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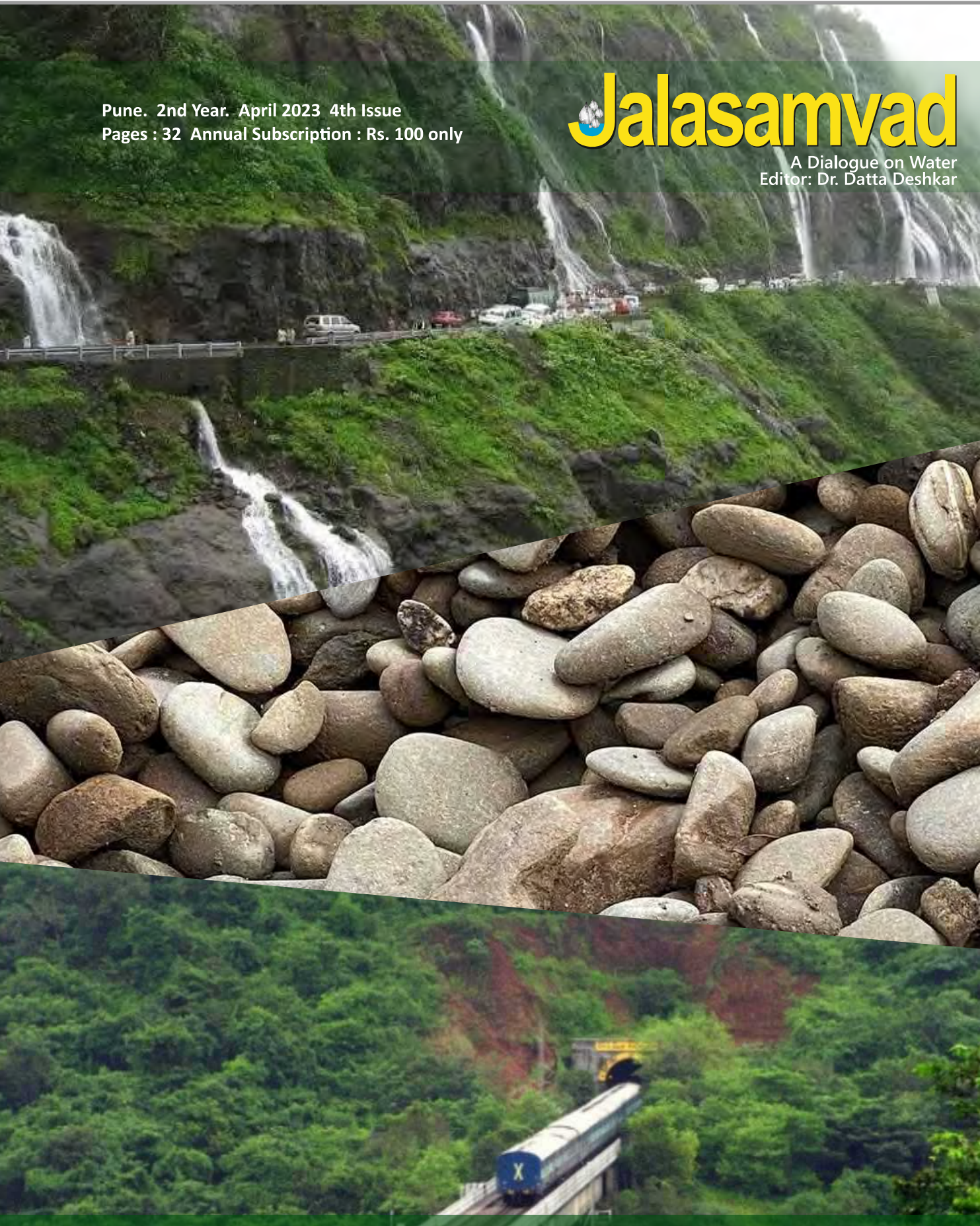
Jalasamvad

A Dialogue on Water
Editor: Dr. Datta Deshkar



Cover Story: Solid Waste Management:

Famous rivers in the world

(1) Ob river

(2) Sepik River

(3) Songhua River

(4) Ishim river

Jalsamvad

Mouth Piece of Bharatiya Jala Sanskriti Mandal

■ **April 2023**

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Contents

Editorial .....

World Water Day 22nd March 2023

On 22nd March 2023 the whole world celebrated the World Water Day. Do you know that this day is being celebrated all over the world at the instance of one Indian water activist whose name is Dr. Madhavrao Chitale, winner of the Stockholm water prize.

It is the practice every year that one theme is declared on this occasion and the whole world is expected to work on that guideline throughout the whole year. This year's theme is – Accelerating the change – Be the change you want to see in the world. Let us try to understand what the world expects you to do throughout the year.

We have involved ourselves in last several years in going against the Nature. We have disturbed the water cycle created by Nature and are facing the consequences. This disturbance has resulted in problems related to health, hunger, jobs, education, industry and even peace. Due to climate change number of new diseases are coming up deteriorating the health standards. Every year crops are failing having their impact on the food security. Many young students, especially girls, are not in a position to continue their studies as they are stuck up in helping their mothers in fetching water from a distance. Due to failure of crops, industries are not getting the raw material in the required quantity. That has disturbed their working. Many employees are getting jobless. Everywhere disputes are increasing in sharing the available water. Thereby the peace is disturbed and who knows, that would develop into wars in the near future. To overcome these problems, we are required to pay due importance to water availability and its distribution. For that this year's theme wants us to pay attention to the key issues. Main of them are as follows :

1. Regulating water wastages : Huge quantity of water is wasted every day. We have changed our life style resulting in increased water consumption. The cultivators, industrialists and even a common man have started using more water without verifying whether it is available or not. Number of watersheds are facing the problem of over extraction. In fact, we do not have any right to withdraw ground water without recharging it. If every person makes an effort to save at least 25 liters of water every, you can just imagine how much water would be available.

2. Protecting water resources : All the rivers, lakes, even streams are facing the problem of human aggressiveness. India, once upon a time, was known as a country of lakes. The number of lakes is diminishing very fast due to this human aggression. Some lakes have been reduced to just half of their size due to aggression from all sides. Because of over utilization of river water, many rivers are not reaching the sea leaving their hazardous impact on the biodiversity. Old water systems which were providing enough water have been demolished. It is the duty of every citizen to protect these sources. Our relationship with water is that of a trustee and not of a consumer.

3. Promoting reuse of water : I have my own definition of a human being. He is a machine of converting pure water in wasteful water. Out of the total water used nearly 85 percent is transformed into waste water. Can we not reuse the same? There are some countries which are using the same water 7 to 8 times. For example, Singapore is satisfying 40 percent of its water need from reuse of water. The best example is that of Nagpur Municipal Corporation which is selling its waste water after treating it for Rs. 350 crores. Can this experiment not be repeated by other municipal bodies? By just treating it to some extent the same water can be used again and again.

4. Effective water governance : We all know that water is a scarce commodity. All the people cannot satisfy all their wants as that much water is not available. As such, efforts are necessary to decide the priorities. Equitable (and not equal) water distribution of water should be the aim of any managing authority. Here we come across the problem of water governance.

All these goals can be achieved if we are successful in spreading water literacy. Water literate society only can find a sustainable solution to solve the water problem.

Dr. D. G. Deshkar
Editor

Water And Irrigation Panorama of India - 4

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PART 4: SURFACE AND GROUNDWATER RESOURCES

The two main sources of water in India are rainfall and glacial snowmelt in the Himalayas. Although snow and glaciers are poor producers of freshwater, they are good distributors as they yield at the time of need, in the hot-weather season. Assessment of water resources of the country dates back to 1901 when the First Irrigation Commission was constituted. Later in 1949, Dr. A.N. Khosla developed a methodology to estimate surface water resources. Subsequently, the Central Water Commission took the responsibility of the estimation of the water resources of India. Accordingly, annual average precipitation in India including snowfall is estimated to be about 4000 BCM, of which the mean annual rainfall is 3880 BCM. The dependency ratio viz., the percent of total renewable water resources originating outside the country were estimated as 30.5 percent. Of the total precipitation, almost 50 percent amount is lost to evapotranspiration. As per the latest estimates of Central Water Commission, the average annual renewable water resources of India have been assessed as 1999.20 BCM taking both surface and ground water into account. Further, about 43 percent of the potential available water resources cannot be put to use due to topographical constraints and uneven distribution over space and time. The estimated utilizable water resources of the country therefore are 1122 BCM per year, out of which, share of surface water and ground water is 690 BCM and 432BCM per year, respectively. Of the annual renewable groundwater resources around 90 percent or 390 BCM are considered overlap between surface water and groundwater.

1.Renewable Water Resources

Renewable water resources are defined as the sum long-term average annual flow of rivers and recharge of aquifers generated from endogenous (internal within the country) and exogenous (outside the country) precipitation. It corresponds to the maximum thermotical yearly amount of water available for a country. This includes surface-water resources and groundwater resources. Of the total renewable resources, about 30.5 percent (dependency ratio) originate outside the country. It is important to note that the hydrological cycle and hence the amount of renewable water resources can vary over time and be impacted by a number of factors such as climate change and land-use change. Table 1 shows the total renewable water resources of the country.

Table 1. Renewable Water Resources of India

Parameter	Year	Unit
Precipitation (long-term average)	2019	1105 mm/ year
Total precipitation volume	2019	4000 BCM/year
Internal renewable water resources (long-term average)	2019	1990.20 BCM/ yr
Total actual renewable water resources	2019	2079.94BCM/yr
Dependency ratio	2018	30.5 percent
Total actual renewable water resources per inhabitant	2021	1486 m3/ year
Total storage capacity of dams	2021	257.81BCM

2. Water Storage Infrastructure

As per the International Commission on Large Dams (ICOLD), a large dam is defined as 15+ metres in height, measured from lowest foundation to crest, or 5 to 15 metres high impounding more than 3 million cubic metres of water. Worldwide, there were 58,713 large dams with an estimated storage capacity of 8,300 BCM which is about one-sixth of all river discharge worldwide each year. Of the total no of large dams, only 19, 838 are meant for irrigation purposes. China, USA, India, Japan, Brazil are the top five countries having large dams globally. China alone hosts almost 40 percent (23,841) of the world's large dams.

Globally, India ranks third in having number of large dams. The Central Water Commission maintains the National Register of Large Dams (NRLD). According to which in 2019, there were 5745 large dams in the country, of which 5334 were completed and 411 were under construction. The top three states having large dams are Maharashtra (41 percent) followed by Madhya Pradesh (16 percent) and Gujarat (11 percent). A total storage capacity of about 257.8 BCM has been created in India due to major and medium irrigation projects. The projects under construction will contribute to an additional 47 BCM. Thus, likely total live storage available will be 304.6 BCM which is 44 percent as against the total annual renewable surface water availability of 690 BCM. Of the total potential storage capacity, the Ganga basin has the highest storage capacity (18.4 percent) followed by Krishna (18.0 percent), Godavari (14.3 percent), and

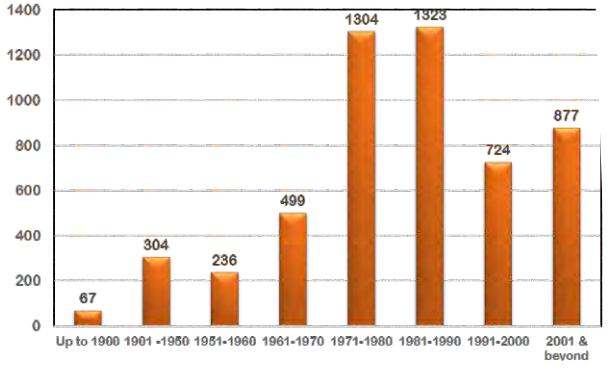

Figure 1. Distribution of large dams in India (decade-wise)

Narmada (8.0 percent). The decade-wise construction of large dams in India is shown in Figure 1.

The top ten large dams in India as regards their gross storage capacity and used for irrigation are shown in Table 2. The Table 3 shows the state and union territory-wise distribution of large dams in India.

Table 2. Storage capacity-wise top ten large dams in India

Sr. no	Name of the dam	Name of the river	Name of the state	Gross storage capacity (BCM)
1	Indira Sagar	Narmada	Madhya Pradesh	12.2
2	Nagarjun Sagar	Krishna	Telangana	11.6
3	Rihand	Rihand	Uttar Pradesh	10.6
4	Sardar Sarovar	Narmada	Gujarat	9.5
5	Hirakund	Mahanadi	Odisha	8.1
6	Bhakara	Sutlej	Himachal Pradesh	7.6
7	Pong	Beas	Himachal Pradesh	7.6
8	Ukai	Tapi	Gujarat	7.4
9	Ban Sagar	Sone	Madhya Pradesh	6.4
10	Rengali	Brahmani	Odisha	5.2

Table 3. State and Union Territory -wise distribution of large dams in India

Sr. No	Name of the State / Union territory*	Status of construction of dams			Total live storage capacity of the completed dams (BCM)
		Completed	Under construction	Total	
1	Andaman & Nicobar Islands (UT)	2	-	2	0.09
2	Andhra Pradesh** (Erstwhile)	149	17	166	28.716
3	Arunachal Pradesh	1	3	4	0.000006
4	Assam	3	1	4	0.012
5	Bihar	24	2	26	2.613
6	Chhattisgarh	249	9	258	6.736
7	Goa	5	-	5	0.290
8	Gujarat	620	12	632	22.553
9	Himachal Pradesh	19	1	20	13.792
10	Haryana	1	-	1	N.A.
11	Jammu & Kashmir (erstwhile)	15	2	17	0.029
12	Jharkhand	55	24	79	2.436
13	Karnataka	230	2	232	31.903
14	Kerala	61	-	61	9.768
15	Madhya Pradesh	899	7	906	33.075
16	Maharashtra	2117	277	2394	37.358
17	Manipur	3	1	4	0.532
18	Meghalaya	8	2	10	0.479
19	Mizoram	1	-	1	N.A.
20	Nagaland	1	-	1	1.220
21	Odisha	200	4	204	24.032
22	Punjab	14	2	16	2.402
23	Rajasthan	204	8	212	9.708
24	Sikkim	2	-	2	0.007
25	Tamil Nadu	118	0	118	7.859
26	Telangana	168	16	184	-
27	Tripura	1	-	1	0.312
28	Uttar Pradesh	117	13	130	2.027
29	Uttarakhand	17	8	25	5.670
30	West Bengal	30	-	30	2.07
	Total	5334	411	5745	257.812

* Information about the UTs of Chandigarh, Dadra & Nagar Haveli, Daman & Diu, Lakshadweep, Puducherry is either not available or there are no large dams in these Uts.

**Separate data about Andhra Pradesh and Telangana is not available

As per the United Nations University Institute for Water, Environment and Health's Report (2021), most of the 58,700 large dams worldwide were constructed between 1930 and 1970. Dams that are well designed, constructed and maintained can reach 100 years of service life despite ageing.

Ageing signs include increasing cases of dam failures, progressively increasing costs of dam repair and maintenance, increasing reservoir sedimentation, and loss of a dam's functionality and effectiveness. The decommissioning of dam is gaining pace in the USA and Europe — as economic and practical limitations prevent ageing dams from being upgraded or if their original use is now obsolete. As per the report, in India, 1,115+ large dams will be about 50 years old in 2025, 4,250+ large dams will be 50+ years old in 2050 and 64 large dams will be 150+ years old in 2050. India's current dam construction rate is among the world's highest.

3. Groundwater Resource

Groundwater resources assessment is carried out at periodical intervals jointly by State Ground Water Departments and Central Ground Water Board (CGWB). Such joint exercises have been taken up earlier in 1980, 1995, 2004, 2009, 2011, 2013 and 2017. Based on the Groundwater Estimation Committee (GEC) 1997, the dynamic ground water resources of India were estimated in 2004 and then in 2009, 2011 and 2013 as base years. The methodology underwent comprehensive revisions in 2015 and a revised methodology, namely GEC 2015 has been prescribed for ground water assessment. This methodology is being followed for assessment carried out from 2017 onwards. The Dynamic Groundwater Resources are also known as Annual Ground Water Recharge, since it gets recharged every year from rainfall and other secondary sources such as irrigation water, surface water bodies, water conservation structures. The report of dynamic groundwater resources of the country (2022) was brought out jointly by CGWB and State Ground Water Departments. As per the report, the total annual groundwater recharge for the entire country has been assessed as 437.60 billion cubic meter (BCM). Keeping an allocation for natural discharge, the annual extractable ground water resource has been assessed as 398.08 BCM. The annual groundwater extraction was estimated as 239.16 BCM and 60.08 percent as the state of groundwater extraction for the entire country. Table 4 shows the state-wise annual extractable groundwater resources and actual withdrawal. The stage of ground water extraction is very high in the states of Haryana, Punjab, Rajasthan, which implies that in these states, the annual ground water withdrawal is more than annual extractable groundwater resources.

Table 4: State-wise total annual extractable groundwater resources and groundwater withdrawal as per the latest groundwater resources of India (2022)

Table 4 on next page

Major source of groundwater recharge is the monsoon rainfall which was estimated as 241.35 BCM. Out of which, it is 55 percent during monsoon season, 15 percent from other sources during monsoon season, 6 percent recharge from rainfall during non-monsoon season and recharge from other sources during non-monsoon season as 20 percent. Other sources of recharge include canal seepage, return flow from irrigation, recharge from tanks, ponds and water conservation structures. Various rock formations with different hydrogeological characteristics act as distinct aquifer systems of varying dimensions. The aquifer systems of India can be broadly categorized in to 14 Principal Groups.

Groundwater levels are monitored by the CGWB through a network of 23,209 observation wells located all over India. Out of the total 7089 assessment units, 1006 units in various states (14 %) have been categorized as 'Over-exploited' indicating ground water withdrawal exceeding the annually replenishable ground water recharge. In, 260 (4 percent) assessment units the stage of groundwater extraction was between 90-100 percent and have been categorized as 'Critical'. There were 885 (12 percent) "Semi-critical'' units, where the stage of groundwater extraction is between 70 to 90 percent and 4780 (67 percent) were categorized as 'Safe'units, where the stage of groundwater extraction was less than 70 percent. Apart from these, there are 158 (2%) assessment units, which are categorised as 'Saline' as major

Sr. No	State/ UT	Total annual groundwater recharge (BCM)	Total natural discharge (BCM)	Annual extractable groundwater resources (BCM)	Total groundwater withdrawal at the present (BCM)	Stage of groundwater extraction (%)
1	Andhra P	27.23	1.36	25.86	7.45	28.81
2	Arunachal P	4.52	0.41	4.07	0.04	0.79
3	Assam	26.53	2.56	21.4	2.65	12.38
4	Bihar	33.15	3.1	30.04	13.5	44.94
5	Chhattisgarh	12.04	1.04	11.01	5.46	49.58
6	Delhi	0.4105	0.0411	0.3695	0.3627	98.16
7	Goa	0.41	0.08	0.33	0.078	23.63
8	Gujarat	26.46	1.88	24.58	13.09	53.23
9	Haryana	9.48	0.87	8.61	11.54	134.14
10	Himachal P	1.03	0.09	0.94	0.35	37.56
11	Jharkhand	6.21	0.51	5.69	1.78	31.35
12	Karnataka	17.74	1.70	16.04	11.22	69.93
13	Kerala	5.74	0.54	5.19	2.73	52.56
14	Madhya P	35.23	2.66	32.58	19.25	59.1
15	Maharashtra	32.29	1.84	30.45	16.65	54.68
16	Manipur	0.52	0.05	0.47	0.04	7.95
17	Meghalaya	1.72	0.17	1.51	0.05	3.55
18	Mizoram	0.22	0.02	0.2	0.01	3.96
19	Nagaland	0.79	0.08	0.71	0.02	2.89
20	Odisha	17.79	1.44	16.34	7.23	44.25
21	Punjab	18.94	1.87	17.07	28.02	165.99
22	Rajasthan	12.13	1.17	10.96	16.56	151.07
23	Sikkim	0.2712	0.0271	0.2441	0.0147	6.04
24	Tamil Nadu	21.11	2.04	19.09	14.43	75.59
25	Telangana	21.27	2.02	19.25	8.0	41.6
26	Tripura	1.31	0.25	1.06	0.10	9.70
27	Uttar P	71.45	6.13	65.3	46.14	70.66
28	Uttarakhand	2.01	0.16	1.86	0.89	48.04
29	West Bengal	23.61	2.19	21.42	10.07	47.01
30	Andaman & Nicobar	0.6185	0.0618	0.5566	0.0075	1.35
31	Chandigarh	0.05	0.01	0.05	0.04	80.99
32	Dadra & Nagar Haveli	0.09	0.01	0.08	0.11	133.2
33	Daman & Diu	0.038	0.002	0.036	0.057	157.93
34	Jammu & Kashmir	4.90	0.46	4.44	1.07	24.18
35	Ladakh	0.08	0.01	0.07	0.03	41.36
36	Lakshadweep	0.01	0.01	0.01	0.00	61.6
37	Puducherry	0.21	0.02	0.19	0.13	69.17
	Grand total	437.6	36.85	398.08	239.16	60.08

part of the groundwater in phreatic aquifers in these units is brackish or saline.

4. Minor Irrigation Schemes

All those groundwater and surface water schemes having culturable command area up to 2000 ha individually are classified as Minor Irrigation Schemes (MIS). The groundwater schemes comprise dug wlls (8 to 15 meter depth), dug-cum-bore wells, shallow(<35 meter), medium (35 to 70 meter) and deep tube wells(> 70 meter depth and giving a discharge of 100 to 200 cubic meter per hour). The surface water schemes comprises surface flow schemes and surface lift schemes and consists of structures like tanks and check dams. Minor Irrigation sector plays a critical role in agricultural growth and increasing farmer's income. The minor irrigation schemes have short gestation period, lower investments and major share in irrigation.

An elaborate data base on minor irrigation works in the country has been created through consecutive six censuses carried out so far commencing from 1986-87, 1993-94, 2000-01, 2006-07 and 2013-14 by the erstwhile Ministry of Water Resources, River Development and Ganga Rejuvenation. The Census Report contains detailed information about sources of irrigation (groundwater and surface water), number of wells, irrigation potential created and utilized, holding size, water lifting devices, sources of energy, drip and sprinkler irrigation equipment among others. As per the 5th Minor Irrigation Census Report published by the Ministry (2017), there were more than 21.71 million minor irrigation structures across 6,46,784 villages of India. These comprise of 20.45 million groundwater structures (94. 5 percent) and 1.19 million surface water structures (5.5 percent). The groundwater structures comprise 8.78 million dug wells, 5.9 million shallow tube wells, 3.17 million medium depth tube wells and 2.6 deep tube wells. As regards the surface water MIS, there were 5.9 lakh surface flow and 6.0 lakh surface lift schemes. The total combined designed capacity which is in use of the surface flow schemes (reservoirs, tanks and ponds and other structures) was estimated as 11.26 BCM. Of the total minor irrigation structures, Uttar Pradesh has the largest MIS (18 percent) followed by Maharashtra (13 percent), Madhya Pradesh (10 percent) and Tamil Nādu (10 percent). As regards the ownership, almost 98.7 percent groundwater schemes and 63 percent surface water schemes are privately owned. Within the surface water lift schemes, about 80.3 percent are having private ownership. As regards surface water flow schemes, 53.9 percent are under public ownership.

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12th Hanseatic India Colloquium, Germany

Solid Waste Manangement : an Indo German Dialogue

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Abstract :

Presented here is Logical Frame Work of need, to recognize the hazards of Construction Debris, particularly of major infrastructure projects. This solid waste is benign when generated but with lapsing time and changing space it becomes violently malignant. It causes, floods, droughts, loss of farming land hence loss of livelihood for humans and loss of precious habitat for aquatic in riverine ecosystems. We are sharing the cause-effect-mitigative actions taken by us through community mobilization.

An unexpected, unassuming, solid waste which is absolutely non - poisonous and non-biodegradable gets ignored mostly even by solid waste experts. It causes destruction of thousands of hectares of habitats of over hundred and fifty species of birds and over 30 species of local fish, a few hundred species of mollusks, arthropods and amphibians put together.

It is infrastructure Debris, Tunnel debris, Hill cutting debris while making road taken out for ambitious Railway Road and Hydro electrical projects. It's quantity is over 45 Million tons. All this was generated in about a decade. Over the next three decades, it has moved to and settled in river beds. Now those river beds are dry. Even the pools, which used to retain water through out the summer, are now dry over 7 months in a year. No fish in the dry pools, no nesting place.

These 45 million tons of debris heat up in six months of dry season. They cause huge heat island effect that brings in cloud bursts. Eventually those has started causing floods in villages and cities along the rivers. We understood this cause - effect reasoning through working with the local communities. Now we have started a people's movement and have emptied at least about 18 kilometer length of pools in the rivers. Now those pools hold water, as they earlier did, about four decades ago. Some fish and many birds have returned.

When removed and repurposed, these 45 million tons will become construction material and make way for 15 million tons of water. This water will be there throughout the year, quenching thirst, supporting forests, fauna and last but bot the least cooling the surroundings by absorbing about 33,900,000,000,000 Kilo Joules of Heat, every year.... Cooling local climate. Similar mistakes must have happened in other parts of the world. After correcting them, we can give much more cooling effect and restored habitats for our warming Earth.

Keywords :

Flood cause/s, Flood Preventive, Infrastructure waste, Global Cooling, Reversing of Global Warming, Alternative Building material Sources, Recycling solid waster from Infrastructure industry, Mitigating Water Scarcity, Riparian Biodiversity conservation / improvement, Habitat Restoration, River Rejuvenation.

1. Introduction :

Recent news show numerous and more devastating floods as compared to news a few decades earlier. These frequent floods and their increased severity are being attributed to global warming. With that reasoning comes a sense of helplessness. We have found that we have a way to prevent many of these floods.

I have been traveling across India in Hilly and plain regions for last four and half decades and meeting people. I have heard from middle ages

people that when they were young they used to dive from trees in to the river pools. They are sad that their children and grandchildren can not enjoy the way they did. Not even in the rainy season.

As a rain water harvester and environmentalist, I know that the annual rainfall has not reduced so mush that the pools in the river would go dry. Same people say that the frequency and severity of flooding has increased. They also said the floods, in recent past, have started coming earlier than usual in the season.

What must have happened in these four to five decades ? In my experience, the floods, in modern times, have many manmade causes. Following are the examples of such causes -

- Diverting and restricting riverine flows by making them pass through narrow culverts or diversion channels.
- Building low height bridges on forest streams. Such low height bridges often get converted to low head dams because of incoming forest material like fallen trees, branches etc. which are quite obvious part of natural flow of such streams when in flood. Such low head dams cause upstream floods.
- One more manmade cause of upstream floods is bebris accumulated in the pools in rivers. Such debris comes from infrastructure projects like Roads, Railway etc. Whether they are executed on smaller or larger scale such projects often involve large earth moving. They generate a lot of debris. This debris is not considered as a solid waste in conventional meaning of the term. But it is solid waste and it has caused and is causing severe damage to aquatic and riparian habitats.

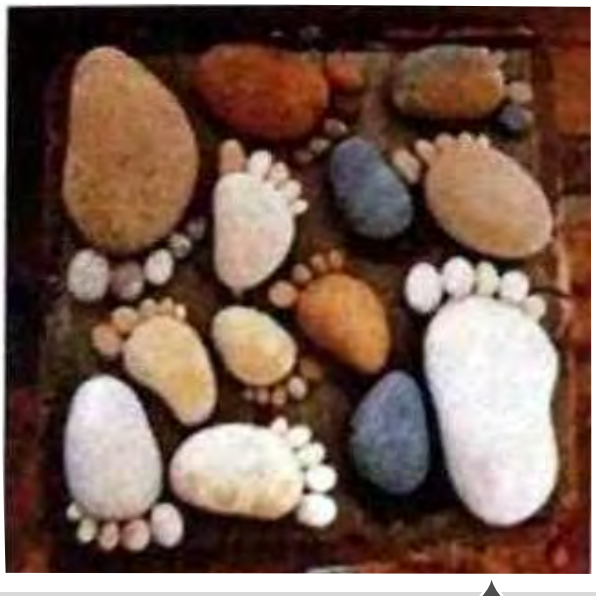
All this debris appears as just simple innocent looking stones and shingle in river beds.'

Environmentalists who do not have historical perspective feel that these are just simple natural, integral part of the riverine ecosystem.

But on probing in details, one understands that these stones, earlier, never came into the stream so often. Or, if they did, they just rolled off. Leaving the pools as they were for literally hundreds of generations. Only in recent past, these pools have started accumulating the rolling stones. And the rivers have started breaking their banks and eating away the rice fields which all those generations have been tilling for their livelihood. With their rice fields washed away by the rivers, the farmers and peasants dependent on them had no other choice but to take refuge in city slums and add to already swollen cities.

There are other group of villagers named as Ghorpi or Bhorpi. These people are traditional fisher folks. They used to fish in the riverine pools for local consumption. The pools, when they held water even in the peak of summer, were repositories of fish. They had the DNA stock of the river. These people had traditional repository of aquatic life. Which fish will arrive when, when will they reach appropriate stage for fishing ? When are they not to be caught ? When are they to be sustainably culled ? They have had all the answers. They too became job less and foodless when the pools filled up with Innocent Natural Stones. They too had to look for another work, or another place to live.

Back then the word " climate refugees" was not there at all. They were indeed disaster hit people. The disaster appeared natural but actually was a result of human activities. The system, just looked at them as aspirants of city life who had come from some obscure village to the slums and urban centers. For them its loss of livelihood and breaking of family, breaking ties with the ancestral



village. For city dwellers they are unwanted blot on their "Beautiful City". Then the city dwellers use them as cheap labour.

For 'Conservationists' and ' Environmentalists' the stones which destroyed hamlets after hamlets are simple Natural Stones, they are cute pebbles with which the artists make aesthetic stuff. They are pebbles and shingles in the stream which should be kept as they are because some foreign language 'Science' books state that they are integral part of the ecosystem. In recent past our whole world perspective has changed. There are people who are very well educated but do not understand the reality of life for many around them.

Simple Stones....Cute !!! ... Aren't They ?

But Reality is they are Villains... Or... Are They ?

In order to bring all of us to our senses, I call readers attention to the fact that we learned folks admire the skill of a person when we use the idiom 'killing two birds with a stone' . We take pride in killing literally and figuratively.

We all have become killers of distant birds. And we do not need bullets, arrows, traps or poison for doing that. We are killing Brown Albatrosses in central North Pacific Ocean. Brown Albatrosses are gaint birds with 7 ft wing span.... they have been living on far off pacific islands for millions of years.

We are causing their death remotely, even without being aware of it, with out plastic refuse and we are killing them with bottle caps. From the carcasses bottle caps can go back to the sea grow algae on themselves, got eaten but the small fish got caught by the big fish and come back to haunt the surviving birds again and again and again. These caps have become reusable bullets... so... killing many birds with a plastic cap should be the new age idiom.

BUT..... this article is not about the plastic waste... and its not about killing the birds....

Its about.... Enlivening many species of birds by removing stones from the rivers and making the rivers flow again. Many a learned scientists and ecologists too wonder that just by removing these stones aquatic and avifaunal bio-diversity could be conserved and supported. Because they do not have the historical perspective, which I have got from many travels and interactions with people.

All the above and many more kinds of birds live in the riverine habitats. Those simple cute stones which are considered ' Natural Part of the River Beds' cause food loss and habitat loss for these birds. And hence we took up a project of removing these stones from the river bed.

This project brought us close to our vision and mission which you can see in our website www.naturalsolutions.org.in We work, only on invitation basis, for the following types of proects :

1. Water Harvesting : Urban and Rural
2. Flood Prevention
3. Natural Wastewater recycling (STP/ETP)
4. Pond and River Rejuevnation
5. Organic Farming And City Farming.
6. Environmental Literacy.
7. Biodiversity improvement

Under each of these headings we have done several different types of projects in several different types of agro - climatic zones. The general geographic spread of our work can be seen in the image on the left. Where each mark is at least a few projects.

While doing all these ecofriendly projects we were brought face to face with some filled rivers.

Such ferocious forceful flows, falling from over 100 meters into the abyss chiseled away by incessant flows. Many such flows combine to form a rivulet...

Such small but fast flowing rivulets gather great force. , We are talking about such fast moving Mountain Rivers. These Mountain Rivers have been flowing for last 100 Million years. Much before the dinosaurs got extinct.

On the Western Slope of the Western Ghats, the bio diversity Hotspot, live thousands and thousands of birds of many different species and subspecies are migratory.

Their food is mainly comprises of aquatic life forms... and insects and fruits which grow by the streams and rivers.

These aquatic life forms have been dwindling.....

Not because of climate change but because of simple river stones, pebbles and shingle. We were invited by M. Shridhar Kabnoorkar a local merchant and a social worker from Kondgaon Sakharpa a village in Sangameshwar Taluka of Ratnagiri District of Maharashtra in India. He and his neighbors elder than him took us to the river and told us her story. An unprecedented landslide caused the river to silt up in 1949. Later on it started flowing through a new path on the right which caused annual flooding of the market area of the village.

2. What must have caused the landslide ?

Making Roads in the Hilly regions change several water and land forms. Above is one such Ghat Road. As can be seen a lot of hill side cutting is necessary to make this road. Some debris is brought into use for leveling the road but a large portion of it is just dumped by the road side, mostly on the down hill side. What happens with the debris ?

Several water flows which had their own

paths to go down the hill, do get converged into on large stream due to the 'Storm Water Drain' planned and executed by the Engineers. This pushes the road debris downhill. Soon it reached minor streams and then the river. Enroute to the river the sharp edged dynamite - torn sharp rock fragments get polished to form nice looking rounded Pebbles and Shingles.

The fact that these do not have' Real Natural' origin does not occur to many 'educated environmentalists'.

Then there are several low height culverts. They are good low cost alternatives to full scale bridges. But they restrict the river flow and reduce the river speed upstream of the culvert and increase the speed of the river downstream of them. Thus, upstream they aid sediment accumulation and upstream flooding while downstream they aid erosion.

After these minor road projects, the region did develop many major road projects and even so called watershed development projects which aimed at breaking the speed of running water. This developed several low height bridges, low head dams (check dams) etc. which resulted in more obstructions to river flow and more accumulation of innocent Pebbles and stones in place of water, aquatic plants, fish and crustaceans.

Thus, slowly, and steadily reducing the habitat and food supply to those many birds in the whole area.

The people of the region demanded and waited five decades to get their own railway system. It was certainly an excellent engineering feat to

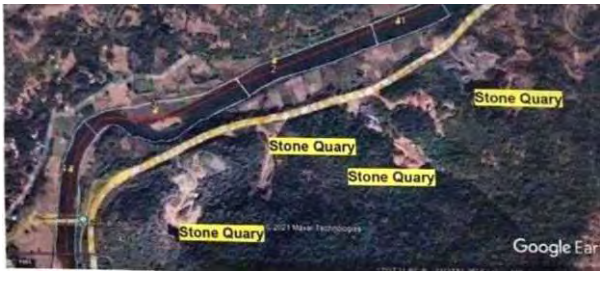
execute Konkan Railway Project. Building the Konkan Railway posed great challenges for the engineers tasked with the job. The rocky Sahyadri range had to be bored through, viaducts had to be built through valleys and more than 1500 rivers had to be forded. Several tunnels opened onto viaducts and viaducts ended into tunnels. Around 2000 bridges were built and 91 tunnels were dug.

Together this resulted in Several Million Cubic meters of material movement. Only a part of it was used for levelling or back filling. Rest was dumped onto the hill sides. Daily several times the heaps got vibrations from passing by trains. Annually over 3000 mm rain battered them. And gravity kept on pulling them down slope, every second.

Train coming out of the tunnel on a bridge and proportion of tunnel and its entry path simultaneously came other infrastructure projects like dams and hydro electric power plants. They too dug several kilometre long tunnels and dumped their debris out on the hill slopes. Good engineering but bad disposal of the by products.

Note the Vertical Cliffs and Tunnels drilled through them.

Koyana dam, pioneering hydro electric dam of India was lake tapped 4 times. This too generated a lot of 'mucking' which essentailly is debris. It accumulated in the lower water ways and caused huge sedimentation there.



319,011 Cu m of mucking material came out of the lake tapping. Four such tapping attempts were done. Over 1200,000 cu m of mucking material was deposited in river beds.... Conventionally it is considered as solid waste But that is what it is .

To make roads and rail road ballasts we need quarried stones. To do concrete constructions, we need quarried stones, gravel, and sand. For this, people make stone quarries. They break hill sides for this and cause landslides and soil slips. Which all adds to further siltation of the streams and rivers. And this caused flooding and habitat loss, So, the habitat loss happens in two places. Where mining is done and where the debris deposits.

In order to reduce flooding and re create the habitat and water pools, we collected information of events in the past from people and developed a plan for actually removing millions of tonnes of debris from the river. The villagers who had come together decided to take action. They approached NAAM Foundation an NGO which is helping villagers who come together to take positive action on water scarcity and famine. This foundation provided the necessary earth moving equipment. The villagers fueled it and looked after the operators. The operators, in their turn worked honestly, intelligently and hard. The result was, in two months time they removed about 210,000 cu m stones. And deposited them in such a way that the banks of the river became strong. Then they got a reformed river with pools and strong banks.

The core team at ground level. They were backed by the village elders and expatiates from the village, now settled elsewhere.

..... River in full Spate but not crossing the banks, In these fast moving rivers fish climb up to spawn in their hilly birth places.

The net result was, there was no flood in the village for the first time in last 72 years.

After seeing the success of this work people from other villages from near and far have come together to work on their own rivers. To clean the infrastructure debris form their water ways. In human boy terms it is like unclogging the arteries and veins.

Kaal River silted up by over 4 to 6 meters. Kaal river getting unclogged. Joint efforts of people. NGO and to a great extent government as well, 'sans contractors'. So that the resources put in are fully converted in ground level action. Making real difference to the fullest extent.

3. What does it have to do with global warning ?

Ever walked, barefoot, on hot stones in summer where temperature reaches 40 - 50 degrees ? They do actually scorch your feet. Stones

There are 1500 river locations crossed by Konkan railway (1,500 rivers had to be forded. Several tunnels opened onto viaducts and viaducts ended into tunnels. Around 2000 bridges were built and 91 tunnels were dug) Almost each causing several kilometres of siltation with stones. Say 5 kilometres per bridge. That amounts to 10,000 kilometres length of water replaced by stones. Considering average width to be 25 metres and average depth of 3 metres. This amounts to - 10,000,000 X 25 X 3 =750,000,000 ci m of stones replacing equivalent volume of water. Which is 750,000,000,000 litres that many kilograms.

This water, in getting heated between 19 degree to 30 degrees would absorb - 4.184 x 11 x 750,000,000,000 = 34,518,000,000,000 K Joules of heat. At present all this is stone filled. Heating up quickly and giving off that heat in the night.

4. What does it do to carbon di oxide and food web ?

Water absorbs 1.449 g of Co2 per lit at NTP... The above mentioned water volume will also absorb 1.449 X 750,000,000,000 = 1,08,750,000,000 g i.e 1,086,750 tonnes of Co2 every year.

So much Carbon do oxide will e available to aquatic food chain enlivening aquatic life forms from protozoa to mammals and the birds life depending on them.... Hence removing stones from rivers helps in rejuvenating rivers and mitigating water scarcity, ensures food security, reduces poverty.

All over the world (at least the third world) the rivulets and streams have accumulated debris in similar manner. Removing it and giving the space back to water will result in regarding tremendous water reservoirs which will cool the surroundings, feed the hungry humans as well as non human life forms.

5. What does it have for the 'Development' ?

750,000,000 cu m of construction material will become available to the Real Estate Industry.

The debris that has accumulated is in a way quarried from the bellies of the bills and entrails of the forests. This is quite similar to the stuff that is quarried using explosives. And milled using huge stone breaking machinery. Instead of blasting new hills and destroying forests on it, a law should be passed world over to use such obstructing debris in a manner that the pools are recreated in the paths of the rivers.

The old riverine harbors should be brought back to life and to that extent the load on the road system is reduced.

6. What does it mean for the wild life ?

For countless species of aquatic flora, fauna and microfauna it will mean regaining their paradise. Their habitat. Their food and shelter. A new chance to repopulate the areas which their ancestors lived in, and that is not only for the land based organisms. It will mean rejuvenation of marine life as well, because the nursery of marine life is in the hills. All fish varieties have their nurseries in the pools of hilly streams.

'Development'.... Global Cooling... Human Food & Water recovery... wildlife habitat recovery.

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Stockholm Water Prize-2011

Prof. Stephen R. Carpenter, USA

Shri. Gajanan Deshpande, Pune (M) : 9822754768

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

Prof. Stephen Carpenter of the USA was awarded the 2011 Stockholm Water Prize for his groundbreaking research on how lake ecosystems are affected by the surrounding terrain and human activities and what concrete measures should be implemented in managing lakes.

Prof. Carpenter, 59, is recognized as one of the world's most influential environmental scientists in the field of environment. He has reshaped our understanding of how humans and the surrounding landscape affect freshwater lake ecosystems by combining experiments and theoretical models from extensive research on lakes.

Stockholm Water Awards Nomination Committee, led by Prof. Carpenter, has placed more emphasis on the importance of Carpenter's contribution, which helps us understand how the discharge of nutrients from wastewater, fishing, and alien species affect these lakes. The Stockholm Water Awards Nomination Committee further states that Prof. Carpenter has demonstrated outstanding leadership in guiding environmental research, integrating it from a socio-ecological perspective, and providing guidance in aquatic resource management work.

Establishing the relationship between lake and land:

Prof. Carpenter is best known for his research on 'tropic cascades' in lakes, a concept that explains how impacts on any species in an ecosystem cascade down or up the food chain. For example, overfishing of large fish in a lake may result in the growth of smaller fish, thus reducing the abundance of immature animals (zooplankton) further down the food chain. This expansion increases the growth of algae and the effect of the decomposition process.

Those findings have influenced concrete policies to deal with the erosion process and have provided a practical framework for the management of freshwater resources. It is pointed out that to overcome the resulting problems, it is necessary to understand that reducing the nutrient discharge to the lake is not enough and may also require changing the composition of the fish community. Apart from this, Prof. Carpenter's research has shown it to be broadly applicable to ecosystems other than lakes.

Learning by doing, leading by example:

Known among his peers in the scientific community for his creativity and enthusiasm, Prof. Carpenter's work combines various scientific disciplines and approaches. He has succeeded in bridging research with both policy and practice by collaborating with institutions outside his academy. Prof. Carpenter is an inspiration to people in his field and beyond. He has mentored numerous students over the years and helped many develop research experiments in innovative areas.

After hearing the news of the award, Prof. Carpenter said, he was thrilled to hear that, and he further says, that this award would increase his determination and sense of duty to work on emerging freshwater issues, such as the intrinsic link between climate change and food and water security.

Born in 1952, Prof. Carpenter lives in Madison, Wisconsin. He holds a Ph.D. in Botany /

Oceanography, and Limnology from the University of Wisconsin-Madison. Prof. Carpenter serves as director of the Limnology Center and Stephen Alfred Forbes Professor of Zoology at the University of Wisconsin-Madison. He is a member of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences. He has played a leading role in the Millennium Assessment.

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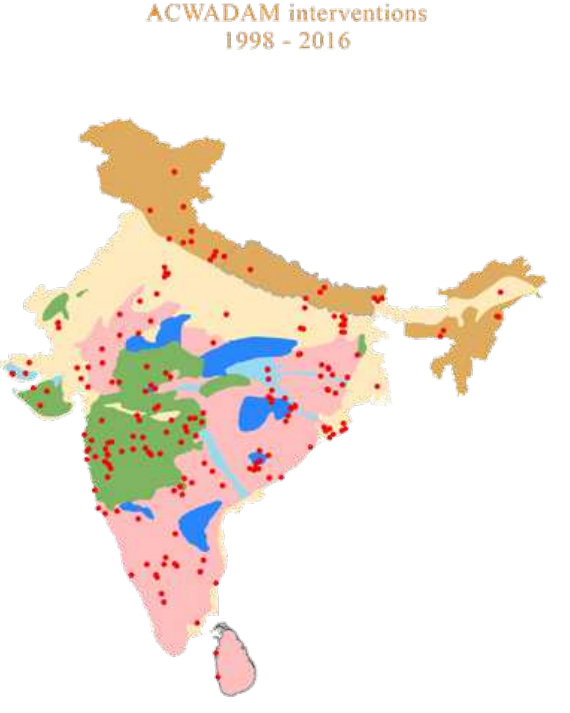
Organization - Advanced Center for Water Resources Development and Management (ACWADAM)

Shri Vinod Hande - (M) 9423677795

Seven geologists from Savitribai Phule University (formerly Pune University) felt that research should not remain confined to the lecture-halls of the academy and founded Advanced Center for Water Resources Development and Management (ACWADAM) in 1988. They believe that education and research programmes on ground water should be strategically designed to enable community decisions on managing resources like groundwater. Managing common resources, particularly ground water requires the act of making easier to understand and less complicated by explaining it in a clear and simple way. This vision became the foundation of their work which even works today.

India has emerged as a hotspot of groundwater extraction, contamination and derived complex situation from demand , supply and availability. It is believed that India is the largest user of groundwater in the world today. ACWADAM's mission is reduce India's groundwater dependency. The purpose of their work aimed of generating knowledge among people in practice and policy.

ACWADAM has partnership with wide range of organizations most of them are the part of NGOs and India's civil society. They have also partnerships with both Central and State Governments working on groundwater management across the country. ACWADAM work is mow spread across India in the field of research and training in challenging areas such as flood plains of North Bihar, Ladakh region of Jammu Kashmir region, tribal land of Jharkhand and Madhya Pradesh and also mountain area of The Himalaya and Western Ghats. ACWADAM is playing a pivotal role in the development knowledge driven management of the spring water resources in the Himalayan region of Nepal and India through their various partners including state and Central Govt. . ACWADAM also shown interest in major policy reforms to address groundwater problems in India and also developing the National Aquifers Mapping Programme during 12th Five year plan. Founders of ACWADAM are also advising various ministers on strategic reforms on groundwater.



ACWADAM never works alone or in isolation. They have shown the power of collaboration, participation and making the thing easier to understand. ACWADAM has come up with the belief that efficiency of programmes such as watershed development, drinking water and sanitation security, rain fed agriculture can be improved by integrating the science of groundwater during planning and execution period of programs.

Research

ACWADAM's action research has a span period of two decades but this action research is backed by more than 35 years by its founder trustee. The focus of this research is groundwater management. The action research included scientific aspects of developing implementable plans for groundwater management without giving more stress to publishing research a academic mode. ACWADAM undertakes independent and collaborative research to develop an understanding of aquifers the demand imposed on groundwater and associated supply system. ACWADAM is also studying groundwater problems in different parts of India. Such research also shared with international research on the subject of groundwater management. This research includes'

- Aquifers in agriculture and rain fed agriculture.
- Aquifers and ecosystem.
- Artificial recharge and aquifers
- Aquifers in watershed programmes.
- Participatory groundwater management
- Urban groundwater.

Capacity Building

ACWADAM's core strength and focus is to generate and spread knowledge about aquifers. This is basic training on groundwater. A clear and easy to understand 15 days training on Application of earth science in watershed management with more stress on groundwater management. This starts from basic activities to meet objectives of training. In early phase of training, focus area is hydrology to watershed programmes to improve groundwater recharge. The training course has changed from last decade by keeping no change in fundamentals of hydrology and included topics are drinking water security, aquifer mapping, groundwater quality, groundwater in rain-fed agriculture, understanding groundwater competition and conflicts and many more. The most important part of addition in training is to understand, social approaches required for managing groundwater. Earlier this course was designed specifically for various professionals working at different levels of civil society organizations but suitably modified now for professionals with varied background of other sectors. The training has been included as a part of a masters course on watershed management. 15 days long program training program at ACWADAM includes,

- Over forty theory sessions with visual presentation in English and Hindi.
- Eight practical sessions of four hours duration.
- Three days field training around Pune.
- Discussions by participants.
- A short objective test to evaluate individuals.
- Feed back from participants about training.

Specific customized modular trainings of three to five days are conducted for organizations who attended basic training course. Customized training felt necessary as basic training cannot provide the necessary exposure to the entire groundwater typology in India. Also basic training does not include approach required for specific groundwater related issues. To transfer ACWADAM's knowledge base to a wider grass root base is the purpose of customized training. These trainings are conducted in English, Hindi and Marathi as per requirement. ACWADAM also provides training in regional languages such as Telugu and Kannada.

Facilitation

The out come of the training and action research cannot be converted to impacts without collaboration and partnership. To make things easier, input from field is required to organization implementing various programs. Facilitation is

usually carried out in collaborations with organizations after they undergo basic training of Hydrology conducted in Pune. Based on training inputs facilitation focuses on components of measurement, monitoring, analysis of groundwater related data. ACWADAM supports partner organizations in following manner,

- Appropriate reading and reference material.
- Procurement and installation of equipment.
- Use of tools and equipments
- Designing projects on groundwater.

Workshop and Conference

ACWADAM organizes workshops on groundwater related topics from time to time. This is the platform for mutual exchange of ideas discussion over issue pertaining to management of groundwater resources. Topics covered in workshops are,

- Application of hydrogeology to watershed management programme.
- Importance of groundwater in drinking water and sanitation programme.
- Aquifer and spring water management.
- Participatory groundwater management.

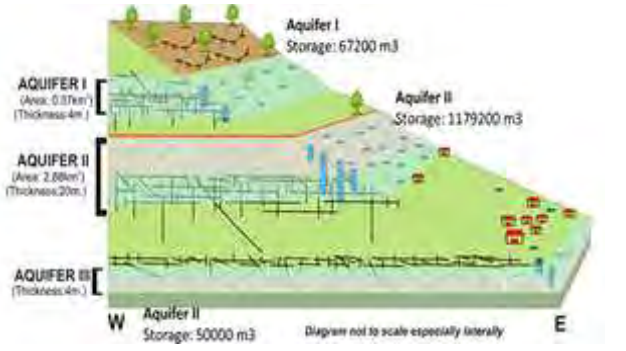
Internship

Internship offered to interested graduate and post graduate students of Hydrogeology, Geology, Environmental Science, Watershed Management that requires inputs from hydrogeology. Students are given practical training on issues regarding hydrogeology. ACWADAM supports the student's research expenses for entire duration of the research.

Projects

Aquifer Based Groundwater Management

Aquifers are the units of groundwater with limits defined by physical or hydrological boundaries. These units have fixed storage capacities and specific groundwater transmission rate. In the case of watersheds, aquifers possess 'catchment' and 'command areas' which are also called as recharge and discharge areas. In the current strategies groundwater development and management deals with sources such as wells, bore wells, pumping system which are supply side of groundwater without consideration of the resources i.e. aquifers. Short term projects of groundwater must give due consideration to the importance of aquifers and aquifer based management. Customized solution for each such project can be designed around this concept to ensure sustainability.



Aquifer and Agriculture

Groundwater has played a major role in improving India's food security through the green revolution. Today nearly seventy percent of India's irrigated agriculture is dependent on groundwater. Growth of the agriculture economy and groundwater development have progressed parallel to each other but importance of groundwater as a resource remained neglected. In the absence of clear groundwater policy, aquifers are being exploited at a greater rate than they are replenished which leads to number of problems. It is therefore essential to understand the role of groundwater in agriculture in India and also ensure resource security to our aquifers. ACWADAM's research on aquifers and agriculture deals with various aspects of groundwater in agriculture like, key role that groundwater can play in rain fed agriculture, soil moisture management and hydrogeology.

Aquifers And Groundwater Quality

Aquifers are source of drinking water to the more than ninety percent of rural population of India. The presence of fluoride, arsenic, salinity, iron and many other contaminants have emerged

as serious threats to drinking water security throughout India. More than sixty percent of India's districts show groundwater problem related to depletion and contamination. Exploitation of groundwater resources leads to deterioration in groundwater quality. Drinking water and sanitation need to be designed with due consideration to local aquifer conditions.

Aquifers And PGWM (Participatory Ground Water Management)

Groundwater is the backbone of India's agriculture economy. Some ninety percent of country's rural drinking water is sourced from groundwater. Similarly fifty percent of urban population and industries depend on aquifers resulting groundwater resources in country under severe stress condition. Aquifer based Participatory Ground Water Management (PGWM) is an innovative concept for managing India's groundwater resources. This is blending of science, technology and people for managing groundwater resources. PGWM is currently a small movement that has brought some 10 odd organizations to work in collaboration towards improved management and governance of groundwater in India. ACWADAM is playing a role of anchor in these collaborations.

Aquifers And Springs

The sources of every major river in the country is represented by a system of springs that is respected religiously. Springs are natural source point of ground water discharge. After discharge it is treated as surface water. Springs have vital source of groundwater in all mountain region across the world. Millions of springs form the life-line for the people of Himalaya, Eastern and Western Ghats as well as small mountain range in the country. Increased demand of water in these regions and climate change has a decline in spring discharge. A 'Springshed' approach includes a combination of landscape, watershed and aquifer as units of spring water management that have a potential to focus on groundwater management for mountain regions.

Aquifers In Urban Spaces

Rising Urban population at an alarming rate is posing tremendous pressure on water management in urban areas. Heavy industrial growth also putting pressure on groundwater. Unchecked exploitation also is leading to severe groundwater quality issues. Poor waste and sewage management is also responsible for contamination of aquifers. Understanding aquifers in urban area challenging because of the land surface converted into built up area making it difficult to study the hydrogeology in a conventional manner. New participatory approach holds promise not only in mapping and understanding aquifers in urban areas but also in developing participatory strategies for unban groundwater management.

Aquifers And Watershed

Watershed development in India has been following the ridge-to-valley approach which considers ridge area as groundwater recharge area and valley as groundwater discharge areas. Aquifer characteristics are by large number of factors and dynamic properties of aquifers may or may not follow watershed morphologies. It is therefore important to include aquifer based hydrological investigations as a part of planning for efficient and

scientific implementation of watershed. In many regions of country, aquifers have limited storage capacity. Hence efficiency of structure built in watershed development will depend on its location as well as how the water harvested in the structure is managed.

Publications

ACWADAM has started its publication of articles and technical reports on different topics from 1999. Till 2016 they have published nearly hundred article for major Indian states. Few of them are as below,

Year	District	State	Topic
1999	Pune	Maharashtra	Geological and Hydrological mapping of Shivare- varve watershed.
2000	Hassan	karnataka	Strategy for watershed development & management
2001	Silvassa	Gujarat	Groundwater resources development & management for Hindalco Industries Limited, Silvassa
2010	Kangda	Himachal Pradesh	Mapping the Bohal spring
2014	Mahabub nagar	Andhra Pradesh	Hydrogeology of Vitaipalli
2016	Nilgiri	Tamil Nadu	Hydrogeological Survey of Conoor Basin.

Recent Events

ACWADAM an established not-profit –organization has signed MoU with UTSAAH(Uniting to Sustain and Assist Himalaya communities) a UK based charity to further develop and enhance its groundwater management programmes in Indian Himalaya. UTSAAH will support ACWADAM by providing technical skill through its UK based academic and professional network.

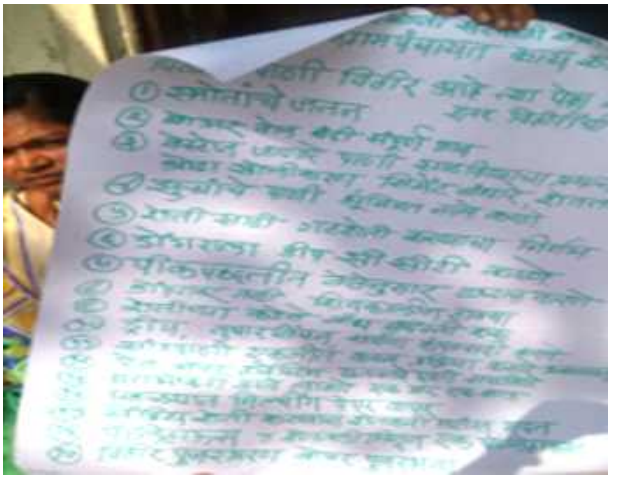
Community dialogue in Bhubhui dist. Ramgadh, Jharkhand. The meeting provided clear direction in strategies that could be developed for each village. Drinking water security was discussed with the project implementation partner and the villagers who understand that any change in their water resources would affect their domestic water availability. Recommendations in meeting was revival of dug wells for drinking water, maintenance of dug wells, sharing of dug wells, tanks and check dams for irrigation, crop management. Regulating the construction of dug well and drilling of bore wells were also discussed in the meeting.

Gram sabha meeting at Gadakwadi, Khed, Pune maharashtra. A meeting was conducted on 2nd Oct.2017 to finalise the groundwater management plan and cropping plan for the village. The sabha was attened by ACWADAM and Groundwater Survey and Development Agency(GSDA) and implementation of Jalswarajya-II and Jalyukt Shivar programs were discussed. Villagers agreed on following points in the Meeting :

• Depth regulation of dug well in order to secure drinking water.

• Ban on drilling of bore wells .

• Strengthening and restoration of existing source of water.



• Undertaking watershed activities .
• Cropping pattern to be modified to suit the water availability.
• Increasing use of drip and sprinklers.
•Interventions for well and bore well recharge.

Upcoming Events

Evening Course in Urban groundwater. – This was scheduled between 9th and 17th Jan.2023. This was off line course conducted at Pune between 6PM to 8 PM. The course was for practitioners, civil society organizations, govt. officials , students.

Contact details of ACWADAM

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जलसंवाद हे मासिक मालक व प्रकाशक डॉ. दत्ता देशकर यांनी
ऐ – २०१, व्यंकटेश मीराबेल अपार्टमेंटस, पॅनकार्ड क्लब जवळ, बाणेर हिल्स, पुणे – ४११०४५ येथे प्रसिध्द केले.
संपादक डॉ. दत्ता देशकर
e-mail - dgdwater@gmail.com
मासिकाची वेबसाईट - www.jalsamvad.com

Jeevitnadi: Activities for the month of February 2023

Jeevitnadi Team

Awareness:

- 16 students from the MBA stream of Symbiosis college did the clean up at Ram Mula Confluence stretch on 4th February. 16 students were present and collected around 25 bags of garbage



- River walk: Had two River walks this month with a total group of 45 students from Bharitya Vidya Peeth, College of Ayurveda and Fridays for Future group.



- Conducted an orientation of the River Ecosystem for students of Tata Institute of Sciences.
- Jeevitnadi participated in the Paryavaran Peth event held on February 11th at Ghole road. We had a stall of Toxin Free products for sale at this event

• We conducted an awareness session on Waste management and segregation at CDAC Pune; with the center focus being on rivers. The event was relayed to 300 + employees online in real time.

Action:

• Jeevitnadi participated in one of the Panel discussions in the River Cities Alliance in DHARA 2023, hosted by PMC, on 13-14th February.

• We participated in the Bhoojal Conference conducted by ACWADAM on 24th February.

• We also presented our work at the Citizen Science involvement on 26th February at the Earth Science Day organized by IISER (Indian Institute of Science Education and Research,Pune)

• Pune Kabir Festival: Jeevitnadi took part in the Pune Kabir festival by hosting a Satsang event at the Ram Mula stretch on 26th February, Sunday morning. Arun Goyal and group from Malwa brought to life a magical morning with Kabir's dohas, their own simple and hard hitting voices, all in the umbrella of beautiful trees, birds and the mighty sun. Over

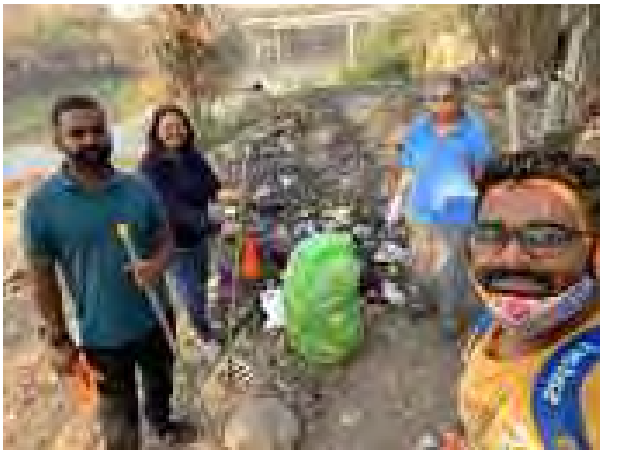
100 people attended the event. We also had the team from Urban Sketchers come and paint at the stretch, during the same time.

- Citizens from all over Pune have been fasting for one year now to stop the latest project of the Government of River Front Development. 27th February was the anniversary of this Chain fasting activity

Regular activities:

- Both the stretches of Ram Mula confluence and Aundh, continued their weekly cleaning activities, with new people joining the force, as and when they can !

- The teams collectively have cleared over 325+ kg of waste in this month of February. Jeevitnadi



Indian and Global Scenario

Water hyacinth

Smt Bhavana Chanana & Smt. Tanushree

Water hyacinth grows over a wide variety of wetland types from lakes, streams, ponds, waterways, ditches and backwater areas. In India water hyacinth potential states are Delhi, Uttar Pradesh, Bihar, West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, and Gujarat. Water hyacinth grows in all types of fresh water. Water hyacinth has been widely introduced in North America, Asia, Australia, Africa and New Zealand. They can be found in large water areas such as Louisiana, or in the Kerala backwaters in India. In many areas E. crassipes particularly, is an important and pernicious invasive species. First introduced to North America in 1884, an estimated 50 kilograms per square meter of hyacinth once choked Florida's waterways, although the problem there has since been mitigated. When not controlled, water hyacinth impacts water flow, blocks sunlight from reaching native aquatic plants, and starves the water of oxygen, often killing fish (or turtles). The plants also create a prime habitat for mosquitoes, the classic vectors of disease, and a species of snail known to host a parasitic flatworm which causes schistosomiasis (snail fever).

Composition of water hyacinth

Fresh water hyacinth is generally considered to be between 90 and 95 % water. An analysis at the Housing and Building Research Institute in Dhaka gave the results presented in Table 1:

Table 1: Chemical constituents of dried water hyacinth on an external ash-free basis %

Cellular ash	12
Lignin	14
Cellulose	32
Hemicellulose	21
Pentosan	19
Raw protein	15
Extractive	4
Miscellaneous waste	2

Ecological Factors

Water hyacinth is a heliophyte plant growing best in warm waters rich in macronutrients (Centre et al., 2002). Optimal water pH for growth of this aquatic plant is neutral but it can tolerate pH values from 4 to 10 (Centre et al., 2002). This is very important fact because it points that Eichhornia crassipes can be used for treatment of different types of water waste.

Water Hyacinth as a source of natural textile fibre

Water hyacinth fibres can be seen as raw material for the manufacture of clothing and home fabrics. Processing the fibres with polyester staples initially produced blended yarns with 20-35% water hyacinth component. The stalks went through a series of chemical and mechanical treatment to achieve the crimp property of wool for better processing, reduce the plant's glue-like or gum content, and soften the fibres to make them fine and fit for knitting and weaving into apparel and other home textiles. For a yarn count of 15 Ne suitable for apparels, blends of 80/20 and 65/35 of polyester/water hyacinth fibres were used. The same blends of polyester/water hyacinth fibres were used to get a yarn count of 10-12 Ne ideal for home textiles such as curtains, upholstery, table runners, napkins, bed cover, pillow case, and other items found at home (Arlene & Obmerga, 2009).

Applications of water hyacinth plant

Although water hyacinth is seen in many countries as a weed and is responsible for many of the problems outlined earlier in this fact sheet, many individuals, groups and institutions have been able to turn the problem around and find useful applications for the plant.

Fibre board : The House and Building Research Institute in Dhaka has carried out experimental work on the production of fibre boards from water hyacinth fibre. They have developed a locally manufactured production plant for producing fibreboard for general-purpose use and also a bituminised board for use as a low cost roofing material.

Yarn and rope : The stalk from the plant is shredded lengthways to expose the fibres and then left to dry for several days. The rope making process is similar to that of jute rope. The finished rope is treated with sodium metabisulphite to prevent it from rotting. In Bangladesh, the rope is used by local furniture manufacturers by winding the rope around a cane frame to produce an elegant finished product.

Basket work : In the Philippines water hyacinth is dried and used to make baskets and matting for domestic use. The key to a good product is to ensure that the stalks are properly dried before being used. If the stalks still contain moisture then this can cause the product to rot quite quickly. In India, water hyacinth is also used to produce similar goods for the tourist industry.

Water purification : In a drinking water treatment plant water hyacinth have been used as part of the pre-treatment purification step. It helps in the removal of small flocks or aggregated solid matter that remain after initial coagulation and floc removal or settling (Ryder 1992).Water Hyacinth has been used in treatment systems for textile factory effluents in Sri Lanka. Five to six clean, healthy plants are incorporated into each tank. The testing of effluents for total solids, total nitrogen, nitrates, phosphates and chlorides is done.

Conclusion

In last few years a great interest has been shown for research of aquatic macrophytes as good possibilities for pollutant removal or even as bio indicators for heavy metals in aquatic ecosystems (Aoi and Hayashi, 1996; Maine et al., 1999). This review article shows that there are many uses of this waste water weed. The flowers have been appreciated and distributed throughout the world. Leaves, flowers and petioles are reported to have been used as a vegetable in Java, Philippines and Formosa, but this does not seem to have become popular elsewhere. The petioles are used for making many different items like baskets, floor mats, glass mats, vases, hats, ropes, shoe soles or as stuffing for upholstery in south-east Asian countries, particularly Thailand, Philippines and Indonesia.

Rope and furniture are made in Bangladesh, Thailand and Uganda. The stalks of water hyacinth (Eichhornia crassipes) are a viable natural source of alternative textile material, according to the Philippine Department of Science

and Technology's Philippine Textile Research Institute (PTRI).

Researchers at PTRI are studying water hyacinth fibres as raw material for the manufacture of clothing and home fabrics. Processing the fibres with polyester staples initially produced blended yarns with 20-35 percent water hyacinth component. The stalks are given a series of chemical and mechanical treatment to achieve the crimp property of wool for better processing. This reduces the plant's gum content, and softens the fibres to make them fine and fit for knitting and weaving into apparel and other home textiles.

Blends of polyester/water hyacinth fibres are ideal for home textiles such as curtains, upholstery, table runners, napkins, bed cover, pillow case, and other items found at home. Hand-made paper and boards are produced in Bangladesh, India and Indonesia.

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World Water Day-2013

International Year of Water Cooperation

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(A new article series 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.)

Water consumption is increasing more and more everywhere in the world. Water use covers hundreds of things like household use, agriculture use, and use in factories. Water also plays an important role in protecting nature. Ecosystems depend on water flow. The world can run smoothly only if there is water. The availability and quality of such vital water are becoming a matter of concern globally. Due to the increasing use of water and the priority given to it according to local conditions, there has been a situation of severe water scarcity in many regions of the world.

Since water is an important resource for all, many tensions and conflicts are arising in communities, states, and countries. Therefore, judicious use of water, diligent care of this resource, and strict attention to how it can be managed and regulated become the primary duties of everyone who depends on the water resources of that place. The cost of social inaction in this regard is huge. Therefore, this precious water resource should be taken care of strictly. For that, it is necessary to have a spirit of cooperation among all the communities. Recognizing this, the United Nations declared 2013 as the International Year of Water Cooperation, and on that year's Water Day, the issue was brought to the attention of the global community by planning various programs around the world.

The importance of water cooperation lies in the fact that water is an all-encompassing factor that requires close attention at all levels and in all sectors. Water cooperation is a key issue and will be the foundation for 'ensuring water security and a sustainable future'.

One of the aims is to build strong and lasting partnerships and initiatives through water cooperation. This will help in maintaining peace and security among nations, communities, and stakeholders, as well as ensuring equitable distribution of water resources to society. Another important element underscoring the importance of 'water cooperation' is the identification of current challenges and stresses on globally shared water resources by all stakeholders, so that a constructive and realistic dialogue can take place.

With the above issues and perspectives in mind, the 2013 International Year of Water Cooperation was called for at the global level to bring water to the centre stage. It will help in establishing strong relations of cooperation between nations, states, and different communities.

In 1992, the importance of integrated water management was emphasized at the Rio de Janeiro conference. Organizations like the "World Water Council' and the "Global Water Partnership' emerged on the global stage to increase global cooperation in this regard. How important it is to have equitable distribution of water became clear from the functioning of these two organizations. This year's trend is expected to increase this cooperation at the global and national level.

The five main objectives of the water cooperation campaign are:

1. Raising awareness of the importance, benefits, and challenges of cooperation on water-related issues.
2. Enhancing knowledge and building

capacity for water cooperation.

3. Undertaking concrete and innovative action programs for water cooperation

4. Enhancing partnerships, dialogue, and cooperation around water is a top priority.

5. Strengthening international cooperation among institutions, users, social and economic sectors, and others to agree on sustainable development goals, whereby we can effectively meet future water needs.

All in all, water cooperation creates peace, generates tangible economic benefits, and is an extremely important means for socioeconomic development, poverty alleviation, social equity, gender equality, and environmental sustainability. Water cooperation plays an important role in conserving water resources, ensuring their sustainability, and protecting the environment.

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Note : While designing the issue of Jalsamvad - English we find very interesting news, information and articles specially on water and its management. That tempts us to include the same in our issues. Getting formal permission for this inclusion is that way difficult. Therefore our effort is to print them as it is in our magazine. We may kindly be excused for such inclusions. We express a deep sense of gratitude to the original writers.

Thanks.

Can we reimagine rivers before it is too late?

Shamsuddoza Sajen

Bangladesh is born of water. The major part of Bangladesh lies in the GBM Delta, which is a confluence of three mighty rivers – Ganga, Brahmaputra and Meghna. The silt carried by these rivers and their numerous branches have formed most of the landmass of Bangladesh, and currently, the country is gaining 20 square kilometres annually through this process. The rivers are not only our past but also our future. Unfortunately, the rivers no longer have a place in our national imagination. That's why 90 percent of rivers are being occupied and polluted; over the past 20 years (2000 to 2020), more than 43 rivers have dried up. Riverine Bangladesh has become the land of dying rivers. Isn't it a tragic irony?

How did we get here? It is well documented that a progressive river management system, maintained by the community with the support of the state, was active in Bengal, which brought her the fame of being the "paradise of nations". However, the chaos following the decline of the Mughal Empire and the advent of British colonial rule disarrayed those indigenous practices. The colonists had the image of peaceful and calm British rivers and, therefore, while dealing with the rough waters in Bengal, they tried to control them. Their arrogance and ignorance led them to undertake projects that proved fatal to the rivers in Bengal. The road-railway network in Bengal, for example, was built in the east-west direction instead of aligning it with the southward course of rivers, and, thus, the natural courses of the rivers were seriously disrupted.

The British left the country, but the colonial legacy remained. The Pakistan government undertook development projects that proved disastrous to the rivers. The Kaptai Hydroelectric Project, for example, on the River Karnaphuli not only damaged the river but also displaced thousands of people who are still suffering from that trauma.

Unfortunately, in independent Bangladesh, we are still obsessed with the idea of development that is apathetic to nature. One recent example is the all-weather road in Kishoreganj. The 29.73 kilometre road was built in the middle of the haor without carrying out a proper environmental survey. Two years into its existence, the road is now causing serious damage to the crops and exacerbating the flood situation by disrupting the free flow of water.

Bangladesh has been spending a significant portion (around 20 percent) of the national budget annually on water development projects since independence, but the water problem in the country is worsening day by day. On the one hand, more and more rivers are losing streams and dying, and on the other hand, the severity of floods is increasing year after year.

We have failed to understand that it doesn't matter what percentage of the country's GDP is spent on maintaining rivers unless and until rivers are considered the driving force of development. History shows that the prosperity of Bengal was led by trade, not by agriculture. Bengal's intricate river network connecting to sea routes afforded her the opportunity of participating in robust internal and external trade and commerce, and important trade centres developed along the river routes. Since rivers were the lifelines of that time, they were revered and properly maintained. Can we now reimagine a prosperous riverine

Bangladesh where rivers will be at the centre of all our plans?

The most important question is who will lead us in this effort. Here, we can learn from the example of Bhabadaha. The permanent polders built around the beels in Bhabadaha between 1965 and 1969 using USAID funding resulted in one of the worst waterlogging problems in Bangladesh, from which thousands of people of the area are still suffering for the last 30 years. Earlier, there used to be an Oshtomashi Baadh that would remain functional for eight months of the year to protect crops from high tide. During the monsoon, it would be cut down to let the tide come in and build land through deposition of silts. The permanent polders interfered with this natural process, thus creating a waterlogging crisis during monsoon.

To deal with this, the locals proposed a solution in the form of Tidal River Management (TRM), based on their traditional knowledge and wisdom. Still, the government and engineers of the Water Development Board were against it. However, the local people implemented TRM near Chuknagar, Khulna and found positive results, which forced the government to accept it as a technical solution to the waterlogging problem. But again, local influentials involved in the shrimp business and members of parliament, in collusion with the government, frustrated the local people, and the problem is continuing to date.

There are many such examples in Bangladesh where the state not only failed to protect the rivers but abetted the river polluters and grabbers. It is clear the responsibility of protecting and maintaining rivers must be in the hands of the community, with the state only facilitating that process.

National Professor Abdur Razzaq, in his "Bangladesh: State of the nation" lecture, pointed out that we, Bangladeshis, don't have any distinct features from our neighbours that distinguish ourselves as a separate nation – except the will to be a nation. There is every reason to imagine ourselves as a riverine nation, except the will to do so. Can we create that national will?

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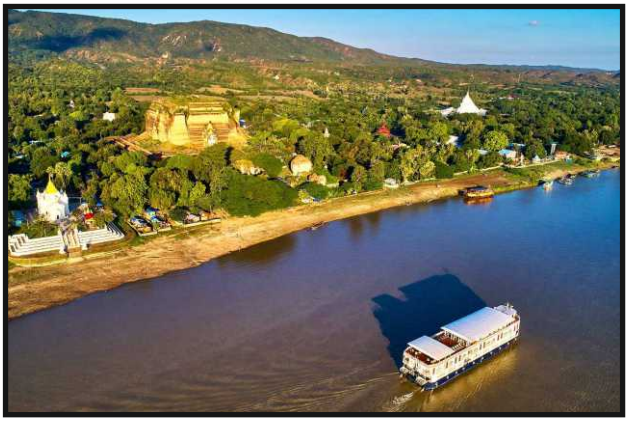
The once vibrant Kaliganga river in Manikganj now appears to be on its deathbed. Star File Photo

Famous rivers in the world

(5) Indus river

(6) Irrawaddy River



(7) Vltava River

(8) Tocantins river

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