INTRODUCTION

Location and Extent of the Area

The North Koel Basin forms the north-western part of Chotanagpur plateau in the province of Bihar fig.1.1. The North Koel river rises from Pakarkonatolli situated south of Bagru hills. The Basin envisages mainly Palamau district and parts of Ranchi and Hazaribagh districts. The basin lies between 23°5' - 24°31'N of latitude and 83°-16' - 85°E of longitude. The North Koel follows a northerly direction in the upper part and turns westward in the middle part and again bends NE to join the Son river near Sonegarh. This area enjoys monsoon type of climate where rainfall decreases from 125 cms in the south to 100 cm in the north.

This area is covered by Survey of India topographical sheets of 63 P/7,8,11, 12,14,15,16; 64 M/13, 15; 72 D/3, 4, 8, 12, 16; 73 A/1-3, 5-11 and 13. Aerial photographs on 1 : 25,000 and 1 : 50,000 scale have been consulted. LANDSAT imagery of the area reveals the lineaments.

The North Koel valley is 252 km long. The basin embraces an area of 10984 Km². The region is formed of granite and gneisses mainly and sediments in small patches. The area records a complicated geological history with various geomorphological problems. The important tributaries of the North Koel draining from the east are Bandi Koel, Chaupat, Auranga and Banki and from the west are Dhardhari, Burha, Saphi, Danro, Tahle and Banki Nadi. The eastern tributaries particularly Auranga and Amanat have etched out a considerable size of basin in the Chotanagpur plateau.

Previous work

The geology of this part of Chotanagpur plateau was outlined by various geologists. Ball (1880) carried out extensive field work in the Gondwana basin. Dunn (1929) outlined the geology of this area. The geology of the area is discussed by geologists in the Memoirs and Records of Geological Survey of India. Dr. S.P. Chatterjee (1940) contributed a paper on the gneissic topography of Ranchi plateau. Bagchi and Sengupta (1958) have put forward their views about the evolution of a part of western Ranchi plateau. R.P.Singh (1969) discussed the
LOCATION OF NORTH KOEL BASIN

FIG 11
geomorphological evolution of Chota Nagpur Highlands. The characteristics of North Koel Basin are discussed in short in this publication. S.N. Sharma (1968), M. Pathak (1968) discussed the drainage of Chechari basin. There are studies of Ranchi plateau which constitutes a part of North Koel basin. The evolution of drainage and the characteristic features of landforms of North Koel basin have not been studied by geomorphologists previously.

Reasons behind the selection of the problem

Geomorphology is the science of the landforms. The North Koel basin is a river basin representing one of the oldest surface of the earth composed of Archean rocks which show imprints of various climatic epochs accompanied by several cycles of erosion. The study of this basin clearly reveals the granite gneissic and sandstone landforms. This area affords an opportunity to study the evolution of the drainage and various landforms in a polycyclic region.

The North Koel basin affords an example of the field for the study of various geomorphological problems viz. evolution of drainage in one of the oldest Archean block of the earth and the influence of rocks on the micro relief of the area and the evolution of landforms. This region depicts the features of Archean and Gondwana landscape. The evolution of landforms in metamorphics, igneous and sedimentary rocks are studied in this region.

Importance of such study

The geomorphological studies were primarily empirical in nature in the past. This study - unravels a new method of study of basin morphology by quantitative techniques. Quantitative geomorphology of drainage basin was pioneered by Horton (1940) and exemplified by A.N. Strahler.

This is one of the pioneer work following quantitative techniques in the field of basin morphology of Chotanagpur plateau. The unique thing about the analysis is that the problems have been analysed by quantitative methods and solved by empirical and field observations. The study gives a detailed account of morphology of the North Koel basin.

Methodology

The method of analysis of landforms of the Basin is divided into three parts (1) Quantitative analysis, (2) Field study, (3) Geomorphological characteristics of the area and preparation of the map.
(1) **Quantitative Analysis** : The quantitative analysis of drainage basin is based on Survey of India topo-sheets on a scale of 1" to a mile which shows contours at 50 feet interval because the new maps on a scale of 2 cm to one kilometer are not available for the whole basin. This is assisted by the aerial photographs of the area. The important points were noted. The composition of branching system of channels has been considered. The North Koel drainage basin is divided into channel segments on hierarchy basis. Linear properties of the stream channels have been computed. Quantitative analysis consists of linear properties of channel system, the areal properties and relief properties of the drainage basin. The regression analysis on the log graph paper reveals satisfactory results of various properties of the drainage system which helps to solve the problem of evolution of the basin. The hypsometric curves and inflection points reveal important facts.

(2) **Field Study** : The quantitative analysis revealed various problems pertaining to the study of evolution of drainage and landforms. The places of field study were noted and visited accordingly by the author. The field study helped to elucidate the problems.

(3) **Morphology of the basin** : The morphology of the basin is discussed in details based on the above mentioned method. A detailed morphological map is prepared on the basis of field study and aerial photo study. Thus the study of landforms has been completed by quantitative and empirical analysis.

The laterite capped Pats with imposing scarps, the dissected upland, and the alluvial valley of the North Koel are the important features of the landscape. The map clearly depicts the geomorphological features of the Basin.