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Jalasamvad

A Dialogue on Water

Editors: Dr. Datta Deshkar, Shri Satish Khade

Cover Story

Gujarat: One of the world's Largest water pipeline grid

Supply of Water :

The major and only supplier of fresh water is the God Rainfall. There are very few countries which receive rains throughout the year. In some countries like India, there is a definite period when it rains. This period lasts for nearly four to five months. But there are many unfortunate countries where the rainfall is very scanty. The best example for this is that of North African countries where the total rainfall in the year is hardly 50 to 100 mm.

Another problem with this rainfall is that there is no guarantee that it would rain regularly. In some years there is a heavy downpour whereas in some years the rainy season goes completely dry. Some years, there is a dry famine whereas in some years we are required to face wet famine. The entire economy has a base of agriculture as it supplies all the raw material to industries. If the agricultural season fails, entire country has to face its consequences.

In India, some years ago, it used to rain for 70 to 90 days every year but due to Climate change, this figure has come down to 30 to 40 days. But surprisingly, the average rainfall every year has remained almost constant. It naturally means that whatever water we get from rains in 30-40 days has to be used for the entire year i.e. 365 days. Due to this reason, conservation and management of rain water has become a key issue in recent years.

Rivers and lakes are unevenly spread over our country. As far as rivers are concerned, some maintain a flow throughout the year whereas many of them flow only for seven to eight months. For the remaining period they go dry. On almost all the rivers in the country dams are constructed and the water is used for irrigation and domestic use. Many of the dams are used for generating Hydropower. In those areas where rivers are not there, water shed development projects are developed to make water available.

Besides the supply of water from rivers and lakes, major source of water is ground water. It is rain water only which is accumulated through percolation for last several years. Because of over extraction, water level of ground water is depleting very fast. Withdrawal of water from the ground is much more than the rate of percolation and that is why this situation has arisen. Artificial efforts are necessary to recharge the ground water level. In fact, a person not recharging has no right to withdraw water from the soil.

As the demand for water is increasing very fast, we are compelled to increase the supply of water by artificial ways like reusing the same water again or converting the sea water into potable water by applying the process of desalination. These two methods are being used by those countries which are facing the water stress.

Singapore has taken the lead in reusing the waste water. Due to water scarcity it has to import water from neighbour Malasia. There was a contract between these two countries where Singapore could get water from one river in Malasia. Since the contract is to terminate Singapore had to make alternate arrangement. It has found out this new way where the waste water is purified to such an extent that it can be used for drinking also. That country calls it NEWater. Initially citizens were not ready to accept that water but by special initiative by the Government machinery now their opposition is no more there. Nearly 34 percent of the demand from the country is met with by this source.

Israel has taken the lead in desalination of water. Country is facing acute shortage of water as it receives insufficient rains. It has erected huge plants to convert sea water into potable water. In Singapore also this practice is being followed.

Besides these efforts, scientists are trying to find out new ways to get water from thin air. There is good amount of humidity in the air. That humidity can be separated by special technique and the water obtained thereby can be used even for drinking.

Jalsamvad

Mouth Piece of Bharatiya Jala Sanskriti Mandal

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Editorial .....

If you ask yourself why a salaried person is happy, the answer is that the salary falls in his pocket on the first day of every month. In the first week after receiving the salary, he has a lot of money in the pocket. He spends it a bit loosely. But as the month progresses, spending constraints begin to fall and by the end of the month, the pocket goes completely empty. But ...

He is sure that his pocket will be warm again on the first date of next month. A lawyer's position is more or less similar. He also does not have any guarantee as to when the money will come in his pocket. And this naturally affects his spending style.

Against this backdrop, if you look at the farmer, you will find that his situation is very dire. For him, the possibility of seeing money in his pocket occurs once or twice a year. And that too the guarantee of that money is zero. Then the question of how to run the daily routine always haunts him. Even if there is no income, the expenses continue to be there. It is natural to feel depressed in such a situation. Don't be surprised if this depression results in a suicide. The sustainability of agriculture is declining day by day. It should not be wrong to say that the cropping pattern he has chosen is responsible for it.

He should choose such a cropping pattern from which he will get continuous income. Farming can be of four types. Those four types are - food grain farming, horticulture, forestry and protein farming. However, farming can be done in many more ways as well. But these four types are very close to the farmer.

That way, all four types complement each other. Food grain farming not only provides grain but also provides fodder for animals. In addition, some crops help improve soil quality. Fruits are obtained from orchards. In addition, since the trees are far apart, other crops such as fodder can be grown in the middle space. It takes less water to water the plants if drip irrigation is used. That water can be diverted to food grain farming. Wood is obtained from forestry. Income can also be obtained from plants like Hirda-Behada, Amla, Bore, Tamrind, Kavath in addition to fodder for animals. Besides, if you plant some sandalwood or teak-wood trees, you can get handsome money after a few years through this. Protein farming is a way to earn a daily income. You can sell milk and dairy products, meat, eggs and other daily necessities on daily basis. In addition, manure is also available to maintain soil texture.

The most important benefit of this is that you get a consistent income from any movement. It also takes into account your concerns of the present, the near future and the distant future. As this is a year-round practice, it also increases engagement with agriculture and makes long-term planning possible. Today, the farmer is leaning towards a single crop cropping pattern. When that crop is lost, it is time to fall and daily life becomes difficult. There is a phrase in English called "Second string to the bow". Life is a war. While, playing this war game, you need to have a second string to your bow; otherwise, losing a war comes with luck.

It is important to make it profitable while developing agriculture. This method of farming can be profitable every year. Some of the profits can be used for future development. This advantageous aspect too, should not go unnoticed. Your farm, no matter how small or big it may be - needs to decide how to divide it within these four types of farming. Only then you will be able to make a decision based on your strengths, your willingness to work and the number of people in your household to help with the work. Agriculture is our means of livelihood, that is our business and it is going to keep you alive. So, we have to think about it appropriately and then take the next step. This quartet will be a guide for the farmer. If the NGOs give proper guidance to the farmers in this regard, the negative thoughts in the minds of the farmers that agriculture is a subsistence business will go away.

Dr.Datta Deshkar, Editor

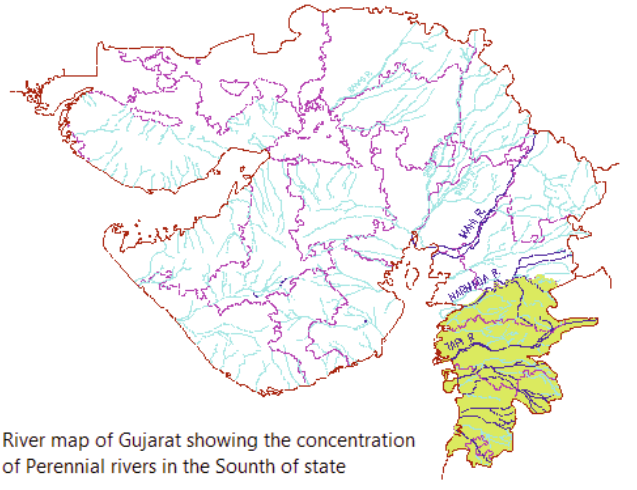
One of the world's largest water pipeline grids: Gujarat

Shri Ajay Deshkar (M) : 989060023

About two years back I joined Rotary Club by becoming a member of the Aundh-Pune chapter of the club. The pandemic took away the possibility of social interactions, so most of the meetings were conducted online. Initially there was a lot of interest in getting expert guests as speakers to share their experiences with the members of the club. However, after a point the meetings started getting a little repetitive. Amid this lull, our fellow Rotarian Ravindra Ulangwar announced a program that created a lot of interest in me. The topic was of that of an infrastructural success which seemed like a rare success story in India. After attending the hour-long session on 'An efficient Water Management by a statewide water supply grid – Gujarat Story' by Mr. Ravi Solanki, Retired Chief General Manager – Gujarat Water Infrastructure limited, I thought the story deserved to be shared by a greater number of people. This is an attempt to pen down my learnings from this session on the mammoth infrastructure project.

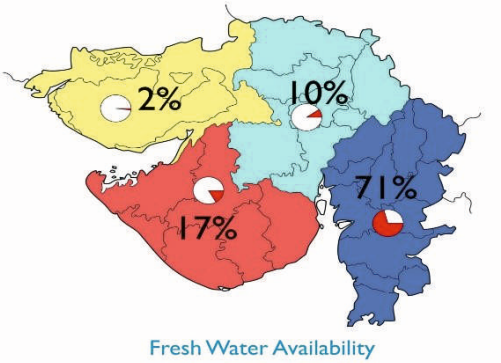
THE PROBLEM :

The problem statement before the distribution network of over 120,000 kms of pipeline project was laid over 20 years in Gujarat sounded like most of the water scarcity problems of the world. There are 185 Rivers in Gujarat State of which only 8 are perennial (those with water flowing through all 365 days of the year) and all are in Southern Gujarat. These perennial rivers are in only 20% area of the State which accounts for 80% of the surface water of the State. In peak summers drinking water scarcity was felt in almost 2/3rd part of the State. Out of the 185 rivers in Gujarat State, 97 in Kutch and 71 in Suarashtra flow only in rainy season and are mostly dry all year round. There are only 17 rivers in the Gujrat region off which only eight are perennial.



River map of Gujarat showing the concentration of Perennial rivers in the Sounth of state

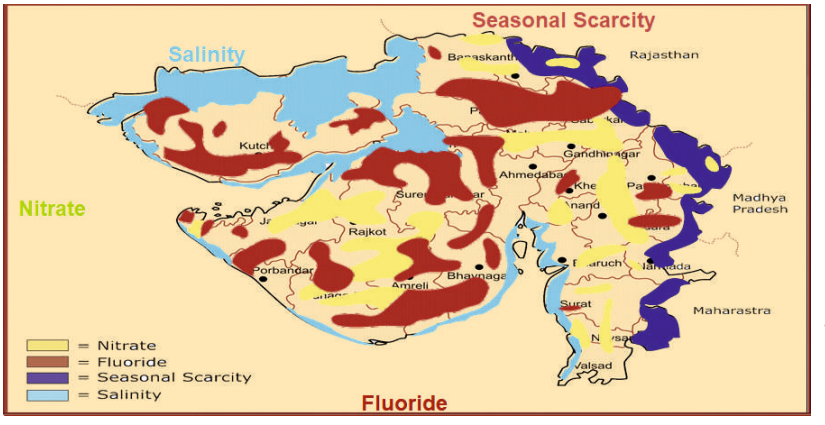
Due to this disparity in water availability Gujarat state faired very badly on the water availability index in country which itself is extremely stretched. Gujarat has around 6.4% share in the geographical area of India and with a population of 6.03 Crore has around 5% of the entire population of the country living within its



Fresh Water Availability

state boundary. However, the water availability of 38000 MCM is only 2.03% of the entire country.

Adding to the drinking water issues in Gujarat is the fact that Gujarat has one of the longest coastline and gulf area of 1600 kms.



Groundwater near these coastal areas has very high salinity making it unpotable. The seasonal rainfall scarcity in the Kutch area gives very little opportunity to save rainwater. These issues coupled with recurrent draughts, have exploited the ground water drastically. This extreme ground water depletion has shown high levels of Nitrates and Fluorides in the ground water. The adjacent map gives a graphical representation of the sad picture. The high fluorides in water have led to many kids in Gujarat getting deformities due to fluorosis. The pictures of women force carrying utensils for kilometers over dry lands to fetch water had created a gory picture of the otherwise progressive state.

The Water treatment and distribution system created over a legacy of old Acts being monitored through Gujarat water supply and sewerage board, Gujarat Water Infrastructure limited and Water and sanitization management organization were now restructured under the umbrella of Narmada Water Resources, Water Supply & Kalspar Department. Under this single body, an organization "Gujarat Water Infrastructure Limited" (GWIL) was set up for the implementation of bulk water transmission pipeline. The other two bodies with specific responsibilities were – Gujarat Water Supply & Sewerage Board (GWSSB) which had the tasks of Implementation of Rural regional water supply projects, individual water supply schemes and handpumps, setting up multi-village water supply schemes, etc. and "Water Sanitization Management Organization" (WASMO) which had the task of in-village water supply through community managed "Pani-Samitis'.

WASMO works on philosophy of "users are best managers" & demand driven approach. In its perseverance to empower the communities WASMO has become instrumental in forming more than 18000 'Pani-Samitis' at village level and more than 70% 'Pani-Samitis' are active and managing their In-village drinking water supply system. So far, almost 18,000 village level schemes have been approved and 15,000 have already been completed and rests of them are in progress.

Meanwhile the public pressure to resolve the drinking water problem of Gujarat was mounting. The Government of India mandated a minimum 40 LPCD (Liters per capita per day) and a desirable standard of 55 LPCD for rural areas. The Gujarat state had an LPCD of 70 in the Urban area which was revised to 100 LPCD in 2013.

THE SOLUTION :

The Narmada Water Resources, Water Supply & Kalspar Department chalked out an ambitious plan which would have an efficient water

management and resolve the drinking water issues of most of the Gujarat State through a paradigm shift from using ground water to mostly surface water. This would be done through inter-basin transfer of water from water surplus southern area of Gujarat to the water scarce north and west areas. Through this dream project Narmada water would reach to 9633 villages and 131 water starved towns of Surashtra, Kutch, North Gujarat and Panchmahal areas of Gujarat state. This regional water supply scheme would be based on irrigation reservoir / canals in central and south Gujarat.

This massive pipeline started laying in 1999 and its scale can be understood by the size of the pipes – ranging from a diameter of 1000 mm (or 1 meter) to a mammoth 2300 mm (2.3 meters). There are historic pictures of the then Chief Minister of state Mr. Narendra bhai Modi standing with his arms wide open standing inside the pipes and yet not able to touch the pipe surfaces or a Maruti car being driven inside the pipe. This water pipeline grid shall be about 2800 Kms of Bulk water pipes and the distribution network of over 120,000 kms!

PROJECT DETAILS :

The connectivity through water grids and its coverage was as under :

	Villages	Towns
Narmada Based Water Grid	8049	159
Other source-based water grid	3807	34
Individual Water Supply Schemes	5987	157
Total	17843	350

The infrastructure of this project includes:

- 2727 Km Bulk Water Transmission main
- 120769 Km Distribution pipeline
- 187 Water Treatment Plant of 300 Crore Lit. Capacity.
- 11640 Elevated Service Reservoir
- 11365 Under Ground water reservoir
- 41 Pumping stations
- 177 HSCF Pumps
- Pumping capacity of 8450 MLD per day

The project was executed in stages. In 1999 a 165 Km of bulk pipeline was laid after which every two years; the project took specific regions of the connectivity ranging between 50 to 400 km of bulk pipeline up until 2021. Simultaneously, the state undertook setting up water quality monitoring activities

The project allocation was 18,000 Crores when it started

Photographs of the pumping stations

THE OUTCOME:

The outcomes were outstanding:

- 2,40,179 Hand pumps Installed.
- 11092 Mini Pipe Schemes Functional & 440 Solar Mini Pipe Schemes
- All 17846 (36066 Habitations) Villages are covered with drinking water facilities

Population Covered:

- Habitations: 36066
- Households: 67.77 lakhs
- Rural Population: 3.71 crores
- Coverage through Piped water supply: 3.46 crores (93.34%)
- Coverage of population with more than 40 litres per capita per day (LPCD): 98.88%

The household tap connectivity improved from a low 26% in 2002 to over 77% in 2016. The plan is to have 100% connectivity by 2025.

There was a tremendous & measurable social impact of this massive project. Due to this permanent solution, there is a marked improvement in the water quality. This has a considerable reduction in water borne diseases, a direct impact on increasing the life expectancy. The polluted groundwater that resulted in deformation issues in kids due to fluorosis has shown a reduction. There is a gross improvement in the students' enrolment in education due to the freedom from the drudgery of fetching water from long distances. Women and in turn children were adversely affected due to this issue which is now getting eased quantitatively. Saving in time has resulted in the increase of other productive activities which lead to an overall good economic situation as the contribution to the GDP per capita has increased with more time to spare for constructive work.

THE FUTURE:

While the drinking water grid itself was an ambitious program, the Gujarat Water Infrastructure Limited has future plans that shall secure drinking water in the coastal regions of the state. A Desalination plant is being set up near Jamnagar which shall have a capacity of 100MLD. Similar Public Partnership projects are also being planed at Bhavnagar, Dev Bhumi, Porbandar, Kutch and Gir Somnath.

A proactive grievances redressal system through a 24-hour toll-free helpline number has

been set up which shall transmit the phone call to the concerned officer and the complaints shall be registered. These complaints shall be monitored by the head office daily.

I hope reading this story has been inspirational to the readers. Amid the several negative overtones around us, such positive, developmental oriented infrastructure projects give immense positivity. These projects take us away from the various anomalies and fault lines of the country that needs replication of such successes across the country for the overall wellbeing of the people at large. I thank fellow Rotarian Ravi Ulangwar himself a water activist and Mr. Ravi Solanki for his presentation that led to this write up.

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Story of Water. Part 5 – Hydraulics Structures

Shri Chetan Pandit

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In the previous article you learnt that we hope to be able to use about 690 BCM of water from the rivers. But there are two challenges in using this water. First, the water in the rivers is at a much lower level than the land – the farms and cities, and the challenge is how to bring this water to the farms/cities/ industries, and as far as possible do so by gravity flow. Second, in most rivers about 90% of the annual flow occurs in just 4 months of monsoon, and we need to store that water, for use in the remaining 8 months. In this 5th article in the series, the topic of our study is the various engineering structures for using the water in the river.

The two most common river water utilization structures are the dam, and the barrage.

Dam. First, the dam. See this beautiful picture. The river is flowing through mountains on both banks. At some point the mountains on both side come somewhat closer, creating a narrow gap. A wall has been built across the river, closing the gap and blocking the flow of the river. This wall is the dam. The water has headed up behind the dam creating an artificial lake, which we call the reservoir. This particular lake is rather small. But the akes formed by man-made reservoirs are usually very large. Billions of cubic meters of water can be stored in such reservoirs.

In the dam wall there is a portion where the height of the dam wall is lower than the rest of the wall and its front shape is like a smooth slide. This is called the spillway. Water can flow over and across the dam over this spillway. On top of the spillway there are steel gates to control the flow of water, though you can't see them in this photo. Actually, there are many things that you can't see in the picture of a dam, and we will come to them by and by.

Here is a close up of the spillway and gates. The view is from the downstream side, i.e. the reservoir lake is on the other side of the dam wall. The gate in the bay on the left is closed, and the gate in the bay on the right is open. You can also see how the gates open, they rotate around a hinge, shown by the yellow circular arrow.

At the foot of the spillway in the first picture, you see a small rectangular tank. When water flows over the spillway and falls down from a great height, it can erode the concrete at the toe of the dam. Therefore we need some way to dissipate the energy of this falling water. The tank you see has some standing water in it which acts like a cushion. It absorbs some of the energy of falling water and protects the toe of the dam. This arrangement is called energy dissipater. This is one type of energy dissipater, there are others too.

How do you release the water downstream if the level of water in the reservoir is below the top of the spillway? Well, the dam wall can be provided with other openings, with control gates, at lower levels.

The dam body is not a dense solid. There are horizontal tunnels in it going from left to right, called inspection gallery. Engineers regularly inspect the structural safety status of the dam from these galleries. Depending on the height of the dam, there may be several galleries at different levels. And there are vertical shafts with elevators in them, to enable the technicians to descend in to the gallery. Of course, there are staircases also, just in case the elevator fails.

Many different types of instruments are embedded in the body of the dam to monitor the temperature, pressure, stresses, any tilting of the dam body, etc. From the readings of these instruments engineers can assess the structural health of the dam.

Dams can be made of compacted earth, masonry, rock-filled, or concrete. The spillway portion is always concrete. We have all these types of dams in India. Hirakud on river Mahanadi is an earth dam; Tehri on river Bhagirathi is a rock-filled dam, and Bhakra on river Sutlej is a concrete dam.

What purpose the dams serve, the arguments for and against the dams, I will address all that in a separate article. In this article the focus is on understanding the various structures.

Barrage. The next important structure is the barrage. This too is a wall like structure across the river, but its height is much less than the dam. Therefore, behind the barrage there isn't a reservoir like in a dam, there is only a small pond. A barrage does not store any significant quantity of water. Main objective of the barrage is to raise the water level in the river by a few meters, so that the water can be diverted in to canals that take off from the upstream side of the barrage. See the picture below.

This is Hathanikund barrage on river Yamuna, about 230 Km upstream from Delhi. North is "Up" and Yamuna in this place is flowing almost North to South. As you can see, the barrage wall has not resulted in a large reservoir, the width of the pond behind the barrage is the same as the width of the river.

There are gates in the barrage also, though you can not see them in this picture. In the dam, the water from the reservoir flows over to the other side over the spillway, which is only a part of the width of the dam. But in a barrage the river flows across the entire width of the barrage.

Two canals take off from the Hathanikund barrage, the larger Western Yamuna canal on your left takes water to Haryana, Rajasthan and Delhi, and the smaller Eastern Yamuna Canal on your right takes water to Uttar Pradesh. Just where the canal takes off from the river, you see another barrage like structure, particularly at the head of Western Canal. This is called head regulator. This is also like a small barrage, with gates, and it controls the flow of water in to the canal. On the upstream side, you see

a canal joining the river on your right. This is not a canal taking off from Yamuna. This is the water coming out from a small power house in the upstream, and flowing in to Yamuna. There is a regulator in this channel too. Its purpose is to prevent backflow from Yamuna when it is in high flood, into the power house.

Quite often, a dam and a barrage are constructed as a pair. The dam is in the upstream and stores water, which is released in the river as and when required. The barrage is a little downstream and diverts that water in to the canals. Hydro Power. Generation of hydro-power requires water from a higher level coming to the power house at a lower level. This is achieved in three ways. First, when water stored behind a dam, the water in the reservoir is at a higher level than in the river on downstream side of the dam. Water is brought from the dam to the turbine in special pipes that can withstand a very high pressure. These pipes either pierce through the dam body, or the hill adjacent to dam. The power house may be located just at the toe of the dam, or some distance further downstream. In the first picture, the rectangular box like structure you see adjacent to the spillway on your left, is the powerhouse.

The second type of hydro-power is with a barrage. As you know by now, a barrage is not very tall and the level difference between the pond on the upstream side of barrage, and the river on downstream side of the barrage, is not much. To create the level difference the diverted water from the barrage is taken in canals/ pipe/ tunnel at a gentle slope for a considerable distance, typically a few Km. The river slope is steeper and therefore after some distance the canals/ pipe/ tunnel will be at a higher level than the river, and this level difference is used to generate electricity. Such schemes are called “Run off the River”, or RoR for short, i.e. without a storage. The advantage of RoR is, it avoids the negative impacts of dams that we are going to discuss in the next article. In either case, after going through the turbine, the water is released back in the river.

The ideal situation for a RoR hydro-power project is, short circuiting a river’s loop in a steeply mountainous region. See this picture. This is a river some place in Myanmar. From point A it flows in a loop and at point B it comes very close to point A.

The length A to B along the river is 20 Km, but direct distance is only 2 Km. The slope of the river in such mountain area is typically 1 vertical to 50 horizontal. In 20 Km from A to B the river bed will drop by 400 M. If we build a barrage at A as shown by the red line; a tunnel from A to B as shown by the yellow line; and the power house at B, we get a drop of 400 M from A to B.

How do we locate such sites? Well, the hydro-power engineers scout around for suitable places. Now the satellite imagery has made it somewhat easy. But decades ago we used to actually trek along the river bank up in to the mountains, searching for good hydro-power sites. After a site is found, we have to carry out many

surveys and investigations. River flow gauging, geological studies for dam and power house foundation, availability of construction materials, alignment of the high voltage line to take the power out, etc. And when we do these investigations, there is no road to the project location. That comes later, as a part of the project. But in the investigation stage engineers often have to trek, or ride mules, live in tents, away from the family. The life of a hydro-power engineer is tough.

A third type of hydro-power is the "canal fall" power house. After a canal takes off from the river, often the canal is in a gentler slope than the ground in which it is dug. As the canal progresses the ground "falls" more rapidly than the canal bed. To adjust the canal bed to the ground level, a spillway like fall, though of much smaller height, has to be provided in the canal periodically. This fall can be used to generate electricity. The height of the canal fall and the quantity of water in the canal, both are relatively small and therefore the electricity generated is also very little, typically 100 KW. But it is without much additional cost, as the canal and the fall are already there. Only, the water has to be passed through a turbine. Such canal fall power houses may not be connected to the grid, but are useful for supplying electricity to a small village.

Hydropower is the cleanest, non-polluting, renewable, and cheapest source of electricity. But there is one more reason why we need hydro-electricity. During early mornings and evening, there is a sudden increase in electrical load. For certain technical reason, output of a thermal power plant can not increase or decrease quickly. Therefore, thermal power stations are operated to generate a steady average load called the base load. Hydro power stations can step up the output and deliver more electricity in just a few minutes, and are deployed to meet the sudden peaks in demand.

Dams are also used to store large amounts of energy. Since the thermal power stations run at a steady base load, as the load drops late night, there can be excess energy in the grid. In some dams the power house is equipped with what is known as reversible machines. A turbine and pump are opposite of each other. Water flows in a turbine from a height and rotates its shaft. A pump's shaft is rotated by some engine and it pumps the water up. A reversible turbine is one which can also work like a pump.

Generator and motor are also opposite of each other. A generator converts mechanical energy of the rotating shaft to electrical energy. A motor converts electrical energy to rotational mechanical energy. A reversible generator is one which can also work as a motor.

During peak load hours the hydro-power stations works in the normal mode, and generates electricity. But the water released from the power house is not allowed to flow away. It is held in a pond by constructing a barrage some distance downstream. During the night when there is excess electricity in the grid, the power house is operated like a pumping station. The generator works as a motor and the turbine works as a pump, and water from the pond between the dam and the barrage, is pumped back in to the reservoir, and is available again tomorrow for generation of hydro-power. Such projects are called "pumped storage scheme".

Do not make the mistake of thinking that this is generating energy perpetually. That is theoretically impossible. The quantity of electrical energy required to pump up a certain quantity of water to a certain height, is more than the energy produced by the same water falling from the same height. Thus, overall the system loses some energy in every cycle of generate-pump up. Pumping of water back in to the reservoir converts electrical energy in to potential energy of water pumped to some height, thereby effectively storing the energy, and that is the whole purpose.

Is it true that the dams also have some adverse impacts? Yes indeed. Then why do we construct dams? All that is a topic for the next article. Meanwhile, though the Covid cases are reducing, the danger is still not over. Continue to follow Covid appropriate behaviour, and stay safe.

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Narmada-Malwa-Gambhir Link Project in Madhya Pradesh

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One of the largest and the most successful and the first of its kind smart irrigation project ever implemented in the country

Preface:

Narmada-Malwa-Gambhir Link project is one of the most advanced project with smart water management system in the irrigation sector. This project is constructed by Navayuga Engineering Co (NEC) along with Saisanket for Narmada Valley Development Authority (NVDA) in Sept. 2019. The project lifts 15,000 liters of water per second from Right Bank Canal of Omkareshwar project on Narmada River. This project showcases many technological innovations like Prepaid Management System to deliver irrigation water through Piped Distribution System.

This project is the life line of Malwa region as it has transformed the entire region by providing much needed irrigation water to 50,000 Ha Command Area in 6 tehsils of Ujjain and Indore Districts of Madhya Pradesh bringing green revolution and empowering thousands of farmers. Author has been in volved from inception to construction to successful implementation of this iconic water project. This article provides the interesting details of this fascinating irrigation projects and its overall economic benefits to the millions of people in the region. This articles describes interesting features of one of the most advanced smart water management project ever built in our country.

The Narmada River

Narmada River is one of the largest river in Indian River system. It is the 5th largest River in India with total length of 1312 kms. It originates from Amarkantak paltue in Vindyanchal ranges in Amarkantak district of Madhya Pradesh and meets in bay of Khambhat near Bharuch in Gujarat. This is also the largest west flowing river in India.

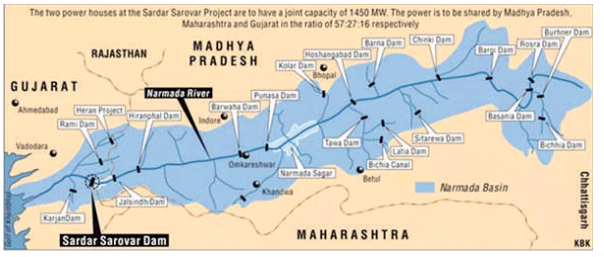
The average discharge of Narmada River is 1457 M3/ Sec. The total area of Narmada basin is 98,796 Sq. Km. It forms the natural boundary between Northern and southern India. The Narmada basin, hemmed between Vindya and Satpura ranges lies on the northern border of the Deccan Plateau.

It is one of the rivers in India that flows in a rift valley, bordered by the Satpura and Vindhya ranges. River flows in a deep narrow channel through the magnesium limestone and basalt rocks called the Marble Rocks near Jabalpur and famous for its beauty in full moon days.

Narmada River is also known as "Life Line of Madhya Pradesh and Gujarat" for its huge contribution to the state of Madhya Pradesh and Gujarat in many ways.

(The path of Narmada River)

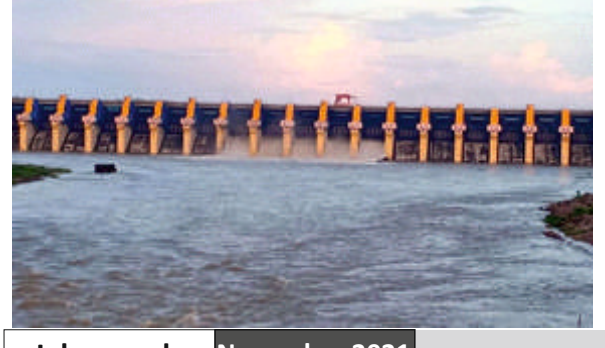
There are 30 major dams, 135 medium dams and around 3000 minor dam projects are proposed alongwith long canals on the Narmada Basin by NVDA.



(The Narmada River Basin and major Dams built in basin)

The Omkareshwar Dam:

The Omkareshwar Dam is a gravity dam on the Narmada River just upstream of Mandhata in Khandwa district, Madhya Pradesh. It is named after the Omkareshwar temple, a famous jyotirlinga, located just downstream. The dam was constructed between 2003 and 2007 with the purpose of providing water for irrigation of 132,500 ha (327,000 acres) of farmland. An associated hydroelectric power station of 520 MW capacity is located at the base of the dam.



The Malwa region of Madhya Pradesh:

The Malwa region occupies a plateau in western Madhya Pradesh and south-eastern Rajasthan with Gujarat in west. The average elevation of the plateau is 500 m from mean sea level. The plateau generally slopes towards the north. The western part of the region is drained by the Mahi River, while the Chambal River drains the central part, and the Betwa River and the headwaters of the Dhasan and Ken rivers drain the east. The Shipra River is of historical importance because of the simhasth mela, held every 12 years. Other notable rivers in this regions are Parbati, Gambhir and Choti Kali Sindh. Most of the rain falls during the southwest monsoon spell, and ranges from about 800 mm in the west to about 105 mm in the east. Indore and the immediately surrounding areas receive an average of 900 mm of rainfall a year.

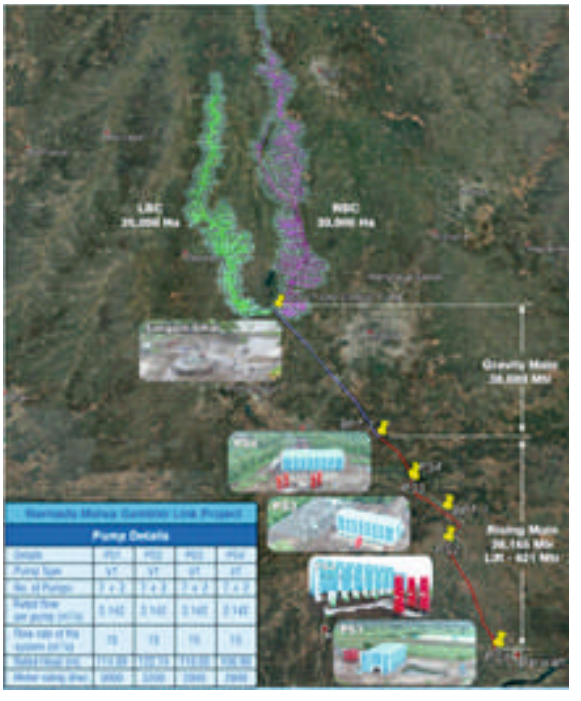
Narmada- Malwa-Gambhir Link Project:

The project has been proposed to provide reliable source of irrigation and drinking water due of declining groundwater level and shortage of drinking water in Malwa region. Out of the total water availability of 15 cusec water 12.5 cusec water will be used for irrigation, 1.5 cusecs for drinking and 1 cusec water will be used for industries. Yashwant Sagar lake located near Indore is also being filled up through this project. The speciality of this project is that it does not involve any re-settlement and rehabilitation or land acquisition as entire water is transmitted by closed pipeline mainly laid underground.

In this project 15,000 litters of surplus Narmada water is lifted every second from existing Omkareshwar project canal through 3 mtr. diameter mild steel rising main of about 38 Km length up to village Dhatoda of Mhow Tehsil and will be further carried ahead through 30 km of mild steel gravity main of 3 mtr meter up to Dhatoda village.

The water is lifted at from 8.0 km chainage of Right Bank Canal of Omkareshwar project by the first pumping stations. There are total 9 sets of large vertical pumps (7 working + 2 standby) are

installed. Each Pump is designed to lift 2100 liters of water every second by 115 M height by 3000 KW electric motor. There are such 4 pump houses each are having 9 sets of large vertical pumps lifting water by total 421 M from Narmada valley to bring it to Malwa platue. Each pump houses are connected by 3 M diameter steel pipeline to transfer water from one stage to other stage.



The Pump house wise details are furnished in below table:

Once the water is lifted from valley the pipeline is bifurcated into two branch lines namely right bank and left bank pipelines respectively of 79 km and 57.5 km long to irrigate 50,000 HA of CCA on both banks of Gambhir River by drip and sprinkler irrigation systems.

Right Bank Canal covers 30,000 Ha of command area in 95 villages of 4 Tehsils of Ujjain and Indore districts whereas Left Bank Canal covers 20,000 Ha of command area of 63 villages of 3 Tehsils of Ujjain and Indore districts. In overall 158 villages of 6 Tehsils in Indore and Ujjain districts are benefitted by this project.

Another specialty of this project is that since Irrigation water is distributed in entire command area completely by underground pipe network there is no need of any land acquisition from farmers. Pipeline is laid minimum 1.5 m below the ground so once pipeline is laid farmers can use the land for farming. Most of the irrigation project are delayed mainly due to land issues however this project is completed in record time as it did not face any delay mainly due to land issues.

This pipeline is also having outlets at Ambachandan village, the origin of Gambhir River and at Yeshwant Sagar reservoir to cater the need of Industrial and domestic water usages of this region.

In overall this Project involved huge network of pipeline including 68 km long gravity/ pressurized pipeline of 3 m diameter, a 147 km long distribution mainline of 500 mm to 2.5 m diameter and a 700 km long HDPE distribution network.

50,000 Ha command area is divided into two section i.e. RBC and LBC. Among these 30,000 Ha command area of RBC covering 95 villages in 4 Tehsil of Ujjain and Indore districts. Another 20,000 Ha command area of LBC covering 63 villages in 3 Tehsil Indore and Ujjain districts. Overall the Project area is in 6 Tehsil of 158 villages in Indore and Ujjain districts.

Details	RBC				LBC			Total
District	Indore	Indore	Ujjain	Ujjain	Indore	Indore	Ujjain	2
Tehsil	Hatod	Sanwer	Ujjain	Ghattiya	Depalpur	Hatod	Badnagar	6
No. of Villages covered	24	26	23	22	37	14	12	158
Gross Command Area (Ha)	9787	8545	9462	3850	12650	5005	2969	52267
Waste Area (Ha)	336	221	487	234	331	158	121	1888
Culturable Command Area (Ha)	9451	8324	8975	3616	12316	4847	2848	50377

This project will supply irrigation water through a pressurized piped distribution network using wireless SCADA, an automated system designed for controlling, metering and monitoring from a centrally automated control room.

Narmadha Malwa Gambhir Link Project							
Pipeline Details							
Details	PS1 TO PS2	PS2 TO BPT1	BPT1 TO PS3	PS3 TO PS4	PS4 TO BPT2	BPT2 TO JS	TOTAL
Total Length (m)	15,862	5,035	6,655	547	10,066	29,977	68,142
Diameter in mm	3,000	3,000	3,000	3,000	3,000	3,000	
Material	MS	MS	MS	MS	MS	MS	

Prepaid Metering System:

Prepaid Management System (PMS) is installed in command area at @ every 40 Ha Chak to deliver the flow of 0.3 liter of water per second per hectare. The main objective of this system is to control the pressure and flow remotely so that irrigation water is distributed equally to every farm in command area. Specially designed Control valve is installed in every PMS which are operated using the hydraulic energy of water from the pipeline. Solar PV panels are installed on each PMS to

operate the control circuit. Hence no external electricity is required to operate the system.

Each PMS are connected to WEB SCADA system installed in central control room through wireless radio system and hence can be controlled remotely. Due to most advanced WEB SCADA this system can be even operated through mobile phones and hence no need to go to the field for any operation.

Once the pressurized water is delivered at 40 ha Chak it is very much convenient for the farmer to connect to drip or sprinkler irrigation without the use of any additional electrical source. So according to crop water requirements in the farm this PMS system can be operated automatically and irrigation water is delivered at particular time without farmer going into farm.

Since pressurized water is available at every farm there is no need to install the small capacity pumps in every farms and hence huge amount of electrical energy is saved. It is also very convenient for the farmer as he is not required to maintain separate pump and pay any electricity bill.

Following are the major benefits of Pre Paid Metering System:

• Prepaid Water Management System enables a uniform and equitable distribution of water irrespective of its elevation and distance from the supply source.

• Irrigation water will be immediately available at Prepaid water system once the water supply starts.

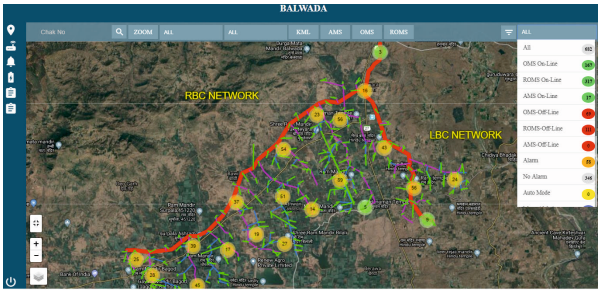
• Prepaid Water Management System will prevent the draining of water from the pipe network.

• In Prepaid Water Management System as water always remains in pipe network it will increase the life and efficiency of pipeline.

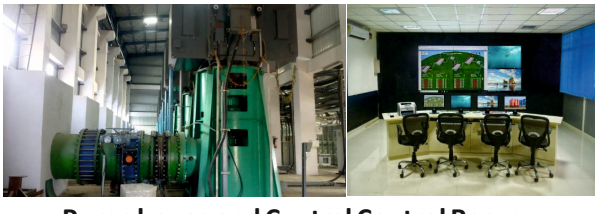
• PMS is capable to control and monitor without external Energy and Wire Connectivity

• Prepaid Water Management System is operated by smart card issued with unique Registration ID and Mobile number

Prepaid Metering system installed in farm



SCADA system is installed in Central Control Room



Pump house and Central Control Room

Sabotage Management System:

In the distribution Network suitable Sabotage Management Systems are also installed one level above Prepaid Water System at suitable location to enable to isolate the Prepaid water system. This Smart system will monitor for leaks, sabotage and theft and shut down the system in the event of any Theft/Pilferage/Leakage with alert message to concerned farmers and officer.

This Sabotage Management System will

also work without Electric Energy and on Wireless communication therefore will work efficiently and effectively in the big distribution network of @ 50,000 Ha.

Sabotage Management System installed in the field.

Air Management System:

Air Management System is installed on the pipeline at suitable location. It is necessary for effective working of system as the chocked air will lead to water hammer and less flow.

Air Management System will monitor the pressure in the underground pipeline and also assist in monitoring of pipeline leakage and water theft. Air Management System has tamperproof enclosure system with vandalized Alert .

Air Management System is also capable of operating as flush valve in the event of requirement of drawing the water for fire incidents etc.

Air Management system is installed on pipe line to monitor pressure

Water User Association:

Water User Association is also formed involving every beneficiary farmers at every 40 Ha chak. One authorized person is appointed as a chak leader for every 40 Ha chak. The role of WUA is to co-ordinate among all the beneficiary farmers within the chak to manage the operation of chak so that required irrigation water is provided to every farm during the season. The chak leader will help the farmers to plan their irrigation activities such that all the farmers can receive their allocated quota of irrigation water as per their farm size.

Each Farmer in the chak will give his demand to Chak Leader and Chak leader will collect and inform the overall water demand of particular chak and its timing to central control room. Since irrigation water requirement varies according to crop growth stage it is important to synchronize irrigation activities in overall command areas. So water requirement is collected from every chak and compile to arrive at total requirement for the project by the project manager.

Every chak leader will have to purchase the prepaid cards to so as to get the water as and when required and to distribute to the farmer in the chak. The smart card will be issued to chak leader with unique registration ID and mobile number.

As and when required chak leader can send his demand from his registered mobile number and will inform ON timing and daily quota of water. Accordingly water will be supplied to him if the credit is available in his account. Chak leader can view his credit limits and his daily quota and valve timing on his mobile. He will get SMS notifications on his mobile whenever the system is open/close, for low credit balance, credit is topped up and valve opening and closing time etc.

Thus each chak leader will have his unique user account. He can Top-up the credit in his account by following ways:

• They can buy “Kisan Top-up” cards. He will scratch it and send SMS to server

• He can buy credit from nearest Gram Panchayat office or authorized agency.

• IVRS–Voice recorded system on toll free number

or any number provide by service provider.

• Using mobile app.

Conclusion:

Narmada- Malwa- Gambhir Link project is one of the most advanced and first of its kind smart irrigation water management project providing much needed irrigation and drinking water to 50,000 Ha command area in Malwa region in 6 talukas of Indore and Ujjain districts on Madhya Pradesh. This also is first project in the country where irrigation water is distributed by underground pipelines to every 40 Ha chak completely eliminating the need of land acquisition which is the main pain area for large irrigation project. Successful implementation of the state of the art technologies like WEB SCADA, Pre Paid Metering system, Sabotage Management system and Air Management system also makes this project a very special and advanced opening the new era in the field of Irrigation management. Such modern technology will also help to prevent loss of precious water and thereby help to conserve water and energy both. The experience gained in this project will be immensely helpful to country like India to transform the irrigation sector and there by bringing green revolution in the entire agriculture sector in the country.

Like Madhya Pradesh other states in India should also take initiative to implement such most modern technology for irrigation projects on large scale. This will not only to help conserve precious natural resources like water and energy but will also help to empower thousands of farmers. Such initiatives by government will help to transform agriculture sector making our farmers Atmanirbhar and thereby making our country Atmanirbhar.

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UK: Three million homes at risk of flooding due to climate change

Climate change is real and if not arrested, will wreak havoc worldwide. If polar ice caps melt, the sea levels will rise and coastal cities and even many of those situated inland risk permanent flooding.

Data gathered by a location intelligence provider Gamma has revealed that around three million homes in the UK risk flooding by 2050. Gamma has released a map and a few images that are sure to scare those who live in the area.

The data has come to light just a week before COP26 climate summit in Glasgow where world leaders will gather to decide on measures to take to arrest global warming.

Three million houses in the country equals 1 in every 10 houses that will be flooded, as per data presented by Gamma. For some cities and districts the ratio is worse.

A third of all buildings in Great Yarmouth risk getting flooded in next 29 years.

In case of Portsmouth one in five buildings risk getting flooded over the same time period.

Flooding isn't the only cause of worry for the Brits. Climate change may cause hotter, drier summers that may lead to uneven cracking of building material that may prove problematic to structures.

World Water Day-1995

Water for the Thirsty Cities

Gajanan Deshpande, Pune - (M) : 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-1996, the main theme was 'Water for Thirsty Cities'. The issue of inadequate urban water supply affects almost all cities around the world. This issue is becoming more and more serious day by day and hence they are becoming a major obstacle in social and economic development. The issue was raised on the occasion of celebrating World Water Day - 1996 to draw people's attention to this profound question. Under this, the following five salient points were brought forward especially for public awareness.

- Water is for everyone.
- The value of water should be understood.
- Wasting of water in cities should be stopped.
- Water partnerships should be built.
- Water should be saved for the future.

Water is for everyone :

As water is an important resource for all, there are many tensions and conflicts in between communities, states and countries. Therefore, in order to resolve this issue, prudent and judicious use of water, taking care of this resource in every possible way and at the same time paying close attention to its proper management and regulation is the primary duty of every dependent entity on the water resources of the place. If there is social inaction in this case, the cost is very high.

The value of water should be understood:

There is no need to underestimate the importance of water for living things; it is well known. Everyone is aware of our sensitivity to water as well as how much we depend on this element. Proper use of water when there is abundant water is an important social cultural aspect. However, there is an universal feeling that we do not understand the proper value of water. Therefore, the culture of saving water is found to be lacking in the common man. During the summer days, too much shower water is used bathing even for more than half an hour to beat the summer heat. Even if we see the bucket is overflowing, the simple rule of turning off the tap is not followed. At the same time, many simple water saving measures are not being implemented spontaneously.

Various types of water wastage in cities should be stopped :

Many cities like Mumbai are facing water shortages badly. This has created a dire need for water conservation. It is easy to come up with some less time consuming and less costly solutions. If these measures are adopted, enough water can be easily made available throughout the year. In many houses, a shower is used for bathing. While, just one bucket of water is enough for bathing, if you take a bath with a bucket instead of a shower, you can save many liters of water. We can save and store water by adopting the method of rainwater harvesting and water recycling in every society. If the whole society decides to undertake this project together, it will be less costly and more profitable. With the use of rainwater harvesting, water can be easily made available to every household throughout the year. Most of the water used in the house can be made available for reuse through recycling. Water recycling equipments are available in the market. Using them, water used for many purposes at home can be reused by processing it

again. If a washing machine is used for washing clothes at home, many liters of water used in it are wasted every day. We can use that water for secondary work without wasting it.

Building Water Partnerships:

In the course of time, different cultures were created in the world and they became the one which gave a different identity to their respective societies. These cultures proved to be extremely conducive to exchange and innovation due to the diversity hidden in them. In that sense, they are the true inheritors of humanity, and maintaining their identity will surely benefit future generations. If the global community embodied in these diverse cultures wants to thrive in this world, it will be better for them to become more empowered by exchanging the good things, knowledge and technology of each other's cultures. For this, the main direction of the next course of action will be to create maximum partnerships in various issues with each other.

UNESCO has planned its work in this direction. This led to the concept of Global Water Partnership (GWP). It is an international network designed to develop an integrated approach to water resources management and to provide practical advice for sustainable management of water resources and its members. It operates as a network - open to all organizations, including government agencies, UN agencies, bilateral and multi-development banks, business associations, research institutes, NGOs and the private sector.

There are different level water partnerships in water development. Such as 1) Country water participation 2) Regional water participation 3) Local area water participation etc. A special issue is planned by Jalsamvad to know comprehensive information in this regard.

Saving water for the future:

This world is not only for us, but also for future generations. So it is important that we leave behind a warm and fresh environment for future generations. For that, water is as valuable as gold and we need to be aware that we will not waste it unnecessarily. While taking care, that water should be pollution free, we should encourage more water conservation techniques like water recharge and reuse of water for sanitation and gardening. As a conscious citizen, we can play a greater role in creating this awareness in the society. That should be the first responsibility of every citizen of the world - so that we can make this world a beautiful and civilized place and hold back the promise of water for the next generation. That is the main purpose behind the idea of celebrating the world water day.

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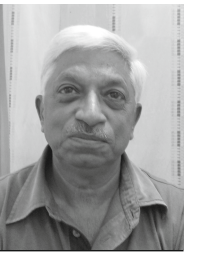
Organization - Center for Affordable Water and Sanitation Technology (CAWST)

Shri Vinod Hande - (M) : 9423677795



"Center for Affordable Water and Sanitation Technology" teaches people how to get safe drinking water, sanitation and hygiene in their own homes, using simple, affordable technologies. CAWST provides technical training, consulting, and acts as a centre of expertise in water sanitation for poor in developing countries. CAWST is a Canadian charity and licensed engineering firm. CAWST is established in 2001. CAWST develops the capacity of local organizations to make decisions and meet their communities needs for water, sanitation and hygiene. To achieve sustained impact CAWST follows five main strategies. And they are,

- Make water knowledge common knowledge – With right knowledge and skill anyone, anywhere can take ownership of their water, sanitation and hygiene. CAWST empowers people.
- Build the capacity of public sector organization- There are thousands of local organizations and governments which provides quality water and sanitation services over the long term. CAWST builds the skill and knowledge of water and health practitioners to start, strengthen and grow their water, sanitation and hygiene services.
- Start with household water treatment – Treating water in the home protects people from water borne disease and it should be within most people's capability to operate and maintain. It should be affordable to reach the large number of people of communities. As per CAWST household water treatment provides good entry point to educate on health, hygiene and sanitation.
- Lead with education and training - Relevant and effective training sparks independent action. When people know that simple solutions exist for their water, sanitation and hygiene needs and know how to implement them they improve their practices. CAWST's training focus on practical options for people to determine how best to move forward.
- Identify barriers to implementation and ways to overcome them- As people apply what they learn from training to their local problems they need help to adopt and respond to issues as they arise. CAWST helps people to find solutions in improving quality and increase effectiveness of their programs.

CAWST's is based at Canada and chairman of this organization is David P. O'Brien. COVID-19 highlighted the impact of not having safe water, sanitation and hygiene. When health authorities told people to do was wash their hands, three billion people lacked basic hand washing facilities at home. And 40 per cent of health care facilities worldwide didn't have water and soap for basic hand washing. If we talk about water, One in four people don't have water that is safe for drinking and 3.6 billion people don't have safety managed sanitation.

CAWST's 19 years of localizing expertise in countries around the world proved remarkably effective. Specialists were there to help communities when lockdowns began and CAWST's networks became knowledge sharing, learning and information sharing. CAWST is proud of their partners, clients and staff who accomplished them in such circumstances. Chairman of CAWST says that 'we have changed and innovated and we are reaching more people in different ways than we before. We will carry momentum of 2020 into 2021

as we continue to support COVID response and assist people to return to a new normal life with better water sanitation and hygiene.'

With support of 6000 organizations in 180 countries including India, 8300000 people started using CAWST training and education material and 14900000 number of people provided with better water and sanitation facilities by CAWST.

Under the Ministry of Urban Development, The National Institute of Urban Affairs (NIUA)was appointed to build the capacity of Govt. at all levels. A sanitation capacity building platform has been created in March 2016 at NIUA. NIUA acts as a hub for knowledge sharing, collaboration and training among local organizations and Govt.bodies. CAWST was invited to support NIUA in designing, establishing and strenghthing this sanitation capacity building platform. This platform will work with cities and states to analyze their situation and will develop approprite capacity building activities. CAWST supported Govt. of India in Clean India Mission, to end open defecation and develop proper waste and fecal sludge management systems by 2019.

As per data of CAWST 2.5 billion people around the world don't have assess to proper sanitation and 44 per cent of them defecate in open. This was a challenge in India where more than half of people without access to proper sanitation. They do not have access to a proper toilet, even if they have waste is improperly managed and disposed which leads to spread of diseases. CAWST supported NIUA to access potential and experience and suitably started capacity building services to India's cities and states. CAWST reviewed more than 40 organizations including prominent universities, training centers, NGOs and consultants. CAWST was excited to be chosen by Govt. of India for this ambitious program. This initiative by CAWST helped India's sanitation challenges. This helped India in finding proper solutions in reducing incidence of preventable water borne disease, and also respect and dignity which all human beings deserve.

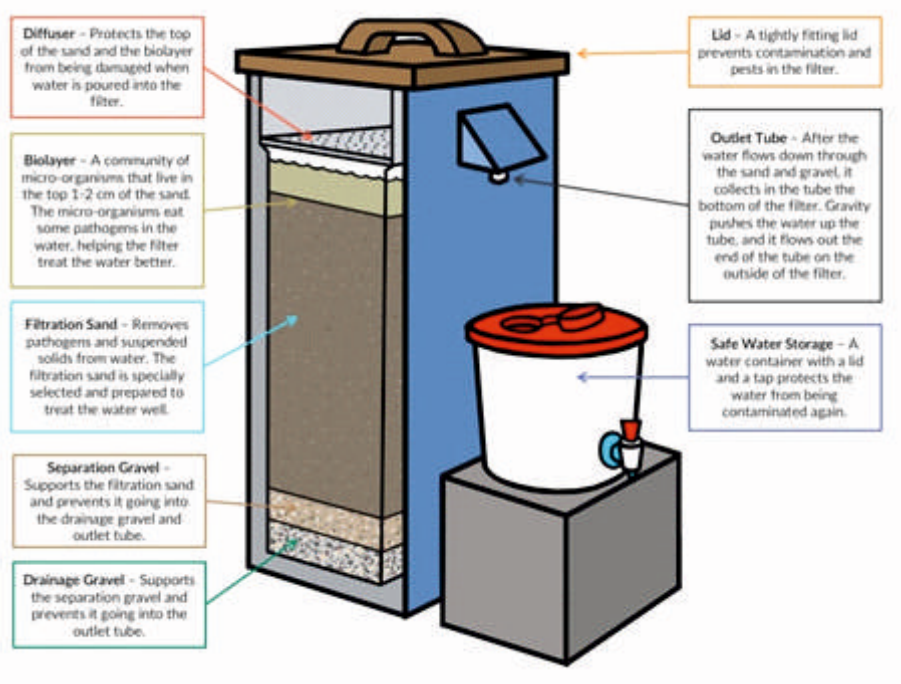
Fecal Sludge Treatment plant near Bangalore

During 2016-2019 CAWST developed a platform for sanitation capacity building in India for individuals, Govt. and private institutions working in the area of sanitation. This program was to ensure sustainable sanitation to the un-served and underserved in India.

As per the data available with CAWST : over 1.8 billion people are drinking fecally contaminated water. People are trapped in a cycle of poverty and disease because they lack access to safe drinking water. To provide people safe and affordable drinking water CAWST has started using biosand filter.

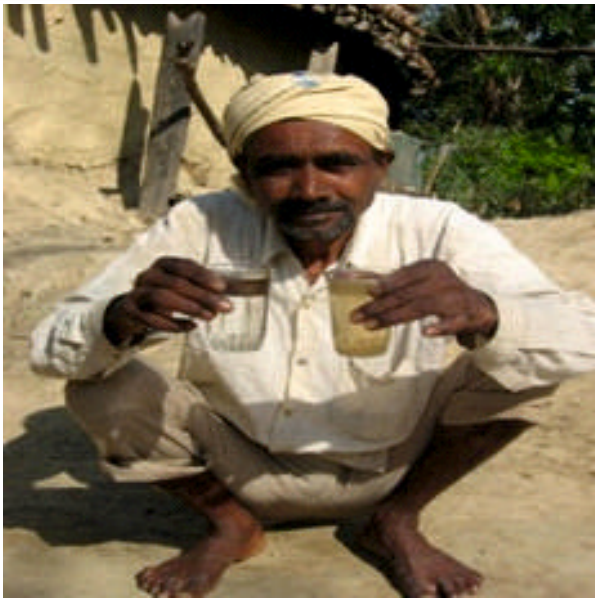
Bio-sand filter :

A biosand filter is an adaption of the traditional slow sand filter which has been used for community drinking water treatment for 200 years. The biosand filter is about 1 mt. height and 0.3 mt. wide in all sides. It is smaller in size and does not flow continuously so making it suitable for use in homes. The filter container can be made of concrete or plastic. It is filled with layers of specially selected and prepared sand and gravel. The sand removes pathogens and suspended solids from contaminated drinking water. A biological community of bacteria and other micro-organisms grows in the top two cm. of sand. This layer is called biolayer. The micro-organisms eat many of the pathogens in the water thus improving water treatment.



the sand and gravel. Treated water flows out of the outlet tube. Main advantage of the filter is no power is required, filter works by gravity. In one hour one can get 12-18 liters of filtered drinking water.

Pathogen and suspended solids are removed through biological and physical processes in the sand. The boisand filter has been studied in the field and in labs. In study it found that the biosand filter removes following from contaminated water.

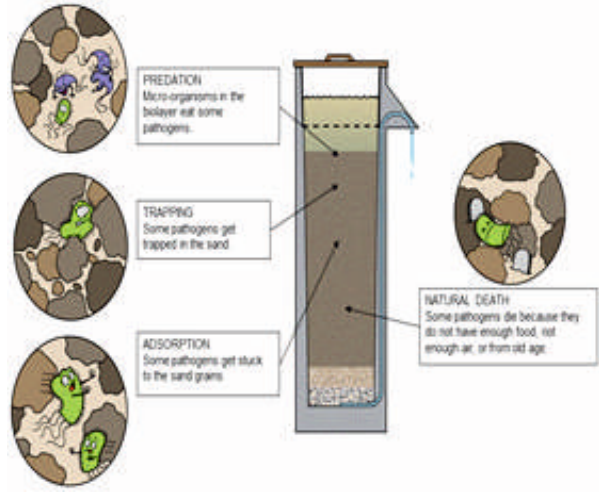


- Up to 100% of helminthes (worm)
- Up to 100% of protozoa
- Up to 98.5% of bacteria
- 70-99% of viruses

The filter can also remove up to 95% of turbidity (dirt and cloudiness) and up to 95% of iron. The biosand filter can't remove dissolved contaminants or chemicals such as salt, arsenic and fluoride. But there are some limitations for the use of this filter:

Working of Bio-sand filter :

Any type of water can be used in this bio-sand filter i.e. bore well water, pond, river water, tap water or rainwater. This makes it very convenient for people because they can use whichever water source is close to there home.



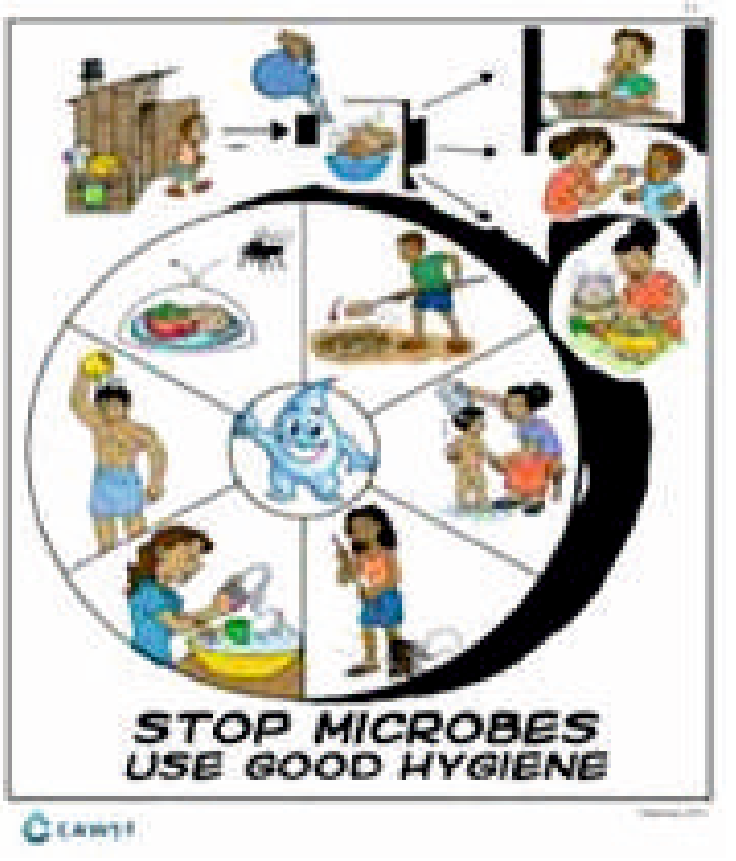
Contaminated water is poured into the top of the boisand filter at least once per day. The water poured into the top of filter slowly drips through the holes in the diffuser and flows down through

1) water should not be chlorinated because chlorine will kill the biolayer, 2) The water should not contain any dangerous chemicals because biosand filter can't remove most chemicals from water. Water from filter may look clear but there may be some bacteria and viruses in the water that can be removed by simple method of disinfection like chlorine liquid or tablet, solar disinfection or boiling.

Biosand filter was developed by Dr. David Manz in the 1990's at the University of Calgary, Canada. In 2001 after the establishment of CAWST started using this filter on humanitarian ground in developing countries. CAWST periodically updated this filter design. Current recommended version of this filter is Version-10. As per CAWST data more than 650000 biosand filters are in use in more than 55 countries and by the use of filters more than four million people have been benefitted.

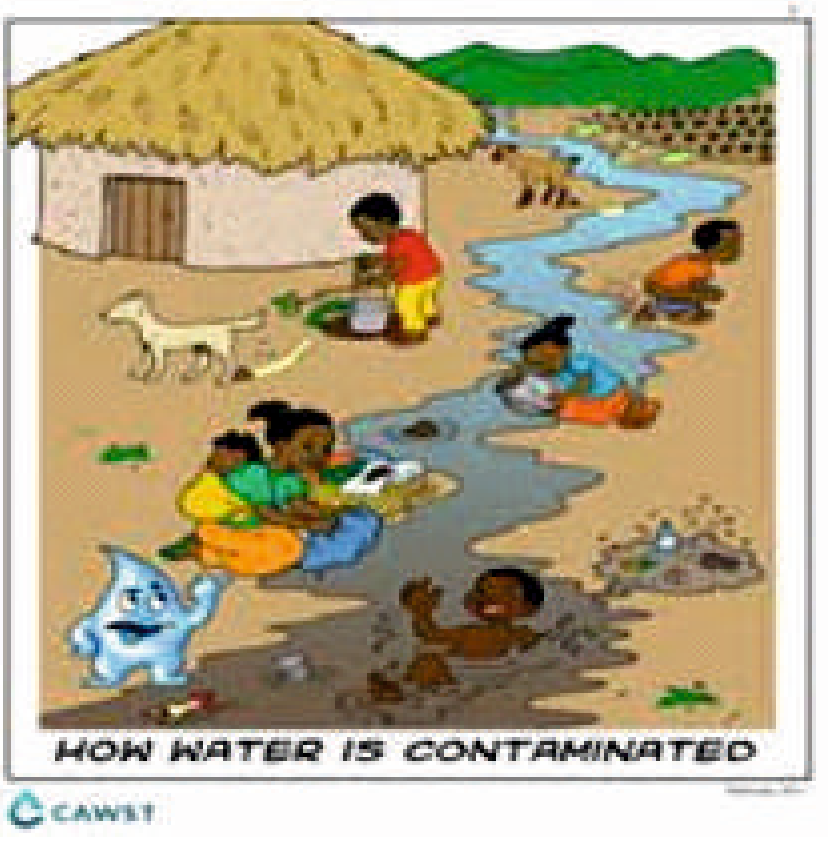
CAWST provide trainings and workshops for water treatment, sanitation and hygiene project. For successful implementation of any project, community health promoter plays a important role. These workshops will teach community health promoters operation, maintenance and how to conduct follow up visits. Community Health Promoters will also learn troubleshooting. CAWST has laid down some conditions for the participants for attending training and workshop. And conditions are,

- Individuals and organizations working in household water treatment, hygiene, sanitation, community development or health projects.
- Motivated and prepared to implement a project to promote household water treatment, hygiene or sanitation.
- Working in water and sanitation, community development or health projects seeking solutions for safe water.
- Aware of the need for safe water and familiar with household water treatment.
- Should have capacity of decision making and organizing projects.
- Program organizers, technicians, frontline supervisors, project managers or project engineers.



CAWST given training to 4900 candidates of 960 organizations of 88 countries. 996000 people were benefited with better water, sanitation and hygiene. CAWST offers globally accessible online information for workshops and other initiatives.

By working steadily and maintaining the momentum CWAST wants to bring bigger changes in 2021. CAWST community is very vast. It comprises of people from all around the world speaking multiple languages. There are 400+ donors who used to donate to CAWST for their good cause. Apart from these donors CAWST have partners, few of them are 'Pure Water for The World', EKHCDC (Ethiopian Kale Heywet Church Development Commission), AFMAC (Africa Manzi Centre) and Acqa Clara etc. .



From the list of clients of CAWST few are UNICEF, ICRC,CARE, Rotary International, WHO, World Vision Oxfam, Save the children etc.

One can donate to the organization for good cause on monthly basis or can make one time payment. To know more about the CAWST organization contact details are given below.

Centre for Affordable Water and Sanitation Technology
B12 – 6020 2 Street SE, Calgary, Alberta T2H 2L8 Canada
Call +1 403 243 3285
E mail- cawst@cawst.org
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Necessity of Hydrogeologist in Water Conservation field, Need of time

Shri Upendra Dhonde (M) : 9271000195

Recently we all heard the news that ''Jalayukta Shivar Yojana is responsible for the recent flash floods in Marathwada. There were many reactions like arguments and counter-arguments between experts also (Mission Easy Water Literacy's opinion was like "Saying that the reason of these flash floods is Jalayukt Shivar Scheme is nothing but pure stunt statement as sensational news). But as blessing in disguise, one most important thing got underlined during this entire episode was that "Importance of technical expertise in the water sector". Be it a Jalyukt shivar or any other government-non-governmental scheme or any type of efforts in the water sector, there must have been a technical perfection and in the last five-seven years, there has been a havoc of uncontrollable & unpardonable intrusion of Non-experts in most areas and almost everyone of us now seems to be agreed on what has happened in water sector.

A very crucial, long period is wasted in '' Festive-Celebrative mentality in water sector, undue diggings by contractors, Poor level guidance by self-proclaimed watermen & celebrities on water conservation, gestures of neglect towards Ground water experts, managed awards and posts, Psychology of Youths been disrupted by the infatuation of name & fame in the water field through public ceremonies and above all the water literacy has setback of over fifty year '', a big loss which people have realising now.

A mere participation in two-four water events, directionless roaming around with such water men-celebrities for getting some name-fame through their mercy, contracts gained through political-administrative flattery etc. such things are not enough to understand the technicality in the ground water sector, they can not give you serious & complete knowledge on the topics related to water. These things are superficial, self-deceiving and consequences of the same start revealing only after 5-6 years. Exactly this happened in Maharashtra, though now people have realized the importance of expertise in water field but unfortunately after a lots of losses, better it should have been realised in time. Since 2014 to 2020, this issue was raised many times through writings of Mission easy water literacy with minute details, but unfortunately it was less heard by decision makers, almost ignored. Also, successful attempts have been made to suppress our voice by using all immoral tactics.

And the great misfortune of the society is that, during entire period, the government not only gave tacit consent over this but in fact encouraged this. The attraction of crowds, giving platform to potholers as experts, taking water advices from illiterates, self proclaimed water conservation celebrities by making them sit besides and criticizing, ignoring the actual experts etc. all made havoc in water sector. Instead of strengthening water management system through development of trained manpower in the water sector, self declared water fighters, amateur potholers etc. were dominating the field with Government support. Instead of strengthening the man power, capacity building in agriculture, irrigation departments by removing corrupts, encouraging the honest people, making the administration more public oriented and enabling the functionality for betterment of society, exactly opposite has happened. It is like working for

breaking down the system, degrading the management, discouraging experts etc. and all happened with very honesty so that a beautiful creation of a shadow confusion developed in society. People are utterly confused as to what is good or bad for them.

Today's situation is that, an ambitious project like Atal Bhujal doesn't have an expert-trained manpower to work on making water security plans. Though a system of advisors has been there at all places but whether they have that expertise of working on such projects? Somebody has to tell that mere Contractorship in any field is not the criteria to work in water sector. A different form of technical expertise is required here, the priority requirement is expertise in making of watershed efficiency plan, but if same cannot be prepared properly, on time, then it is likely that we have to see data only as paperwork. How to achieve technical perfection? What will happen if water structures are nothing but numbers? Simply blocking running water bybunds or diggings it is not sufficient, it does not mean that water stopped in such way will directly go to aquifers. Yes, doing such structures may definitely have some effect, but not every time good, it can be a bad result also. We have experienced this in the previous years of droughts and now as flash floods.

If you want the right results as you expect, then you need a proper technical plan and this is where the topic of hydrogeology comes.

Now see this,

How total rainfall in the watershed distributed?

Some part gets blocked artificially or naturally as surface water storages, some as ground water storage, some is being used directly by plants, some part gets evaporated and the rest flows away as runoff to next area.

Now what about the ground water recharge? Check this out,

Part of 1 : It is naturally infiltrated, the soil structure, roots of trees also helps in that. But the rate of such natural infiltration only is 0.01 percent because of adverse nature of rock formation and less area as forests. Also the plantation with shallow roots require water and that does not support recharge. The dense forest with big, deep rooted trees is the requirement for recharge and we lack on it. Trees planted recently in two to five years, they absorb water from the aquifer instead of supporting through infilitration, they do not have that ability to recharge.

2. Through watershed measures like CCTs, Bunds, area treatment, only some specific areas get benefited as recharge but not in high quantities. The impact is only down to the depth of 20-30 feet that too with exceptions. Large ground water storages created from such techniques is day-dream. Also such structures help less as recharge but affects more as evaporation due to their shallow nature.

3. A well planned multi-aquifer recharge system of Infiltration pots + Village pond+ dugwell recharges helps to much better extent but again the perfect choice of sites for this is the criteria, only then these structures can benefit. There are limits to certain structures as far as faster and deeper recharge of aquifers is considered.

In-depth study of local hydrogeology i.e. soil types, rock formations, drainage pattern etc. is important. The knowledge of hydrogeology of the area definitely has impact on results of work done and that's the reason that avoiding the role of hydrogeologists in the water sector is not affordable to the society.

Have you collectively thought about all these while doing water conservation work in your village? It is foolish to expect drought relief by only potholing as water conservation structures. What structure takes how long time to reach surface waterdown below to depth of 300-500 feet? And in the meantime, what is the role of evaporation and water usage play? The Self-proclaimed waterman-celebrity-potholers won't tell-teach you any of this, because technology is not in their priority, they only know crowd attracting as their criteria. The childish techniques through games, songs, experiments etc. attacking on the general mindset of people and entire water education system in Maharashtra has collapsed due to redundance of

such things and now we are suffering the consequences.

Of course, there are some exceptions to those who are working tirelessly and the Mission easy water literacy is for them only. Efforts are going on here to coordinate public participation + technical guidance + honest administration. Even though the reality seems bitter, many times in the social interest we have to take evil while criticizing the flaws found in the water sector, even if there is ignorance by people's representatives, no matter how unattractive people may feel this mission, even if the media doesn't take notice of it, irrespective of the group politics, conspiracies, the mission easy water literacy is doing its job. People who have been connected till time, seems doing better, they are creating technically perfect structures (and of course, that too without any governmental, CSR support). Though positive examples are being found, but are rare, hence Hydrogeologists have to reach to more and more people.

'' All Maharashtra will be water-literate '' is resolution tag line of mission easy water literacy and we will continue to try as much as possible without bothering slow or fast progress of our efforts. Rather than how much fame or wealth we get from all this, we think that when the coming generations look back and seek to know the sincere efforts made in the water sector for the society, it will definitely take notice of the Mission easy water literacy.

*****

Stockholm Water Prize 1994

Gajanan Deshpande, Pune

(M) : 9822754768

Dr.Takeshi Kubo, Japan

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

Every time when we walk down a suburban street in Tokyo, we see the red brick pavement on the sidewalk and get mesmerized; as these bricks are made from sludge and baked in huge kilns. This hard and resistant material is increasingly used in Japan for foundations of buildings, sidewalks and roads. This is a striking example of any technical solution plan developed specifically from Japanese efforts to treat wastewater and sludge disposal.

The question is how to better manage the sewage system for Tokyo's 12 million people. Kubo had been struggling for a long time. He tackled this question in the early 1960's and spent almost half a century as a guide to the planning of wastewater treatment facilities in Japan, directly up to the age of 74, when he resigned as the Director General of the Sewage Management Research Institute in Japan. He was awarded the Stockholm Water Prize in 1994 for his outstanding work.

In the early 1970's, Tokyo's rivers looked white because of the large amount of foam in them. Most of the rivers were discharged with untreated industrial and domestic effluents, causing a strong odor. This is the dark side of the rapid process of industrialization and urbanization in Japan.

"These things have changed a lot now. We have strict standards for water quality, businesses have to strictly adhere to. Sewage from almost the entire city of Tokyo is connected to wastewater treatment plants," says Kubo.

By 1993, water was supplied to 93 percent of Tokyo's inner city areas from 18 sewage treatment plants, by laying about 22,000 km of pipelines beneath the roads of the capital. Until then, a network of double pipelines had been built in the outer suburbs to separate surface rainwater and sewage. Citizens of Tokyo should thank Dr. Kubo for many of these improvements in the city.

Many of the waterways laying in the dead state for a long time, have been revived by adding processed sewage water to the city. One of them is the 350-year-old Tamgawa canal of the Ido dynasty, which has been revived and is filled with huge carps now. Another example is the "pocket" park in the city, where the addition of a small water supply from the regenerated sewage has added to the beauty of the place.

But without limiting his vision, Takeshi Kubo extends beyond the horizons of Tokyo and Japan. One of Kubo's most important contributions was his involvement with a number of Asian hydrologists and professionals, including Western organizations for ensuring the exchange of knowledge of the country on this subject. To this end, he enlisted the cooperation of Western countries such as Britain, the United States and Germany, and Asian and Pacific countries in the Eastern Water Environment Federation as chair of the RIM Steering Committee. Not only that, Kubo also brought together nations like China and Taiwan to tackle important issues related to wastewater treatment and clean water from a holistic perspective.

Kubo states that “there is a need to be able

to control the entire catchment area of the river, including its soil use. This is because whatever chemicals or fertilizers you use to increase agricultural yields are eventually released into the river. Therefore, this problem can never be solved by considering land and water separately. "

Since 1993, Dr. Kubo has officially retired. However, contribution in Annual Water Environment Council continues to pass through several water-councils, such as the Stockholm Water Symposium. For the 3rd World Water Forum, he produced a summary version of the findings from the 10th Stockholm Water Symposium in Japanese.

Hokkaido University of Japan recognized Dr. Kubo and Prof. Takashi Asano, winner of the Stockholm Water prize-2001 and announced a permanent award in recognition of the work of these two distinguished graduates of the university in 2004.

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Women and water

Dr. Datta Deshkar

M : 9325203109

Water is the field of women. They fetch water from distant sources of water (may be wells, streams, river or other undefined sources), are involved in cleaning utensils, washing clothes, bath of other family members, cleaning the house or storing water in the house. In villages they have to look after watering the farms, cleaning the sheds meant for animals, transplanting the seedlings etc. Thus, it naturally means that managing water physically is the primary job of women. This is true in our country so also in the other countries in the world. Because of this involvement they are required to face various health problems. Their feet, all joints from top to bottom, back bone, neck, head, hair, brain all get affected. Their morning precious time is just wasted in fetching water. That is also the case of small girls in the house. Since they are busy in mornings hours in making water arrangements, they are deprived of going to school. Men in the house , even if they are free, do not get themselves involved in these activities, sitting in the verandah chewing pans or tobacco and wasteful chitchatting.

If women move out early in the morning to fetch water, there is a fear of stray dog bites, scorpion and snake bites. On many occasions, since they are alone, they have to face molestation from gaon goondas, even rapes sometimes. When they leave home for fetching water, their small children are left unattended in the house. This may cause their accidents and even deaths. Village wells are not properly built up and sometimes the water levels are very deep. In that case there is a possibility of falling in the wells resulting in deaths.

Even after contributing so much in this field, nobody shows any sympathy or gratitude for the efforts they take. This is more or less a thankless job they are doing. On any particular day, if they do not do this job they are blamed for that. Society has accepted that this is their job and they should do it without fail with no complaint from their side.

From what has been stated above, it can be concluded that physical work of water management is entrusted to women but not the mental work such as decision making. All these decisions are taken by those men who do not exert at all. If you study the working of Water resources department of any state or municipal bodies how many women do you find working in these offices? May be not even 1 percent.

In the year 1992 one international conference on water was held at Dublin (Capital of Ireland) where water issues were thoroughly discussed. At the end four important resolutions were passed which are known at Dublin Statement. The third statement reads as follows:

Women play a central part in the provision, management and safeguarding of water.

All these three activities involve the physical activities as well as the process of decision making. It is observed that only the physical work is entrusted to women. In reality, management of anything involves planning, organizing, actuating and controlling. In all these four activities their role is seen only in actuating which is more or less a physical work. Their involvement in planning, organizing and controlling is nearly zero. We tried to contact the apex body of women organization located at Delhi and asked the Office bearers whether they had any idea of such a resolution and conference. But their answer was negative. This naturally means that these organizations did not

give any importance to this issue even when it is closely related to women. It also means that they accept the situation in which women are presently placed.

What are activities involved in water management?

Following activities can be listed in any water related activity:

(1)Availability of water

(2)Use of water

(3)Economy in use of water.

(4)Reuse of wasted water

(5)Water budgeting

(6)Entrusting the responsibility to different persons.

(7)maintaining the quality of water.

(8)Augmenting the water resources.

(9)Equitable distribution of water

Women have proved that they are quite capable and can do all these jobs independently or in collaboration with males. Water being closely related to women, why not entrust this job to them entirely? That would be justicenot to women but water itself. Let us now define the dimensions where they can show a definite mark.

(1)What are the various problems associated with water, how they would affect the women community can be visualized and a detailed programme can be designed in a conference.

(2)How this programme will look like at village level, region level, state level and even national and international level can be carefully studied.

(3)Formation of women organizations which could design and implement this programme. Where women organizations already exist how best they can be associated with water issues.

(4)Undertaking capacity building plans in the field of planning, organizing, decision making

(5)building up pressure groups which can pressurize appropriate bodies to see that involvement of women gets increased at every level

(6)What are those opportunities available in water sector, how our association with them cam be increased, What is the training needed to do those jobs proficiently.

(7)There can an exchange of information in between various women organizations working in water sector, as to what they are doing, what we are doing, what can be done together to promote our involvement.

(8)A directory can be prepared to know how many women organizations are working in this field, who are their Office bearers, what are the activities undertaken by them, what is their area of operation, how many member do they have on their list. What are their objectives, which programmes they have already undertaken and what they want to do in future.

(9)Preparation of an exhaustive list of organisations which are working in this field at national and international level, can we have their membership, can we undertake joint programmes with them, can we hold national and international conferences in their collaboration.

(10)Easiest job for women can be that of water literacy. They can divide the Society in groups like school children, college going boys, women, senior citizens, farmers, social organizations like Lions, Rotary and make the members aware of their duties in this field. They can hold essay competitions, elocution competitions, drawing competitions to promote water literacy. They can move from housing societies to societies and see whether there is any wastage of water there. They can hold seminars for maid servants to tell them the ways and means to save water and get their work done with minimum of water. They can take up the programmes of cleaning the wells in colonies, rainwater harvesting, reuse of water.

(11)They can collect samples of water from various colonies in the city and get the same tested in the laboratories to assure availability of quality water to the community. Nearly 80 percent of the diseases owe their origin to poor quality of water. By testing the drinking water women would be doing valuable service to the community.

Can the women's organizations accept this challenge?

*****

A reliable water drinking system for remote

Atauro Island case study

Shri Ulhas M. Paranjpe - M : 9820788061

Distribution of Jalshudhi Liquid Chlorine Bottles 100 ml in Flood Affected Kokan Region

We have been distributing since 2006, Jalshuddhi Liquid Chlorine Bottles of 100 ml each to every house of about 10 Padas / Wadis in Taluka Karjat, Dist Raigad during Monsoon Period. Totally about 500 bottles are distributed each year. This 100 ml bottle is normally sufficient for one family for a period of three months. This Liquid Chlorine Takes care of water borne diseases such as Loose motion, Diarrhoea, Gastro, Typhoid etc . which are epidemic during monsoon. due to lock down we could not distribute in 2020 and 2021 in Taluka Karjat

This Year we thought of distributing 2,000 such Bottles in flood affected Chplun and Mahad area

1] Shri Dinesh Dalvi and his Ngo [Manav Arogya Sanshodhan Va Krushi Vikas Sanstha] distributed about 1,000 such Bottels in Chiplun area

2] Shri Vikas Bargode and his team Distributed in Taluka Chiplun about 500 such Bottles

3] Shri Ajit Pitale and his Kokan Katta and his karyakata from Mahad distributed 500 such Bottles in Mahad area

Bottles were distributed in August and few in September 2021

Please find attached Few Photos of Bottle Distribution

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Demand of Water

Water keeps a man alive and that is why we call it life. Man can survive without food for several days but not without water. This importance of water, man has realized for several generations. A nomadic man settled near the banks of river and later started cultivating land only with the help of water and later, stage by stage, he came to know various other uses of water.

He later realized that if the crops are irrigated, they give more output. Naturally his demand for water further increased. He started constructing bunds and dams to regulate the flow of water. Thus he started creating artificial storages of water. We find now, there in not a single river in the country where dams are not constructed. China, for example , has constructed more than 50,000 dams on each and every river in the country.

A stage came when he realized that vapour pressure had tremendous energy. This vapour and the invention of wheel changed the whole complexion of the world and whatever economic progress we are noticing today is the outcome of the use of water in this direction. Industrial revolution has its origin in this combination.

Later he found out that the flow of water also has the capacity to move the turbines. That resulted in generation of electricity. Electricity can be passed from one place to another with the help of wire network. This power has given another push to the industrial growth.

Out of the various modes of transportation like rail, road, air and water we have understood that the cheapest mode of transportation is water. Air transport is the costliest of these modes followed by road and rail. Realising this, the world has shifted to this cheapest mode. More than 75 percent of the international trade is done with the help of water transport. Continuous efforts are being made to shift the internal transport also to water transport.

A stage has come now where we are using water for recreation also. Various water sports are invented like water polo, swimming, canoeing, rowing, rafting, scuba diving etc. Water sports have found out a very important place in the World Olympics. Huge gardens like Brindawan Garden have come up where water is extensively used.

In different uses of water, water quality also plays a very important role. For drinking water, 100 percent purity is needed as it is required for healthy living. Agriculture, industry also need a definite quality. For maintaining cleanliness, it does not matter even if some quality norms are sacrificed.

With the growth of population, industrialization, irrigation and increased domestic use the demand for water has tremendously increased. Some crops like sugarcane, bananas huge quantity of water is needed. It has become practically impossible to satisfy this growing need for water. Some efforts are being made to increase the supply by treating the waste water and desalination of sea water. But the greed far water has no limits. Water activists all over the world are advocating the policy of Integrated Water Resources Management to overcome this problem. But the greed for water has increased so much that different uses, different regions, different states and different countries are seen daggers drawn on this issue. Who knows, this greed may end in one more world war.

Demand for water, from economic point of view, has different elasticity in different uses. Domestic consumption has greater elasticity as it can be increased or decreased taking into the availability of water. Industrial demand has comparatively less elasticity as the production process is such that the demand cannot be curtailed. But in agriculture there is a definite commitment for each crop where such elasticity cannot change in shorter period of time.

Heartiest greetings form the Jalasamvad family

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