

Evaluation of cement plugs in Konkan region of Maharashtra state

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■ **Abstract :** The study on 'evaluation of cement plugs in selected watersheds of Dapoli Tahsil' was undertaken in the year 2005-2006. The selected water harvesting structures were tested for hydrological, hydraulic and structural design before so as to ensure proper design of structures. Two cement plugs were situated at watershed Pisai-2 (CP_1) and Ganpatipule (CP_2), respectively in Dapoli Tahsil of Ratnagiri district were selected for the study. For design of cement plugs by using rational formula peak discharge was calculated. The height of cement nala plugs, spillway position and relative dimensions were calculated by considering hydrological and hydraulic design procedures. Existing cement plugs constructed by the Department of Agriculture, Maharashtra State was evaluated. The peak rate of runoff computed by using the rational formula for the design of cement plugs CP_1 and CP_2 was 11.38 m³/s and 9.10 m³/s, respectively. The total cost of construction as per the standard design procedure for CP_1 and CP_2 was Rs. 1,84,249/- and Rs. 98,452/-, respectively.

■ **Key words :** Cement plug, Cross sectional area, Stability analysis

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Soil and water are the two most important natural resources required for the survival of living things on the earth. The environment and economy is driven by these two vital resources. Therefore, for the sustainable development of environment, economy and to provide life enhancing systems for human being and animals it is inevitable to inculcate efficient management practices of land, water and vegetation.

Konkan region constitutes 10 per cent of the geographical area of Maharashtra state and receives 46 per cent of the rainfall of Maharashtra. Farmers of Konkan region are lacking in irrigation facilities and forced to take only one rainfed crop in the year. This has put the rural people in vicious cycle of 'poverty-low purchasing power-low investment-less productivity-poverty'. To overcome the problem, development of land and water resources through scientific and integrated approach on watershed basis is necessary (Mahale *et al.*, 2004). Hence, harvesting and harnessing the runoff water is very important.

Traditionally, water harvesting refers to the act of runoff water storage in ponds for off-season use. Water harvesting can be achieved by construction of structures like farm ponds, small check dams, nala bunds, gully plugging, percolation tanks etc. These structures are integral part of the soil and water conservation activity and are important components of

the watershed development and management programme.

It is essential to make survey and study the geomorphology of watershed for planning, designing and executing the works of soil and water conservation structures. Most of the time, the morphological characteristics of watershed are not taken into consideration, while designing water harvesting structures. The water harvesting structures need to be tested for hydrologic, hydraulic and structural design before their execution so as to ensure their safety as well as their functional efficiency.

The Department of Agriculture, Maharashtra state had constructed number of cement plugs in order to harvest surface runoff under watershed development programme. The Department Agriculture has their own standards and norms for the design to suit the field conditions and administrative procedures. However, such simplifications in the design may lead to improper design, which may result in more construction cost and improper functioning.

■ METHODOLOGY

Dapoli Taluka is confined in between Sahyadri hills at the East and Arabian Sea at the West have a geographical area of 86,400 ha, out of this 52,500 ha is cultivable area, 30,200 ha is cultivated area, 1300 ha is culturable waste, and