

Strategic Analysis Paper

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The National River Interlinking Scheme: A Solution to India's Water Challenges?

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Key Points

- India has a long history of designing, but rarely implementing, grand infrastructure projects that aim to move water from high rainfall areas to arid regions.
- While the current BJP government supports those grand infrastructure projects, most remain in the planning stage and any change in government is likely to halt further progress, particularly as the national river interlinking scheme will take years to complete.
- Interstate disputes and an unwillingness to share water across state boundaries could also frustrate those plans.
- Critics of the river interlinking scheme suggest that India has other options available to it that would improve its water security.

Summary

On paper, India has abundant water resources. Water is not always available when it is most needed, however, and neither is it evenly distributed throughout the country. Various schemes have been devised over the years to shift water from the wet north-east to the drier western parts of the country. Since the 2000s, the Bharatiya Janata Party has advocated for the construction of a series of canals that would link various rivers across the country. Water could then be shifted between those rivers according to the needs of various parts of the country. The cost of building those canals, the interstate politics of water sharing and the possibility of inadvertent environmental degradation are factors that are likely to slow, or even prevent, the realisation of the scheme.

Analysis

India receives the equivalent of four million gigalitres of rain annually. That rainfall does not fall evenly across the country, however, and neither does it fall consistently throughout the year. According to the Water Resources Information System of India, [85 per cent](#) of the country's rain falls during the summer monsoon season between July and September. It further suggests that large parts of Haryana, Maharashtra, Andhra Pradesh, Rajasthan, Gujarat, Madhya Pradesh, Karnataka and Tamil Nadu not only receive limited rainfall, but also large year-to-year variation in water availability. For decades, Indian engineers, hydrologists and political leaders have attempted to find ways to move water from areas of abundance to regions that have limited water supplies.

The Indian land mass can be divided into 19 major river basins. The per-capita water resource availability of those basins [varies](#) from a low of 263 kilolitres in the Sabarmati basin to 20,136 kilolitres in the Ganges-Brahmaputra-Meghna river system. Similarly, there is considerable [variation](#) in the amount of water withdrawn from those basins. As little as 243 kilolitres are withdrawn from the Meghna basin and as much as 1,670 kilolitres in the Indus basin.

Approximately two-thirds of Indian agriculture is rain-fed, with most of the remainder using groundwater to irrigate crops. In some parts of the country, groundwater is being used at such a rate that it [surpasses the natural recharge](#) of aquifers.

Water management is a central part of the Indian Government's mandate and its political leaders have long sought to find ways to manage the country's water supplies and store water from the monsoon. Large infrastructure projects, such as dams, reservoirs and canals to store and move water around, are seen as vital to that vision. Jawaharlal Nehru, the first Prime Minister of independent India, described the large dams that his government built as 'the new temples of India, where I worship'.

Those dams, as well as the efficiencies brought about by the Green Revolution, helped India to avoid famine and lifted living standards. By the 1980s, however, it became increasingly obvious 'that simply having many dams and large-scale water management projects was insufficient to deliver growth – they had to be appropriately designed and administered effectively.'¹ Dams are often [socially and politically contested](#) in India, due to the effect they can have on local communities and the environment. India can only store about [30 days of rainfall](#), compared to 900 days in major river basins and arid areas of developed countries, however, suggesting that the construction of more storage infrastructure is appropriate.

Since the 1980s, government investment in surface water irrigation has declined and Indian farmers have drilled more groundwater wells. In 1975, when groundwater wells were uncommon, there were about 800,000 wells across the country and most of them were shallow and dug by hand. Many of them continued to use oxen to draw water. By 2000, however, the number of wells had increased to 22 million, with most using electric- or diesel-powered pumps to draw water from deep underground. The number of wells has

¹ Steven Solomon, *Water: The Epic Struggle for Wealth, Power, and Civilization*, (Harper Perennial, New York: 2010), p. 419.

continued to increase, by about one million per year. In Haryana and Punjab, the water table is falling by more than one metre per year and, according to some estimates, India is extracting groundwater twice as fast as it can be recharged.²

British engineers first thought of inter-linking Indian rivers in 1858. Those plans were revived by Indian politicians after independence and continue to inspire similar ideas. In the 1970s Dr Kanuri Lakshmana Rao, an Indian engineer and former irrigation minister, proposed that India create a “National Water Grid”. Such a grid would transport surplus water from the north to the drier south to alleviate floods and drought.

A modern version of the water grid concept, known as the river interlinking project, has its origins in the National Perspective for Water Resources Development report that the Ministry of Water Resources released in 1980. It recommended the transfer of water from areas of surplus to water deficient regions. The National Water Development Agency was established under that plan to complete a series of feasibility studies for the proposed links. In 2002 the ruling Bharatiya Janata Party (BJP), led by Prime Minister Atal Vajpayee, reinvigorated the plan and, in that year, the Supreme Court of India passed an order that the government should complete the construction of the interlinking project by 2012. A Task Force was established to further develop the project. That Task Force concluded that by linking the rivers, irrigation could be provided to 160 million hectares of land (compared to 140 million hectares through conventional sources) and 34 gigawatts of hydroelectricity could be generated (equal to one-sixth of the installed power capacity at the time). A few years after the National Congress Party came to power in 2004 it [warned](#) against ‘playing with nature’ and suggested that ‘the interlinking of rivers will be a human-ecological-economic disaster. It is easy to do interlinking on paper. Interlinking of rivers has limited basin value, but largescale interlinking would be a disaster’. The interlinking of rivers, initially at basin rather than national level, was [revived](#) again by the Narendra Modi-led BJP government in 2014.

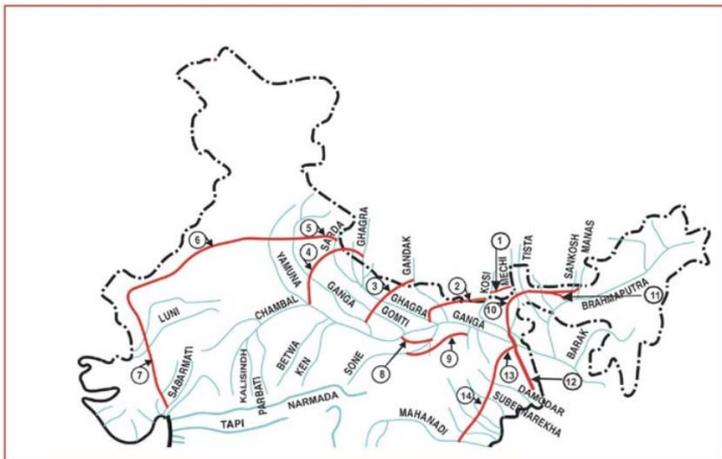
That government outlined plans to spend at least [US\\$87 billion](#) (but probably much more, figures of [US\\$120 billion](#) or [US\\$168 billion](#) have been suggested) to link up to 60 rivers to better control floods and drought. If each link currently under consideration were to be built, 15,000 kilometres of canals and 3,000 dams would be constructed. The scheme aims to move water from areas where there is believed to be a surplus of water to areas that experience water scarcity.

The scheme initially had two components. The Himalayan section has 14 links, and is expected to transport 33,000 gegalitres of water per year. The peninsular component has 16 links and will transport 141,000 gegalitres per year. As most of the Himalayan rivers are fed by glacier melt and those in peninsular India are rain-fed, those two components face different water supply constraints. The Himalayan section depends on stable rates of glacial formation and melt, while the peninsula component depends on steady monsoon events. The scheme broadly envisions transporting water from the relatively wet north-west of the country to the drier east. A third component was added in 2005 and focusses on linking [31 rivers](#) within the borders of a single state.

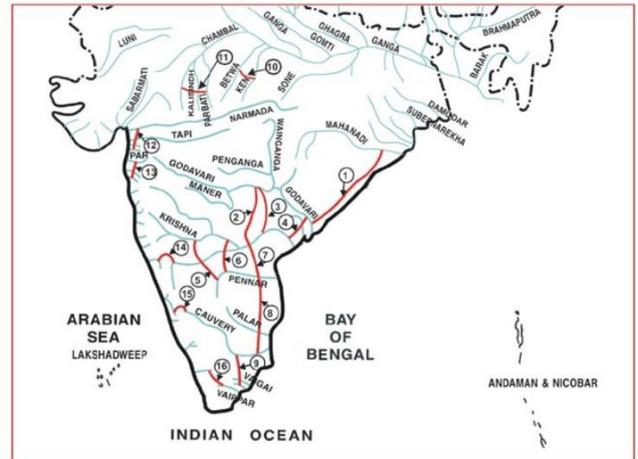
² *ibid*, p. 423.

PROPOSED INTER BASIN WATER TRANSFER LINKS

HIMALAYAN COMPONENT



PENINSULAR COMPONENT



- 1. Kosi – Mechi
- 2. Kosi – Ghagra
- 3. Gandak – Ganga
- 4. Ghagra – Yamuna *
- 5. Sarda – Yamuna *
- 6. Yamuna – Rajasthan
- 7. Rajasthan – Sabarmati
- 8. Chunar- Sone Barrage
- 9. Sone Dam – Southern Tributaries of Ganga
- 10. Manas –Sankosh - Tista - Ganga
- 11. Jogighopa – Tista – Farakka (Alternate)
- 12. Farakka – Sunderbans
- 13. Ganga (Farakka) – Damodar – Subernarekha
- 14. Subernarekha – Mahanadi

* FR Completed

- 1. Mahanadi (Manibhadra) – Godavari (Dowlaiswaram) *
- 2. Godavari (Inchampalli) – Krishna (Nagarjunasagar) *
- 3. Godavari (Inchampalli) – Krishna (Pulichintala) *
- 4. Godavari (Polavaram) – Krishna (Vijayawada) *
- 5. Krishna (Almatti) – Pennar *
- 6. Krishna (Srisailem) – Pennar *
- 7. Krishna (Nagarjunasagar) – Pennar (Somasila) *
- 8. Pennar (Somasila)–Palar- Cauvery (Grand Anicut) *
- 9. Cauvery (Kattalai) – Vaigai – Gundar *
- 10. Ken – Betwa *
- 11. Parbati – Kalsindh – Chambal *
- 12. Par – Tapi – Narmada *
- 13. Damanganga – Pinjal *
- 14. Bedti – Varda
- 15. Netravati – Hemavati
- 16. Pamba – Achankovil – Vaippar *

* FR Completed

Source: Water Resources Information System of India

In September 2015, the Godavari and Krishna rivers, the second- and fourth-longest in the country, were linked through a canal in Andhra Pradesh. After some initial engineering challenges, including a [breach of the canal](#) shortly after its inauguration, the link is working as planned. The Chief Minister of Andhra Pradesh, Chandrababu Naidu, [said](#) that the link had improved water access in the Rayalaseema region and helped to manage the water needs of his state. It remains to be seen, however, whether the diversion of water will lead to the changes in sediment load, nutrients and contaminant levels in the two rivers that were [feared](#) at the beginning of the canal’s operation. The [next phase](#) of the Godavari-Krishna link involves the diversion of the Krishna River to the Penna, and ultimately, the Cauvery River.

That phase might not occur as smoothly as the first. Several interstate water sharing disputes, most prominently the one over the sharing of the Cauvery River between Karnataka and Tamil Nadu, will have to be resolved if the water transfer is to operate effectively. Other linking projects could face similar challenges, particularly as states such as Bihar; Odisha and Kerala, [do not accept](#) that they have surplus water resources to share with the rest of India. It is also possible that a water sharing agreement will need to be finalised with Bangladesh, particularly in relation to any water transfer that involves the Brahmaputra or its tributaries.

The [Ken-Betwa link](#), another project that is close to being started, involves the construction of a 231 kilometre canal to transfer water from the Ken to the Betwa river. It will provide water to the drought-prone Bundelkhand region between Madhya Pradesh and Uttar Pradesh. The Indian Water Resources and River Development Minister, Nitin Gadkari, [stated](#)

[in June 2018](#) that the necessary clearances had been obtained for the project and that groundworks would soon commence.

As those two projects took years of planning, and the interlinking of rivers has been discussed for decades, there is no guarantee that the other components of the national river interlinking scheme will be built in the near future. The Congress Party has been hostile to the scheme in the past and continues to have doubts about its long-term value to the country. A change of national government is likely to slow progress.

Perhaps counterintuitively, there is also a chance that an increased reliance on canals and reservoirs will decrease Indian water security in the long term. An over-reliance on water infrastructure alters the supply-demand cycle and [can lead to greater water insecurity](#). An increase in the water supply often leads to an increase in consumption, which can create vulnerabilities in the event of drought or a sudden water supply shortfall. That is unlikely to occur in India's case, however, due to the limited water supply infrastructure that it has.

A focus on water infrastructure could also lead to the so-called "[reservoir effect](#)," where the construction of reservoirs can reduce the incentive to take other actions that could improve water security outcomes. Critics of the interlinking scheme [suggest](#) that such grand infrastructure projects are not the only options available to India. Other options could have equal or better outcomes for water security, they include: increased irrigation efficiency; growing crops that are appropriate for the climatic conditions of the region in which they are grown; managing water demand; increasing rainwater harvesting; and ensuring that existing infrastructure is maintained and operating effectively.

Changes in the hydrological profile of Indian rivers, whether by climate change or changes in the volume of water withdrawn from them, could leave current surplus rivers with a deficit. The amount of water in many of the Himalayan rivers, for instance, depends on the amount of glacial melt present in the system. It is assumed that regions and rivers with a surplus of water will continue to have abundant water supplies. If that situation changes, however, and those rivers no longer have surplus water to shift elsewhere, the basis for the whole interlinking concept could be compromised.

The river interlinking scheme was launched as a solution to the persistence of hunger and water insecurity in Indian society. It is hoped that the transfer of water from surplus areas to regions with a water deficit will increase Indian food production and lower food insecurity. India already [produces enough food](#) to feed its population, however, and while Indian farmers do not achieve the same crop yields per hectare as farmers in other countries, that is generally not because of a lack of water. The interlinking of rivers is a grand infrastructure scheme that is designed more to impress and enthrall Indian voters than meaningfully improve food and water security.

Any opinions or views expressed in this paper are those of the individual author, unless stated to be those of Future Directions International.

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