Available online at www.sciencedirect.com
SCIENCE DIRECT®
Geomorphology 54 (2003) 279–292
GEOMORPHOLOGY
www.elsevier.com/locate/geomorph

Late Pleistocene–Holocene hydrologic changes in the interfluve areas of the central Ganga Plain, India

Pradeep Srivastava[a,1], Indra Bir Singh[b], Shikha Sharma[b], Uma Kant Shukla[c], Ashok Kumar Singhvi[a,*]

[a] *Planetary and Geoscience Division, Physical Research Laboratory, Navrangpura, Ahmedabad-380 009, India*
[b] *Department of Geology, Lucknow University, Lucknow-226007, India*
[c] *Department of Geology, Kumaun University, Nainital-263 002, India*

Received 11 October 2000; received in revised form 4 November 2002; accepted 5 December 2002

Abstract

Abandoned channel belts, ponds and point bar deposits of palaeochannels in the interfluve regions of the central Ganga Plain suggest changes in the morphohydrologic conditions during the Latest Pleistocene–Holocene. Stratigraphy of these ponds comprises channel sand at the base overlain by shell-bearing clayey silt. The contact of the two facies marks the phase when channels converted into standing water bodies. Point bar deposits of some palaeochannels are overlain by oxidised aeolian sand, indicating that the channel abandonment possibly occurred due to the desiccation and aridity in the region.

Optically stimulated luminescence (OSL) chronometry of the pond sediments suggests that the deposition of the basal channel sand started before 13 ka and continued up to ~ 8 ka. The ponds formed around 8–6 ka when the channel activity ceased. Evidence from the point bar deposits also indicates that the fluvial activity in the region ended sometime during 7–5 ka. This was followed by aeolian aggradation. The present study thus suggests that the hydrologic conditions in the Gangetic plains, i.e. initiation of channels and their abandonment, formation of microgeomorphologic features such as ponds and their eventual siltation, were controlled largely by climatic changes (i.e. monsoon changes) supported by tectonic activity. For the past 2 ka, increasing human and related agricultural activity has substantially accentuated the natural siltation rate of ponds.

Keywords: Ganga Plain; Interfluve; Ponds; Alluvial ridges; Luminescence dating; Holocene climate change

1. Introduction

Abandoned channel belts, ponds and palaeo point bar deposits have been useful in palaeohydrologic reconstructions. Palaeo river changes in response to climate changes have been investigated in detail in South East Asia, Australia, Africa and South America (Bishop and Godley, 1984; Rotnicki, 1991; Thomas, 2000). However, in the Indian context, such studies have been minimal.

The Ganga Plain in northern India is a major component of the Himalayan foreland basin and is one of the largest, fluvially controlled depositional systems of the world. This region has three distinc-

* Corresponding author. Tel.: +91-79-6302129x4366; fax: +91-79-6301502.
E-mail address: singhvi@prl.ernet.in (A.K. Singhvi).
[1] Present address: Department of Geography, University of Georgia, Athens, GA 30602, USA.

0169-555X/03/$ - see front matter © 2003 Elsevier Science B.V. All rights reserved.
doi:10.1016/S0169-555X(02)00361-6