyse impact of drought and help in decision making.

(c) Methodology or approach used

The two-key functions of this *Drought Proofing Tool* are to assess: 1) the water balance of the study area, and 2) the impact of proposed water management interventions on achieving the level of drought proofing. The tool applies monthly water budget approach in balancing the water resources availability and water demand within the study area. More than 20 commonly practiced water management interventions have been integrated in the tool to simulate their impact on drought proofing. The tool has a simple interface and is modelled in excel spread sheet with minimum input data requirements for simplifications by field practitioners.

(d) Results or conclusions derived from the project

Developed tool has been applied in four contrasting agricultural watersheds in India. Results show that tool, despite requiring limited data and parameters, performs well in simulating water balance and drought impact on the crop yield of rainfed and irrigated areas. Simulating interventions scenarios highlights the limitation of focusing on only structural supply or demand side interventions which are not enough to drought proof severe droughts. Extensive capacity building of field partners in these four watersheds was undertaken. Outcomes of capacity building resulted into internalizing of tool for watershed planning by partners. This replaced the often ad-hoc and thumb rule approach of planning interventions.

(e) Implications of the project relevant to congress themes

The developed framework and tool are applicable and can be used globally to plan water management

interventions. This is relevant for multiple themes of congress, more specifically A, B and C.

Keywords : Agriculture, Drought, Drought proofing