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Morphometric Analysis of Mithmumbri- Malvan Area, Sindhudurg District, West Coast of Maharashtra, India

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Abstract

Morphometric analysis has been carried out from the Mithmumbari to Malvan area, Western part of Maharashtra in Sindhudurg district, India. The morphometric analysis is carried out in fourteen drainage basins, *viz.*, Achra, Pyali, Golvan, Mithmumbari, Katvan, Kamtakhudi, Gavaliwadi, Kunkeshwar, Kandalgaon, Munge, Malvan, Masura, Belachiwadi and Tambalwadi. The morphology of these basins is governed by a number of drivers including tectonic processes mainly the Vijaydurg fault, Mithbav fault, Malvan fault and lineaments, climate and lithology that influence the river system over a range of timescales. The majority of the basins are highly dissected and structurally controlled. The drainage density is low, with moderate to steep slopes within the elongated basin. The Achra, Pyali, Golvan, Gavaliwadi, Kandalgaon, Munge and Malvan basins are structurally controlled. The lower values of length of overland flow in study area reveal that stream erosion is more dominant than sheet erosion. Achra, Pyali, Mithmumbri, Golvan and Malvan basins are higher stream power, which represents higher erosion of the basin indicates high river basin management measures. Achra, Pyali, Golvan, Katvan, Kamthakhudi, Gavaliwadi, Kunkeshwar, Munge, Masura, Belachiwadi and Tambalwadi basins are rapid uplift stage of the basin. The Achra, Pyali, Golvan and Kamthakhudi basins can be inferred as SSW tilting in response to tectonic tilt. The hypsometric analysis shows eight basins (Achra, Pyali, Mithmumbari, Kamtakhudi, Kunkeshwar, Gavaliwadi, Belachiwadi and Tambalwadi) under the mature stage, five basins (Katvan, Munge, Kandalgaon, Malvan and Masura)in the youth stage and one basin (Golvan) under the old stage. The mature stage drainage basins show significant incision and entrenchment as a result of the Late Quaternary upliftment of the study area. The stages of drainage basins development in the western part of Maharashtra thus identify tectonically active and quiescent phases.

Keywords: Morphometric and Hypsometric Analysis, Structural Control Basin, RS-GIS, Sindhudurg District, West Coast of Maharashtra

Introduction

Morphometric and hypsometric analysis are important aspects of planning and sustainable development of management programs of the river basin. The planning and implementation of various development activities such as soil and water conservation and erosion control measures are quite necessary (Bagyaraj and Gurugnanam, 2011). The morphotectonic indices such as asymmetry factor, transverse topographic symmetry factor, stream length gradient index, mountain front sinuosity index and ratio of valley floor width to valley height as a reconnaissance tool in order to determine the relationship between tectonics and the drainage morphology of Rietspruit Sub-basin, South Africa (Rimuka Dzwairo *et al.,* 2024). The geomorphic indices of active tectonics on both sides of the Western Ghat rivers of Maharashtra havebeen uplifted and tectonic deformation from Tertiary to recent times (Kale and Shejwalkar, 2008).The coastal region of Maharashtra was tectonically active during Miocene-Pliocene epoch (Tandale, 1993).

The evolution of the Western coast of India is the rifting events beginning with Late Jurassic-early Cretaceous breakup of Gondwana land and subsequent Late Cretaceous separation of Madagascar (88 Ma) (Storey *et al.,* 1995). The present Indian margin formation was the result of a ridge jump which detached India from the Seychelles at the time of the Deccan volcanism (Norton and Sclater, 1979; Chandrasekharam, 1985). The Western Ghats form the main drainage divide of Peninsular India. The easterly flowing rivers mainly Godavari, Krishna and Bhima originates at the Ghats and debouches to Bay of Bengal, while Konkan rivers mainly Vaitarna, Kundalika, Savitri, Vashishti, Shastri, Vaghotan, Kharda, Achra, Gad and Karli meet the Arabian sea. The asymmetry of continental scale drainage pattern is not unique to Western Ghats, India, comparable examples in southern Brazil (Parana) and southeast Africa (Karoo) (Cox, 1989), contend that the initiation of such drainage pattern was a result of the dynamic plume uplift before continental rifting (Widdowson, 1997). The Panvel Flexure is a regional monocline dipping towards

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