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CLIMATE CHANGE AND AGRICULTURAL CRISIS IN MAHARASHTRA

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Vulnerability to climate change and adaptation strategies

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Climate change is a human induced stress (at least in part) that is generally not yet taken into account. An annual mean global warming of 0.4 to 0.8 ^{0}C has been reported since the late 19th century. In India, the analysis of seasonal and annual air temperature, using the data for 1881 to 1997 has shown a warming trend of 0.57^{0}C per hundred years. Substantial increases in greenhouse gases are likely in the future as a consequence of which global mean surface temperature is expected to increase by between 1.4^{0}C and 3^{0}C for low emission scenarios and between 2.5^{0}C and 5.8^{0}C for high-emission scenarios by 2100with respect to 1990. Global mean sea level is likely to rise by 0.14 to 0.80m from 990 to 2100.

Under changed climatic scenarios, a number of chain events like melting of glaciers, sea level rise, submergence of islands/coastal areas and deviant rainfall patterns, are likely to occur. Likely impacts would include a greater annual variability the monsoon's precipitation levels, leading to more intense floods and droughts. Thus, climate change in future is expected to have implications on river flows in South Asia including India. Global climate change is likely to result in severe droughts and floods in India, with major impacts o human health and food supplies. Developing countries of temperature and tropical Asia already are highly vulnerable to the extreme climate events such as floods, droughts and cyclones. Climate change and variability would exacerbate these vulnerabilities. Annual and seasonal change in climate would alter the frequency and severity of major droughts. Changing temperature and evaporation rates would alter soil moisture conditions and the amount of runoff from the catchments into reservoirs. There are some evidence of increases in the intensity or frequency of some of these extreme events o regional scales throughout the 20th century. The abnormalities generated due to climate change are likely to trigger shifts in the existing biodiversity patterns and demands for totally new set of land use. The growing frequency and magnitude of extreme environmental events worldwide has intensified research interest in natural disasters as well as regional vulnerability and response capabilities.

Water resources assessment and planning assumes that the past records of variability are reflections of what will happen in the future. Climate change is likely to result in hydrologic conditions and extremes of a nature that will be different from those for which the existing projects were designed. The approaches for effectively dealing with climate change will have to be different from those that have been employed to manage variability in the past. It is also likely that the variability due to climate change may be beyond the range for which current projects have been designed and are being operated. A review of current coping strategies of populations already affected by climate variability is needed. The likely impacts of increased climate variability and climate change on the water resources are required considering major factors, viz. social, economic, institutional, etc. to reduce vulnerability and enhance adaptation to climate-related developments and events. Some part of the country facing the frequent drought are adopting the dry land farming practices to grow the crops which require less amount of water. However, there is a need to take up such studies for assessment of available water resource for different agro-climate regions of India and various adaption practices under the changing climatic scenarios.

Some recommendations to cope with the problems in a systematic and planned manner are:

i) A nation-wide climate monitoring programme should be developed.
ii) While formulating new projects that influence climate, it should be ensured that no action is taken which causes irreversible harmful impact on the climate.
iii) Improved methods for accounting of climate –related uncertainty should be developed and made part of decision making process
iv) Existing systems should be examined to determine how they will perform under the climate situations that are likely to arise.
v) Water availability and demands in all regions, particularly in water-scarce regions should be reassessed in the new climate scenario.
vi) A re-examination of the water allocation policies and operating rules should extremes that are likely to arise.
vii) There should be proper coordination among concerned organizations so as to freely share the data, technology and experience for capacity building.

Conclusion

Climate change is posing a challenge before the water resources engineers. Hydrological studies are required to be taken up for assessment of water resources under changing climatic scenarios. For predicting the future climatological variables on micro, micro and meso and macro watershed scales, a comprehensive general circulation model is required to be developed for India, giving due consideration to the global scenarios. With the rapid industrialization and increasing use of fertilizers and pesticides' the quality of surface and groundwater resources is deteriorating. The movement of pollutants in the rivers, lakes and groundwater aquifers needs to be regulated. In this regard, regular water quality monitoring programme

has to be identified for identifying the areas likely to be affected because of the water quality problems. For maintaining the quality of freshwater, water quality management strategies are required to be evolved and implemented.

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