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# Jalavamvad

A Dialogue on Water  
Editors: Dr. Datta Deshkar, Shri Satish Khade



Pleasures of a clean beach...



Dr. Bhogale, Retired Professor of WALMI has recently completed 75 years. He is a water activist and close associate of Jalsamvad Magazine. He was the Chairman of the committee which designed the framework of the Participatory Irrigation Management Act passed by the Government of Maharashtra in the year 2005. He gave intensive training to the workers of different water users associations in the capacity building programme conducted by WALMI. He was also in charge of the training programmes arranged for fresh engineers joining the Irrigation Department. We wish him long and peaceful retired life.



Our friend, philosopher and guide, Shri Sharad Mande completed 80 years recently. We congratulate him on this occasion of Sahasrachandra Darshan programme. He was felicitated at the hands of Shri Ramraje Naik-Nimbalkar, Chair person of Maharashtra Vidhan Parishad. This programme was arranged by Shri Anil Patil, Chairman of Maharashtra Vikas Kendra, Pune. We wish him long and peaceful life.

# Jalsamvad



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With great efforts and after spending crores of rupees, that too borrowed from world financial agencies we constructed innumerable dams to make water available to the cultivators in the country. And the tragic part of this is we are using that collected water with only 35 percent of efficiency. On one side, we say that water is not available but on the other side we find that whatever is available we are not using properly. It means that something is wrong with the management of water. This is happening in all sectors of the economy. We are creating thousands and lakhs of management students in the country every year but they are not being used profitably for building the Nation. Is there something wrong in the training we are giving to them?

Is it that the staff of irrigation Department feel that stopping the flow of water by constructing a dam is their only responsibility? Who is responsible for the proper use of that water collected by the dam? If a thought is not given to this, the entire purpose of constructing that dam is basically defeated. On one side we have designed a slogan, More crop per drop. But unfortunately 65 percent of the drops collected are not used at all for the purpose for which they are collected. It would not be an exaggeration to say that the interest of the people working in the irrigation department comes to an end immediately after the construction work is over as distribution of water is a thankless job for them.

The Government has realized that jala also has a shakti and that prompted them to rename the Mantralaya as Jalashakti Mantralaya. But what is happening to that Shakti? Is that shakti being properly utilized? Till now all our efforts were directed towards creating that shakti but we have miserably failed in using that shakti. Side by side we should have directed our efforts to create efficient water users associations but nothing significant has been done till now. It is only after the pressure from the World Bank we have started thinking in that direction. Right from the time we got freedom, we started constructing dams and by 2000 innumerable dams were constructed. But till then there were no efforts to form water users associations in the country.

Till now, measurement of water was not our priority. And the entire system created by us never gave any thought to it. As a result, all of us have adjusted ourselves to a system where measurement of water was no issue. Even literate citizens of cities like Pune even today oppose to the metering system for use of water for domestic consumption. If this is the case, how can we compel a cultivator to get a measured quota of water and use it?

In this background let us examine the position of water users associations in Maharashtra. The condition of these association is deplorable. It is said that more than 5000 associations have been formed. But of these, how many are functioning? The Government of Maharashtra has made it obligatory to cultivators in the command area to organize themselves in such associations if they want water. But the response from the cultivators is not at all satisfactory. The total command area in the state is around 17 lakh ha. It is estimated that we would need approximately 9000 water users associations to manage water in this area. Basic purpose of these associations is to use water efficiently and promote equitable distribution of water. But the process of handing over the water distribution system to water users is so clumsy that very few of them are being operated satisfactorily. Presently managing water has become nobody's business. Government desires to withdraw from the system but has failed to create a satisfactory alternative and there are no systematic efforts on the part of the machinery to create such an organization. Let us hope that in years to come such efficient system comes into being.

Dr. D. G. Deshkar, Editor

## A Medieval Hydraulic Wonder !

The Water Supply System at Burhanpur (MP) - India

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### The begone History :

It takes four hours by road to reach Burhanpur from Bhopal - the Capital of Madhya Pradesh (India), but it will take you four centuries back in the history showing the bygone shining period of Mughal Kingdom. All religions have their footprints in and around Burhanpur. Importantly the dead body of Mumtaj - wife of Shahjahan who died at Burhanpur, during delivery was buried for six months near Ahukhana before it is relaid finally in Taj Mahal. Similarly, Jama Masjid, Shahi Qilla, Biwi-ki-Masjid belonging to Islamic culture, Asirgadh, & temples of Hindu community Gurudwara Badi Sangath of Sikhs, Dargah-e-Hakimi of Dawoodi Bohras, Kabir Panthi - followers of Kabir etc. were the prominent contributors. The trade & market was busiest in that period. The cotton, clothes of Jari Kalabatu etc. were even exported to Afghanistan, Arab and European countries. Burhanpur, at that time was a large military base camp of about 2 lakh infantry. But, the most important and unique in India - maybe in the world, is the Underground Tunnel Water Supply System, executed around 1615-1620 and still satisfactorily supplying water to central part of the city. The appropriation of subsoil water, comprehensive collection & specialized treatment, conveyance through tunnel by gravity, massive storage holding Bhandaras, Distribution through Karanjas is all of specular type. The remains are suffering by aging, hence it is very essential to restore the various components and to make them functioning at their original designed level, not only for the sake of getting water but to preserve this historical monument of hydraulic wonder, otherwise this medieval architecture, constructed using precise

hydraulics and engineering may soon be lost to posterity. The main mission in taking up reinstallation of this monumental Hydraulic scheme, which is similar to Qanats in Iran is to recognize its importance, to transfer knowledge and experiences, to the incoming generations and to preserve cultural heritage. Transmission of such invaluable experiences which have been obtained through centuries of great diligence to the next generation seems to be inevitable. More negligence will cause the eradication of our ancestors heritage. So, recognition, recording and transfer of such precious experiences are the main tasks for the proposed restoration. Preservation of cultural values regarding the materialistic and spiritual frameworks are another important objectives, since water, culture, human beings and civilization are deeply interwoven. Historic hydraulic structures and the referred humanities have always been under one another's deep influence. The relics of many components of these schemes are strong hold even after four centuries facing after all odd natural calamities, atmospheric conditions and importantly negligence of the residents of surrounding area.

### Indian Historical Development :

So far India witnessed four phases of town planning. It being a child of Monsoon known for its vagaries results on the frequency of famine. To meet the water challenges, specially in times of famine, the regional people innovated number of interesting devices of water collection as noticed from old cities such as Harappa, Dholavira. However, in the Islamic period, defence being the major issue, most of their capitals and major cities were situated at geographically safe locations i.e.

usually at higher altitudes, hence to provide the amenities like water remained a challenge before the city planners. Muslim rulers were even in minority within their own domains were always cautious about the internal and external unexpected intrusions. The entire state-craft was interlaced around the king whereas his power was supposed to be absolute and unbeaten, therefore due to internal politics, sometimes tactics were played. Water and food could be the easiest media for poisoning as which was in vogue during those days in the upper classes of royalty and nobility.

The first phase of Indian Town Planning commences with the beginning of Chalcolithic age. Cities of Mohenjo-Daro, Harappa and Ganweriwala which are now in Pakistan are the best examples of the town planning of those days followed by contemporary chalcolithic sites like Rakhigarhi and Dholavira which are in India. The excavations at Dholavira (3000BC) revealed that even though it was situated in middle of the desert they were successful in collecting rain water and conveying it with two seasonal water channels, called Manhar and Mansar. This knowledge of Water Management was derived from the early 'Gabarbands' (water augmentation device), innovated by Baluchis and "Sailabs" by Indus people.

The second phase is the beginning of 'Mahajanpadas' (Republican state). Later the third phase began with the arrival of the Muslims. The layout of their capitals and their personal lifestyles being quite different from Indian concept, hence drastic changes in town planning and urban Water Management were introduced. Security of the State head was the governing principle as seen from Delhi, Agra, Ahmadabad, Golconda, Daulatabad, and Burhanpur. The Fourth Cultural Phase is considered after the decline of Muslim ruling that is from arrival of East India Company which later controlled governed the no. of states in India, remarkably Indian continent.

#### **Burhanpur and its importance :**

Burhanpur is beautifully situated on the Northern bank of Tapti; the natural barrier

between the South and North (i.e. Maharashtra and MP) formed by Satpura rolling hills having Murum type geology. The average rain fall is comparatively higher in these hilly tracks. Hence there is ample storage of underground water available in the vicinity. Being a tribal area, numbers of tribes viz. Kohlis and Korkus were well adept in the knowledge of tapping the underground water sources.

From the historical spectrum, Tapti basin had witnessed the rise and fall of number of proto historic cultural phases like Malwa (Prakashe), Savalda (Bahal) culture.

By betraying Aasa Ahir-a-Hindu king of Ashirgarh, Nasir Khan laid the foundation stone of the city of Burhanpur (1400 AD), named after Burhanuddin Garib Shah of Daulatabad - famous Sufi Saint of Chistia order and Jainabad on the bank of Tapti was founded in reverence to Jainuddin - the disciple of Burhanuddin Garibanah. Faruquis ruled for two centuries during which the city earned a name in not only as political centre but an advanced centre of religion and as a cultural centre of great eminence. In the early decade of 17th century, Akbar the Great Mughal, brought under his domain the territory from Ahmednagar including Burhanpur in south to present Kabul and Kandahar. His son and successor Jehangir but retained the status quo using good offices.

In the medieval period there were different systems based on the collection of surface run-off, eg. the Zing system of Ladakh, the Kool system of Himachal Pradesh, the Drip system of Meghalaya, Zohad system of Rajasthan, Khadin system of MP. Phad system of Khandesh etc.

#### **Medieval Schemes in Burhanpur :**

Abdur-Rehman-Khan-e-khanan came up with the idea of developing an underground water supply system at his own cost and hence invited Tabkutsal Arj - a famous persiavi geologist in 1615 to Burhanpur. In Persia, this feature was very common. Qanat which is also called Kariz, Aflaj, Kahriz, Foggara, Khettara and Kenarjing, is a gently sloping subterranean canal, which taps a water-bearing zone at a higher elevation is cultivated



**Map of Madhya Pradesh Location Map**

known as KUNDIES and stand upto one meter above the ground. The running water below is visible if seen from above these Kundies. These Kundies are often round-shaped, having radius of 1.2 to 1.8 M. or some times square also. It is gratifying to note that the head or altitude of the Kundies is the same as the head or altitude of the source or origin of the water. The tunnels carrying water under law of gravitation are around 80 cm. wide and are so high that an average man can walk on them easily.

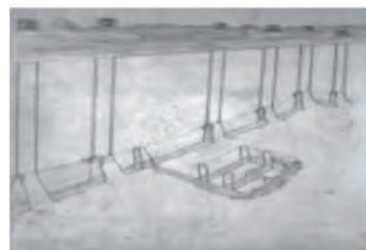
**Kundi Bandhara**

It is 30 M below ground with wall of one meter width was built in lime and mud mortar. Water percolating from the rocks as well as through the holes purposely provided for in the said one-meter wide wall.



**Map of Underground Water Supply Systems, Burhanpur**

lands which brought down to lower contour. Water was collected at 3 places called as Kundi Bhandara, Mul Bhandara, Chintaharan Bhandara from where it is carried to Gol Karanj in Burhanpur town, through porcelain and chiseled stone pipes. Out of these 8 channels during these four hundred years long period 2 have been completely damaged and remaining 6 channels are connected to the underground galleries through tunnels and water percolating from the nearby hillocks reaches them. Out of these, 3 channels supply water to Burhanpur town and the 4th & 5th to the Palaces of Burhanpur and Raoratan and the last vanished in ground. Open wells were built at short distances say 20 M to provide ventilation to the water flowing and are



**Alignment of manholes on tunnel  
Deposited calcium layer on walls**

### Mul Bhandhara :

Mul Bhandhara is situated 10km. away from Burhanpur. In the direction of Lal Baug at the Bank of Nallah is 15 Meter deep reservoir made of chiseled stones. Its 10 Meter high four walls are made of bricks and stone. The Mul Bhandhara water, ultimately mixes ahead with the water of Chintaharan Bhandhara.

### Chintaharan Bhandhara :

It is located on the bank of another Nallah 2 furlong away from Mul Bhandhara towards South and is 90 Meter deep made of stones. Chintaharan and Mul Bhandhara kundies meet at a distance of one furlong and then journeys along side the Mul Bhandhara through kundies towards Lal baug area and deposits the water in the Lal baug's Gol Bhandhara.

### Gol Bhandhara :

Gol Bhandhara 5 km away from the town towards the direction of Lal baug and is 10 Meter below ground. Gol Bhandhara has stonewalls upto 3.6 Meters and thin brick walls above that. Structure above the ground is of thick bricks. In reality, "Gol Karanja" is such a junction at Lal baug where water from all the three Bhandaras (Kundi, Mul and Chintaharan) is collected.

### Third Scheme (Sakkar Talv Filter Plant) :

This system was built in 1670-80 from Shakkar Talao to Bahadurpur with two big wells 300 Meters east of Shakkar Talao. Two receptacles, commonly known as Karanjas, were built at a distance of 20 Meters from the Talao but get dirty water hence 2 small canals were built from karanjas by laying 1½ Meters high and ½ Meter deep stone-lime infrastructures. This canal was divided at 5 places by walls, laid at a distance of 10 Meters each.

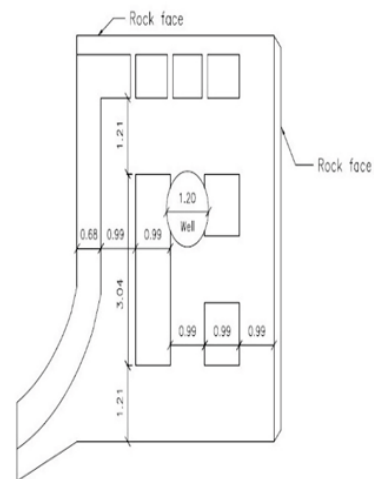
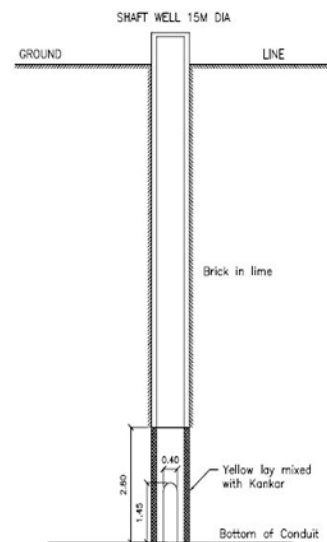
### Fourth Scheme (For Ahukhana)

Fourth water system was in Ahukhana. i.e. is in Jainabad, the other side of Burhanpur towards South coast of Tapti river.

### Fifth Scheme (Kaldoh Waterfall) :

In 1650-1670 Mughals gave a final shape to Kaladoh waterfall project, 15 Km North-West of Burhanpur. Utawali river originates from the bottom of Satpura and travels towards Thathar

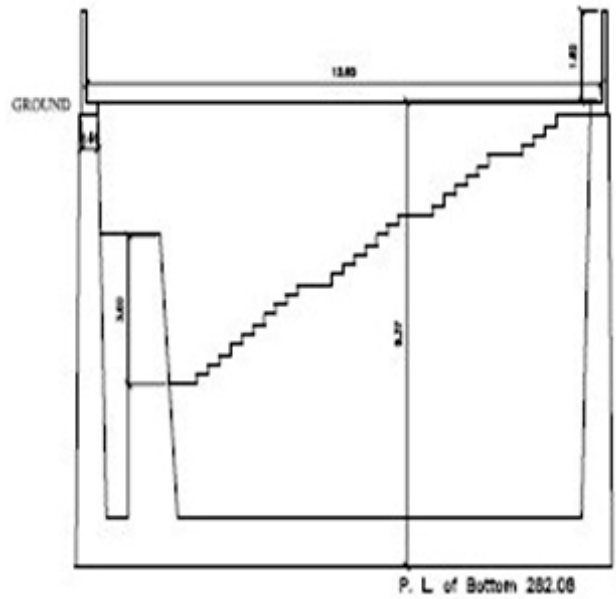
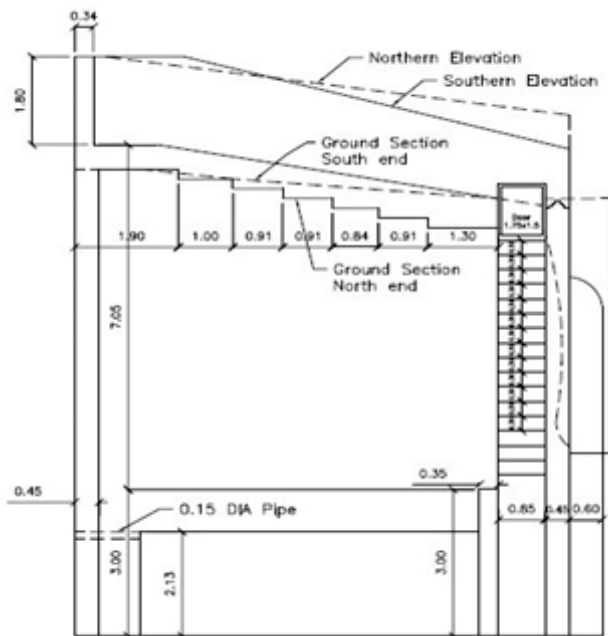
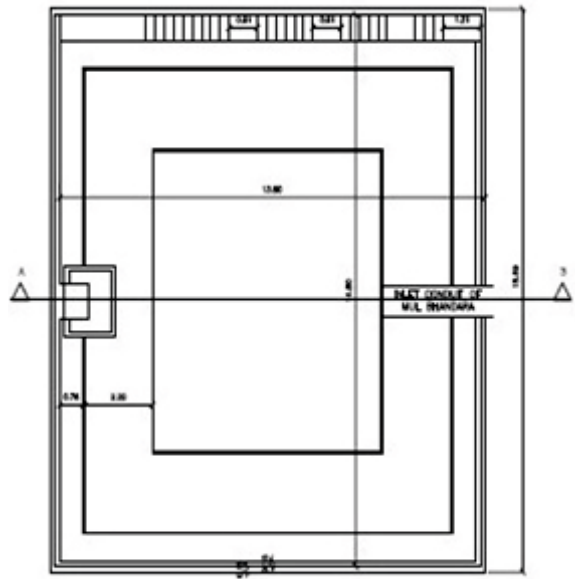
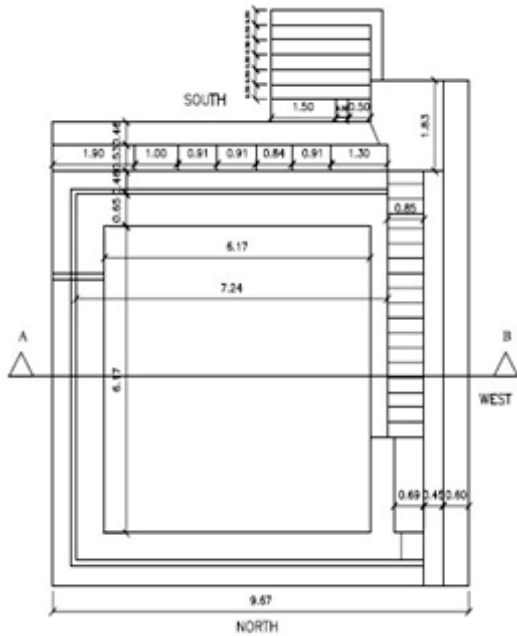
village towards big rocks and takes the form of a waterfall thereafter. The fast speed of the waterfall leaves a cistern below (a small pit like pond). On both sides 16 feet high stonelime walls of 500 M long were built and water was stored by making wall of the Dam. From the middle of the Dam a small Dam was built at a short distance and through a network of 1 to 1.5 feet earthen pipes, water was collected in small domes for onward journey of water from one pipe to another. 20 to 30 open domes were built at distances of 30 to 40 Meters.



Cross Section of Shaf Plan

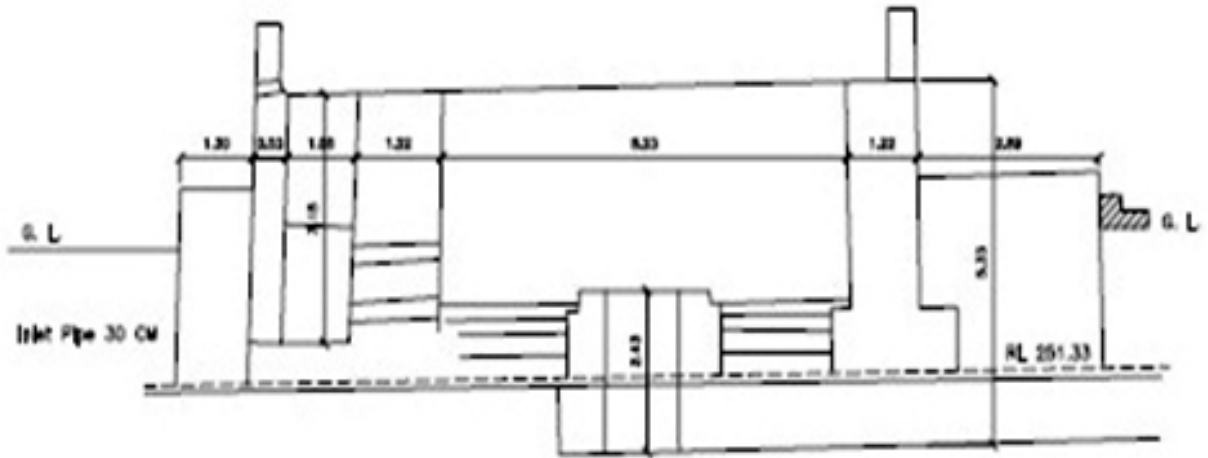


# Kundi Bhandara



plan Section - Mul Bhandara

Plan Section - Chintaharan Bhandara



**Section of Jali Karanja**

**Hydraulics of Flow**

Suitable downward gradients are provided as under :

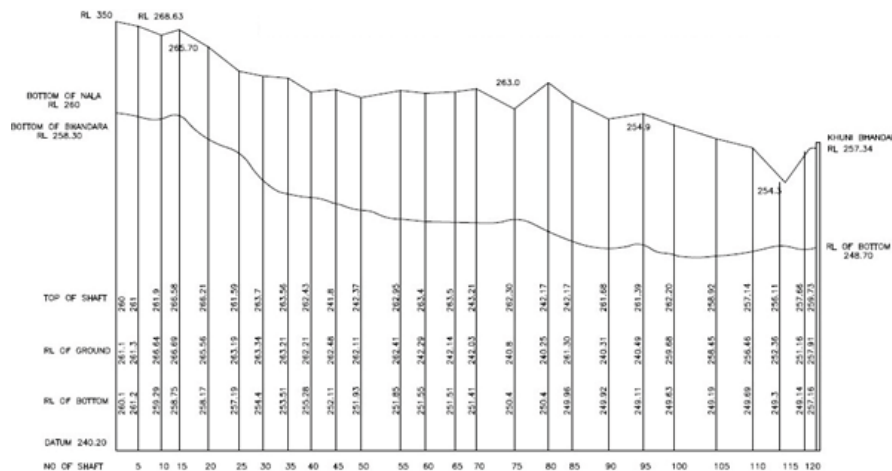
- (a) From Mul Bhandara to Gol Bhandara in 300 1
- (b) From Kundi Bhandara to Gol Bhandara in 700 1
- (c) Jali Karanj to Gol Bhandara 1 in 245
- (d) Kundi Bhandara to Jali Karanj in 324 1

transport.

- b) Because of constant seepage, large amount of salt has got deposited on both the inner surface and outer edge of the brick lining.
- c) Weep-holes in the underground channels had almost clogged with signs of excessive salt at some places.
- d) Few kundis are acting as sources of filth dumping.

**Proposed Measures for Conservation & Revival of the Systems**

- a) Development of groundwater potential in the catchment.
- b) Accelerating the inflow & promoting recharge the surrounding area of Bhandaras.
- c) Cleaning and observing smooth flow by gravity in the canal.
- d) Cleaning filtration systems, Karanjas, Kundis etc.
- e) Preparing record Drawings, Designs, Informatory Boards, Photographs, Folders etc.



**Section from Mul Bhandara to Gol Bhandara**

**Identification of problems**

- a) The collapse has taken place due to heavy duty

**Conclusion :**

The models and methods of harvesting water have formed an ideal medium that have bound ethnic groups into a political economy right

from the times the Aryans first settled in the Gangetic Basin. They have served to integrate social, economic, political, cultural, legal and environmental stakes to optimize the utilization of the community's resources. This medieval water supply scheme has survived over four centuries and is an exemplary model of sustainable development, put in place, operated and maintained by the people. It is to be planned to restore it, repairing in such way that the originality could be maintained and repair work even though carried out now could resemble matching with the original style and inflow can be improved by removal of choked mouth ends of weep holes and rendering smooth plaster to the invert gutter. Hence, flow chart of activities will be as under.

- a) To coordinate all concerned departments.
- b) To carry out GIS mapping of alignment of tunnel & to get drawn the Plan, Sections etc. of existing structures.
- c) To prepare structure wise status report, computing damages & volume of remedial measures & Master plan with cost estimates.
- d) To monitor progress and cost control.
- e) Wide publicity be given through electronic media & local press to generate awareness in the citizen and publicity at National level for restoration of this cultural heritage.
- f) To publish literature on this scheme as well as other historical monuments in and around Burhanpur, so as to bring the city on national heritage plan.

#### A Way Forward

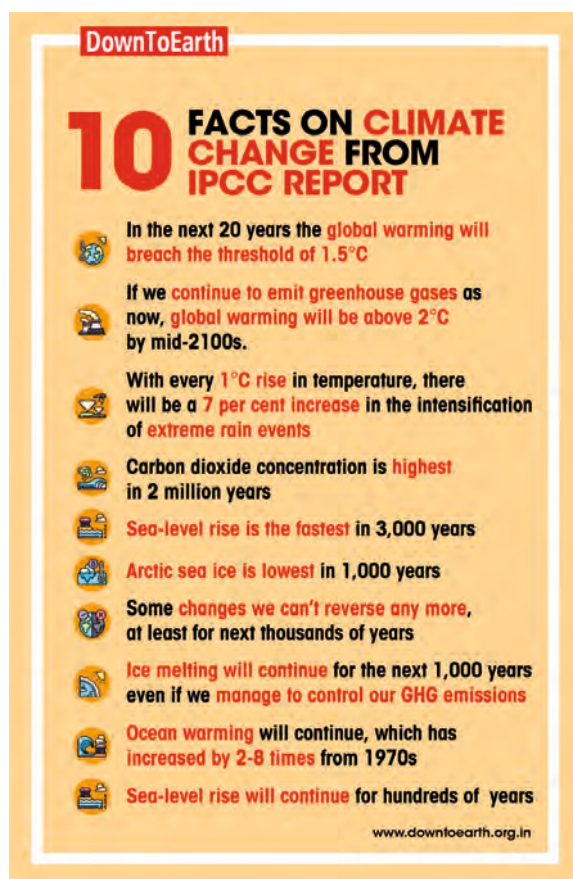
Since the beginning of the 'Integrated Water Resources Development and Management' planning is one aspect but restoration of cultural heritage is above all. Investigation into aspects like water quality, disaster preparedness, impact assessment, tourism, agriculture etc. are to be understood. These investigations are to be carried out through community-based groups, field staff and the experts team. The findings of these teams would be converted into sub-plans or action plans, which would be compiled into the Master Plan. The proposal for restoration has been sent to Govt. of India under "Science & Heritage Research Initiative

(SHRI)" for restoration.

#### Acknowledgement :

The authors express gratitude to Dr. R.S. Morwanchikar, Ex. Head. History & Archaeology Department Ambedkar University, Aurangabad, Dr. Arunchandra Pathak, Ex. Gazetteer Maharashtra, Smt. Yaminee Mubayi, New Delhi, Independent Researcher, Sneha Bakshi, Aurangabad, Architect for their guidance and contribution and humble tribute to Nandkumar Dewda, a pioneering personality who is lucky to see the book published in his life time.

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# Inter-Basin Water Transfer

Shri Chetan Pandit

(M) : 9423174594



Continuing the story of water, and particularly the river-valley infrastructure, in this article we are going to look at a very important intervention, transferring large quantities of water from one basin to other.

You will recall that in the article # 4, I had explained the terms catchment and river basin. A river gathers water from rainfall and snowfall. At any location on the river, the area from which all the rainfall and snowmelt is collected, is the catchment of that river up to that location. The entire catchment of a river, up to either its outfall in to the sea, or its confluence with a larger river, is called a river basin.

Under natural conditions, all water from the rain or snow, flows only within the basin. In fact, that is the definition of the basin. Is it possible to transfer water from one basin to another, by a man-made canal or pipe line ? And if possible, should we do it ? If yes, why? If not, why not ? Has it been done anywhere in the world? In India? Have any studies been made for its feasibility? These are some of the questions I am going to answer in this article.

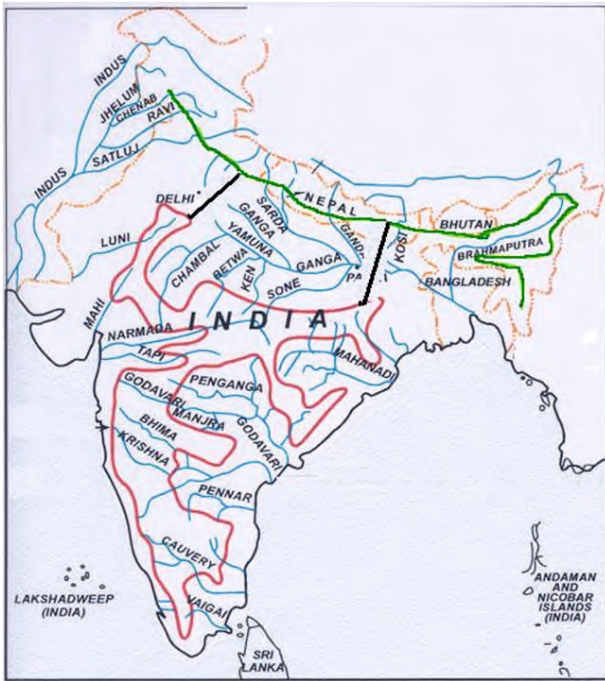
A canal from one river to other, the popular media calls it “river linking”. But that is an incorrect name. If you link two cities by a road or rail, traffic can move in either direction. Likewise, if you connect electric power plants by high voltage transmission lines, electricity can flow in either direction. But if you connect two rivers by a canal, water can not flow in either direction. One end of the canal will have to be higher than the other, and water will only flow from the higher end to the lower. The correct name for the concept I am about to explain, is “Inter Basin Water Transfer”, or IBWT for short.

**History :** Around 1858, a British engineer Arthur Cotton came up with the idea to connect major rivers by canals. But this was not the first attempt IBWT. Because Arthur Cotton’s objective was to provide in-land transport through canals and rivers, and not water transfer. The railway came to India in 1853 and was found to be more attractive than water transport, and that put a stop to Arthur Cotton’s plans.

In 1972 Dr. KL Rao proposed transferring water from Ganga from somewhere near Patna, to Cauvery in Tamil Nadu by a 2640 Km long canal. This concept came to be known as “Ganga Cauvery Link”. Dr. Rao was a very experienced river engineer and his concept was technically sound. But the particular plan by him was not for gravity flow entirely. It required pumping large quantities of water at several places. The capital cost and also the recurring cost for pumping was disproportionate to benefits, and the idea was dropped.



Dr. KL Rao's Ganga Cauvery Link



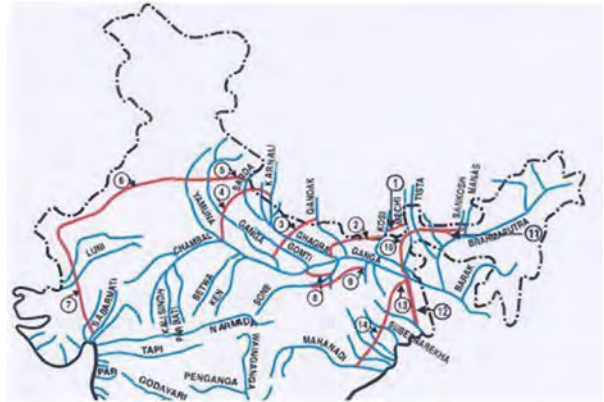
**Capt. Dastur's Garland Canal**

Capt. Dinshaw J Dastur was a pilot with the Indian Airlines. While flying all over India, he saw that at times there is flood at some places and there is drought at some other places. From this he came up with an idea to transfer water from flood prone areas to drought areas, thereby solving both problems. Around 1977 he proposed a plan that comprised a 4200 Km long canal in Himalayan area (green line in the figure) at constant elevation of 400 M with 90 lakes; a 9300 Km long canal at 300 M level with 200 lakes (the red line in the figure) in peninsular India; and two pipelines joining them (the two black lines in the figure). The canal in the peninsular India (red line) looked like a garland placed at the feet of "Bharat Mata", hence he called his plan the 'Garland Canal'.

Unfortunately, river engineering is far more complex. The idea of thousands of Km long canals at constant elevation and with 100 or more lakes in between, was sheer utopia, such a thing can not be constructed, and its cost or benefits were irrelevant.

In 1980, the Government of India set up an organization named "National Water Development

Agency" (NWDA) to prepare a plan for Inter-basin water transfer. After about 15 years of surveys and analysis the NWDA came up with a plan which became known as "National Perspective Plan" or the NPP. This is the plan that is being pursued now. The main difference between the NPP and Ganga Cauvery link is, instead of one large link, the NPP comprises several smaller links, 14 in the Himalayan region and 16 in peninsular region. These are shown in two maps below.



**NPP, Himalayan Links**



**NPP, Peninsular Links**

The links are listed below.

Himalayan Links.

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. Jogigopa – Tista – Farakka; 12. Farakka – Sunderbans; 13. Ganga (Farakka) – Damodar – Subernarekha; 14. Subernarekha – Mahanadi

**Peninsular Links :** 1. Mahanadi – Godavari; 2. Godavari (Inchampalli) - Krishna (Nagarjunasagar); 3. Godavari (Inchampalli Low Dam) – Krishna (Nagarjunasagar Tail Pond); 4. Godavari (Polavaram) – Krishna (Vijayawada); 5. Krishna (Almatti) – Pennar; Krishna (Srisailem) – Pennar (Prodattur); 7. Krishna (Nagarjunasagar) - Pennar (Somasila); 8. Pennar – Cauvery; 9 Cauvery – Vaigai – Gundar; 10. Ken – Betwa; 11. Parbati – Kalisindh – Chambal; 12. Par – Tapi – Narmada; 13. Damanganga – Pinjal; 14. Bedti – Varda; 15. Netravati – Hemavati; 16. Pamba – Achankovil – Vaippar. For more information, visit the NWDA website [nwda.gov.in](http://nwda.gov.in)

**Cost and Benefits :**

The Himalayan component will provide irrigation to 22 MHa area; generate 30,000 MW of hydro-power; augment flows at Farakka barrage; will provide drought mitigation in W.B., Bihar, U.P., Haryana, Rajasthan, Jharkhand, and Gujarat; and will provide flood control in Ganga and Brahmaputra basins. The peninsular component will provide irrigation to 13 MHa area; generate 4,000 MW of hydro-power; will provide drought mitigation in Andhra Pradesh, Karnataka, Tamil Nadu and M.P.; and will provide flood control in Mahanadi and Godavari basins.

Overall, these links will provide irrigation to 35 MHa; generate 34,000 MW of hydropower; provide drinking water to enroute villages; improve drinking water supply to urban areas; facilitate inland navigation; help development of fisheries; generally aid infrastructure development; result in employment generation; and will improve aquatic environment.

The cost of all these links was estimated as Rs 5,60,000 crores in the year 2000. But that was a very rough estimate without undertaking detailed surveys. That estimate is irrelevant now. In any case this is not one project, it is a collection of 14 + 16 = 30 links and each link has to be assessed independently.

**Understanding NPP :**

**Gravity Flow.** The NPP is gravity-flow based. How does water flow from one basin to other over the ridge by gravity flow? It is simple. Recall how the road travels from a hill station down to plains. The road travels along the hill face in a gentle gradient. But the ridge is falling at a much steeper gradient. After a while the road and the ridge line are at the same level. At this point the road takes a U-turn across the ridge and continues in a gentle gradient on the other side of the ridge. See the photograph of a ridge. I have drawn a line in brown



**Crossing the Ridge**

marking the ridge line. The blue line is a road (or canal) that travels down the hill, meets the ridge, crosses over, and continues on the other side. This is how canals take water from one basin to other, crossing over the ridge, by gravity flow.

Flood Control. In the benefits I have mentioned flood control in many areas. How does inter-basin water transfer control the floods ? Certainly not by transferring water out from flooded area. If the flood in, say, Brahmaputra is so large that even the more than a kilometre wide channel of Brahmaputra river can not contain it, then a canal to take all that water out safely, will have to be even bigger. And that is obviously not possible. Flood control will be achieved by construction of dams. I have already explained in a previous article how dams control the floods. The basic philosophy of NPP is to transfer water to water deficit areas. The deficit is most severe in non-monsoon times. So water is most required in recipient area during non-monsoon. But during non-monsoon even the donor basin doesn't have much flow. Therefore, dams will have to be constructed in the donor basin to store the water during monsoon, to be transferred out to recipient basin during non-monsoon. It is these dams that will provide flood control benefit.

**Environmental Impacts :** Will these links have any adverse impact on the environment? The answer is, yes. That said, you must understand that every human activity has some adverse impact on the environment. Construction of roads, houses, mining, automobiles, industrial production, even cooking of food by burning a fuel, has some adverse impact on the environment. Should we then abandon all this and advocate living in caves, travelling on horse-back, and eating uncooked raw food? At some point of time the mankind lived exactly like that. But not even the most staunch environmental activist would suggest going back to cave-man era. Then how do we resolve this "adverse impact on the environment" question ? The problem lies in this incorrect question "will some activity have any adverse impact on the environment?" Because the answer to that question is always "yes". The correct question to ask is:

- a) Is the said activity avoidable ? Are there any alternatives ?
- b) If it is unavoidable, then how to minimize the

adverse impacts?

Once you examine the issue from this perspective, the answer comes easy. Construction of houses, automobiles, eating cooked food, are all unavoidable. We can't abandon any of these. But we can and do try to minimize the adverse impacts. Viz. we make our cars more and more fuel efficient, instead of coal we use LPG for cooking, etc.

Likewise, water transfer from relatively water rich areas to relatively water short areas, is unavoidable. But every link will be subjected to an EIA (Environmental Impact Analysis) to assess and minimize the adverse impacts.

Will it impact monsoons ? Of all the objections raised by the activists, this is the weirdest. Their argument is, transferring water from say Brahmaputra to Mahanadi will reduce freshwater outflow from Brahmaputra to Bay of Bengal and that will impact monsoons. This argument is not only wrong, it is plain silly. Outflow of freshwater to the ocean reduces if water is used for irrigation etc. It makes no difference whether the water is used in the same basin or transferred to and is used in some other basin. In any case the quantity of water used by the mankind, whether within the original basin or in some other basin, is negligible compared to the quantity of water in the oceans.

Has it been done elsewhere? Certainly, not only in other countries, but also in India. Some notable existing links are :

- a) The Kurnool Cuddappah Canal, popularly known as K.C. Canal, transfers water from Tungabhadra, a tributary of Krishna, to Pennar basin.
- b) Beas-Sutlej link. If you have travelled to Mandi in Himachal Pradesh, on the way you will recall crossing a small dam called Pandoh. This dam on river Beas is the starting point of a link comprising one tunnel, then a channel and then again a tunnel, transferring water from Beas to Sutlej.
- c) The Sutlej-Yamuna link canal is envisaged to transfer water from Sutlej to Yamuna. Although this is not yet completed, but a smaller quantity of water is already being transferred from Sutlej to Yamuna by a different route, called Narwana

Branch canal.

d) The Sardar Sarovar main canal takes water to Sabarmati basin, Kutch, Rajasthan, and Indore city, all of which are outside Narmada basin.

These are just a few examples, there are others too. And these links have been operational since very long periods. The KC canal was commissioned in 1870, has been in operation for more than 150 years; Beas-Sutlej link has been in operation for more than 50 years, and no environmental catastrophe has befallen because of these, or any other link.

Inter-State and International Aspects. If an inter-basin link is also inter-state then concurrence will be required from both the states, and particularly the donor state. This may be difficult, but not impossible. Viz. agreement has been signed between the states of Madhya Pradesh and Uttar Pradesh for the Ken-Betwa link. And some more agreements are on the anvil. As for international aspect, we have a treaty with Pakistan on sharing of Indus waters, and also a treaty with Bangladesh for sharing of Ganga waters. Each party is free to do what they like with their share. India has a very good track record of abiding by international treaties and our neighbours have no reason to be apprehensive. However, it is strange, and sad, that some of our NGOs are more worried about the interests of neighbouring countries, than about interests of India.

Present Status. As soon as the NWDA released the general plan the activist community was up in arms against it. This was entirely expected. I have mentioned in the previous article

that any project that will make India economically better and stronger, be it large dams/ hydro-power/ thermal power/ nuclear power/ river linking/ mining/ highways/ ports and harbours/ industries/ . . . anything, is opposed in the name of environment. And only the very naive will believe that concern for environment is indeed the real reason.

Fortunately, the Hon'ble Supreme Court took note of the concept and in a path-breaking judgment on 27.Feb.2012, ordered that the work on this be speeded up. The Court also gave detailed directions to coordinate and monitor the progress. Two links are progressing well, the Pollavaram project which will transfer some water from Godavari basin to Krishna basin; and the Ken-Betwa link that will transfer water from Ken basin to Betwa basin.

The Union Govt. approved the Ken-Betwa link on 8th Dec 2021, for a cost of Rs. 44,605 crores. The link will be 221 Km long, including a 2-km long tunnel. The project is expected to provide annual irrigation of 10.62 lakh hectares, supply drinking water to about 62 lakh people, and generate 103 MW of hydropower and 27 MW of solar power.

In the next article we will learn about a few major projects, that are landmarks in India's water management paradigm, and with that we will complete our study of the infrastructure and move on to other things. Meanwhile, a new variant of Covid, called Omicron, has been detected. Do continue to take precautions and stay safe.

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जलसंवाद हे मासिक मालक व प्रकाशक डॉ. दत्ता  
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## Aao Nadi Ko Jaane - Report 02

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“The Process and Advance of A People’s Movement Towards Deeper and Wider Synergies, between people active in the Water Sector and Other Sectors.”

In this article I will be exploring the foundation of the Sankalp, the Shared Vision and Mission, placed before the people involved in the Aao Nadi Ko Jaane series of Webinars through our year and a half of enhanced inter-communication brought about by exploring online communication methods to support the on-the-ground meetings.

In this article I will also be presenting the Wider Background of the Systemic Transformation described as Samanvayon-ka-Samanvay (roughly translated as Network of Networks) within which Aao Nadi Ko Jaane is happening -

### **On Improved Inter-Communication :**

In the previous report on Aao Nadi Ko Jaane (ANKJ) I had shared about how the corona virus pandemic sent us all indoors all over our planet. The impact on inter-communication in terms of Obstacles and New-Possibilities was as follows :

(a) Perceived Obstacles to Intercommunication: There was a slowing down of our physical meetings in the field, which were missed. This caused a ‘need to meet’ through some alternate ways and means to rise up in us, with some urgency and some concern about continuity of organizational ‘review & respond’ meetings. Pre-pandemic on-the-ground conferences, which Jalbiradari Maharashtra was conducting, where all members from Maharashtra were invited to one physical place were at the most 3 meetings every year. Would these be entirely skipped and missed - that

was the concern.

(b) Perceived New-Possibilities of Intercommunication: There was a re-discovery of the availability of online platforms like Google Meet, Zoom, Microsoft teams, Cisco and others. Through these was found the ability to invite hundreds of willing participants and contributors through group messaging on platforms like WhatsApp - which were already available in the background.

### **On the urgent need for on-the-ground Sampark Yatras:**

During the first wave of the corona pandemic, the shock of the vulnerability of every human being had begun to sink in. There was much hesitation in venturing out of our own village or town or city. The postponed ground level meetings, which help to review and reform through the self-corrective process we all follow, were piling up. It was time to take stock of the situation and to decide to venture out to meet the people, to learn all about the situation, the problems and the solutions, from them.

A theme had to be worked out, which would guide all such Sampark-Yatras (Outreach Journeys) towards a Shared National and International Goal - a Vast Open-Ended Vision and Mission. Outside of the Aao Nadi Ko Jaane webinar series going on, on each Sunday, at that time, we began to call in all the senior mentors and field-experts we knew into a separate webinar. This was named as the SWAADHYAAY Webinar Series (Swaadhyaay meaning, the self-examination and self-deliberation which would be the main focus). While the group meeting each week under Swaadhyaay-Webinar-Series was happening the

senior mentors joined the deliberations - and a single page document was first crystallized after taking inputs from the participants. Our guides as well as senior-by-experience participants included Dr Rajendrasingh, P V Rajgopal, the late Dr Subbarao, Medha-tai Patkar, Mohanbhai Hirabai Hiralal ji of the direct democracy Mendha Lekha self-governance initiative, Jayaji Paikrao who has been fighting to protect the Kayadhu River from encroachment, exploitation and pollution; the Director of NEERI; the Director of West Bengal Pollution Control Board and a dozen more. At the same time more than fifty experts and mentors who were working on the ground to protect and rejuvenate the river where they lived - were also collaborating in the online brain storming.

Would it be enough to focus on rivers and river basins? What about groups working with adivasis? Would we not weave the themes of water and adivasis, together, simply on the basis of objective synergies possible between such vertical silos? Would we also be able to attract activists working with rural and urban solid waste management into the conversations and discussions on river rejuvenation and reform in behaviour of river basin populations towards an environment friendly life style? What about activists and groups trying to study alternate energies, traffic system reform, organic farming, electoral reform, women's rights and livelihoods and at least a hundred other 'vertical silos'? Could the subject of river rejuvenation and river basin transformation be central enough to be able to work together in collaboration with all such vertical silo based approaches?

To us it seemed then and it is a still stronger conviction today, that river basins are very important microcosms of the entire human population on the eco-system earth. There are many other economic-ecological microcosms too - desert ecologies; coastal ecologies; oceanic coral-atoll ecologies; mountain ecologies; ice-bound ecologies from the polar ecologies to the tibetan plateaus and the Himalayas and Alps and other mountain ranges across our planet; mangrove

ecologies; unique sweet-salt water ecologies like Lake Chilika; forest ecologies; urban cement jungles as disruptive ecologies; cultural ecologies; spiritual ecologies; educational ecologies; nationalistic ecologies - the last four being social and psychological eco-systems which decide how the human beings will grow to create either a harvest of global conflict and war or a harvest of global peace and sustainable lifestyles.

It was clear that by starting and continuing Aao Nadi Ko Jaane, we were climbing a hill of building synergy between all those like us who were interested in and focused on river rejuvenation and river basin reforms. We could see others in equally widening and deepening dialogue around us - seeking out their own synergies in their own silos. And yet the conviction remained that as the populations of human beings are concentrated along the rivers and on the coastlines, water would always be one of the strongest and most important issues affecting our survival, happiness and security.

It became clear that human beings converge around very important issues that affect them and the easiest way to list those issues is to study the list of Ministries and Departments created by the march of human civilization. All those subjects are vertical silos and each Ministry is important. It was clear that the overall theme of Governance of Civilization held the vertical silos of the Ministries together. Was it true, then, that Governance was the all inclusive and all encompassing theme we should focus on, if we were to advance Aao Nadi Ko Jaane, not in isolation, but in collaboration with all other efforts at human reform?

Would the subject of rivers and river basins be able to call all types of activists and volunteers towards Samanvayon ka Samanvay (Network of all Networks) to flow together in mutual enrichment of understanding, involvement and combined action?

What emerged from brain-stormings on these and such subjects was the fact that the focus on river-basins is an attention being paid to learn

what is the positive and negative that is happening with all our rivers. We were meeting every week to seriously study, together, what to do to prevent the damage being caused to the rivers and river basins from origin to confluence; what to do to strengthen the good and healing efforts undertaken by the river basin populations; how to bring people together in vast masses to understand enough about rivers, to get involved enough in hands-on protection of rivers. It became clear to us that the dialogue would be inclusive of all human activities which consume water, affect the health of water and are affected by the state of health of the water in the springs, streams, lakes, rivers, aquifers, oceans - to take decisions which would prevail on the political class to enable implementation with open eyes and sensitive hearts. We would also have to reach every single family - locally and globally - to be water-literate; river-literate; water-body literate; water-active; river-active and water-body active. We would have to sensitize, motivate, incentivize and mobilize, converge and synergize the people to enable their own life-style changes supporting sustainable-governance - with open eyes and sensitive hearts.

Through long deliberations once a week a document emerged which I am going to fully reproduce below. It is a document that is an emergent narrative of what is happening to us and how we can and should adapt to this deteriorative change that we seem to be globally undergoing - as the Needs:Resources Ratio is turning critically imbalanced. Too many human needs compounded by needless human greed are overdrawing from and therefore destroying the Web of Life.

The mentors mentioned above and a few hundred participants and their expressions about a wide range of situations, issues, problems, remedies and guidelines to create a safer future - gave rise to looking outside every silo, including rivers and river basin issues. The result was a statement of intent well discussed and put together, drafted, shared, enriched with suggestions and then placed before all as the theme document of working in all and any silos of

life. It is a Document on the Human Civilizational Process itself.

The guidance of Dr Rajendrasingh and P V Rajgopal and a dozen other mentors and activists was important in putting together the following draft. This draft has been reformed already and is therefore a draft-document in transit - it will always ask every reader to customize it to himself/herself and ask every reader to contribute to improve upon it.

Governance through lateral leadership and not vertical or hierarchical leadership - began to emerge as the topic discussed again and again. Anything which disturbed the lateral equity of human populations began to be diagnosed as disruptive and hurtful. The draft shaped itself with the focus on the value of equity, most of all. All through the process of our exploration of the topic of Governance Reform, the vast inequity in access to water resources and access to making community decisions on water resources was urgently highlighted in our minds and hearts.

Vast inequality between haves and have-nots; the wealthy and the poor; those with access to education and those not with access; those with access to land and water and those without access; those with access to community decision making and those without access.. all these came to the fore as a flaw in the civilizational traffic. A deeply insightful global civilizational diagnosis is far off. And yet there is a feeling now that even as we walk and march for inclusive synergy by constantly working a dialogue to invite more and more water-activists to have a life-long continuous dialogue that will never end but will always be in-transit (like any road-traffic system which is always new every second and never repeats a pattern) - that even as we work to widen the referencing around the focus of protecting and preserving and enriching water bodies through people's participation, we are going to have to place in the wider context of human civilizational traffic the scope and synergy now flowing and evolving improvingly between water and river activists that we manage to increasingly

reach in larger and larger numbers.

In the light of these wide ranging and deep thinking SWAADHYAAY discussions that evolved us beyond Aao Nadi Ko Jaane's focus on rivers and river basins, we kept realizing that we had an important central thread of thinking and exploring - the Water Cycle and its Health - of which the river itself is a part connecting the catchment heights to the ocean. Anything which disturbs this water cycle so that the Life supported by the ancient natural rhythms and harmonies of this water cycle is itself disturbed - began to be noticed as a harmful vector. An anthropocentric life-style in all aspects of human life emerged and was confirmed as the primary disruptor of the water cycle and life cycle.

And that is what shaped the draft between us - shaped by the ongoing contributions of every expression by every participant in the traffic of discussion in Aao Nadi Ko Jaane Series of Webinars, modified and refined by suggestions from the mentors, the document is called 'A Call for National Action'. It is reproduced below in the quotation marks:

"A Call for National Action

Dear Friends,

THE SITUATION:

One sentence that is common in every article or in every statement is that "the overall situation of the country is not safe and demands attention from all of us". We think this particular sentence speaks a lot for the situation that we are facing today. The farmers & laborers, the adivasis, women & men, dalit & savarn, the poor & rich, the middleclass & upper-class, rural & urban are all saying the same. Let us admit that this is not something special for India alone. Many countries are facing the same situation as a result of Covid-19.

**THE LACUNAE IN POLITICAL AND ECONOMIC LEADERSHIP :**

What is shocking is that the political and economic leaderships of many countries are refusing to learn lessons from the Covid-19 situation. There is a complete lack of political leadership globally: leaders are focused on

remaining in power and expanding their power. They think that they can solve the problems by accelerating the same old economic and development models. The majority of the people are not yet aware that power flows from the people. Once people realize that it is they who hand over their ability to take decisions for themselves to 'leaders' and 'representatives' without keeping a post-election independently-vigilant watch on them, there will be the emergence of a robust bottom-to-top governance movement. Regarding politicians, we so badly want to believe their top-to-bottom promises (aashwasan), that even though we realize that these are half-truths, we do not want to question, and so we continue to vote them to power. They think that by reducing democratic space and by suppressing the voice of Human Rights Organization's, People's Organizations and Environment Protection Organizations they can push their agenda faster. There is a complete takeover of the entire system by the corporate lobbies. To a great extent they have also silenced the credibility of government institutions, the media and the judiciary in every country. To a greater extent, we the people have allowed this to happen although it was in our potential power to stop this, to prevent it.

**MEASURING UP TO THE CHALLENGE BEFORE US :**

The size of the challenge in-front of us should encourage people like us to stand up to it. Of course, the challenge is so big that it is not within the capacity of one individual or one organization to deal with it. This is the time for us to put together our ideas, capacities and resources to build resistance, resolution and resilience and also to build awareness for change and an interest in change that transforms quickly into a sustained individual and collective motivation - to bring back equity to the millions of the marginalized.

**THE DIRECTION IN WHICH WE SHALL MOVE: (5 PILLARS)**

The first draft had the first four of the five pillars given below. It has later emerged through discussions that the fifth pillar of Governance Reform is critically important to the whole process

of refinement and evolution of human civilization to meet the current challenges. The agenda proposed by Jai Jagat global campaign, which was placed before the meetings hosted by the Aao Nadi Ko Jaane online webinar host team, was drawn from the Sustainable Development Goals of the United Nations and after being proposed, a fifth pillar was added to that theme.

(Whatever the silo we came and evolved from, we could all have these five themes in common as a broad direction which was inclusive of all possible silos of activism for reform. Before stating the remaining part of the draft it must be understood that all such drafts are constructs in transit, forever, and that even if frozen and acted upon by a generation, the results, good and bad, expected and unexpected, invite the draft to be further edited and modified to the new era which emerges in human life. So what continues to be shared below is a document in transit - and it will be continuously in the process of evolution. The Bihar Sampark Yatra Appeal was derived from this draft named 'A Call for National Action'.)

**The five pillars are :**

1. Eradication of Poverty
2. Eradication of Inequality
3. Mitigation of Climate Crisis (of which River-Rejuvenation & River Basin Reform are an important backbone in which the people and their governments have to find a bridge-protocol to save the River-Ecosystems and the Environment together)
4. Bringing/Establishing Non-Violence
5. Just, equitable and transparent Governance, (which is necessary to achieve these above 4 goals)

In countries like India we should also include the issue of land, labour, livelihood, and legislations (4 L's) in our action plan, which we are sure will have an immediate impact in the life of millions of those who are in a struggle for survival. We also need to focus on nature rejuvenation, since we already know now that the current nature-destroying 'development paradigm' is neither sustainable nor equitable.

**TIMELINE FOR AWARENESS, MOTIVATION,**

**MOBILIZATION, TRANSFORMATION :**

- The year 2021 contact building and mobilization across the country. This will also include listening to the people voicing their situations and micro-solutions
- The year 2022 local state regional actions for awareness and regional motivation/mobilization
- The year 2023 sustained National action for awareness and national motivation/mobilization
- The year 2024 Structured Integrated Mobilization for Direct Action for basic changes in the governing system - through focus on grass-root reform.

1. (2021) Around the above issues there should be mass mobilization across the country. Many of us will have to devote our time and energy for this task in the coming days. Each one of us will have to take a region and travel through the region for many months.

2. (2022) This mobilization can lead to local community level actions that can send strong message to the people that "we" ourselves can change the situation by not giving our power to any representative but by using our power to make decisions, with consensus, at our local community level - as demonstrated conclusively in the Mendha Lekha experiment and implementation of Direct Democracy. It will also send a strong democratic message of an active daily and detailed supervision of the people's representative that we have elected.

A charter of change can also come out of this process. This charter of change shall have a preamble that acknowledges the global concern about the current model of development which has led to global warming and the possibility of the 6th extinction. However, at this stage, for 4 years, our combined activity on the field, while retaining the international networking context, will certainly be focused on action in India.

3. (2023) The third year should be for a large and sustained national struggle to create mass-motivation towards a change based on equality & nonviolence. A major part of this change will be the people restructuring their own lives and

livelihoods, their own regional-cluster economies and ecologies - without dependence on elected representatives. The top-to-bottom governance will be counter-balanced by bottom-to-top governance in a historical balancing reform.

4. (2024) This National action should continue in different forms till the year 2024 and should deeply impact the political structure based on individual voters who have compulsion, today, to give their political power to some representative and become weak and dependent victims with no control over one's own health, wealth and destiny. We need to establish small communities living in small villages, tola, pada, palli, hamlet in rural area and in mohalla, galli, housing society in urban area where they can all sit together and can take their decision with consensus for themselves, thus building a strong foundation of the new political and governance structure, based on individual and local community Collaborative Governance Responsibility.

Through the grass-roots pressure thus generated, there should be a deep impact on the manifesto of different political parties as well as on the result of the election. This mobilization should initiate the process of understanding the appropriate structure and method of election where representatives are of local communities elected with consensus at the village/Mohalla level. Moreover, the "Right to recall" can be practically possible at taluka, district, state and national levels, under their collective Collaborative Governance Responsibility.

The eventual result that shall evolve is the Collaborative and True Representative Governance that flows in a system of strategic mutual feedback to create Civilizational Course Correction - to benefit the marginalized populations and the Environment Systems. The ultimate achievement achieved will be the wellbeing of "All". (Sarvoday).

We have the option to act or not to act, risk our freedom & life or not to risk, history will judge us according to what we may do today. We thought this is the time to give a call to act within whatever capacity we have or at whichever level we can.

Acting with the people as their collaborative friends, helping people to use their personal political power, which is their birth-right, in themselves as individuals and in small communities governed by consensus. In this process, only by respecting each individual equally, we can change the situation in which we are today.

Throughout our Samanvayon ka Samanvay abhiyaan we shall seek to be broader based and more inclusive by also taking into consideration

- adherence to the Constitution of India;
- communal reform for non-violence – this also includes change in perception, behavior and acceptance;
- addressing the aspiring and powerful middle class for creating broader consensus at the civilizational level;
- training of Youth to institutionalize Samanvay in our education and culture;
- networking laterally with similar movements of Samanvay which exist parallel to us; there will have to be a mutual learning between us;
- maintenance of a decentralized synergy with no narrow vertical hierarchy;
- by identifying successful case histories and their path-breaking achievements – as the first emerging seedlings of a movement, whose time has arrived
- and by judicious implementation of the cycles of Study (Adhyayan), Decision (Nirnay), Action (Prayog) leading to the next Study (Adhyayan) to enable the refinement in individual & collective behaviour, decision making & implementation that we need.
- Adhyayan will include analysis and a robust transparent audit of outcome of policies and interventions which are introduced and implemented."

While this above Call to National Action includes the universality of a global sensitivity, it is practically aligned to the first phase of seeking synergy - every nation and community within itself at first - to create strong regionally adapted threads of global rebuilding and healing. The original draft was compiled by the senior mentors after due discussion and absorbing the views of a larger

number of interested contributors. The version here is an adaptation in the context of the Jalsamvaad online magazine and therefore consistently juxtaposes the theme of Governance Reform with Individual, Community and Government Reforms.

As hosts of the online Aao Nadi Ko Jaane series we have also been hosting the Samanvayon ka Samanvay webinar series and, as a reporting member, I felt it is my responsibility here to state the wider context within which the River Protection, River Rejuvenation and River Basin Reform, discussed and implemented through Aao Nadi Ko Jaane strategy meetings, will take place.

The draft above is under modification and was the base document for the Bihar Sampark Yatra - the first action derived from the thought in the draft that says - each one of us will have to travel through India to bring the message and awakening to those who are close to us and already having an inner motivation and energy that supports the five pillars listed above.

It is with great inner confidence that I state, on the basis of what I have learned from all my colleagues in Aao Nadi Ko Jaane, and especially from our senior mentors, that one of the most powerful ways of strengthening the five pillars listed above will be to work on River Rejuvenation

and River Basin Reforms, fully aware that that is a sub-set, although almost the most important sub-set, in the overall task of Bharat Punarnirman Abhiyan within the Universally Open Ended commitment to evolve an all-inclusive Samanvayon ka Samanvay - the Network of All Healing Networks.

This methodology leaves open, to any activists seeking reform within any subset and any vertical silo, whether directly working on water issues and river issues or not, a window to feel free to contribute, to collaborate and to even lead towards a Universally Inclusive Healing Synergy.

(With inputs for the above quoted draft, from P V Rajagopal, Dr Rajendrasingh, Mohanbhai Hirabai Hiralal, Medhatai Patkar, Dr Indira Khurana, Manohar Manav, V Prakash Rao, Jayaji Paikrao, Satyanarayana Boliseti, Dr Rajendra Poddar, Dr Sumant Pande, Ramakant Kulkarni, Uma Shankari; Dr Kishor Moghe, Dr Snehal Donde, Sudarshan Das, Aniket Lohia, Rajni Bakshi, Advocate Guruswami, Dr Chiranjivi Bhattarai (Nepal); Narendra Chugh, Ramkrishna Sawkar; Satish Khade, Dr Ravindra Vora, and many, many others)

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## Micro-Watershed capacity mapping, need of time

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Groundwater plays an important role in our lives as well as Country's economy, but it is disappearing fast. There is mounting evidence that we are extracting more than that which can naturally replenish. If we "run out" of groundwater, millions of people will be left without any means to sustain themselves. Groundwater-dependent towns and villages spend an increasing fraction of their budgets chasing the water table. Stories abound of farmers spending their life savings or taking loans to drill a borewell, but failing to find water. Access to groundwater in hard-rock regions like Maharashtra has almost become a lottery now. Ground water levels have fallen down hundreds of meters below the ground and now in spite of drilling to greater depths i.e. beyond 200-300 meters, not all are lucky enough to strike the water. Scientific evidence also points to over-exploitation of aquifers. The Ground Water depts. classify all blocks in state based on trends in long-term groundwater levels. Since 2018, almost a third of blocks in Maharashtra have been continuously classified "over-exploited" or "semi-critical". The shortage of water is increasing its cost and hence becoming a new valuable market commodity which will definitely going to burden the society, its already started in the form of Tanker Mafias and Bislery businesses.

On the other side, If we observe watershed programmes implemented since last 10-15 years it clearly seems that they got limited success. What could be the reason? Less rainfall? Improper design/implementation? Water literacy? If we understand the problem and if the consequences are so severe then why we are unable to address it? The answer lies partly in politics? Or in the invisible

nature of ground water leading to ground water illiteracy? Or partly in our reliance on simple techno-economic fixes?

Yes, still in today's time, the people are too illiterate in terms of Hydrogeological aspects of Watershed. They just think that digging the river channel or trenches on hill slopes will result in drought free area. There is dire need of Ground water experts to tell the need of scientific planning but people still are unaware about it. If any commodity is in the hands of people without the knowledge of it's proper use, then how there will be its judicious use? And this is the situation since long. We are facing the drought situation, we want to fight with drought but do not know exactly how. As far as Maharashtra is concerned, more than 90 percent of the villages are not doing any watershed capacity mapping? The recharge and consumptive use methods are being implemented haphazardly without calculations and results are disheartening.

This is the root cause of failure of any Water conservation Scheme either by Government or by NGO. The solution is that we need a creative scientific solution, its awareness among people through education and then it's planned implementation. Watershed capacity mapping is one such solution which covers the above path. Watershed capacity mapping at village level is the basic remedy and local people not only should know it but must be well versed about it. Water management problem is not only peoples concern for their daily uses, it is a big concern for ecosystem also. Without understanding how much water is available, how much is being used and by whom, solving this water crisis is going to be a non-starter. Every village has to prepare its own watershed



capacity map. If they don't know how much water is coming to their watershed every year through rainfall, how much rainwater is going to the underground, how much of it is evaporating, how much they require for agriculture and other needs, then how they plan its proper use?

But there is hope in the form of sahaj jalbodh abhiyan coming ahead with Watershed capacity mapping plans ie. Jal Arakhada. We need the persons who will learn the methodology and will spread the knowledge to grassroots level. The students/Youths are taking initiative, showing interests, they want avenues/opportunities. The success of trainer's training in watershed capacity mapping will certainly result in mass scientific efforts and thus may help in positive result oriented water conservation schemes. This will be the true start of campaign of Drought free, water cultured India. Through the watershed capacity mapping, if farmers will come to know that they took water intensive crops inspite of less availability of water, then they might try diversifying the crop varieties taken each season and thereby utilize water more efficiently, this way water can be saved and a good income can still be earned.

There are many ways of saving water like drip irrigation, sprinklers, rotation of crops but people will use them only when they are aware about the intensity of water scarcity and know remedies. A proper watershed capacity mapping will do this. It will draw their attention towards the true facts & figures of water availability in their watershed. They will then initiate the recharge methods, drainage line treatments and appropriate watershed measures. The way forward is comprehensive watershed capacity mapping, simultaneously in each watershed and then river basin as a whole.

Watershed capacity maps at the watershed level will inform communities about how much water they have, so it can be equitably shared within communities. Watershed capacity maps for the river basin will inform communities how much must be left for downstream users, ensuring that water resources are allocated

between communities fairly and transparently. There are plenty of Government schemes with big amount of expenditure in the form of subsidies. Here through watershed capacity mapping presentation of true, quantitative information of the particular village/watershed, planning accordingly and results thereof will definitely trigger interests of the rural communities. In fact it is a most powerful way of motivating and mobilizing communities for action and cooperation to Government schemes.

As precautions during Watershed capacity mapping exercise, people need to be guided through the challenges emerging from changes in weather patterns as well as market pulls and their own income aspirations off-course, by using local and factual data. It is vital for watershed development activities to have regular maintenance of the watershed structures, it is required to enhance the supply side.

True validation is very difficult, To simplify & making it easily understandable it requires locally measured data, hydrometeorological databases, maps, general literature from local experience. Can be used as a tool in municipal planning as an aid in decision making. Several uncertainties, especially related to representative values of the homogeneity and infiltration factors but further experiences from application of the procedure in various geological terrains may improve the selection of representative values. Emphasis also be given to the typical geological sections for each type of soil & stratigraphy defined by an experienced Hydrogeologists because the kinematic porosity varies with different geology.

The hydrologically defined drainage basins are generally dissimilar to the recharge areas of the specific wells, especially in hard rock areas with well-developed fracture zones. Hence, a Micro-watershed (hydro-geomorphic unit) will be evaluated for its recharge potential and suitable map showing such groundwater recharge potential zones for appropriate recharge will be prepared to be used for better and improved ground water resources i.e. for accuracy in watershed capacity

mapping and to provide scientifically appropriate locations & structure types for artificial recharge to Aquifer

This work is to be implemented by Paani samitee of each village, who will prepare the schemes in consultation with the Block Level Committee. The same will be submitted to the District Level Committee for its appraisal in order to ensure that the same is in conformity with the water security plan. Subsequently, they will obtain necessary approvals and finalise the funding arrangement. An Action Plan can be prepared for implementation of the scheme. The Committee will submit a monthly report of physical and financial achievement to the Block level Committee, which is responsible for monitoring of the implementation of the scheme. The committee will also prepare a completion report after execution of the work is over so that process for transfer of responsibility for operations and maintenance could be initiated.

A Micro-watershed (hydro-geomorphic unit ) can be evaluated for its recharge potential and suitable map showing such ground water recharge potential zones for appropriate recharge will be prepared to be used for better and improved ground water resources i.e. for accuracy in water budgeting and to provide scientifically appropriate locations & structure types for artificial recharge to Aquifer.

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**World Water Day-1998 -  
Ground Water - The Invisible  
Resource**  
**Gajanan Deshpande, Pune**  
**(M) : +91 9822754768**



(A new series of articles has been launched from August 2021 to learn more about the importance of World Water Day and the various water awareness programs implemented every year.)

On the occasion of World Water Day-1998, the guiding theme “Groundwater: An Invisible Resource” was specially implemented by pointing out the following three shortcomings in groundwater management. As half of the world's population is dependent on groundwater, efforts have been made to draw the world's attention to these issues.

**Issue 1. An awareness in the society and business sector about the scarcity of ground water and its depleting level day by day :**

Even today in Maharashtra, 54% of transactions are dependent on groundwater. Until 40-50 years ago, the groundwater level generally seemed to be very high at 25-30 feet. Therefore, despite the frequent droughts, the availability of groundwater enabled people to cope with the situation successfully. In those days, when there were no enough facilities for surface irrigation, there was a complete reliance on ground water.

Groundwater abstraction increases when surface water sources used for agriculture, industry, urban needs or for other purposes become unavailable. Drawals of groundwater are consistently done regardless of the recharge. Now that the technology of pumping water from the depths is at hand, the groundwater level is going even deeper.

The common man can quickly understand that the water in a pond, stored on the surface, is collective. But, it does not come to mind quickly that groundwater, which is invisible to the naked eye, is also collective. Our groundwater law is designed to streamline various rules as how much water one should use, how deep wells be dug and how much lifting be done while using this collective water.

For groundwater development, we need to work at different levels keeping in mind that all these things cannot be governed alone by the government. For this, a mass participation movement will have to be formed. People-organization is the most important factor in water management. From the government administration, we can pay attention to some rules

and their strict implementation. However, everything does not come from the administrative system alone. Increasing people's skills in water use - be it on the farm, at home or in the factory - will have to be handled by the social elements.

**Issue 2. Not addressing the economic aspects arising out of the demand and supply of ground water :**

It is considered that there is an economics of groundwater development works. One thing, that is getting better now, is that the feeling that water has value is slowly taking root in people. Otherwise, until now, there was a kind of belief that water is a gift of God and available a lot in the nature and so use it as you want. That sentiment should go away now and water should be used sparingly and especially we should look at water management in terms of how to increase its productivity financially and how we can make the most of it. Fortunately, this approach has now grown. Therefore, the society will have to keep eye on the calculations of the capital required for water management, its recurring annual expenditure and the income we get from it. So, in the future, we have to move in this direction.

**Issue 3. Degradation of water quality due to pollution through groundwater-recharge process :**

Water pollution issues should be deliberately discussed in conjunction with unrestricted groundwater drawals. Take the example of rivers in Maharashtra, or lakes in cities other than Bangalore. Water pollution is a major problem in all areas. There is no state or province exception for this. In fact, when the river passes close to the civil areas, it becomes polluted. The larger the population, the higher is the pollution. In this way, water resources are also being polluted vastly. This is also the problem with groundwater. In many areas, it has already happened. This is compounded by the growing number of unplanned cities. The cities are growing with lack of planning without considering water availability, reusable wastewater, its recycling

etc. All of these things seem to be happening persistently. In the future, we will have to pay close attention to all these things and plan them in detail.

Water pollution causes substances with certain properties that get added in to the water to such an extent that it changes the natural quality of the water making it unusable. Water pollution affects the health of living things, spoils the taste of water and makes it dirty or smelly. Human action and other factors directly and indirectly change the natural quality of water and make water unusable for any purpose. Water pollution is a process that adversely affects human and aquatic life due to changes in the natural, chemical and biological properties of water.

According to a World Bank report on groundwater and health, about 21 per cent of infectious diseases in India are caused by poor health habits and improper water intake and 500 children under the age of 5 die of diarrhea every day. We have to work hard to change this dire situation.

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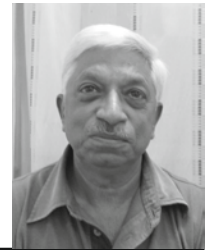
To a **thirsty** man, a drop of **water** worth more than a sack of **gold**.  
Thousand live without **love**, but not without **water**.

**Save Water, Save Life.**

## Organization- Circle of Blue

**Shri Vinod Hande**

**(M) : 9423677795**



Fresh water scarcity is disrupting population, economies, environment we can call it every aspect of life. The effects are profound in health, food and energy. There are better ways to manage the water needs of people and planet says 'Circle of blue'. 'Circle of Blue' is an organization where water speaks. 'Circle of Blue' is founded in 2000 by leading journalists and scientists. It provides relevant, reliable and actionable information about the world's resource crises. With an intense focus on water and its relationships to food, energy and health 'Circle of Blue' has created a frontline reporting, data collection, design and convening that has changed with the world's need to encourage new methodology in science, collaboration, innovation and response. 'Circle of Blue' collaborates with leading scientists and data experts. Organization then dispatches top journalists to define region where change is occurring and publishes these reports online free of charge to inform academics, governments and general public and region. 'Circle of Blue' and its partners have developed a recognized and collaborative operating system that is shared by world leading journalists, designers, multimedia specialists and scientists. 'Circle of Blue' is a non-profit organization based in USA. J. Carl Ganter is cofounder and director of Circle of Blue. He is an award winning journalist, broadcaster and photojournalist. He is a recipient of the Rockefeller Foundation's Centennial Innovation Award. Funding for the organization comes from various sources like various foundations, govt. grants, individual donations and corporate contributions. Circle of Blue's staff and Directors will ensure that there will be no undue influence of donation on

these activities and adversely affect their reputation.

As per organization challenges before the world are of water, food and energy. The world's capacity to respond is in doubt. Global demand for fresh water mainly from agriculture, industry and expanding cities is growing fast and by 2030 supplies will be scarce enough to threaten economic development, political stability and public health.

Circle of Blue's trusted reporting has enhanced climate agreement, urban policy and citizen activity. It has inspired collaboration from Davos to Beijing and from Washington to the Vatican. Its visionary works across the Great lakes, US., China, Australia, Mexico, India and Middle East earn Rockefeller Centennial Innovation award.

About the organization Ian Bremmer, President, Eurasia said "No one is better positioned to deliver groundbreaking knowledge on the critical resource of global water than circle of Blue".

In January 2020 leaders of major group assembled for special workshop in Davos, Switzerland for designing water's future. Together they have made up their mind to inform a new strategy that to create a water secure world in a changing climate.

"Circle of Blue" mentioned ten choke points of following nations which are coming in the way of development of that nation. The conflicting demand for water, food and energy is the crucial challenges of our 21st century. Global choke point, a collaboration between 'Circle of Blue' and the 'Wilson Center' which explores the risk and promise with frontline reporting, data and

policy expertise. And Countries are,

- Choke point of Australia,
- Choke point of Tamil Nadu,
- Choke point of South Africa,
- Choke point of China,
- Choke point of India,
- Choke point of US,
- Choke point of Index,
- Choke point of Great lake.

There are ten choke points for India also among them choke point 2nd, 3rd, 4th and 9th are serious as per info graph'

- Choke point 2nd- Largest population: with 1.27 billion residents as on June 2013, India is currently the second most populated nation in the world. It is expected to cross China in 2025.
- Choke point 3rd: Largest grain harvesting: Free water and free electricity is provided to grain farmers in India, which has led to massive surplus i.e. 60 % more of last years harvest.
- Choke point 4th: Largest energy consumer, fifth largest coal reserves and third largest coal production. India has 67 billion metric tons in proven reserves still to be mined and pulled out 540 million metric tons of coal from its mine last year.
- Choke point 9th : Largest freshwater reserves: India's annual renewable water reserves total 1608 billion cubic meter a year.

As per Circle of Blue India's resource problems are not those of scarcity but rather of inefficient use and bureaucratic policies.



### Choke point stories

#### Toxic water, toxic crop :

India's public health is as good as a time bomb. Raw sewage and industrial wastewater contaminated with metals and chemicals irrigates much of the nation's food. This is the story of small town near Bangalore. This is a story of securing water for the crops. With ground water tables continuously falling farmer borrowed heavily to dig wells deeper. If he is lucky ,he found water. If unlucky he did not. In 1994 and 1995 one of the farmer Muniraju was forced to direct water into his field from nearby storm water drain. In 1998 the nearby town installed a sewer system and discharged the untreated wastewater through the same storm water drain alongside his field. Since then Muniraju has a secure water source of water to grow his crops. Across India countless numbers of farmers like Muniraju grow their crops with untreated wastewater. Farmers are praying that wastewater flow should last as long as there children find other jobs and support family. Medical specialists say farmers and their families risk serious disease from exposure to harmful sewage born microorganisms and metals. Scientists have measured unsafe levels of heavy metals and other toxic substances in Indian crops, posing a public health threat if consumed.



Just 30 percent of wastewater undergoes treatment before discharged in the stream. To date there is no regulatory framework for testing vegetables and fruits for toxic contaminants. By the use of Contaminated surface water used for irrigation farmers are likely to experience diarrhea, bronchitis, skin disease, eye irritation etc. 'Circle of Blue' says motivation for farmers to use wastewater to raise their crops is mainly to meet three primary challenges of nation. 1. Rapid population growth and urbanization, 2.increasing demand for food, and 3. Depleted reserves of clean water. Supply of clean water to produce food is diminishing. Rivers and lakes are polluted according to state and government studies. And groundwater reserves are shrinking fast from over pumping.

Damaging effects of heavy metals affects on safety of the country's agriculture export. India is the 15th largest exporter of agriculture and forestry product. US is India's top export market. Other important markets include Vietnam, UAE, Saudi Arabia, Bangladesh, China, Iran, Malaysia, Pakistan and UK. The world is well aware of India's wastewater contaminated food export. The united states ranks India among the three nations that violate American import safety limits. 60 percent of food grain grown in India are refused by US custom inspectors to allow in the US market. Other countries have also warned India for not meeting International food standard.

Big Indian dams, unfinished and silent, could be tomb for giant hydropower projects: India's need for electricity is more acute than any of the Earth's biggest nation. With 238000 mega watts of generating capacity in 2014, this nation of nearly 1.3 billion residents contains less than a quarter of the generating capacity of the US and less than fifth of China's capacity. Nearly 70 percent of India's generating capacity in 2014 was developed from coal power plants. Less than 20 percent came in hydropower. According to Vajpayee's 2003 development plan, India was to have 162 new big dams and 50000 more megawatts of hydropower capacity by 2025. Of the 162 dams proposed in 2003, 42 were build in Arunachal Pradesh. To date none have been started. Power shortage that causes regular blackout in the region. The state's hydropower development authority promotes popular mini power projects which generates less than 1 mega watt electricity. But govt. has decided on its own to go for large dams for hydropower development in the region without consulting local people who live there. It's a mistake that led to distrust. Govt. projected 168 hydropower projects in Brahmaputra basin but people are not going to let it happen taking into account of flood of 2004, 2008 and 2011.

The experience on the Subansiri River turned out to be the lead for new era of India's hydropower development, the era of cancelled, shutdown, delayed and destroyed dams. The cost

for big dams are so high which do not make economic sense. India's supreme Court concluded last year that dam in Alaknanda, Mandakini and Bhagirath River basin amplified the damage and recommended that 23 proposed dams not to be built.

**India's water, food, energy problem:** Here organization is focusing on the state of Punjab where farmers are provided free water and energy that yield huge grain surplus. This subsidy also drains groundwater reserves and over a million units of power to run water pumps. Effect of surplus grain drains groundwater and cause uneaten grain to pile up in out door storage area. India is a nation rich in supplies of indigenous coal but unable to develop them efficiently. To keep power plants running providing water is a big challenge. Farmers of coal belt region worry about new power plants because of diversion of water. Local people are complaining about environmental loss due to coal mines.



'Circle of Blue' illustrated the climate related threats to dams in India's Himalayan States. 'Circle of Blue' directly observed June 2013 flood wrecked new and existing hydropower projects in Uttarakhand with major implications for India's efforts to increase supplies of electricity. In 2014 'Circle of Blue' interviewed a number of India's top natural resource policy experts to help them to identify the most fundamental resource challenges for government, why they have arisen and how they can be resolved. Means how can India's natural resources management be more efficient and effective so as to mitigate growing food, water, energy choke points.

Along fouled Ganga Fresh resolve to make India's mother river clean again. In 1985 Mehta

brought suit in Supreme Court to clean up Ganga and its tributaries. Despite long series of court orders to close polluting factories and build wastewater treatment plants, directives were also ignored by state and national authorities. University and govt. water quality measurement show that the river is more foul, dangerous and dirty than ever. Cleaning the river Ganga will take all of India's skill. In 1947 India was a Nation of 344 million residents and 120 million people were dependent on Ganga. Today Ganga and its tributaries support 40 percent of India's population. 90 percent of its basin water used in agriculture according to Govt. report. More than 50000 big and small factories use river for draining their untreated wastewater. As per 'Circle of Blue' report Ganga is one of the planet's most polluted river. The river's degradation is more than an insult to national pride. Insufficient water and energy infrastructure investment have left India's cities



and countryside in miserable condition.

In the opinion of Circle of Blue World Bank Loan to India leads to water damaging projects. There are ten choke point of Tamil Nadu state of India also. Limitation of space is not allowing me to throw light on remaining choke points of India and

Tamil Nadu. They are about coal mines, renewable energy and Uttarakhand flood disaster, etc. Interested people may visit on 'Circle of Blue' web site given below for detail information.

'Circle of Blue' is run on donations received from govt. organizations, through other organizations and by individual donors. Donation made to Circle of Blue is tax free.

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## Stockholm Water Prize 1996

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### Prof. Jorg Imberger, Australia

(An article series has been launched in August 2020 to learn more about the World Water Prize winners and their work.)

The 1996 Stockholm Water Prize was awarded to Professor George Imberger, an environmental engineer in Australia, for his research on water. Professor Imberger is an environmental engineer, and he has a keen interest in the way water is transported and dispersed in stratified lakes. In this regard, he pays special attention to the lakes but also specializes in rivers, creeks, swamps and coastal waters.

George Imberger is seen as a special person in this field of research. When the most respected critics speak on the subject, it is always in the form of "before Imberger and after Imberger".

Most water bodies are stratified due to salinity or temperature differences. Due to the natural movement of wind and water, they are not always able to mix enough water in the deeper layer. As a result, water samples at short distances in the same water body show different properties. Many of these types of transport in the water bodies that Imberger studied, were previously unknown.

During his research days, Imberger developed a wide range of sophisticated equipment in collaboration with industry. It is said that "Need is the mother of research." According to that statement, this is true for Imberger's research also. Imberger has developed a special plant where he has immersed an equipment in the Swan River near the skyscrapers in city of Perth, where he lives. Visually it looks like a milking machine;

however, practically and technically it carries out many tasks. It records accurate data on various parameters of different depths of water. The record was made available through two laptops connected to the plant in his study. Imberger's doctoral students keep a close eye on this. Many graphs are printed from it; from which the physical, chemical and biological data of different layers of water is studied and obtained.

George Imberger says, "We have succeeded in creating computer models by comparing the velocities of currents in different layers of rivers, creeks, and lakes using these techniques. It can be used for estimating how contaminants are spread in those layers and how quickly they can be dissolved."

Imberger and his students monitor all this work from their computer room at the University of Western Australia, and this extraordinary and beautiful graphical replica records the behavioral changes of currents and substances being tested according to various parameters. A wave of different colours is seen constantly going up and down on the computer screen. There can also be seen an effect on the movement of layers at higher depths of water.

This creates a better understanding of water-related environmental issues; so also it provides a good basis for dealing with the problem, and the response needed to address future aquatic-environmental defects can be predetermined with great certainty. These are some of the environmental benefits of George Imberger's research.

The global scope of Professor Imberger's work was another factor behind the decision to

award him the Water Prize. Imberger conducts research work simultaneously on several projects around the world. Examples include the study of tidal currents in the Netherlands, measures to maintain water quality during the construction of the Bacon Dam in Borneo, and the effect of groundwater on the bottom of Valdivia in Chile etc. He is conducting research around the world on a variety of topics, including the impact of waves on the biochemical balance of Lake Kinneret in Israel, the amount of wastewater that can be absorbed in a reservoir in Brazil, and the transportation system in the Biva Reservoir in Japan.



The main advantage of Professor Imberger's global experience is, perhaps the future generation of researchers he has created. Professor Imberger is credited with starting the first environmental engineering course in Australia. He also founded the Department of Environmental Engineering at the University of Western

Australia. The achievement of Professor Imberger's work is remarkable, and as a researcher he has gained worldwide excellence; at the same time, he is equally committed to how students can get more and more improved results.

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Publishing shortly: **Jalopasana** - Diwali Issue (Marathi)  
Subject: Water on the World Forum

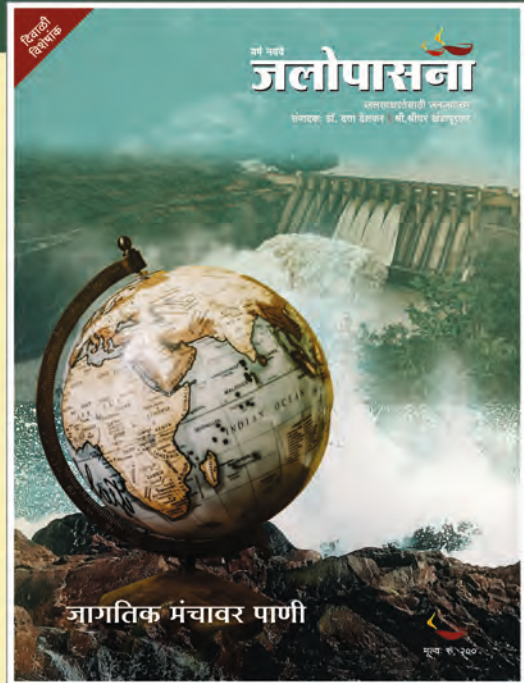
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- (4) Shri Suresh Kulkarni
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Last week, Rashtriya Jala Sammelan was held at Gwalior. We are happy to state that in this Sammelan, recent issues of Jalashamvad (English and Marathi editions) were published at the hands of Shri Giriraj Goel (Director, Jalashakti Mantralaya, Government of India) and the waterman of India Shri Rajendra Singhji. Representatives of 22 different states in India attended this Sammelan. Thus, countrywide platform was made available to our issues. Shri Vinod Bodhankar took special efforts to make this publication happen. We are thankful to him for the same.





Water literacy has become the need of the day. We expect more and more literature to promote this activity. Taking this fact into account, Retired Secretary of Irrigation Department of Government of Maharashtra Shri Vidyanand Ranade wrote one book by name '*Panya Tuza Rang Kasa?*' In Marathi. This book is published by Rajhans Prakashan, Pune. This publication ceremony was held at Pune on 13th December ,2021. Chief Guest for this function was Shri Ramraje Naik-Nimbalkar, Chairperson of Maharashtra Legislative Council. Elaborate arrangements for this function were made by Shri Anil Patil, Chairman of Maharashtra Vikas Kendra, Pune.