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Save Water to Save Our Nation

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Abstract:
Water is essential natural resource which cannot be generated like other commodities. Water is the elixir of life, a basic human need, its use need appropriate ground work, development and management. Households, industries and farmers freely extracted ground water and dumped untreated waste into water ways without second thought but such practices are now increasingly untenable in this rapid growing country. As per the Ministry of Water Resources, per capita availability of water has been steadily falling for over a decade, dropping from 1,816 cubic meters per person in 2001 to 1,545 cubic meters in 2011. By 2025, it's projected India's annual per capital availability of water will further reduce to 1,340 cubic meters and by 2050, to 1,140 cubic meters.1 The reduce is projected to deepen in coming years as the population grows. India which currently has 1.3 billion people is set to overtake China by 2022 and reach 1.7 billion in 2050.2 Water tables have lessen by an average of one meter every three years in some parts of the Indus basin, turning it into the second most over stressed aquifer in the world, according to NASA.3 Across nearly the whole country, basic sewage management is inadequate to the Third World Centre for water management, only about 10% of waste water in the country is collected and properly treated. As a result, all over water bodies in and around human settlement are seriously polluted in India.4 Today, the country is struggling to provide potable water to every citizen. The economy of the country is increasing at a fast pace (According to updated World Bank figures on GDP(Gross Domestic Product) of countries for 2017, India has become World's sixth biggest economy surpassing France to seventh place) due to rapid urbanization and industrialization.5 The enormity of the quantum of water growth is therefore easily understandable.

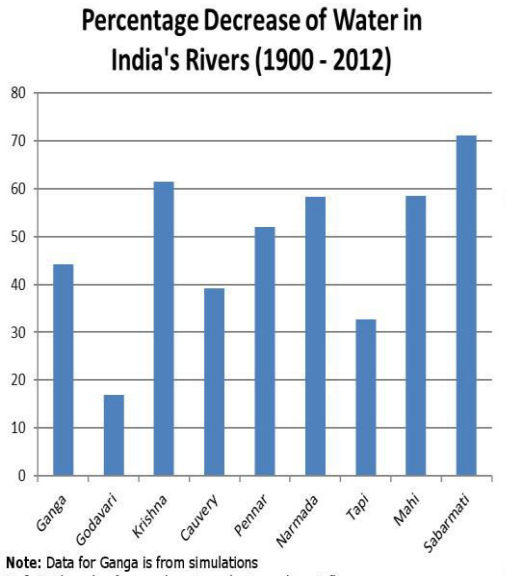
Keywords: water conservation, spatial disparity, catchment area, mitigatory steps, cropping area, hydrological cycle, storm water management, multiple linkages, environmental concern

I. INTRODUCTION:

The water resource outline of the country is changing fast both in terms of demand and availability. The situation is further exasperated by the climate change which is going to alter the paradigm of management of water resource. It is on the catchment area of its rivers that India's civilization and its cities emerged and nurtured. Population pressures and developmental imperatives may have led to overexploitation of our rivers and groundwater, but poor planning and deliberate neglect breaking the organic links between rivers, nature and people is no longer acceptable. India is heading for a grave water crisis and remedial measures cannot be adjourned. For irrigation purpose nearly 80% of water required followed by drinking needs, industry and energy sector. On the demand side mitigatory steps like changing cropping patterns, restraining wasteful practices, and nurturing renewable energy must be stepped up. India has 4% of the world water resources and 17% of the world population. **6** Then also, residents of New Delhi or Kolkata today use more than twice as much water, on average, than people in Singapore, Leipzig, Barcelona or Zaragoza, according to data compiled by the Third World Research Centre. The water use in Delhi is 220 litres per capita per day (lpcd), while some European cities boast figures of 95 to 120 lpcd.**7** Surplus consumption is attributable in part to citizen indifference about saving water after so many years of plentiful supply. Since large swaths of many Indian megacities lack piped supply of clean water, leaks and theft are common. Cities in India lose 30% to 40% due to leakages and non-authorised connections. At this point, the only viable option for India would seem to be managing demand and using water in a way that achieves maximum productivity with minimum expanse. For inspiration on how to manage water demand, India could look to Berlin in Germany, Singapore and California, All of which have designed and implemented such policies in recent years. Successful measures include raising public awareness, recycling water, fixing leaks, preventing theft and implementing conservation measures such as water harvesting and storm water management should be taken care. Between rapidly disappearing fresh water, unchecked pollution and so many thirsty citizens, India is facing a forthcoming water crisis unlike anything prior generations have seen. If the nation does not begin urgently conserving water, the faucets will run soon dry. There is simply no more supply to misapply.

Present Status of water accessibility Only handful of countries in the globe can boast of such an extensive river network that our country India has. The total precipitation including snowfall, in the country is around 4000 Billion Cubic Meters (BCM). Of this, 3000 BCM precipitation is confined during three to four months (June – Sept). Thus, there is significantly high temporal disparity. On the other hand, the spatial disparity is also evident from the fact that while on one hand rainfall is of the order of 12,000 mm in Meghalaya, it is merely 100 mm in the western parts of Rajasthan. Taking into consideration the loss due o evaporation soil absorption, percolation etc, the average annual natural runoff is about 1869 BCM. Because of topographical and

other constraints only 690 BCM from surface water and 433 BCM from groundwater can be put to valuable use. Further out of the 690 BCM of utilizable surface water, about 40 percent is in the Ganga-Brahmaputra-Meghna system which drains the states lying in the north and north-eastern regions .So there is clear indication to the nation to make proper arrangement for storage capacity to meet the demand of every citizen.

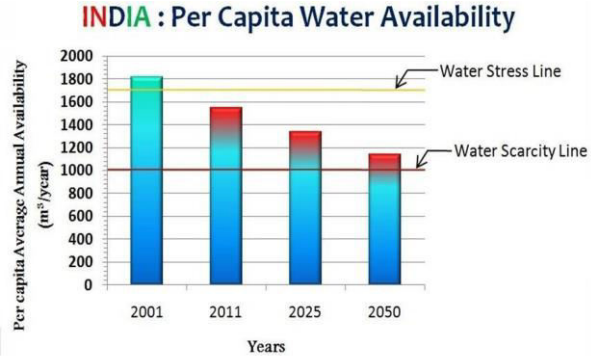


Note: Data for Ganga is from simulations
Ref: 1. The role of mega dams in reducing sediment fluxes
A case study of large Asian rivers (http://dx.doi.org/10.1016/j.jhydrol.2012.07.038)
2. Man-made Climatic Changes In The Ganges Basin (doi: 10.1002/joc.732)
3. Ganga Basin Water Balances (http://documents.worldbank.org/curated/en/983071491924854124/pdf/108247-V1-WP-P159445-OUO-9-volume-1-ACS.pdf)

India's water availability per capita is reducing progressively due to increase in population and the country is already facing water stressed conditions.

"India cannot sustain drought beyond one non-Monsoon season due to low per capita storage, and faces acute stress if any year happens to be drought hit," said Water Resource Minister Mr Nitin Gadkari on 6 march 2018

According to Central water commission India's average annual per capita water may reduce to 1340 cubic meters in 2025 and 1140 cubic meters in 2030. In 2001 it was measured to be 1816 cubic meters, and in 2011 it was 1545 cubic meters.**8** The government defines anything less than 1700 cubic meters per capita water, annually, as water stressed conditions, and anything less than 1000 cubic meters as water scarcity. Mr Nitin Gadkari said that the total capacity of completed dams in the country needed to be upped, from 253



Source: Central Water Commission Report June 2018

billion cubic meters (BCM) to 450 BCM. This was needed to utilise the surface water resources of 690 BCM.

Climate Change and Water Resources

Climate change is estimated to have acute impact onto water resources. Temperature drives the hydrological cycle, affecting hydrological processes in a direct or indirect way. A warmer climate may lead to intensification of the hydrological cycle, resulting in higher rates of evaporation and increase of rainfall. These processes, in association with a shifting pattern of precipitation, would affect the spatial and temporal distribution of runoff, soil moisture, and groundwater reserves and increase the frequency of droughts and floods.

The future climatic change, though, will have its impact globally but likely to be felt critically in developing countries with agrarian economies, such as India. Increasing population, industrialization and associated demands for freshwater, food and energy would be major areas of concern in the changing climate. Increase in extreme climatic events is of great consequence owing to the peril of the region to these changes.

Recent Administrative strategy for water conservation

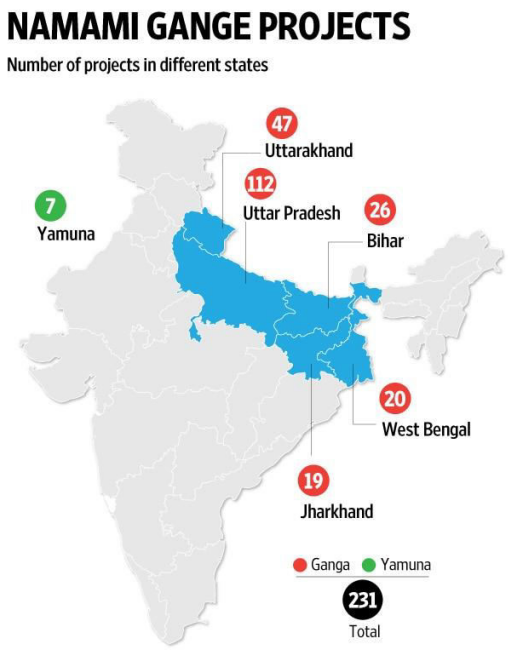
Water is one of the most key elements in our national planning for the 21st century. The proper management of our limited water resources is necessary to ensure food security for our rapid growing population. It is essential also to avoid the growing conflicts and the possibilities of social unrest in the country in future due to water shortage.

The strategy should provide broad guidelines and should be flexible enough to suit the various conditions in each watershed and river basin. Different regions of the country are enriched differently with water in the form of precipitation, surface flows and ground water, need their own region-specific policy, which can be based on broad guidelines elaborated below:

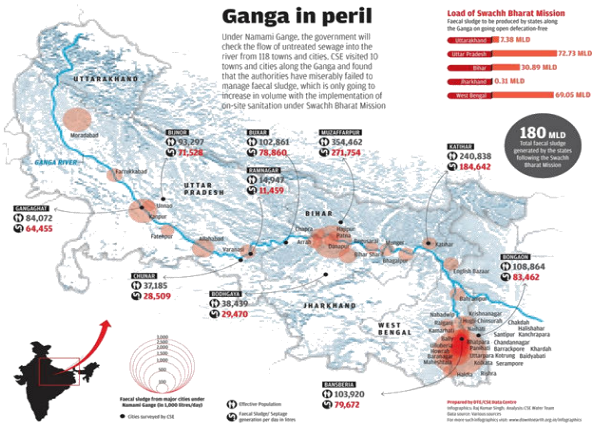
Namami Gange Programme

Namami Gange Programme is an ambitious integrated Ganga Conservation Mission that was launched by Prime Minister Narendra Modi in **May 2015**.

The National Mission for Clean Ganga (NMCG) is the execution wing of National Ganga Council which was set up in October 2016 under the River Ganga (Rejuvenation, Protection and Management) Authorities order 2016. The order dissolved National Ganga River Basin Authority. The objective is to clean the Ganga and its tributaries in a comprehensive manner.**9** Marking a major shift in application, the Government is focusing on involving people living on the banks of the river to attain sustainable results. Drawing from the lesson learned from the previous, enactment the program also focuses on involving the States and grassroots levels institutions such as Urban Local Bodies and Panchayati Raj Institutions in implementation. The scheme would be implemented by the National Mission for Clean Ganga (NMCG), and its state counterpart organizations i.e., State Program Management Groups (SPMGs). NMCG will also establish field offices wherever it's required.



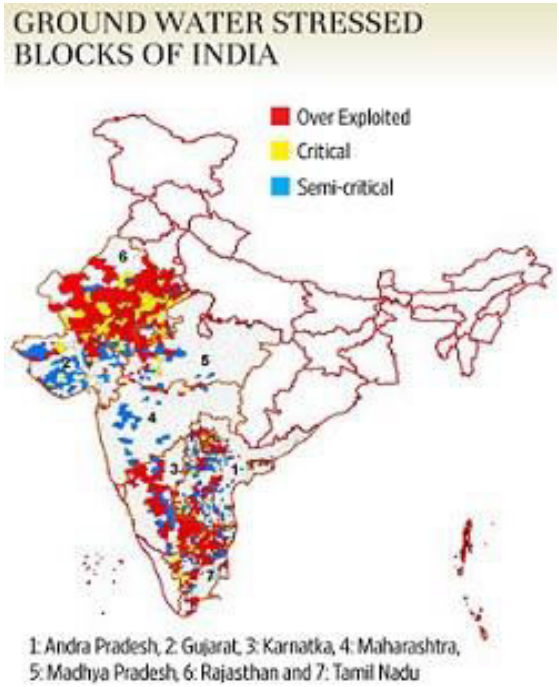
Source: Ministry of Water Resource,October2016



Source: Centre of Science and Environment Report 2017

National Mission for Clean Ganga (NMCG) organized a brainstorming session on World GIS Day 2018 in New Delhi, with the theme 'G-Governance of Namami Gange programme through Geospatial Technology'.**10** The objective of the session was to share the knowledge on use and application of geospatial technology for monitoring and management of various activities being undertaken under Namami Gange Programme, and also provide feedback on the current use of this technology with reference to Ganga Basin. Shri. Rajiv Ranjan Mishra, DG, NMCG said "The use of GIS technologies has improved our ground level understanding of the Ganga River Basin and we have been able to evolve evidence based policies and develop projects that are bringing about tremendous changes at the ground level. The GIS cell of NMCG has brought about paradigm shift in visualisation of all crucial spatial and non spatial information of Ganga basin as it is a robust, scalable and standards-based circulation framework.

Atal Bhujal Yojana has been formulated by the Ministry of Water Resource to address the criticality of ground water resources in a major part of the country. The scheme aims to improve ground water management in priority areas in the country through community participation. The prime concern areas identified under the scheme fall in the states of Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh. These States represent about 25% of the total number of over-exploited, critical and semi-critical blocks in terms of ground water in India. They also cover two major types of groundwater systems found in India - alluvial and hard rock aquifers- and have varying degrees of institutional preparedness in groundwater management. The execution of the programme is expected to have several positive outcomes like better understanding of the ground water regime and integrated community based approach for addressing issues related to ground water depletion, sustainable ground water management through convergence of on-going and new schemes, adoption of efficient water use practices to reduce ground water use for irrigation and proliferation of ground water resources in targeted areas. The World Bank has approved Atal Bhujal Yojana (ABHY), a Rs.6000 crore Central Sector Scheme of the Ministry of Water Resources, River Development and Ganga Rejuvenation. The scheme is to be implemented over a period of five years from 2018-19 to 2022-23, with World Bank assistance. **11**



Source: Ground water Scenario in India, November 2014, Central Ground Water Board; PRS.

This scheme will help those who are in need for constant ground water supply especially farmers who have been hard impacted by acute shortage of groundwater for past several years. It's aim is primarily on participation of local communities and convergence with different water schemes. Its major element is making society aware and bringing about behaviour change to manage groundwater resource. It will help improve overall outlook towards water resource. The current status of groundwater is alarming, primarily due to non-uniform ground water development and its over-exploitation. According to report published by the Central Ground Water Board (Ground Water Assessment, 2011), out of 6,607 assessed administrative units 1,071 units are over ground water exploited, 217 units are

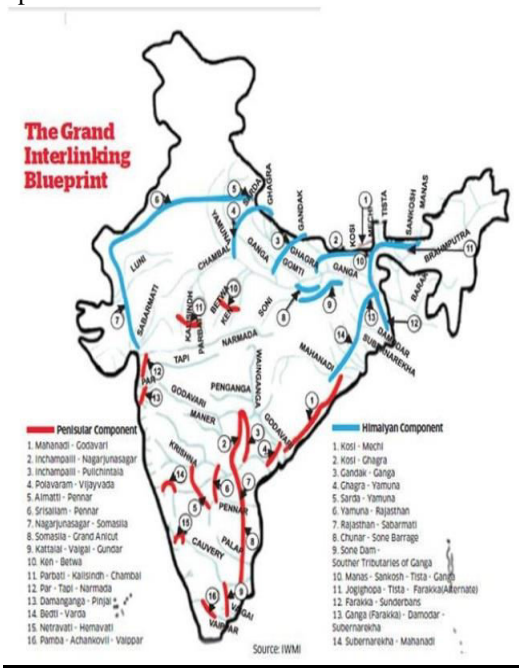
critical, 697 units are semi-critical, and 4,530 units are safe. Moreover, there are 92 units are completely saline.

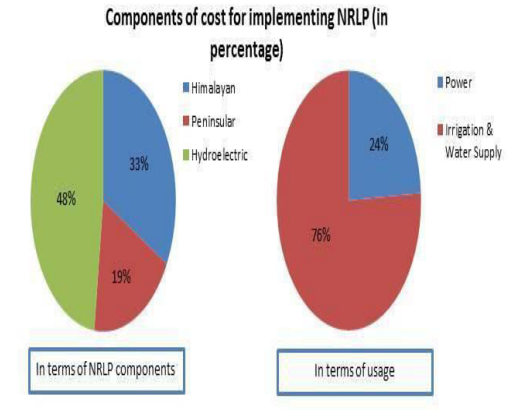
Swajal yojana

The government of India has launched Swajal scheme to ensure there is a steady supply of clean drinking water in rural areas. These remote rural areas usually receive contaminated and harsh water which, on consumption, has led to many illnesses. The government has chosen 115 rural districts which will receive rapid transformation to match up to government's vision of 'New India'.**12** The selection criteria of these districts are dependent on six socio-economical parameters, according to Niti Aayog. The parameters are health and nutrition, education, financial inclusion and skill development, agriculture and water resources and basic infrastructure. A National Consultation on the National Rural Drinking Water Programme (NRDWP) and Swajal was held in the Capital of India on 14 june 2018 to discuss the reforms needed in NRDWP and to outline a road map for the Swajal scheme. The consultation was chaired by the Union Minister of Drinking Water and Sanitation, Sushri Uma Bharti, Union Minister for Drinking Water and Sanitation publicised that Swajal schemes in 115 aspirational districts of the country will involve an outlay of Rs 700 crores through flexi-funds under the existing NRDWP budget. These schemes will aim to provide villages with piped water supply powered by solar energy. The scheme will train hundreds of rural technicians for operation and maintenance of Swajal units. The Minister spoke about the relevance of Swajal in remote rural areas in the aspirational districts of the country.Rs.1000 crores will be earmarked for addressing the drinking water needs of 27,544 arsenic and fluoride affected habitations of the country in this financial year under the National Water Quality Sub-Mission (NWQSM). Further, she called upon the States to ensure that the Sustainable Development Goal 'safe drinking water for all' is achieved in India by 2030. This Swajal scheme was launched by the government for sustained water supply in rural areas. 90 per cent of this project is funded by the government and 10 per cent is funded by the beneficiary communities.**13** The management of this operation is managed by local villagers and hundreds of technicians will be trained under this scheme to maintain and operate the units. All the villages will get water supplied through fitted pipes. This will ensure that the water is not contaminated. The maintenance of these pipes will be taken care of by the technicians. The management of this operation is managed by local villagers and hundreds of technicians will be trained under this scheme to maintain and operate the units. All the villages will get water supplied through fitted pipes. This will ensure that the water is not contaminated.

River-Interlinking project

The idea behind River Interlinking mammoth project is to deal with the problem of drought and floods exasperating different parts of the country at the same time. PM Modi's project has plans to interlink more than 60 rivers across India, including the Ganges, aiming to reduce floods in some parts and water shortages in other parts of the country.**14** It also targets to decrease farmers' dependency on uncertain monsoon rains and bringing millions of hectares of cultivatable land under irrigation. The National Perspective Plan envisions about 150 million acre feet (MAF) or 185 billion cubic meters of water storage along with building inter-links. These storages and the interlinks will add nearly 170 million acre feet of water for beneficial uses in India, enabling irrigation over an additional area of 35million hectares, generation of 40,000 MW .Water-surplus rivers will be dammed, and the flow will be diverted to rivers that could do with more water. In all, some 30 canals and 3,000 small and large reservoirs will be constructed with potential to produce 34 Gigawatt of hydroelectric power. Prime Minister Narendra Modi's ambitious Rs 5.5 lakh crore Rivers Inter-link plan is a large-scale civil engineering project that aims to link rivers through a network of reservoirs and canals across India. The mission of this programme is to ensure greater justice in the distribution of water by intensify its availability in drought-prone and rainfed areas. A Task Force for Interlinking of Rivers was constituted by the Ministry of India in April, 2015 which also meets the requirement of Committee of experts as directed by the Cabinet while approving the constitution of Special Committee.





Source: Survey of major Rivers of India, International Water Management Institute

II. DETAILS OF IMPORTANT ILR PROJECTS

1. **Ken – Betwa Link Project**

Ken-Betwa link project has been declared as National Project by the Government of India. That will require building of a dam on

the Ken river, also known as the Karnavati, in north-central India and a 22-km (14-mile) canal connecting it to the shallow Betwa. Detailed proceedings/documents of the public hearing under Phase I of Ken – Betwa link were submitted to Ministry of Environment and Forests and Climate Change by Madhya Pradesh Pollution Control Board in April, 2015. The various clearances for Ken – Betwa link project are in the advance stages and the Government is all set to start implementing this National Project as model link project of ILR programme.

2. **Damanganga – Pinjal Link Project**
The Detailed Project Report (DPR) of Damanganga – Pinjal link was completed in March, 2014 and submitted to Maharasthra and Gujarat. The Municipal Corporation of Greater Mumbai (MCGM) which has been made the nodal organization by Maharasthra Government submitted the report to Central Water Commission during January, 2015 for assessment.

3. **Par – Tapi – Narmada Link Project**
The DPR of Par-Tapi-Narmada Link Project completed by NWDA in August, 2015 and submitted to Governments of Maharashtra and Gujarat.

4. **Mahanadi – Godavari Link Project**
Mahanadi Godavari link is the first and critical link of nine link system of Mahanadi-Godavari-Krishna-Pennar-Cauvery-Vaigai-Gundar under Peninsular Component of National Perspective Plan (NPP).

5. **Manas-Sankosh-Teesta-Ganga link**
MSTG link envisages diversion of 43 BCM of surplus water of Manas, Sankosh and intermediate rivers, for expanding the flow of Ganga and provide 14 BCM of water in Mahanadi basin for further diversion to South through Peninsular link system.

6. **Intra-State Links**
The NWDA has received 46 proposals of intra-state links from 9 States - Maharashtra, Gujarat, Jharkhand, Orissa, Bihar, Rajasthan, Tamil Nadu, Karnataka and Chhattisgarh. Out of these 46 proposals, Pre-Feasibility Reports (PFRs) of 35 intra-state links have been completed by NWDA up to March, 2015.

III. MAIN CRITICS OF RIVER INTERLINKING PROJECT

Although National Perspective Plan has several merits as mentioned above, it has several demerits too as pointed out by the opposing group. These are briefly discussed underneath.

- A group of people, especially the NGOs, the Socio-Economic and the environmental lobby are antagonist to the government's River Interlinking programme which will eventually result in environmental degradation, climatic changes, evaporation loss, loss of aquatic eco-system, water logging and salinity .
- only a small part of floodwater (approximately 3 % of flood volume) will be stored and transferred through the link canals, there will be hardly any flood relief.**15** Droughts may not occur concurrently with floods and it may not be feasible to remove drought in all the distant areas, especially those lying in higher altitude due to excessive cost of pumping.
- Water is a state subject under entry 17 of state list- II subject to entry 56 of central list- I at present. Even if the project is found to be techno economically feasible, implementation of the same will be a Herculean task. It needs constitutional amendment. Most of the donor states, even though surplus, will be reluctant to part with its resources free of cost and shall try to project their future demands stating that their surpluses are owing to insufficient storage due to lack of investment in their states.
- Recently, the country has witnessed bitter quarrel and animosity amongst the States of Karnataka and Tamil Nadu over the sharing of water from rivers Cauveri and Krishna, even though both the states are riparian states. One can well imagine the degree of complexity and the dispute that will arise over sharing of water from the proposed scheme where a large numbers of states are involved, resulting in tension and rivalry amongst the people of different states.
- The November 2000 report by the World Commission on Dams concluded that a mere 10-12 per cent of India's foodgrains production comes from big dams. But it is groundwater that has been India's real lifeline, says Himanshu Thakkar, 53, SANDRP's convenor, who has spent most of his life battling big dam lobbies.It is estimated to be 70 per cent more productive than canal irrigation, it needs to be sustained by protecting traditional recharge systems. If implemented, the ILR programme, he says, would seriously jeopardise the very resource that sustains India's food security. Because river courses-the most important recharge areas-completely lose their capacity to replenish aquifers because of being denied flows downstream of the dams"**.16**
- A new study by researchers at the Indian Institutes of Technology in Mumbai and Chennai, analyzing weather data over 103 years (from 1901 to 2004), has found that rainfall has decreased over the years by more than 10% even in river basins that once had a surplus, such as those of the Mahanadi and the Godavari. The project seems to view the river as a uni-dimensional water pipeline when it is, in fact, an entire ecosystem—and any changes to its natural course will have an impact on all the flora and fauna, the wetlands and the floodplains that are intricately linked to the river system.
- The long-term environmental impact of such a project is a major concern. For example, one of the reasons why the Ken-Betwa link, which is now receiving priority attention, has been stuck for several years is because it requires environmental clearance for diverting 5,500 hectares from the Panna National Park, a tiger reserve. Less than positive experience other countries have had with such projects—be it the Soviet regime's decision to divert the Amu Darya and the Syr Darya, which fed the Aral Sea, to irrigate the desert, or the Australian government's experiments in its Murray Darling basin. Political challenges as well. Water transfer and water sharing are sensitive subjects that have already spawned century-long disputes.
- Former water resources secretary and a determined ILR opponent, the late Ramaswamy Iyer had dismissed it as "technological hubris", famously saying that a river wasn't "a bundle of pipes which can be cut, turned and welded at will".**17**

For its timely implementation, some aspects should be taken care of -

- As pointed out by the Draft National Water Framework Bill, 2016, equity component of access to water should be given prime importance while choosing the beneficiaries of the programme.

- There is a considerable disagreement between the states on the ILR. While Tamil Nadu is in its favour, Assam, Kerala and Sikkim may oppose it due to the loss of water resources.

Hence, it is the responsibility of the Union Government to frame consensus on the programme in order to avoid tention in federal relations. For this, the Parliament is the most suitable platform.

- Principles of excess should be laid down instead of legal definition of excess which has different perspective among stakeholders and environmentalists.
- Necessary legal framework should be prepared in the form of MoUs and consensus to ensure cooperation of neighbouring countries that have sovereign rights over the Himalayan river waters.**18**

NEED FOR WATER CONSERVATION AND MANAGEMENT

In every sectors inconsistency and mismatch of water availability and demand highlights the need for conservation of water. Water conservation has three dimensions:

i. Water resources conservation- efficient management of available water through proper storage, impartial allocation and transfer to scarcity areas for use. Preservation of the quality of the resource including ecosystem conservation.
ii. Water use conservation -water supply and distribution with minimum losses and consumption through negation of wastage.
iii. Well planned use of water through adoption of water saving technologies and cropping patterns. To achieve the objective of conservation of water in the agricultural and industrial sectors focus of attention will have to be on amplification and creation of additional resources, performance improvement of existing systems, coordination amongst various agencies Strategies will need to focus on augmentations and optimum utilization without sacrificing on quality of water with people's participation.

IV. CONCLUSION

Water resource development is to be seen not merely as a single-sector-end objective, but as a prime mover in developing larger systems with multiple linkages. This calls for a well set out multi-disciplinary agenda covering not only technological issues but also issues of social, economic, legal and environmental concerns. Therefore the planning, management and development of water resources has to be taken up in an integrated manner for addressing the concerns facing the water sector. This integration has to be a multi-disciplinary approach which would take care of all the conflicting issues and deliver solutions that would be technically feasible, economically viable, socially acceptable and ecologically & environmentally sound. Water use, in turn, has its impact on water quality and therefore utilization of water has to be so managed as not to contribute to the decline of water quality that may seriously threaten it's future availability.

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