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Linking river basins – geomorphological considerations

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Introduction

Any proposal to link several major river basins in the country needs to appreciate the basic laws of nature pertaining to the development of rivers and their basins. For, rivers do not originate anywhere and everywhere without rhyme or reason – tiny streams get initiated only at a few selected loci; they then get elongated, elaborated in details and finally abstracted to form rivers that get set in their own valleys.

River basin

River basins represent one of the most amazing creations in nature - they are indeed fluvial workshops where a vast multitude of streams, big and small, carry out their assigned tasks perfectly harmoniously within their confines. In these river basins everything is so well organised optimally that many morphometric attributes like the number of streams, their lengths, areas of their operation and slopes of their channels are all interrelated excellently well. There is a perfect 'order' in what looks like a chaotic disorder in their development, with numerous streams joining among themselves to graduate on to higher and higher orders from the first order. The fluvial activities in these basins obey several natural laws pertaining to these variables all of which happen to be controlled by a single independent variable, namely the stream order (Horton, 1945, Strahler, 1953).

Morphometric relationships

The most interesting of these laws of morphometry is the Law of Contributing Areas, (Schumm, 1956, Strahler, 1956).This law defines the relationship between the drainage basin areas of each order and the total stream lengths contained within and supported by these areas. From the graphical plots of this relationship can be obtained an important Constant of Channel Maintenance which in fact gives the value of the area which supports a stream channel of unit length, say, 1 km. In simpler terms, this means that nature provides just the optimum area to sustain a stream of unit length - nothing more, nothing less!

Likewise, there are many other meaningful relationships that exist between the other attributes too within the basins like the ones between area and altituude (hypsometry) and slope and altitude (clinography).

Repercussions of interlinking basins

With such remarkable equilibrium conditions obtaining in the river basins, "any attempt to link two rivers is beset with the danger of disturbing this harmonious set-up and interfering with nature's well-planned operations. And nature does not brook any interference but hits back sooner or later" (Subramanyan, 2003). In a multivariate system like the river basins, it will be difficult to quantify all such repercussions but suffice it to say that there are bound to be large-

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scale adverse impacts if many river basins are interlinked across the country in diverse geological, geomorphological and climatic conditions. It also needs to be realised that a massive exercise of interlinking river basins will amount to "redrawing of the geography of the country" (Iyer, 2002).

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