

TerraGreen

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INTERLINKING OF RIVERS BOON OR BANE?

IN CONVERSATION

Professor Michael Porter
Deakin University, Australia

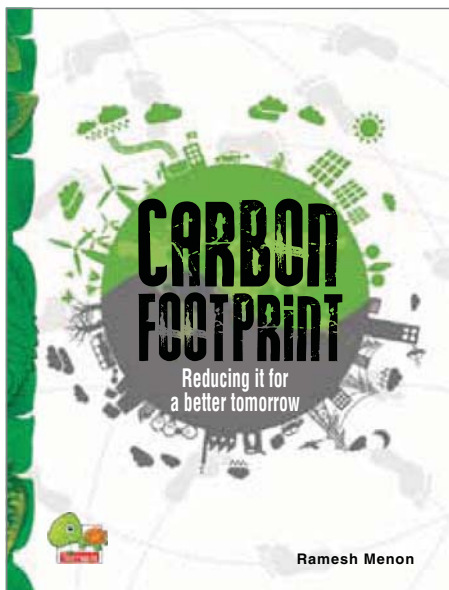
SPECIAL HIGHLIGHTS

Bees, Wasps, and Hornets Maneka Sanjay Gandhi
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That is the CO2 Question Guy C Noronha



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CARBON FOOTPRINT

Reducing it for
a better tomorrow

Ramesh Menon

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Description

Most of us lead careless lifestyles that keep adding to environmental pollution. Carbon Footprint takes an in-depth and critical look at those day-to-day activities – be it diet, power consumption, or our preferred mode of transport. It also offers solutions like utilizing renewable energy, making our homes energy efficient, and recycling waste, among others. Learn about several innovative “clean” initiatives undertaken by corporate India. Follow 101 easy ways to refashion your lifestyle and emerge as “green” citizens.

Table of Contents

- Carbon Footprint? What's that?
- Our Actions Determine Our Carbon Footprint
- Can We Reduce the Emission of Greenhouse Gases?
- Green Initiatives
- 101 Exciting Ways to Reduce our Carbon Footprint
- Glossary

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“ We necessarily need to look at every option by which the water problems of this country can be solved in an economically efficient and ecologically sustainable manner ”

The issue of interlinking of rivers in India has been discussed and debated for several decades now. A number of eminent engineers have seen this as an essential solution for the problem of water scarcity in the country. However, seldom in these debates, discussions, and proposals that have been put forward have the environmental or ecological implications of linking rivers been adequately explored. There are, of course, direct environmental implications in linking river systems, which would involve possibly submergence of forests and loss of biodiversity, as well as likely loss of farmland and displacement of people as well. A far more difficult issue to understand is related to the mixing of water from different rivers and their ecological implications. Unfortunately, a number of our rivers have been polluted to a point where species that existed in them earlier can no longer survive. However, in several river systems, particularly in the upper reaches, there is a rich biodiversity of life that still thrives. It needs to be investigated how interlinking of rivers would impact on the survival of species that currently exist within them.

Interlinking of rivers is a complex issue that should not be seen purely as an engineering challenge. In fact, distribution of water from one river system to another as clearly intended in any plan on interlinking rivers, has to be seen in a much larger context – as only a part of the total challenge of managing our water resources efficiently for a population that is growing rapidly and an economy that is expanding. We necessarily need to look at every option by which the water problems of this country can be solved in an economically efficient and ecologically sustainable manner. For this reason it is important to carry out detailed scenario analysis of how demand for water would grow in the future with and without appropriate policy interventions, including pricing of water for specific purposes and laying down benchmarks for efficiency of water use in specific sectors of the economy. There is also a role for regulatory measures and research and development by which, for instance, in the agricultural sector it may be possible to evolve and introduce crops that are much lower in water intensity than what we have currently. The agricultural sector in particular needs some major policy interventions, since water use at the aggregate level is 80% in agriculture.

It is only after a detailed analysis of future demand and scenarios related to different levels of policy initiatives and interventions that a proper assessment of any scheme to interlink would even merit attention and examination. And, in case both in economic and ecological terms a case can be made for interlinking some river systems, then perhaps it would be essential to implement at least one such project, which has the least ecological problems and the greatest economic merit, before we consider extending such possibilities to other river systems. In essence, a proof of concept would be essential through one single such project to throw up any problems or complexities that may be faced before we can even consider anything on a grandiose scale at the national level.

In essence, our problems of water scarcity and water stress in the country require an aggregate analysis of future options at the national, regional, and sub-regional level, and a strengthening of institutions and practices at the local level in several parts of the country.

R K Pachauri

Director-General, TERI

The article on 'Eco-friendly make-up' underlined the reality of synthetic cosmetics. It is shocking to know that synthetic cosmetic manufacturers kill most of the lab animals while testing their products on them, apart from spreading air pollution. Organic cosmetics, on the other hand, are eco-friendly and safe for the users as well as the lab animals, who do not need to undergo any dangerous test procedures. I am really thankful to the entire team of TerraGreen for covering this issue very delicately and presenting a holistic view about it.

Prasantha Km. Borah | Lakhimpur, Assam

Your report on films made on local development and sustainability initiatives was a very interesting read. It's good to know that people are documenting these efforts as the more people watch such films, the more they will be encouraged to take up similar work and implement sustainability in their own lives. The article on grassland conservation also made a pertinent point. We all tend to treat grasslands as waste or fallow land without realising that it is a proper ecosystem in its own right.

Sudha Goyal | Faridabad

In your article 'Green buildings', the writer, Mr Samrat Mukherjee, has failed to explain what 'embodied energy' is. When I saw it for the first time in the article, I imagined that it was the energy consumed by the building. However, he has also mentioned the embodied energy of construction materials, synthetic carpets, etc. I assure you, my carpets don't consume energy! Since this is an article in TerraGreen, I assume that the term has been correctly used. But I am a layman, unfamiliar with the jargon, and it would be wise to ensure to all such technical terms are explained properly.

Suresh Tyagi | Ambala



The article 'Making investments in future' in the last issue of TerraGreen is truly very inspirational. The joint venture of corporates with Aanganwadis for the overall development of the child is truly commendable. The cover story on 'Radioactive waste management' is quite informative. The article suggests a very effective way of disposing radioactive materials. The article on propagating sustainable development through cinema is very interesting. Thanks to the team of TerraGreen for bringing out such informative topics to us.

Bhairav Gokhale | Kanpur

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4	News	26	Cover Story Interlinking of Rivers : Boon or Bane?
8	Comment Chami Devi Murmu: The Green Crusader from Jharkhand	34	Special Report Green Growth and Development: Foundations, Issues, and Knowledge
12	Environmental Research Evidence of 3.5-Billion-Year-Old Bacterial Ecosystems Found in Australia	38	Perspective To Google or Not to Google : That is the CO ₂ Question
14	Features The Shrinking Greens Encroachments Constrict Kallar Wildlife Corridor	43	Terra Youth
22	In Conversation Professor Michael Porter, Deakin Unviresity, Australia	48	Maneka Speaks
		50	Pioneer
		54	Breakthrough
		56	Green Events and Wake-up Call

FEATURES

14

SPECIAL
REPORT

34



PERSPECTIVE

38

MANEKA
SPEAKS

48



Interlinking of Rivers

BOON OR BANE?

The Supreme Court of India has directed that the National River Linking Project be carried out without further delay.

However, **Sharada Balasubramanian** investigates whether we have considered all the aspects and impacts of this project and questions the wisdom of implementing it.

What comes to mind when we think of a river? The gush of water that traverses varied landscapes, picking up soil, minerals, and a whole lot of nutrients along the way, offering them to human beings and animals, and even supporting the tiniest life forms. The river has so much to offer us, yet we never understand its importance in our daily lives. Where some tribal and local communities still worship the river, others have caused destruction and wreaked havoc by obstructing the natural flow of rivers by building dams and canals. How justified are our decisions when we intrude into the paths of our rivers?

The landscape writes the river's course, the gravity decides its downward flow. The valleys and mountains, slopes and gradient, and the soil, in turn, design the river's path. Rain or snowmelt nourishes and maintains the stream.

A river is much beyond water being wasted into the sea. The flow of the river is a dynamic phenomenon, dependent on the rains received and the status of the catchment. Viewing the river as a mere 'water supplier' would be undermining its value.

According to the findings of the World Commission on Dams, the most important impact of dams is the physical

transformation of rivers. The World Resources Institute estimates that at least one large dam modifies 46% of the world's 106 primary watersheds.

The International Water Law classifies rivers into national, international, and internationalized rivers. The national river is one where the entire course flows within the territory of a single country; an international river is that which flows through the territory of one or more countries or forms an international boundary. An internationalized river is a river which, whether originally national or international, has been subjected to a special conventional regime between two countries.





The Onset of River Interlinking in India

Way back in the 19th century, interlinking of rivers was proposed by Sir Arthur Cotton for inland navigation in southern India. The partially developed project failed to take off as the railways was developing in India. In 1975, the idea to develop a Ganga–Cauvery link was proposed by the former Union Minister for Irrigation Dr K L Rao. The proposed project looked at the link taking off near Patna, passing through the Sone, Narmada, Tapi, Godavari, Krishna, and Pennar rivers, and joining the Cauvery upstream of Grand Anicut. The link was built to cross 2,640 km to draw water 450 metres from the Ganges during the flow of flood from the river. The plan proposed to withdraw 60,000 cusecs (cubic feet per second) of water for 150 days in a year. The

plan failed as the technological and energy cost to build and operate the plan was not practically feasible.

The then Ministry of Irrigation (now the Ministry of Water Resources) formulated a plan for a 'National Perspective for Water Development' in August 1980. This led to the establishment of the National Water Development Agency (NWDA) in 1982 to study basin-wide surpluses and deficits, and how storage, linking, and water transfer can happen. The approach aimed at evaluating water resources. This was based on a plan where information on optimum development of available, as well as new water storage sites, (wherever feasible) were known, for interlinking of major rivers. However, the question to be asked is, were appropriate measures taken to assess the hazards related to the project? For instance, did we factor in river pollution, biodiversity,



and the impact in surplus basins when water is taken away? Here, water was only looked at from the standpoint of whether the area under scrutiny was a drought area and the need to cater to the shortage by drawing in water from a basin with surplus. The reasons for why drought occurred in an area or an assessment of what happens to the surplus areas later on were not considered. These are important questions raised by the experts.

Where drought is cited as an important reason for carrying out the river linking project, a point to be mulled over is that drought can happen when rains do not arrive on time, due to ground water depletion, or when soil loses its moisture holding capacity due to incorrect cropping pattern or land use. It could even be a surface water drought when streams and rivers dry up after the monsoon period due to a host of reasons such as deforestation. Reports state the clear example of this case in Cherrapunji, Assam, one of the wettest

places on earth. Here, due to illegal logging and expansion of farmlands, there are floods for three to four months in a year and during the rest of the time, there are water shortages.

This is also precisely the reason why drought has become a recurring phenomenon in Kerala. Says A Latha from the River Research Centre, "The per capita water availability in Rajasthan is more than Kerala, just because we have not been managing our water well."

Defining Surplus and Deficit

A crucial question stands before us. How do we know if a river basin has surplus or not? Is there a benchmark? If yes, who decides this? Apart from this, there is a need to understand how the receiver uses the water given by the donor.

Says Latha, "Most of the times, sharing of rivers, whether inter-state rivers or others,

“ A point to be mulled over is that drought can happen when rains do not arrive on time, due to ground water depletion, or when soil loses its moisture holding capacity due to incorrect cropping pattern or land use.

is for irrigation purposes. There is no such thing as deficit or surplus here. It is an engineering-driven approach. The river holds water according to its capacity and its size." And the larger the river, the larger its basin; it is as simple as that. We opt to transfer water from one basin to another because we need it.

Latha also raises another important question: Do we analyse the reasons for water deficit in a particular river? Why does an area become dry?

Says Himanshu Thakkar, South Asian Network on Dams, Rivers and People, "Before interlinking is implemented, the environmental need for water needs to be understood. There has to be scientific basis before such decisions are taken."

Secondly, where do we find a reliable source of data on the rivers before we identify the so-called surplus and deficit areas?

Let us take the case of the Sardar Sarovar project across River Narmada. In this case, it was revealed after several years that the actual flow in the river is at least 27% less than what was projected. When such projects are commissioned, the data is a huge question mark.

There is another thing to be pondered over here. There needs to be an accurate database on the hydrology of the river basin to plan any water resource project. In a book titled *'Tragedy of Commons: The Kerala Experience in River Linking'* published by RRC and SANDRP, questions have been raised on how this database is created. How do we know whether these are factual numbers?

Another point is that the costs of irrigation or hydropower projects are estimated on the basis of the direct cost of construction, operation, and maintenance alone, according to the report. The benefits are assessed on the basis of rise in area of production due to irrigation. However, since irrigation water is subsidized in India, the cost-benefit estimation becomes skewed.

The idea of transferring water from so-called surplus to deficit areas is hardly possible in view of high infiltration and evaporation of water in dry areas. Such attempts would impair the ecosystem in both the areas. Is there such a thing called

"unutilized" waters? How reliable is the data on unutilized water resources?

There also needs to be a definition period of surplus and deficit time in rivers before linking is implemented. For instance, the linking plan needs to consider the surplus period in the donor area, which is July–October in the Ganga-Brahmaputra basin, which is not the time when it is needed most in the recipient area, which is January–May in the peninsular rivers. So, how is the period of water transfer decided in such a case?

Why are many large and medium dams not filling up if there are unutilized waters available? If and when we build our interstate "link projects", will they also have the same fate?

Why Interlinking?

Considering that large parts of the Ganga–Brahmaputra–Meghna basin face recurring floods and a number of western and peninsular states face severe droughts, the National Water Development Agency (NWDA) contends that "One of the most effective ways to increase the irrigation potential for increasing the food grain



Interlinking of Rivers

BOON OR BANE?





production, mitigate floods and droughts and reduce regional imbalance in the availability of water is the inter-basin water transfer (IBWT) from the surplus rivers to deficit areas.”

The National River Linking Project (NRLP) was formulated to ease water shortages in western and southern India and mitigate the impacts of recurrent floods in the eastern parts of the Ganga basin. The project cost of connecting nearly 30 rivers was estimated at over US\$ 100 billion.

Another reason for river linking is saving a drought-hit area. Says Latha, “Drought is not always natural. We also create drought due to incorrect intervention on land.”

River linking is more a human need than anything else. It is also looking at rivers as only water, and nothing else. “We do not see whether the rivers can take it or not”, she adds.

Reports reveal that the India’s average annual rainfall of about 4,000 billion cubic metres is unevenly distributed, both regionally and seasonally. The people who are for the linking project suggest that this would help in maintaining the flow

of water in all the rivers. It will also reduce the risk of drought and floods in various states.

Environmentalists and water experts rejected these claims. To them, it was a “mindless proposition”, especially when the government was not sure of the engineering and environmental impact, and some even warned about the ecological disaster the project may cause.

Environmental Hazards

Interlinking of rivers has been associated with various environmental issues. For instance, at the Suez Canal linking the Red Sea with the Mediterranean, some fish species of Red Sea origin passed through the canal and reached the eastern Mediterranean. The local species of fishes were displaced in this case. Such risks of trans migrations in interlinking of rivers are unknown.

In the case of India, linking of the Ken and Betwa rivers at the Panna Tiger Reserve in Madhya Pradesh was expected to submerge

an important wildlife habitat which was home to many endangered species. Apart from submersion, there were issues of noise pollution and movement of diesel vehicles which would kill the ecology of the forest.

The river has to flow; it has to reach the sea, even during the summer. The fishes that breed in the river and the people dependent on them need to be considered. And how can we ignore the most important aspect of catering to the zoological needs of the river?

Experts say that rivers are not reaching the sea in India; their ecological functions are damaged. The coastal and marine fisheries are affected, and rivers bring in filth. Any human endeavour on such a scale is an artificial intervention in the ecology, whether it is interlinking of rivers, harvesting rain, making dams, or afforestation. These decisions have to be taken on the basis of a strict social, environmental, and economic costs and benefits analysis.

According to Ramaswamy Iyer, former secretary, Union Water Resources Ministry and a well-known expert on water resources development, the proponents

and supporters of the interlinking of rivers project announced by the Government of India in 2002 often cite the Periyar project as a century-old and successful example of inter-basin transfer, but when we consider the strength of feeling in Kerala against the project, it might well be cited as a bad example of inter-basin transfer and a powerful argument against the larger national project.

It was envisaged that the NRLP, if implemented, would be one of the largest interbasin water transfer projects in the world. But this project was not conceived as practically viable.

Studies the world over show the disastrous impacts of blocking fresh water flows into the sea. For instance, in Pakistan and India, diversions on the Indus River and its tributaries have reduced water outflows into the Arabian Sea by 80%, thus destroying deltaic mangroves.

There is also a deep concern over linking polluted rivers to unpolluted rivers.

How Safe are Our Dams?

Have we done proper assessment on the safety of our dams, and what happens to the river after these dams are constructed? Says Latha, "In Europe, for instance, the licence of the dam agency is taken away if they are not adhering to the norms." Studies to determine these effects need to be undertaken in India.

As the case of the 119-year old Mullaperiyar dam shows, the ravages of time take their toll. This dam has been a matter of heated debate among the states of Kerala and Tamil Nadu for some time now. According to Ramaswamy Iyer, there is a strong need to question the safety of the dam here, more than anything else. Beyond the politics of water ownership and use, the matter of concern here is the condition of the dam itself. The dam is located in a seismically sensitive zone, and recently there have been a series of tremors with epicentres close to the dam.

An outbreak could be unimaginably disastrous, putting the ecosystem and the lives of many people at stake. However, expert opinion on the safety of the dam

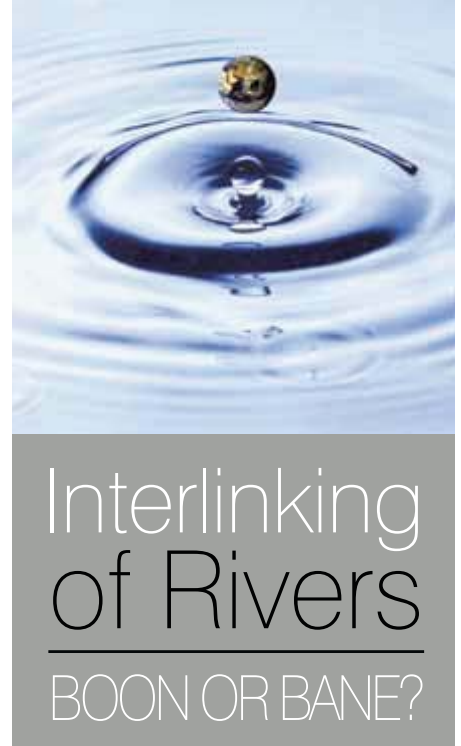
is divided. On the one hand, some believe that the dam would be safe with certain repairs; others believe that the dam may be unsafe, based on hydrological studies as well as the technology and material used for dam construction.

Who Owns the Water?

Many times a river development project by one state on an interstate river may submerge the territory of another riparian state. Hence, it becomes reasonable that the state that uses the territory of another state for storage purposes pays compensation to the latter.

Kerala, which has always been projected as a water surplus state, has linked rivers. The agreement between the two states, Kerala and Tamil Nadu, on the rights to compensation (riparian rights) for land and water, sharing the benefits, power, and irrigation has been violated, according to reports. The tribes which have been displaced from those areas were also not rehabilitated.

Another point of contention is the legal status of the water. In the Constitution of India, water is subject to state control, with the national government being allowed to intervene only in the regulation and development of interstate rivers to the extent that it is declared by the parliament to be a situation that is in public interest. Under Article 262, the Government of India



“Studies the world over show the disastrous impacts of blocking fresh water flows into the sea.



created the Interstate Water Disputes Act of 1956 to resolve interstate problems, but water has become an increasingly politicized issue.

India is locked in conflicts both with its neighbours and domestically over water problems. Though the diplomatic relations of India with Nepal and Bangladesh are good, water issues could impinge upon these connections. Reports suggest that our laws are not sufficient to address such conflict issues. Though interstate conflict has a law, it is limited to adjudication only and is, hence, severely limited. Where the water comes from and where goes have become very critical issues in every water conflict.

Any withdrawal of water in the upper catchment area may cause depletion of water resources lower down the river. This may cause severe inter-district, inter-state, and inter-country disputes, as we witness in the cases of the Cauvery or Ganges.

Water is indeed in the State List when it comes to India, but this is subject to the provisions of Entry 56 in the Union List, which runs as follows:

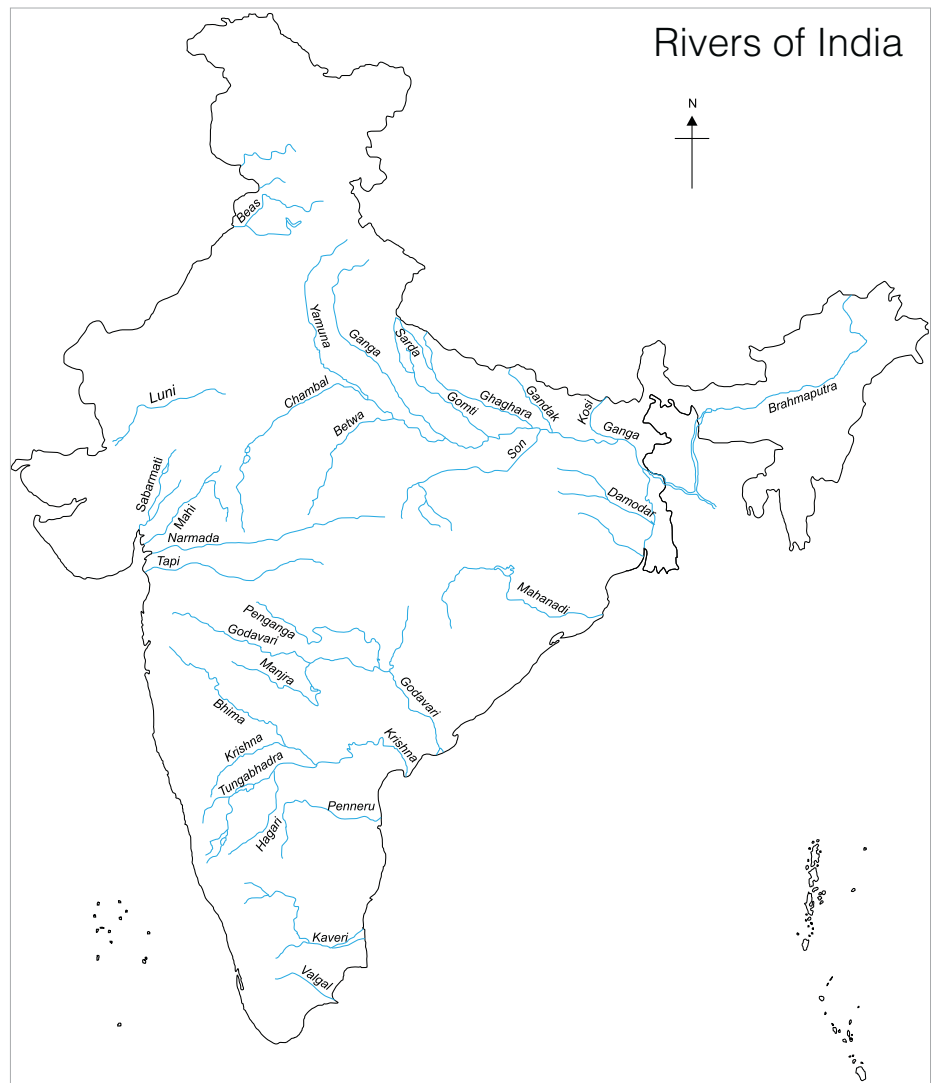
"Regulation and development of inter-state rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by parliament by law to be expedient in the public interest".

The Centre is given an important role with respect to inter-state rivers.

Reports suggest that this is reinforced through provisions of Entry 20 in the 'economic and social planning' by virtue of which major and medium irrigation, hydro power, flood control, and multi-purpose projects have been subject to the requirement of Central clearance for inclusion in the national plan.

There is also a requirement of clearance from the Centre under the Forest Conservation Act and the Environment Protection Act.

The Sutlej-Yamuna link canal is an attempt at transferring the waters of River Sutlej to the Yamuna river basin. However, despite the Supreme Court order, Punjab refused to implement this plan, citing lack of surplus water in the region. There are scores of such examples.



In such cases, constructing a reservoir would add to the financial, social, and environmental costs. Though the government tries to justify the linking project, the impacts will be disastrous for states or countries living downstream as livelihoods are dependent on these rivers. For instance, the major economy of Bangladesh depends on the seasonal fluctuations of the Ganga and Brahmaputra. Also, wetlands such as the Sunderbans will be impacted by it.

In India, the principle is well accepted that the state which will be flooded due to another state should receive compensation. Apart from monetary compensation for the acquisition of land for the project, and resettlement of affected people, benefits with respect to irrigation or power may be given to the submerged state by the river project. For instance, the construction

of the Bajaj Sagar dam by Rajasthan and Gujarat on the Mahe River in the territory of Rajasthan would flood some areas in Madhya Pradesh. Therefore, it was agreed that Madhya Pradesh should be compensated by giving it a share of project benefits.

Alternatives to River Linking

Historically, since the time of kings, local communities managed water using indigenous water tanks and harvesting techniques. The British brought in a centralized system and slowly these ancient mechanisms faded. With that, the ownership of water changed hands from the local community to the government.

According to the NWDA, India will require about 450 million tonnes of food

grain per annum to feed a population of 1.5 billion in the year 2050. To meet these requirements, there is a need to expand its irrigation potential to 160 million hectares, which is 20 million hectares more than the total irrigation potential.

There is also some talk about how Lalitpur in Bundelkhand, Madhya Pradesh, with the largest dam density in Asia, is facing serious problems of depletion of ground water. However, some distance away in Tikamgarh, there are 500-year-old ponds and small dams constructed by the Chola kings. These have retained the ground water level to assist 35% more land irrigation.

There is a strong need to assess the existing projects and dams and find their impacts. There is also a pressing need to sustain ground water. We also need to push efforts to save rainwater.

Says Thakkar, "Considering that fact that we receive ample rainfall, water saving mechanisms can be one of the solutions to the water scarcity issues."

The proponents of the river linking project cite irrigation, more food production, and eventually, a solution to the future food security issues as major advantages. This needs to be looked at carefully. Says Thakkar, "For food production, a better option is to find ways of saving rain water."

Experts opine that when water is let out for irrigation purposes, people start taking water for granted and do not restrict its use. The demand in such cases will keep increasing. Says Latha, "In five districts in Tamil Nadu, the irrigated area increased to about 400,000 hectares. However, people started irrigating more and more when they started getting water. Water is never enough in such a scenario. Once people get water, they become irresponsible." Thus, the need for the usage of water itself has to be justified. In such cases, proper water efficiency measure is the only recourse. Now, there should be a move towards crop efficiency, and developing cultivation practices and mechanisms that save water.

Can we manage the available water in meaningful ways? Are citizens and communities willing to have interlinking? The revival of water harvesting techniques and water management systems and

practices begins in the community. Some of the driest regions, such as Rajasthan, have been following these practices and manage water by themselves as a community. The people in such regions prove that local water issues can be sorted without importing water from elsewhere.

The solutions to interlinking are many. By proper management of existing water systems in an efficient manner and by saving rain water, one can irrigate the land. By following ancient water saving mechanisms and storing techniques, we can have more water. For irrigation purposes, sprinklers and other water saving mechanisms can be put in place. It has also been suggested that instead of interlinking of rivers, virtual water can be used. Simply put, virtual water is like the concept of exchange of goods and services. For instance, when a country imports one tonne of wheat instead of producing it domestically, it is saving about 1,300 cubic meters of the local water. If this country has water scarcity, the local water can be saved and used for other purposes. In the case of river linking, experts suggest that instead of merging rivers, investing money, and playing with the natural cycle of the river, food grains can be transported to the needy areas. The concept of virtual water can be one of the alternatives to river linking.

When there are so many alternatives, why should we opt for river linking without knowing its consequences? Think about it! ■

Sharada Balasubramanian is an environmental journalist based in Coimbatore. She writes on wildlife conservation, water, green energy, and other environmental issues.



Interlinking of Rivers

BOON OR BANE?



TerraGreen promotes the concept of sustainable development. Launched in June 2004, this magazine from TERI is an effort to bring forth information and knowledge in the fields of energy, environment, and sustainable development. The magazine is in keeping with our mission to expand the base of environmentally conscious readers and popularize sustainability issues at the local level. *TerraGreen* aims to provide the readers with the necessary inputs to enable them to be a part of the process of change. The magazine stays away from all jargon, so that the educated, informed, yet lay readers are updated on all that happens around them everyday.

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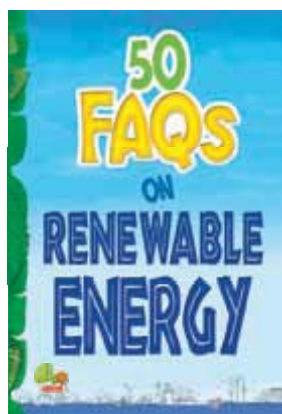
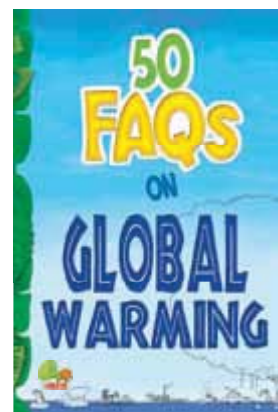
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