

MEGALITH '10

DEPARTMENT OF CIVIL ENGINEERING
IIT KHARAGPUR

CASE STUDY

THE RIVER INTERLINKING PROJECT

The Task Summary (Problem Statement)

For the Ken-Betwa river interlinking project (shared by the states of Madhya Pradesh and Uttar Pradesh), the contestants have to “reverse engineer” and justify the adequacy and suitability of the various project components or point out the faults of the project. The following specific aspects need to be independently discussed, data and information as available through the internet or any other sources may be used. Reasonable assumptions for unavailable data would be accepted. The contestants

should be clear in presenting the step-wise algorithms which lead to the final conclusions.



Introduction

Inter-basin transfer of water has been in practice in certain regions of India but not in large scale. In the neighboring country of Pakistan, the five rivers and the River Indus have been connected through an extensive network since after independence. World-wide, there have been quite a few projects which aim to transfer the excess water of one river basin to another suffering from water deficit. Details of such projects may be had from the following link of the National Water Development Authority (NWDA) of India, under the Ministry of Water Resources, Government of India. <http://nwda.gov.in/index2.asp?sublinkid=45&langid=1>

In view of basin-wise variation in rainfall over space and time and relative extents of their catchments certain river basins occasionally experience flood-like condition while their adjacent basins experience droughts. The water requirements (arising mainly out of irrigation demands) are also often different for contiguous basins. Over the past few years, therefore, projects are being considered for interlinking some basins in the Northern and Southern parts of India to reduce the regional imbalance and to provide better distribution of water in neighbouring river basins. The basic principle is to transfer some of the surplus water which flows waste to the sea from a basin for fruitful utilisation to another.

The NWDA, with the help of the Central Water Commission (CWC) under the same ministry, has carried out feasibility studies of one of the smaller of the proposed river interlinking projects in India, that between the rivers Ken and Betwa, falling in by the states of Madhya Pradesh and Uttar Pradesh. Detailed report of the project may be found in the web-site of NWDA at the following address: <http://nwda.gov.in/index3.asp?sublink2id=25>

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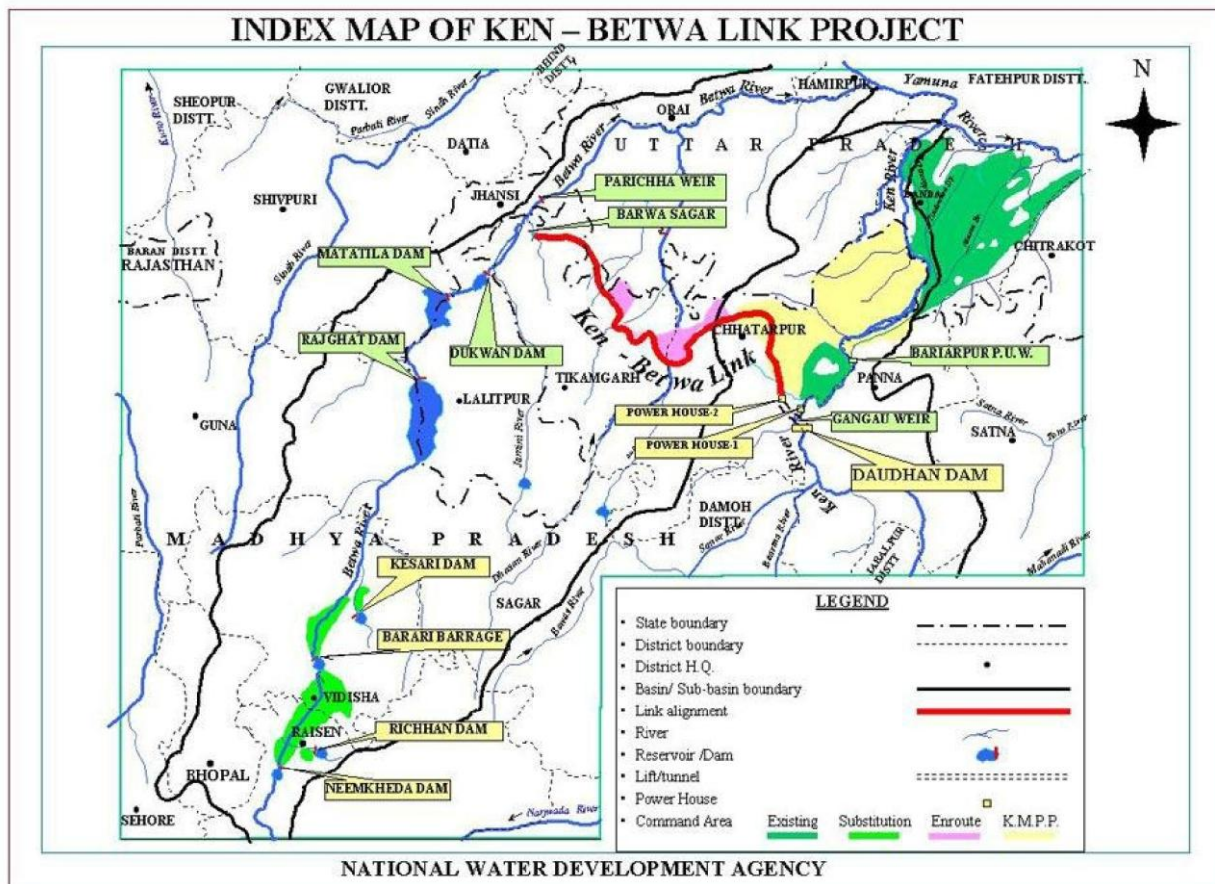
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Other studies for this project have also been carried out, especially as an academic initiative, for example the work reported in the following web-site:

http://dukespace.lib.duke.edu/dspace/bitstream/10161/1374/1/KB_Link_Hydrological_Feasibility_Study_Mysore.pdf

Nevertheless, these reports present only the summary of the detailed analyses that have gone behind to evaluate the feasibility of the project. For example, the excess water of one watershed (river basin) has been determined from finding the difference between the expected demand of a basin and its expected water input (usually by rainfall). Similarly, the deficiency or shortfall of water requirement (because of irrigation, drinking, industrial, etc.) has been calculated for another. Subsequently, the location and size of the dams have been worked out, the sites of pick up weirs and barrages have been determined, alignment of canals has been finalized, etc.



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The contest

What is expected of the contestants, therefore, is that they need to give a detailed step-by-step algorithm for deciding the following parameters in general and hence justify, with calculations and analysis, the suitability or shortcomings of the proposed Ken-Betwa river interlinking project:

1. The donor and acceptor basins – excess or shortfall of runoff in the basins as against their full requirement of irrigation, drinking water and industry.
2. Type, capacity and location of the dam or dams to store the excess flood water in the donor and other basins.
3. Type, capacity and location of pickup weirs or barrages in the intervening cross basins.
4. Optimized alignment of interlinking canals or tunnels.
5. Location and design details of the lifting pump, wherever necessary.

It may be emphasized that the deciding last four parameters (2-5) require extensive spatial analysis (for details see, for example, http://en.wikipedia.org/wiki/Spatial_analysis). Topographical analysis, which is an important feature of spatial analysis, is used extensively in water resource planning and management, as for the analysis of the present problem. The most effective tool presently available for topographical spatial analysis is the class of software programs or packages known as the **Geographic Information Systems** (GIS: http://en.wikipedia.org/wiki/Geographic_information_systems). The contestants may indicate the application of any GIS software that they might have used in arriving at decisions for the given problem.

Helpful ideas

The following variables can be used as the key design parameters

- Catchment and command areas of each basin
- The lean season and monsoon season flows (average and variability). Since daily flows would be too many to handle, and monthly flows too sparse, a unit of a week may be considered optimum.
- The annual agricultural water requirements per unit area in the irrigation command areas of each basin.
- Seasonal rainfall data.
- Demand volume in both donor and acceptor basins for agriculture, drinking water and industry.
- Topographical distribution – agricultural lands, villages, forests, hills and mountains and uncultivable lands.
- Link characteristics – canal, tunnel, pump houses, pick up weirs, etc.
- Cost of dams, excavating, embanking, tunneling, cross-drainage structures and pump houses.
- Submerged area distribution – inhabited, agricultural lands, villages, forests, hills, etc.

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Caveat

Some of the data required for the study required for the contest may not be explicitly available or would be difficult to collect in a short span of time. In that case, justified assumptions may have to be made.

Contest Evaluation

It is expected that the contestants would attempt their best to technically justify the success and sustainability of the Ken-Betwa inter basin water transfer link. However, points would be given for each step, starting from data selection, analysis steps, logic of the algorithms adopted for the technical evaluation, presentation of the summary of the results, final report, etc.

Rules:-

1. Each team should comprise of a maximum of 5 members.
2. Online and other sources should only be used as references. Any direct resemblance may lead to disqualification of the team.
3. Each team is required to submit a report based on their studies in not more than 10 pages latest by **10th January 2010.**
4. Final presentation shall be made in front of the judges during Megalith.
5. A maximum of 20 minutes will be given for the presentation followed by a 10 minutes Q/A

session. Guidelines for report submission

1. Paper size: A4
2. Font :Arial
3. Font size : 10
4. Spacing : Single line
5. References : All references should be listed at the end of the report
6. Forwarding: Soft copy of PDF to be sent in one file as attachment by Email :

Email: megalith.iitkgp@gmail.com

Email: megalith.iitkgp@gmail.com

For more information visit: www.megalith.co.in