

## **Controlling Gully Erosion: An Analysis of Land Reclamation Processes and Challenges in Chambal Badlands, India**

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Gully erosion is among the significant environmental problems in the Central Indian states. The Chambal badlands, spread over an area of around 4000 sq. kms is among the worst affected regions in terms of land degradation. The enormity of the Chambal ravines, which achieve depths of more than 60 metres, points to the significance of the geological explanation, suggesting that neotectonics may have paved the way for ravine erosion, but it is most definitely exacerbated by anthropogenic activities. Although, there is field evidence that ephemeral gully erosion is responsible for significant soil losses, little is known about the contributing factors. The region also faces significant developmental challenges and the inaccessibility and low productivity of the area contributes to its continued underdevelopment.

This study uses a combination of geo-spatial techniques and physical and socio-economic field survey to evaluate the responses to gully erosion and its implications. This paper attempts to study (a) extent and severity of gully erosion process in the Chambal badlands; (b) an evaluation of reclamation measures undertaken by various agencies, including the affected people; (c) to examine the sustainability implications of land reclamation measures. The extent, pattern and inter-temporal changes of gully erosion have been examined through various mapping techniques and field survey. The land reclamation have been mapped using satellite images and ground truth verification. The various kinds of land reclamation measures that have been undertaken on the ground and their sustainability implications have been investigated through survey of affected households in selected villages. The results show that in response to the severe loss of agricultural land because of gully head encroachment in the agricultural field and decline in land productivity, farmers have undertaken various land reclamation measures, including mechanised land levelling. The land levelling techniques involves selective levelling and sequential terracing within a time span of 3 to 5 years. Other land reclamation measures are gully bunding, construction of check-dams, flow-diversion and plantations. These methods are found to be expensive and labour intensive, with uncertain results for long-term sustainability.

**Key words:** Gully Erosion, Geo-spatial Techniques, Land Reclamation, Sustainability, Chambal