

## River Geomorphology of The Cagayan River カガヤン川の河川形態

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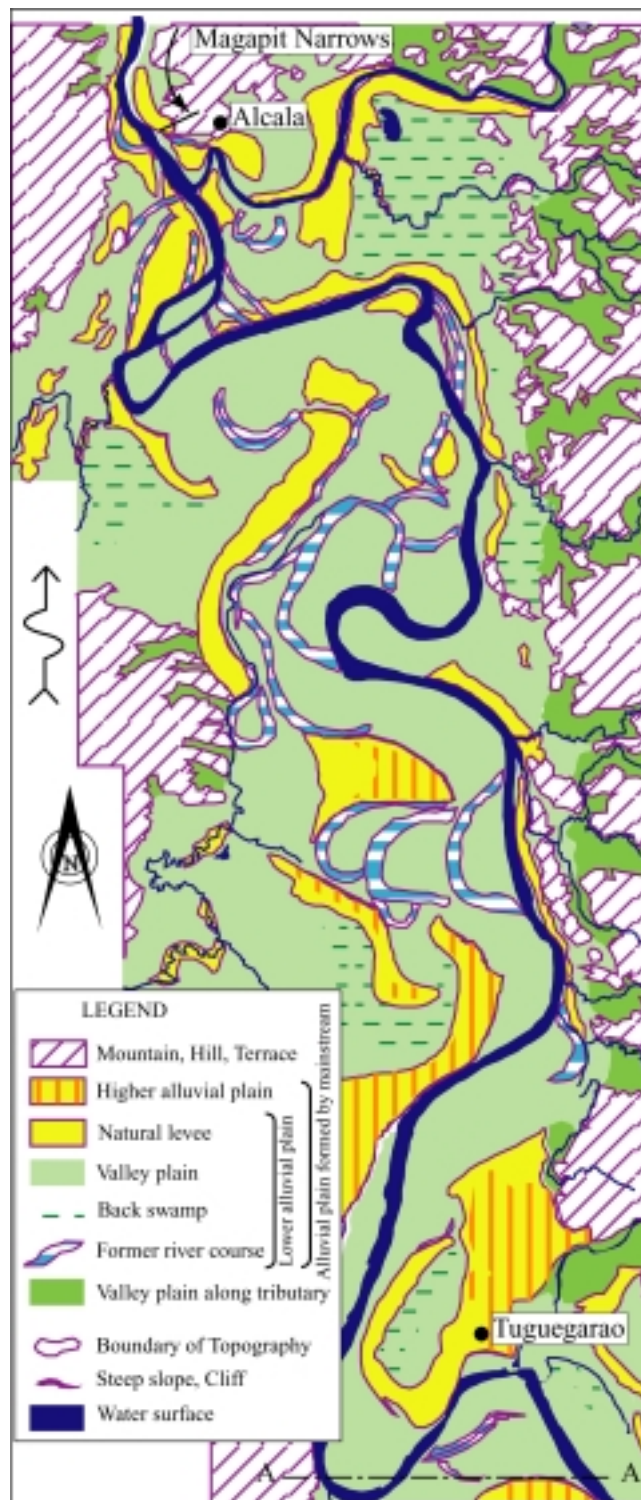
The Cagayan River basin, of which the basin area and river length are 27,281km<sup>2</sup> and 520km, respectively, is located in the northeastern part of the Luzon Island in the Republic of the Philippines. It bounded on east, west and south by the Sierra Madre, Cordillera Central and Caraballo-Maparang mountain ranges, respectively. The basin faces the Babuyan Channel on the north.

### General

A river geomorphologic study was made based on the satellite image, aerial photographs, topographic maps, and site reconnaissance. A river has the individual characteristics based on its unique natural and social condition. Also the Cagayan River has peculiar characteristics resulting in prehistoric background throughout repeated upheaval and lowering ground movement.

The main Cagayan flows down generally in a northerly direction. Notable geomorphologic features of the Cagayan River are the existence of bottlenecks (constricted sections) in the narrows named as Magapit Narrows stretching for 30 km long and river meander forming in the upstream reaches especially from Alcala to around Tuguegarao (meandering river). According to the study results, the following can be pointed out.

Compound actions of repeated upheaval and lowering ground movements in the prehistoric time formed a Cagayan Valley with bottlenecks of Magapit Narrows, in the zone between tectonic lines of north-south and east-west directions. Afterwards, alluvial plain in the Cagayan River was gradually developed in combination with the repeated both the actions of sedimentation by rivers and fluctuation of seawater level resulting in climatic changes.



キーワード：river geomorphology, river geomorphological map

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The present alluvial plain extending over the upstream at Alcala was thus formed largely by backwater phenomena due to the bottlenecks in the Magapit Narrows. Similarly, river meandering naturally and violently proceeded in the alluvial plain because of gentle slope gradient. Such historical process of the Cagayan River formed the present river channel.

### Characteristic of alluvial plain formed by the Cagayan River

Geomorphologic survey map of the Cagayan River showing classification of flood prone area is presented in Figures.

The alluvial plain formed by the Cagayan River is classified into two categories of a higher and a lower. The higher alluvial plain of large-scale natural levee and/or small-scale natural levee were historically and repeatedly formed by siltation of sediment discharges transported by overflowing from low water channel of the Cagayan River.

The ground elevations of the higher alluvial plain are sufficiently higher than flood water levels overflowed from the main Cagayan river channel. Lands on the higher alluvial plain have been developed as village areas, and paddy fields of the irrigated and rain-fed.

In the lower alluvial plain, there exist a lot of small natural levees, back swamps, former river courses, etc. Inundation as a result of floodwater overflowing from the Cagayan River is confined within the valley plain of the alluvial plain. Subsequently, as lowering of the water level in the Cagayan River subsides, the overflowed water naturally flows back into the channel of the Cagayan River without spilling out into the other river basins (storage type).

Former river courses exist cover a wide area and the river changing has been active in the reach from Alcala to Tuguegarao (meandering river), while natural levees have developed along the river channel and river channel flows in a braided formation in the upstream of Tuguegarao (braided river).

### Conclusion

The river morphological survey map prepared in this study indicates the process of formation of alluvial plain, the condition of flood inundation and the location of potential breaking of dike, etc. Therefore it is very useful for not only flood control plan, which is in harmony with characteristic of the river basin, but also construction of flood control facilities.

