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Climate change impact on design and costing of soil and water conservation structures in watersheds

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A study was carried out to determine the effect of climate change on design rainfall and its effect on design and costing of soil and water conservation structures

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in watersheds. For this study, the micro watershed located at Central Soil and Water Conservation Research and Training Institute, Research Centre, Research farm, Vasad was selected and rainfall data from 1957 to 2012 was used. The analysis showed that as a result of climate change, there is significant increase in number of extremely heavy rainfall days as well as rainfall amount. The design rainfall of various soil and water conservation structures has increased by 11%, 30% and 38% for design of staggered contour trenches, contour bunds and check dams respectively. The cost of construction of staggered contour trenches, contour bunds and check dams in watersheds has increased by 26%, 28% and 12% respectively. This study reveals that, there is a need to account for design and costing of soil and water conservation structures in the light of the climate change and a relook into the watershed programmes of the central Gujarat region of India.

Keywords: Climate change, design and costing, soil and water conservation structures, watersheds.

THE rainfall received in an area is an important factor in determining the amount of water available to meet various demands, such as agricultural, industrial, domestic supply and hydroelectric power generation. The global climatic data analysis clearly confirms a change in the climate¹. In India, too, the effect of climate change on rainfall, rainy days and water resources has been studied, which bears testimony to changes in these parameters over a long-term basis^{2–5}. Global climate changes may also influence long-term rainfall patterns impacting the availability of water, along with the increasing occurrences of droughts and floods. Studies^{2,6–10} show that, in general, the frequency of more intense rainfall events in many parts of Asia has increased, whereas the number of rainy days and total annual precipitation have decreased. Due to climate change impact, the irrigated maize, wheat and mustard in the northeastern (NE) and coastal regions, and rice, sorghum and maize in the Western Ghats (WG), may lose¹¹. Impacts of climate change and climate variability on the water resources affect the stream hydrology. Stream flows may rise drastically in the monsoon season, but will decrease in the non-monsoon season due to the projected future climate change^{12,13}.

The watershed management programme (WMP) is aimed at managing the precipitation (rainfall) in such a manner that it reduces runoff controls flood and helps in water harvesting (surface or subsurface) so as to be used during lean period for successfully raising the crops, and for other uses such as aquaculture or livestock, or both. It also maintains soil fertility, and does not accelerate soil loss. The watershed management programme provides livelihood support to the farmers as well. The watershed-based rural development management programmes are