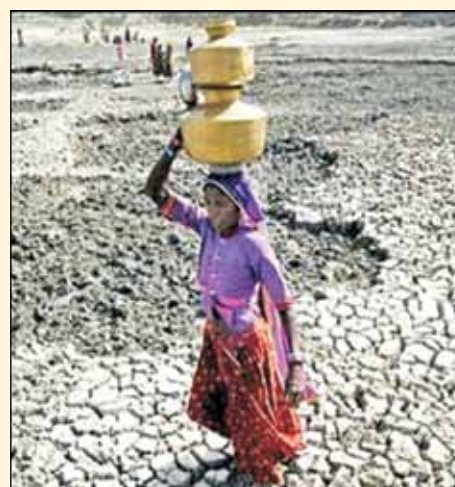


## DROUGHT MITIGATION MEASURES IN CONTEXT OF CLIMATE CHANGE FOR SECURING AGRICULTURAL LIVELIHOODS IN UTTAR PRADESH (INDIA)

### Background

Prolonged and recurrent drought, being experienced in India and various parts of South Asia, is the manifestation of climate change, partly caused by human interventions. Drought has been one of the primary reasons for widespread poverty and environmental degradation including deteriorating water quality and water security. The world has been more drought-prone during the past 25 years and the vulnerability of tropical countries to drought is likely to increase (Inter-governmental Panel on Climate Change, 2007). The South Asian region has been among the perennially drought-prone regions of the world. India, Pakistan, Sri Lanka, Bangladesh and Nepal have experienced droughts at least once in three years in the past five decades. The effect of climate change has been observed the world over in the past several decades in the form of flash floods, hurricanes, droughts, changing precipitation patterns, heat waves and other natural disasters.

Indo-Gangetic plains, in which the State of Uttar Pradesh is located, have very fertile crop lands with immense potential. Although more than 80% of the crop lands are irrigated in the region, irrigation is not assured throughout the year. Dependence on rainfall for cultivation makes crop production vulnerable to frequent moisture deficits. Geographically, Uttar Pradesh is divided into 71 districts and 9 agro-climatic regions. During 2008-09, failure of monsoon threatened the projected growth rate of 6.1% of the Indian economy, as 278 (44 %) out of 820 districts of India were affected by drought. Of these, 58 districts were in Uttar Pradesh, the largest food grain producing State. Bundelkhand and Vindhya-chal are chronically drought affected areas while the central plains and eastern plains are prone to floods alternated by drought. Paradoxically, when there was drought in several parts of Uttar Pradesh in 2008-09, in Bundelkhand there was excess rainfall, causing excessive runoff and soil erosion from the barren hills into the swelled up seasonal streams and rivers.



Bundelkhand hit by drought (2009) - Women in search of Water

### Objective

The objective of the study was to develop a consensus document on drought mitigation strategies for securing agricultural livelihoods for the State of Uttar Pradesh, in the context of climate change.

### Activities undertaken

Keeping in view the GWP Strategic Goal – II: Addressing critical development challenges, Output-1: Coping with climate variability and climate change through partnership, India Water Partnership (GWP-India) under its Strategy 2009-13, and GWP-SAS work plan 2010, focused on the status of drought in Uttar Pradesh to find out the best remedial measures to cope-up and mitigate the impacts of drought. For the purpose, GWP-India, with the support of Institute for Development Initiatives (IDI), New Delhi, took up a research study on the 2009 drought. After the desk research, experts from the field of Water, Agriculture, Livestock, Forestry, Community Development/Infrastructure/Insurance/Social Science were identified for development of concept papers. Based on the above exercise, a State level workshop was organized by IDI on 7th December, 2010 at National Research Centre (NRC) for Agro-forestry, Jhansi, Uttar Pradesh with the participation of scientists, professionals, NGOs and Government officials. Dr. J. C. Dagar, ADG (Agronomy and Agro-forestry) from Indian Council of Agricultural Research, Govt. of India was the guest of

honour. The keynote address was delivered by Dr. S. K. Dhyani, Director NRC, Jhansi. Papers were presented on the topics of agriculture, livestock, forestry, water and social issues by experts. The papers were discussed and a set of recommendations were emerged that could form the basis for a drought mitigation strategy, which can be suitably adopted by the Government of Uttar Pradesh for appropriate drought preparedness and mitigation strategy. The salient points of the study are:

**Physical and Social Impacts of Drought** (a) Drudgery of women (in collecting water, fodder and firewood); (b) School dropout and increase in child labour; (c) Change in marriage age of girls; (d) Neglect of the aged; (e) Reduced social visits and intra-family tensions; (f) Increase in contract (bonded) labour; (g) Conflicts over drinking water collection; (h) Feeling of helplessness and depression leading to low morale; (i) Reduction in food consumption expenditure and nutritional status; and (j) Distress migration.

**Economic Impacts** (a) Crop failure, loss of livelihoods in agriculture, declining income levels; (b) Food insecurity emerged as a serious problem due to decline in production of food grains; (c) Fodder shortage resulted in cattle death in large numbers and distress disposal to get cash; (d) People became excessively dependent on drought relief. This led to increased vulnerability; (e) Vulnerability also increased due to indebtedness, sale of assets and jewelry; (f) People even sold agricultural land to purchase auto-rickshaws, with the hope of better earning than by practicing agriculture; and (g) People started selling soil to brick kilns, increasing vulnerability.

**Environmental Impacts** (a) Decline in water recharge; (b) Declining water levels due to over-extraction; (c) Water quality deterioration-increase in fluoride and salinity; (d) Loss of agro-biodiversity; (e) Destruction of wild species and biodiversity due to overgrazing and degeneration of forests; and (f) Degradation of common pool resources such as *gauchars* (grazing lands) and forests.

**Adaptation Strategies;** (a) Many of the coping strategies to drought practiced by people are not sustainable; (b) People who succeed in finding alternative occupations are less affected; (c) Wells near check dams helped sustain some crops; (d) Institutional support is helpful to sustain livelihoods (dairy co-operatives, panchayat, NGO); (e) Households with diversified livelihoods are less affected by drought; (f) Information networks have been helpful to people to find labour elsewhere; (g) Drought relief and drought proofing works helped the asset-less people to survive; (h) Demand side management of water helps sustain livelihoods; (i) Improved agricultural practices and drought resistant variety have potential for food and livelihood security; (j) Livelihood finance strategies are needed.

The interventions required to manage the impacts of drought are as follows:

- Provision of need based science and technology applications with a focus on fusion of local knowledge and organized knowledge for development of agriculture system and the livestock sector;
- Provision of renewable energy (RE) services for household improvement and/or enterprise development;
- Watershed based planning for managing drought, water and livelihoods;
- Strengthening different kinds of institutions (SHG, Farmers Club etc);
- As an important adaptation measure, there is a need to empower farmers with knowledge of water management techniques, drought resistant crops and varieties, conservation of ground water; and,
- There is a need to customize the training packages keeping in view the above requirements, as drought will be a recurring feature due to the effect of climate change and global warming.

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