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Interlinking of Krishna and Godavari rivers: An ecological study

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Abstract

India known for rivers and biodiversity throughout the world. Himalayan rivers and peninsular rivers are main rivers in India. Himalayan rivers have water throughout the year but peninsular rivers are depending on monsoon precipitation. Droughts are common problem in this peninsular Indian rivers region. Some rivers have plenty of water and that water flow into the sea without use. Some rivers have very small quantity of water that is not enough for irrigation. So the concept of interlinking of rivers came out. Interlinking of Rivers is good thought but every river has its unique biodiversity. Due to interlinking of rivers the uniqueness of biodiversity will disturb and due to invasion of non-native species the native species will go for extinction. Krishna River has unique fish biodiversity. When Krishna river inter link with Godavari river, it will lose its unique biodiversity. Already exotic fishes like Piranhas present in Godavari River enter the Krishna River causing damage to the fish nets in Krishna River. Piranha fishes are carnivore. Due to this carnivorous habit, it can cause the damage to the native species.

Keywords: Biodiversity, interlinking, Godavari River, Krishna River, piranhas

Introduction

Interlinking of Rivers is nothing but joining the rivers of the country by networks of canals and reservoirs. Interlinking of rivers in India was proposed for the first time during British Colonial rule. The Indian Government has established the National Water Development Agency to study the interlinking of rivers under the Ministry of Water Resources. Many states have proposed for interlinking of rivers due to scarcity of water in their states and hence the central government is working on a few projects.

Interlinking of rivers project is an idea to transfer water from surplus river basins to ease the water shortages in western and southern India. It comprises of 30 links to connect 37 Himalayan and peninsular rivers. ILR project is itself a half century long project with a huge capital requirement.

Over the next 10 years, it is envisaged that 37 major rivers in India will be linked through 12,500 km of canals ^[1]. Proper storage and distribution of the water thus salvaged would require the construction of at least 400 reservoirs ^[2]. Notwithstanding the huge estimated cost of US\$ 100 billion, a number of socio-economic benefits have been promised from time to time by national leaders, development planners and engineers. At least one scientific opinion suggests that the project will prove environment friendly in that it will reduce air pollution by generating pollution-free hydroelectric power and provide more carbon sinks through enhanced crop production ^[1]. At the same time, there is also the feeling that environmental services like flood control that the project proposes to offer, are not quite viable and agricultural productivity may be better enhanced through rainwater harvesting ^[2]. Surprisingly, despite the widespread propaganda and debates about interlinking of rivers, ecologists have adopted the role of 'sleeping policemen'.

As the water availability in the Krishna river was becoming inadequate to meet the water demand, Godavari River is linked to the Krishna river by commissioning the Polavaram right bank canal with the help of Pattiseema lift scheme in the year 2015 to augment water availability to the Prakasam Barrage in Andhra Pradesh. The irrigation canals of Prakasam Barrage form part of National Waterway.

Economical aspects

India receives most of its rain during monsoon season from June to September, most of the rain falls in northern and eastern part of India where as the amount of rainfall in southern and

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western part are comparatively low and thus these places have shortage of water. Interlinking of rivers will help these areas to have water throughout the year. The main occupation of rural India is agriculture and if monsoon fails in a year, agricultural activities come to a standstill and this will aggravate rural poverty. Interlinking of rivers will be a practical solution for this problem, because the water can be stored or water can be transferred from water surplus area to deficit. In Ganga and Brahmaputra Basins floods are common almost every year. In order to avoid this, the water from these areas are diverted to other areas where there is scarcity of water. This can be achieved by linking the rivers. There is a two way advantage with this – floods will be controlled and scarcity of water will be reduced.

Interlinking of rivers will also have commercial importance on a longer run. This can be used as inland waterways and which helps in faster movement of goods from one place to other.

Interlinking creates a new occupation for people living in and around these canals including fishing in India.

Ecological aspects

Interlinking of rivers may cause huge amount of distortion in the existing environment. In order to create canals and reservoirs, there will be mass deforestation. This will have impact on rains and in turn affect the whole cycle of life.

Due to interlinking of rivers, the amount of fresh water entering seas cause a serious threat to biodiversity of estuarine and ecosystems.

Forty years ago when the Green Revolution was ushered in, there was no foresight of its impact on India's ecosystems and biodiversity. Even as we are beginning to understand the various adverse impacts of water-intensive agriculture on natural ecosystems and biodiversity, paths are being paved to usher in the Second Green Revolution that places a greater demand on freshwater. Water-intensive agriculture has taken a heavy toll of biodiversity in rain-fed ecosystems throughout the country. The magnitude of biodiversity loss across various other natural ecosystems has not been scientifically analysed to the extent that it could influence conservation planning. Over a decade ago it was shown that birds of the semi-arid tracts of peninsular India have been locally displaced due to changes in land use that favoured water-demanding crops [3]. Birds, being warm-blooded and mobile, are relatively less vulnerable to changes in the local environment than other vertebrates.

India's freshwater ecosystems have nurtured some 750 species of fishes [4], among which 230 are endemic [5]. At least 50% of the species of freshwater fishes that are endemic to India are not found outside the limits of the Western Ghats. Many of these are taxonomically unique, being remnants of the biodiversity that evolved in peninsular India for more than 150 million years before India became part of Eurasia [6]. The aquatic fauna of peninsular India, which is now preserved only in the Western Ghats, originated in the prehistoric Gondwanaland has become increasingly evident with the discovery of the frog *Nasikabatrachus sahyadrensis* [7, 8].

Interlinking of rivers will affect, besides other aquatic life, fish diversity throughout the project area and beyond, by changing the depth, flow and turbidity of water, creating barriers to those species that migrate upstream to spawn, encouraging the spread of alien invasive species such as tilapia (*Oreochromis mossambica*), permitting the invasion of the hardier species of carps from the northern rivers that tend

to out-compete the endemic ones or even hybridize with them and carrying disease-causing parasites and pathogens through water.

Studies in lakes of Rajasthan have revealed that 60–70% of the fish biomass in such waters can be of tilapia [9]. In South Africa, aggressive species of fishes, including *Austroglanis sclateri*, *Barbus aeneus*, *Clarias gariepinus* (African catfish) and *Labeo capensis* have been accidentally transported through the interbasin transfer of water. These are now a threat to the local species [10]. Pathological studies have shown that these species are more prone to be a carrier of bacterial infections than the native *Clarias batrachus*. Eighteen species of infectious bacteria have been isolated from the African catfish as against three in the native Indian species of catfish [9]. Major carps (*Catla catla*, *Labeo rohita* and *Cirrhinus mrigala*) that are found throughout south India are those that have been introduced from north Indian rivers. These carps were earlier known to hybridize only in aquaculture [4]. The existence of natural hybrids of *L. rohita* and *L. calbasu* has been recently confirmed in Indian waters [9].

Against this backdrop, the plan to interlink major Indian rivers has to be put through more serious ecological scrutiny. The National Bureau of Fish Genetic Resources had initiated a programme to conserve fish genetic resources throughout the country. As part of this initiative, two fish sanctuaries have been identified in northwest India [9]. However, the greatest diversity of Indian fishes lies in the south and locally in the Western Ghats. Linking the rivers that flow out of these hills with the other peninsular and north Indian rivers without rigorous evaluation of the ecological impacts can prove disastrous not only to the fish, but also to the many intricately linked biotic processes that have evolved over the past hundred of millions of years [11].

River Godavari With a length of 1465 Kilometers, Godavari is India's second largest river that runs within the country and also the longest river in South India. It originates near Trimbak in Nashik District of Maharashtra state and flows east across the Deccan Plateau into the Bay of Bengal near Narasapuram in West Godavari district of Andhra Pradesh.

The Godavari River has its catchment area [12] in seven state of India: Maharashtra, Telangana, Chhattisgarh, MadhyaPradesh, AndhraPradesh, Karnataka and Odisha. The number of dams constructed in Godavari basin is the highest among all the river basins in India [12]. Nearly 350 major and medium dams and barrages had been constructed in the river basin by the year 2012 [12-14].

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 kilometers (810 mi) long. The river is also called Krishnaveni. It is a major source of irrigation for Maharashtra, Karnataka, Telangana and Andhra Pradesh [15].

Krishna Basin extends over an area of 258,948 km² (99,980 sq mi) which is nearly 8% of the total geographical area of the country. This large basin lies in the states of Karnataka (113,271km²), Telangana, Andhra Pradesh (76,252 km²) and Maharashtra (69,425 km²) [16].

An average annual surface water potential of 78.1 km³ has been assessed in this basin. Out of this, 58.0 km³ is utilizable water [17]. Culturable area in the basin is about 203,000 km² (78,000 sq mi), which is 10.4% of the total cultivable area of the country.

The Pattiseema plan

Pattiseema is a village in Polavaram mandal of West Godavari district. 80 TMC of flood water from the Godavari at this point will be diverted into the Polavaram Right Main Canal, which is nearly complete up to Prakasam Barrage on river Krishna at Vijayawada, 174 km away.



The gains of interlinking of Krishna–Godavari Rivers

Of the 80 TMC of Godavari water, 10 TMC will be diverted to domestic and industrial users in major towns in Krishna and West Godavari districts. The remaining 70 TMC will be released for irrigation in Krishna and West Godavari districts, enough to irrigate 7 lakh acres of paddy fields. With this interlinking 80 TMC of Godavari water in the Krishna delta. The Krishna water can be saved and stored at Srisailem dam, from where it can be supplied to the drought-prone Rayalaseema region.

Fish species of Godavari River

The fish families present in Godavari River are belonging to Cyprinidae, Mastacembelidae, Bagridae, Notopteridae, Siluridae, Cichlidae, Ambassidae, Bagridae and Schilbeidae. The fish species like *Catla catla*, *Labeo rohita*, *L.calbasu*, *L. bata*, *Chanda nama*, *Channa marulius*, *Amblypharyngodon mola*, *Puntius*, *Barilius bendelisis*, *Channa striata*, *Cirrhinus cirrhosus*, *Clarias dussumieri*, *Heteropneustes fossilis*, *Notopterus notopterus*, *Ompok bimaculatus*, *Oreochromis mossambicus* and *Wallago attu* are common [18].

Fish species of Krishna River

The fish families present in Krishna river are Cyprinidae, Balitoridae, Anguillidae, Ambassidae, Channidae, Schilbeidae, Cyprinidae, Gobiidae, Sisoridae, *Heteropneustidae*, Mastacembelidae, Siluridae, Cichlidae and Bagridae. The fish species are *catla catla*, *Labeo rohita*, *L. bata*, *L. calbasu*, *Mugil cephalus*, *Rita rita*, *Puntius species*, *Ompok pabda*, *Notopterus notopterus*, *Heteropneustes fossilis*, *Channa marulius* etc [18].

Invasion of Non native fishes and Presence of Piranhas

One of the most dreaded fish in the world, the red-bellied piranha, has found its way into the Godavari River in Andhra Pradesh. The predator fish Piranhas are a native of fresh water rivers which flow through South American nations like Argentina, Brazil and Venezuela. Although red-bellied piranhas are not “man-eaters”, there have been many reports of attacks on humans. The fish has razor-sharp teeth and as per scientific reports, they tend to bite off flesh from humans, usually, when there is a scarcity of food in the river they live. Piranhas were first reported near the Dowleswaram barrage in Rajahmundry last year by the Wildlife Institute of India (WII), Dehradun. There have been several sightings of the fish since then. The fish has also been spotted as being sold in

the market for consumption. Shaik Salauddin of Deccan Anglers came across the fish at a fish seed farm in Akividu, West Godavari.



The Red bellied piranha from the Godavari

The linking of the Godavari and the Krishna rivers in Andhra Pradesh, which was inaugurated last year, seems to have led to an unforeseen problem. Fishermen in Guntur district's Tadepalli village on the banks of river Krishna are complaining that a species of fish near the Prakasam Barrage, hitherto never seen in the river before, was damaging their nets and scaring away other fish. Consequently, their catch, and earnings, have dropped.

Conclusion

Interlinking of rivers is definitely a good solution for the scarcity of water, if interlinking has to be done after detailed socio-economical studies without causing any problem to the environment or aquatic life. Interlinking of rivers may affect the native species of Krishna River in the terms of their feeding and breeding activity. It is advised to do the environmental impact assessment before interlinking the rivers.

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