

## Evaluation of earthen nala bunds for the Konkan region of Maharashtra state

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■ **Abstract** : The present study was undertaken in the year 2005-2006 in selected watersheds of Dapoli Tahsil in Ratnagiri District of Maharashtra State. Two earthen nala bunds ENB1 and ENB2 selected for the study were situated at the outlets of watershed Pisai and Shirkhal, respectively. The selected nala bunds were tested for hydrological, hydraulic and structural design before execution so as to ensure proper design of structures. The dimensions of emergency flood spillway were selected in such a way that the discharge passing through flood spillway was greater than peak runoff rate. The total earthwork for the earthen nala bunds was computed to find the total cost of their construction. The earthen nala bund structures designed by considering hydrological data were compared with the earthen nala bund designed by the Department of Agriculture of the State Government. The cross-sectional area of earthen nala bund designed by considering the storage volume was less as compared to those designed by Department of Agriculture. Major differences were in height, top width, base width and side slope of the structures. The cost of construction of all the earthen nala bunds claimed by Department of Agriculture was overestimated. All the selected and designed dimensions of earthen nala bunds were found to be safe from stability analysis. Runoff volumes estimated for ENB1 and ENB2 were 84448.8 m<sup>3</sup> and 84981.6 m<sup>3</sup>, respectively. The peak rate of runoff computed by using the rational formula for the design of spillway were 1.72 m<sup>3</sup>/s and 1.71 m<sup>3</sup>/s. The total cost of construction of earthen nala bunds ENB1 and ENB2 as per the standard procedure was Rs. 156945/- and Rs. 223998/-, respectively. The study revealed that the design procedure used by the Department of Agriculture needs to be modified by considering the hydrological, hydraulic and structural design of the earthen nala bunds.

■ **Key words** : Earthen nala bund, 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 potential 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, earthen nala bunds, 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