

## **Concept Note on Climate Resilient Agricultural Water Management Systems**

Climate change is one of the major challenges facing the humanity, especially in assuring water and food security for the increasing population of the world. Industrialization and population growth are the two primary reasons for climate change resulting in major impacts on soil, water, air, biodiversity, and food systems. To achieve UN's 17 Sustainable Development Goals by 2030 and to make this world a better place for the global society to thrive and revive the damaged ecological systems, we need to be innovative in developing technologies, practices, and incentivized policies for making sure that soil, air, water, and environmental pollution challenges are mitigated at a rapid pace in response to climate change. For countries like India, the primary need of the society is to ensure food security for its rapidly growing population in response to global climate change. India is bracing extreme weather events more frequently in the last decade in the form of severe floods or drought spells. The global temperatures are likely to increase from 1.00 to 2.50 °C by 2030. Increased temperatures may bring changes in crop photosynthesis, crop respiration rates, plant diseases, and pest population. Climate change could also affect soil health, fertilizer use efficiency, nutrient mineralization, soil organic matter, soil fertility, and water availability for plants resulting in yield reductions of most crops grown in the world.

India's population has increased 3.35 times since Independence and in 2023, it surpassed China to become the most populated country in the world with its population now at 1.4 billion —about 18% of the world's population. At the same time, India has only 4.2% of global freshwater resources and about 2.4% of the global land with an average landholding of about one hectare per farmer making the job even more difficult to ensure food security for its population. Agriculture is also the primary source of livelihood for about 60% of India's population. India's food production is estimated at 330.5 million tonnes (MT) for 2022-23. To meet India's food security needs, food production must double by 2050 to match country's population and income growth. The small and marginal farmers, therefore, have a major role in assuring India's food security.

Water is the most critical input for enhancing agricultural productivity and thereby, intrinsically linked to food, nutritional, environmental as well as livelihood security of the country. An important challenge facing the irrigation sector in India is the growing gap between Irrigation Potential Created and Irrigation Potential Utilized, and uneven distribution of water over the length of the canal system. The overall irrigation efficiency of the major and medium irrigation projects is estimated to be around 35-40%. Groundwater is the main source for drinking water and irrigation in India, and its overall development is about 60.08 %. The over-exploitation of groundwater resources in North-western states coexist with its under-utilization in the water abundant Eastern region. The

efficiency of surface irrigation system can be improved from about 35-40% to around 50-60% and that of groundwater from about 65-70% to 72-75%. Improving water use efficiency to enhance agricultural water productivity is critical to address water scarcity, including the need to have minimum flows in rivers and lakes to sustain ecosystems and to meet the growing demands from other sectors. Some of the technologies based on a precision use of water to meet crop water needs; careful groundwater withdrawal rates for irrigation and landscape changes to increase groundwater recharge; adoption of best soil and water conservation methods; precision-irrigation and other water saving technologies (more crop per drop), fertilization with micro-irrigation systems, developing less water requiring crop varieties; and adopting zero or conservation tillage will certainly help small farmers to achieve economical crop yields, even in deficit rainfall and warmer years.

Therefore, the Indian Society of Agricultural Engineers (ISAE) has decided to publish a special issue of the journal on “Climate Resilient Agricultural Water Management Systems” to bring the current status of knowledge on this theme for its readers on diverse topics of research including irrigation, drainage, solar powered groundwater pumping for irrigation, precise fertigation, landscape management systems, and policies for rapid adoption of water saving irrigation practices to mitigate climate change. By sharing this concept note with our international community of researchers and policy makers, we encourage you to submit original research articles related to this theme for possible publication in this special issue. All papers will be peer reviewed before accepted for publication in this special issue of ISAE.

**Submission deadline: January 31, 2024**

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