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INTERLINKING OF INDIAN MAJOR RIVERS

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Abstract -*In India, water resources are unevenly distributed. India has a vast geographical area of 329 mha. Interlinking of rivers is an attempt to link various rivers in the country to solve various problems such as flood control, irrigation problems, etc. Interlinking of rivers literally means joining of natural channels. Going by this natural geomorphologic process through which river systems and their flood plains are formed. Link channels are constructed to connect or transfer water of a river to another river belonging to a different basin. This paper deals with various aspects of interlinking of rivers.*

1. INTRODUCTION

The variations of the magnitude of annual rainfall in India are quite marked. It varies from an average of about 300cm in north eastern states of India to less than 15cm in its north western part in the semi-arid and arid parts of Rajasthan and Gujarat. Also the Himalayan rivers flowing in the northern part of India are snow fed and perennial, the peninsular rivers are rain fed and seasonal. The hydrological, climatic and topographical factors cause recurrence of floods in certain parts of the country and some parts may be under scarcity of water.

2. HISTORY

Human societies have always tried to expand the spatial extent of availability of water by the diversion of streams or rivers. Sir Arthur Cotton proposed links for inland navi-gation for better early last century. But, the concept of interlinking of rivers evolved during 1950s. At that time, the UN promoted such projects as part of "Stability and Peace". That was the time when big projects and technology were seen as the answer to poverty. It was also the time when many countries, after gaining independence from co-lonial powers wanted to express their national confidence through such major projects. The interlinking of Indian rivers proposal originated at the same time as the world be-came fascinated with large water infrastructure projects.

3. OBJECTIVES

1. River interlinking is a very common term used these days. The basic idea behind river interlinking is to provide water in the region which faces worst water scar-city is most part of the year.

2. The concept through which this river interlinking project is undertaken is to di-vert some water from heavy discharged rivers into dry rivers.

3. GIS (geographical information system) and Open source Map (OSM) is used in this study

4. RIVER COMPONENTS

The erstwhile ministry of irrigation (now ministry of water resources) and the Central Water Commission had formulated in 1980 a National Perspective Plan for optimum utilization of water resources in the country which envisages inter basin transfer of water from surplus to deficit areas. Apart from diverting water from rivers which are surplus in ultimate stage of development to deficit areas the plan enables flood moderation also. The National Perspective Plan comprises of two main components

a) Himalayan rivers Development

b) Peninsular rivers Development

5. River characters of Tungabhadra and Krishna

5.1 Introduction to Tungabhadra River India

The Tungabhadra River is a river in India that starts and flows through the state of Karnataka during most of its course, before flowing along the border between Karnataka, Telangana and Andhra Pradesh and ultimately joining the Krishna River near Alampur village in Mehaboobnagar District of Telangana. In the epic Ramayana, the Tungabhadra River was known by the name of Pampa.The Tungabhadra River is formed by the confluence of the Tunga River and the Bhadra River at Koodli which flow down the eastern slope of the Western Ghats in the state of Karnataka. The two rivers originate in Mudigere Taluk of Chikmagalur District of Karnataka along with the Nethravathi (west-flowing river, joining the Arabian Sea near Mangalore), the Tunga and the Bhadra rise at Gangamoola, in VarahaParvatha in the Western Ghats at an elevation of 1198 metres (near Samse Village).According to Hindu Mythology

legend, Varaha Swamy(Third Incarnation of Lord Shri Hari Vishnu) after killing the Demon was very tired. After that war, He took rest by sitting on present day VarahaParvatha peak. When He sat on that Peak, Sweat over flowed from his scalp. The Sweat which flowed from his left side of Scalp became Tunga River and the Sweat which flowed from his right side of Scalp became Bhadra River.

5.2 Introduction to Krishna River

The Krishna River is the fourth-biggest river in terms of water inflows and river basin area in India, after the Ganga, Godavari and Brahmaputra. The river is almost 1,300 kilometres (810 mi) long. The river is also called Krishnaveni. It is a major source of irrigation for Maharashtra, Karnataka, Telangana and Andhra Pradesh. The Krishna river originates in the Western Ghats near Mahabaleshwar at an elevation of about 1,300 metres, in the state of Maharashtra in central India. It is one of the longest rivers in India.

6. PROCEDURE FOR INTERLINKING OF RIVERS

- Select the starting and ending point of the rivers So we have selected Shakti Nagar devasugur as a orgin Point where the river Krishna flows and Rajoli as the destination. Where the river Tungabhadra flows.
- Using GIS we are going to choose the best and economic way where we can connect the rivers from Krishna to Tungabhadra for the interlinking of rivers project.
- Using Bhuvana 3D open source GIS we are getting the elevation profile and the coordinates where we can designer channel for interlinking of rivers.
- Using Bhuvana 3D GIS we mark the origin and destination point of the river
- Number of places undergoing this project are listed below

1) Shakti Nagar Diva sugar
2) Kukanoru
3) Khanapara
4) Matmaari
5) Puratappli
6) Nagalapura
7) Udamaggala
8) Marchatalla
9) Ashapura
10) Rajoli

- Using Bhuvana 3D GIS we mark the origin and destination point of the river Shram Shakti Nagar devasugar to Rajoli.

7. STUDY AREA OF PROJECT

7.1 Shaktinagar (devasuguru) Locality Name : Devasugur
Taluk Name : Raichur
District : Raichur
State : Karnataka
Elevation / Altitude: 404 meters. Above Seal level
Population : 17,088

7.2 Kuknoor Locality Name : KanoorTaluk Name : Sindhanur
District : Raichur
State : Karnataka
Elevation / Altitude: 358 meters. Above Seal level
population: 774

7.3 Khanapur Locality Name : Khanapur
Taluk Name : Raichur
District : Raichur
State : Karnataka
Elevation / Altitude: 404 meters. Above Seal level
Population : 1370

7.4 Matmari
Locality Name : MatmariTaluk Name : Raichur
District : Raichur
State : Karnataka
Elevation / Altitude: 404 meters. Above Seal level
Population: 5434

7.5 Purtipali Locality Name : PurtipaliTaluk Name : Raichur
District : Raichur
State : Karnataka
Elevation / Altitude: 404 meters. Above Seal level Population:2041

7.6 Naglapur Locality Name : NaglapurTaluk Name : Raichur
District : Raichur
State : Karnataka
Elevation / Altitude: 404 meters. Above Seal level
Population:524

7.7 Udamgal Locality Name : UdamgalTaluk Name : Sindhanur
District : Raichur
State : Karnataka
Elevation / Altitude: 358 meters. Above Seal level
Population:1930

7.8 Merchathal Locality Name : Merchathal
Taluk Name : Raichur
District : Raichur
State : Karnataka
Elevation / Altitude: 404 meters. Above Seal level
Population:1957

7.9 Ashapur Locality Name : Asapur
Taluk Name : Raichur

District : Raichur
State :Karntaka
Elevation / Altitude: 404 meters. Above Seal level
Population:1415

7.10

Rajoli Locality
Name : Rojalabanda
Taluk Name : Lingsugur
District : Raichur
State : Karnataka
Elevation / Altitude: 508 meters. Above Seal level
Population:2917.

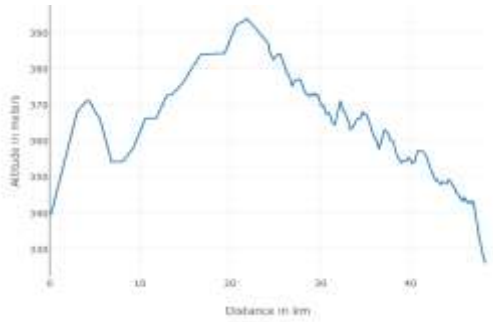

CHART1-:Graph Generated From Bhuvan 3D

8. ADVANTAGES AND DISADVANTAGES ILR

8.1 ADVANTAGES OF ILR NETWORK ANALYSIS

The other more specialised spatial analysis functions provided by GIS are the network routines. These routines were basically developed for transportation planning and allocation analyses. Shortest route and least cost path analysis are common examples of network functions. Canal alignment can be finalised using this technique. Optimum and shortest possible options can be determined before execution. Using the network routines, it is possible to make an analysis of the movement of the resources from one location to another. Inputs to routine are the river network configuration, source of river (u/s end), outlet of the river and constraints upon the movement of resources across the network. Transport of water through a system of link canals can be modelled by network functions. Alignments of canal, Reservoir projects and water use for command area and domestic purpose en route of the canal. Visibility analysis can be made using Network analysis capabilities of GIS.

Technical Issues

Drinking water supply to towns and villages enroute It is worthwhile to plan for domestic water supply to towns and villages enroute. Water supply network can be planned in GIS environment to carry out route tracing and resources allocation. People may come forward to get the consensus of concerned socio-political authorities, as they get water.

Water allocation for irrigation

Optimum usage of water for irrigation has to be facilitated by distribution channels up to the agricultural field from the link canals. This involves planning of field channel network so as to divert the water from the main link canal. Quantity of water can be metered and monitored. The above aspect can be very well planned using network analysis capability of GIS.

Command area development

Command area development involves suggesting cropping pattern to suite the region, providing proper drainage system, soil conservation, and water harvesting and credit system for the farmers and related activities. This also involves evaluation of present cropping pattern, irrigation facilities and related aspects of the command area. The spatial analysis capabilities of GIS will offer excellent facilities towards the planning of the command area along with the link canals.

Navigation

Many of the river links will also constitute National waterways. The Brahmaputra – Mahanadi link will be a major step in augmenting inland water transport. Inland waterways Authority of India has developed various important water ways such as Allahabad to Haldia, and Sadiya to Dhubri of Brahmaputra river. Techno- economic studies for waterways along the link canals can be planned for, before the execution of the project and necessary technical provisions can be made while executing the project. Network analysis capabilities of GIS can be explored for planning waterways with the link canals.

8.2 DISADVANTAGES

Land submergence

The extent of land submergence due to the alignment of the canal and construction of reservoirs and hydraulic structures can be assessed before the initiation of project so that alternatives can be planned accordingly. The spatial assessment of submerged land can be analysed with the functionalities of GIS.

Forest Cover

Forest cover in India mostly lies in Mountainous regions. Forest areas that will be affected due to the alignment of the canal and construction of reservoirs and other hydraulic structures will be assessed. Deforestation can be avoided to maximum extent possible. Remote Sensing and GIS, in an integrated manner can be utilised for the above assessment. Ground truth verification is very difficult for forest cover assessment. The virtual GIS derived from contours and high-resolution satellite data will greatly assist for simulation of forest cover assessment as if in the real situation.

Ecology

Ecological aspects consist of studying the rare species located in the project area. The project canals, reservoirs and other irrigation structures may be planned accordingly so that the species are not affected to the maximum extent possible. GIS will support for the spatial analysis of the above feature. Areas of concern and modifications required in the project can be easily reviewed with the use of GIS database of the entire project.

Water logging and Soil Salinity

Soil salinity and water logging along the canal alignment has to be studied in detail so as to avoid those zones or to suggest remedial measures. Study of those spatial problems along with soil characteristics can be made using GIS. Lining of canals can be planned according to the zones. The problems zones can be identified mapped and planned accordingly.

Land Acquisition and Rehabilitation

Land acquisition and rehabilitation include payment of compensation for land, houses and properties acquired, allotment of agricultural land and house plots at new sites, free transport for shifting to new site, payment of ex-gratia, rehabilitation grant, subsistence allowance, development assistance, ration card issued at new R&R site and civil amenities provided at new site. Spatial database consisting of land and persons affected due to the project can developed in GIS environment. The spatial analysis capabilities of GIS will speedup the completion of entire process of Land acquisition and other aspects of Relief and Rehabilitation.

Socio-Economic Issues

At present 80% of the people live in rural India and most of them directly and indirectly depends on agro based activities. In most of the drought prone states, rural people live below poverty and under nourished. Due to water deficit most of the people particularly farmers and agricultural labourers are left with no means for their livelihood. This sort of acute scarcity will be reduced by irrigation from link canals. As irrigation facilities increases in the regions through which the link canals passes, the economic status of the rural people will be elevated. Particularly agriculture and related activities will fetch a good living condition to the rural people. The spatial socio-economic assessment with respect to various issues such as gender, social status of the people, cropping pattern, traditional practices with respect to occupation, and other related aspects at micro level can be made using GIS for the upliftment and development of the rural people of India.

9. CONCLUSIONS

9.1 WHAT SHOULD ALL OF US ASK FOR?

- The Interlinking Rivers plan should *not* be projected as an inevitable
  national priority. Instead, it should be considered a plan that is open
  to debate and scrutiny with public participation at all levels.
- All reports on ILR, including the pre-feasibility and feasibility studies should be made fully public with *immediate* effect.
- Detailed options assessment has to be done before choosing a path.
- Each individual link should be critically examined, including public
  hearings, instead of being considered *fait accompli*.
- More resources to be allocated for studies and implementation of
  time-proven sustainable approaches for managing water resources
- Prior informed consent to be obtained from all affected people before
  embarking work on any of the links.
- An undertaking from the Government that no part of any river will
  be privatized.
- Agricultural policies should be really oriented towards food security and increasing sustainable production by most needy.

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