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# Jalasangraha

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




Cover Story:  
Atma nirbhar



Happy Rotary Village: PINGORI  
Shri Ravindra Ulangwar







## Catch the rain Where it falls:



■ There is a natural tendency that when a drop of rain water falls on the ground it starts moving forward and there is no possibility of it moving back. That drop moves forward taking into account the slope of the ground. That is why all the efforts should be made to stop the flow if we are interested in using that drop. If the average rainfall of any region is 750 mm the total amount of water falls in one acre is 30,00,000 liters. This is quite a sizable amount and if collected, we can irrigate our land for getting better crops.

■ What we do is, we allow that water to flow. Out of that, streams are formed, if many streams come together, rivers are formed. We construct dams, stop that flow of water and then we bring it back. For doing this we spend crores of rupees and we call it development. Instead of that, if we stop the flow in the beginning itself, necessary purpose would be served.

■ Huge storage of water in dams creates problems. The principle of Might is Right gets applicable there. That person who has might tries to grab that water source for his benefit and sufferers are the poor farmers who are deprived of that collected water. The best way is to collect that water in the farm itself to reap maximum benefits. Thus, it is very rightly said that the drop of water must be stopped where it falls.

■ When there is a flow of water that flow carries with it the soil also. That is called soil erosion. Because of this erosion, quality of land deteriorates. For the formation of soil, years are required and in minutes the upper layer of the soil is taken away by the flow of water. If the drop does not move forward, soil will not be disturbed.

■ Fast moving rain water does not percolate in the soil. If this continues, the ground water level starts depleting. So, for better percolation, all our efforts should be directed towards stopping this flow. For reducing the flow of water, trees, shrubs, grass provide a great help. That is why plantation is encouraged to improve the rate of percolation.

■ Ground water is as good as a bank. We can lift water from this bank whenever required. But at the same, it is our responsibility to see that sufficient balance is maintained in this bank. If the natural percolation of rain water is stopped for one reason or the other, we should take resort to artificial recharge of ground water. It is by the grace of Nature, we get water regularly every year in the form of rainfall. And if we do not stop the flow of rainwater, we would be denying this gift of Nature.

■ Wherever such treatment is given to the rainwater, the results are astonishing. In our country, Gujarat is the best example where, through people's participation, the flow of water is reduced sizably. People came together and constructed more than 5,00,000 check dams on nallas (streams). Thereby the rainwater flow was restricted. Here ground water level has gone so high that the cultivators have started cultivating three crops every year.

■ Thus it is our duty to stop the flow of rain water. It is very rightly said that we have to catch the rain water drop where it falls.

# Jalsamvad



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■ April 2022

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Recently, a farmer in Maharashtra committed suicide by declaring that, in the next birth he would not be born as a farmer. Stories and novels can also be written over this topic if the announcement is viewed emotionally. But, as an analyst of economics, I can't see to it that way. For years, farmers have been told that, "O' man, look at farming as a business". I can understand if there is a loss in the field for one year, but if there is a loss for year after year, then the real question is, why he does not consider that he is mistaking somewhere.

The most important issue in farming today is getting money from agriculture every day. In personal life of the farmer, he has to spend money every day. He wants to run the house along with farming. But if you are to get money from agriculture after four months, how can you manage your household expenses? And what is the guarantee of getting money even after four months? For this reason, a person in the family should be set aside for a job from which he can earn regular money. Apart from this, there will be a part of agriculture from which money can be earned every day. Occupations like cow and buffalo rearing, poultry rearing, goat rearing, bee keeping, pig rearing, vegetable production etc., if done as a side business, can earn money from them every day. And if I get money every day, I claim that such a farmer will never commit suicide. Unfortunately, he feels inferior to do these businesses.

I think that, it is important to consider the cost of production. Inputs like seeds, fertilizers, medicines are required for cultivation. The suppliers of all these items travel in automobiles. However, the farmer, who buys it, is seen walking around on foot all over. Today all the emphasis of farmers is on chemical fertilizers. Just unzip the bag and the manure is present before him, is the situation. But, it spoils the texture of the field and he has to spend money like water, what is the answer to this? Is it that, the farmer has forgotten a thing that it is possible to make free manure by collecting wet waste and dung (but it requires animals in the field), don't understand. Valuable pesticides can be made from cow's urine. But instead of doing that, the method used is to bring a bottle of medicine from the market. Furthermore, the same toxins can be used for committing suicide, a different matter.

We use the saying that 'It is not sold where it is grown'. The real question is as to when the farmers will implement this saying. No manufacturer produces his product, unless he has made a specific sales arrangement for that. When he goes to the bank for a loan, the bank manager asks him as to what type of sales arrangements he has done for his product; and only if the bank is satisfied over it, it will sanction the loan for him. I will produce, let whatever happens next - it doesn't work that way. This is the reason why a farmer who first sets his consumer, seems to be successful. There are many farmers around Pune who have strengthened their sales chain; and so, they seem to be earning seven to eight lakh rupees per acre.

If you want to survive in farming business, you have to invest in agriculture. New techniques have to be adopted. But there is nothing left for the farmer after selling his farm produce, to run his household expenses. So, how will he develop his agriculture? The question arises as to how will he repay the loan. In short, he can't get agriculture out of trouble and has been weeping for years. Farmers having financial stability are very rare.

If you want to sell farm produce at the right price, you have to have a lot of farm produce. Only then you can put pressure on the market. How can a man cultivating just one and a half acres of land bring this pressure? If so, it has no control over the market. He has to be satisfied with the price he gets. If many farmers come together, the supply can be controlled. But the farmers do not seem to be trying to come together. Co-operation has been so discredited by the rulers that the farmers are afraid of coming together.

Farming can only be profitable if we think of integrating various factors like the size of the field, storage facilities, market observation, control over cost production, productivity of the farm, availability of water and a lucrative crop; and only then we may prevent the farmer from committing suicide.

## Story of Water. Part 9 – Floods and Droughts

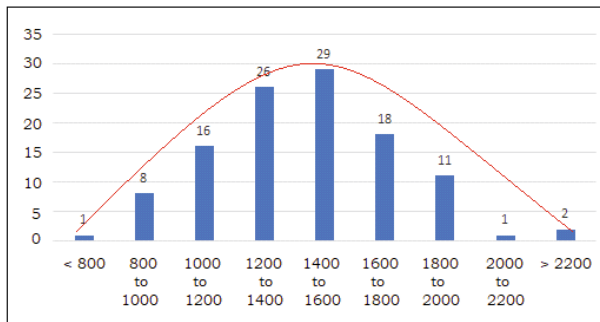
Shri Chetan Pandit

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Hi folks. In the eight parts so far, we have covered the engineering aspect of the story of water. Topic for part 9 is – Floods and Droughts. What causes floods, what causes droughts, and how to manage them. Too much of rain causes floods and too little rain causes droughts. Even an illiterate person knows that. But this is an over simplified view. Today we will dig deeper into it.

Hydrologists call floods and droughts “extreme hydrologic events”. At any given location, in most of the years the rainfall will be near its average. Very less or very high rainfall is very rare. If we plot the frequency of occurrence of various rainfall values, we get a graph as shown below.



This graph is for 112 years of annual rainfall, 1901-02 to 2012-13, at a location in central India, about 80 KM east of Nagpur. Why did I write the years as 1901-02, or 2012-13 ? Why not just 1901, 2012 ? Because the annual rainfall is not counted for the calendar year. In India, in most places the rainfall is during monsoons, that starts approximately in June, and the hydrologic year is reckoned as 1st June to 31st of next year’s May. So, year 1901-02 means 01.06.1901 to 31.05.1902.

The average rainfall at this location is 1445 mm. I have grouped the rainfall in 9 groups, less

than 800 mm, 800 to 1000 mm, 1000 mm to 1200 mm, and so on and finally more than 2200 mm. Each vertical bar shows the number of years, also called occurrences, when the rainfall was in that group. It is seen that the largest number of occurrences are centred around the average. In 73 years out of 112, the rainfall was in the 1200-1800 mm range. As we move away from this central range, whether in lower side or higher side, the number of occurrences reduce. Only in 1 year the rainfall was less than 800 mm, and in only 3 years it was more than 2000 mm. The red line curve shows the shape of the frequency distribution. The occurrences of very low or very high rainfall are on the extremes of this curve, and hence are called extreme events.

If we divide the number of occurrences in a range by the total number of years, we get the probability that the rainfall will be in that range. In 112 years, the rainfall has been less than 800 mm only once, so its probability is  $1/112 = 0.009$ , Or 0.9%. Likewise, the rainfall was more than 2000 mm in 3 years, and hence its probability is  $3/112 = 0.027$  or 2.7%. And the probability of rainfall being in the 1200 to 1800 mm range is  $(26+29+18)/112 = 73/112 = 0.65$ , or 65%. This shape of probability distribution, where the probability of middle values around the average is very high, gradually reduces on either side of the average, and the probability of very low or very high values is very less, is called “Normal distribution”. It is called “normal” because “normally” this is how most of the natural data is distributed. Weight of the students in a class, height of the people in an office, income of the people in an area, if you plot their probability, you will find they all follow the same shape – most



of the values around the middle, which is the average, and gradually reducing on either side of the average. Viz. in a class, a very few students would be under-weight, very few would be obese, and most would have their weight around the average.

Floods happen due to very high rainfall and droughts are due to very low rainfall, and both are extreme events. But there the similarity ends. There is a major difference between these two hydrologic events, and this difference shapes our response to them. Flood is an instantaneous phenomenon. Very high rainfall continuously for 3 days will cause a flood. But drought is a phenomenon of aggregation. Zero rainfall continuously for 3 days or even 3 weeks, will not cause a drought. Persistence of low rainfall extending to months, which aggregates as low rainfall over the entire monsoon period, is what causes a drought. Now let us examine each of these in depth.

**Floods and Drainage Congestion :** Any inundation of human habitation, is normally called “flood”. But in hydrology the word “flood” has a different and specific meaning. Inundation of human habitations is caused by two different mechanisms.

- Heavy rainfall in the upstream catchment causes a very large flow in the river; which can not be contained in the usual width of the river, and water from the river spills in to human habitations. This is flood.
- A local heavy rainfall deposits a large quantity of water in the city. Because of obstruction of drainage paths, this water fails to reach the river and drain out quickly, and the city is inundated. This is not flood. The correct name for this is drainage congestion.

These are two entirely different mechanisms. In flood, the rainfall is someplace upstream, in drainage congestion the rainfall is local. In flood the flow of water is from the river in to the city. In drainage congestion the flow is from the city to the river, but is not fast enough.

In August 2006 a large flow in the Tapi river spilled out in to the Surat city. That was flood. But in July 2005, water did not spill out from Mithi river in

to Mumbai. Mithi river is not all that large. There was a very large local rainfall in Mumbai, 944 mm in 24 hours; the drainage paths were not sufficient to drain out all this water, it stagnated in the city, and Mumbai was inundated. This was drainage congestion, not flood.

Rainfall may be very high over a long period, but if it is well distributed over that period, it will not cause inundation of areas occupied by mankind, at least not a major inundation. Conversely, rainfall may be average, or even less than average over the entire monsoon, but if a lot of it is concentrated over just 2 or so days, it may cause a flood. Therefore, for the purpose of flood management, what matters is the rainfall over a short period, of up to 3 days.

Drainage congestion usually takes place in urban or semi-urban areas, mainly due to encroachment of natural drainage paths, and to some extent due to obstructions to the flow of water in the river. Normally one doesn't expect drainage congestion in rural areas. But, when roads, railway lines, and canals are constructed, it is necessary to allow the natural drainages to flow across the road/ railway line/ canal. Sometimes it may happen that the planning of these cross drainage works is faulty or inadequate. In such cases drainage congestion can happen in rural areas also.

A flood, i.e. water from the river spilling out in to areas of human activity, is caused by a high flow in the river, which in turn is caused by a very high rainfall in the catchment. People often use words like “the river flow has spilled over its banks”. But this is not a correct expression. Mankind can not decide what should be the width of the river. In my lectures in training programs, I sometimes ask a question “what is the width of river Ganga?”. Most participants respond that the question is incomplete. Width of river Ganga – where ? It is different at Rishikesh, at Kanpur and at Patna. Good. Next I ask – “OK, what is the width of river Ganga at Patna?”. Many participants attempt to answer this question. Very few see that even this question is incomplete. “Width of river Ganga, at Patna, when ?”. It is different in February, and in

September. Even in September, it is different 3 days after a major rainfall in the catchment, and 10 days after.

A high flow requires a large river width. But most of the time the flow in the river is much less, and occupies a small width. The area on both sides of the river which is required only once in a while when the flow is high, is called flood plains of the river. People encroach and build their houses, roads, and undertake other activities in these flood plains. Once in a rare while when the rainfall and therefore the river flow is very high, it needs more width, flows over the flood plains, and then we accuse the river of spilling over its banks.

**Flood Management** : Should we then completely ban any activity in flood plains? Ideally, yes, and that is what the “experts” from the community of environmental activists insist on. But real life is far from ideal. In a large country with less population, viz. USA, where the population density is only 34 persons / SqKm, this may be possible. But in India, the population density is 411 persons / SqKm, and it is a waste of land resources to keep the flood plains unoccupied for an event that may happen only once in a few decades, that too for only a few days. We in India have adopted a flood plain zoning policy. The flood plains should be categorized for various level of flood risk, and depending on the risk, different activities are permitted. e.g. it would be wrong to build a houses, or factories, in the high risk area. But roads can be built, farming may be allowed. If once in several decades it gets flooded for a few days, we accept it.

There are three strategies for flood management. One I have already explained in the Part 6, The Dams Debate, but will repeat here for those who missed it. The reservoir created by construction of a large dam stores a substantial part of the incoming flood water and releases it slowly over a period of time, thereby reducing the intensity of flood in the downstream area. A group of dams in Damodar basin, and also the Hirakud dam in Mahanadi basin, are living examples of flood control by large dams.

The second is flood embankments, constructed along the river, to contain the river

flow in a defined channel. Embankments may be semi-permanent, made of consolidated earth, or temporary, made of sand bags etc. Dams and embankments are the only and most reliable method of moderating a flood of a specified magnitude.

The third strategy is flood forecasting. This doesn't prevent the flood, but enables the people to be evacuated to a safer place, and saves loss of life. A variation of flood forecasting is, “inflow forecasting” for reservoirs. The flood forecast is essentially a forecast of the water level in the river, whereas inflow forecast is the forecast of volume of water in the flood. This helps the reservoirs vacate some storage space to receive the incoming flood, and thus improve their effectiveness. Central Water Commission provides flood and inflow forecasting services all over India. The forecast is in public domain. You can see it at <https://ffs.india-water.gov.in/> You won't see any forecast now, because this issue of Jalsamvad will reach you in April and we don't have floods in India in April. Try it during monsoons.

**Common Fallacies** : There are many fallacies that have been deliberately nurtured about flood management. It is not possible to address them all in this article, but I will briefly mention only two. Those interested can read my detailed article in the “Current Science” at <https://www.currentscience.ac.in/Volumes/97/07/0991.pdf>

**Role of Dams** : As explained in the foregoing, dams moderate the flood by storing a part of the flood flow. Depending on the size of the flood and the storage space available in the reservoir, the dam may absorb the flood completely or partially. But even if some flow is released over the spillway, the flood intensity in the downstream area after the dam is always less than the intensity, had that dam not been there.

**Flood Management by Forests**. Theoretically, forest will reduce the intensity of a flood. However, the impact of a forest is significant only for very small floods. For large devastating floods, the impact is negligible. Next time an “water expert” tells you that forests is the way to manage

floods, ask him/her, how many Sq.Km. of forest is required to moderate a flood caused by, say, 250 mm of rainfall in 24 hours over a 10,000 Sq.Km. catchment. I assure you, there will be no answer. Mere theoretical principles are being marketed as a solution.

**Drought** : Drought is lack of water. Inadequate rainfall for a few days, even a few weeks, does not cause a drought. It is the persistent inadequate rainfall over a long period, that causes a drought. Engineers define three kinds of drought. Inadequate rainfall is meteorological drought. That may not necessarily cause a shortage of water, if there is adequate storage in the reservoirs. But if there is inadequate flow in rivers and inadequate storage in reservoirs, then it is hydrological drought. And if there is inadequate water for the crops, it is called agricultural drought.

The starting cause is of course the meteorological drought, inadequate rainfall. If that persists, it leads to hydrological drought, and then to agricultural drought. While the possibility of a large rainfall in next few days can be, to a some extent, forecasted, absence of rainfall over a prolonged period can't be forecasted. In other words, while a flood can be forecasted, a drought can not be forecasted.

Till about 80 years ago, drought used to result in famine and tens of lakhs of people used to die in such famines. That doesn't happen anymore. The last major famine in India was the 1943 Bengal famine. Two things have changed. First, earlier the annual food grains production was just about enough for annual consumption, and there was no significant stock of food grains to carry across the years. Now, after extension of irrigation by construction of many large dams, barrages and canal systems, and also from ground water; use of high yielding variety of seeds; and use of chemical fertilizers; we are able to produce more food grains than our annual consumption requirement. We are exporting food grains, and still have such a large stock that there are problems in how to store it. Therefore, drought doesn't cause food shortage anymore.

Second, 100 or more years ago, the

transportation system wasn't sufficiently developed to transport large quantities of food grains from one part of the country to other. Now, with a well-developed rail and road system, that is possible. Therefore, drought doesn't cause food shortage and famine. Still, a drought does cause huge hardship to the rural people, as drought leads to loss of livelihood and they have to migrate to other places in search of work; the farm animals suffer from want of water and fodder; etc.

Most dams in India store water for use within the year, after the end of monsoons to next monsoons. Very few dams have storage, called carry over storage, sufficient to carry some water to the next hydrologic year. The protection from drought can come only from ground water. Large stocks of ground water have been created over many decades, even longer periods. If the use of ground water in a year is restricted to average annual recharge, the main stock will remain intact for use during a drought. Such use of ground water is called sustainable use. This is like, annual expenditure should be met from annual income. The long term savings should be used only for times of financial difficulty.

However, our use of ground water is far from sustainable. The annual utilization exceeds annual recharge, and the ground water levels are going down and down. Then, when there is a drought, in many places the wells also go dry. In 2016 water had to be supplied to Latur in Maharashtra, by railway tankers !!. Yet, additional area is brought under sugarcane and new sugar mills are established. The drought problem now is because of mismanagement of water, particularly the ground water.

I think that is sufficient analysis of floods and droughts. With that I come to the end of analysing the "quantity" aspect of the story of water. Next article will be on water quality. Degrading quality of water is as serious an issue as decreasing quantity. Now, the Covid threat almost seems to be behind us. Still, do follow the safety instructions by the Government, take care, and stay safe.



## A story of Pingori Village : A Atmanirbhar Happy

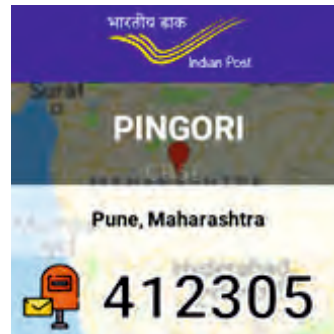
### village by Rotary - Cover Story

Rtn. PP. Ravindra P. Ulangwar (M) : 90 75 00 6509



Pingori is a small village situated in Sahyadri mountain ranges in Western Ghats with nature in bounty. It is 66 Km away from the Pune city in South-West direction. You have to travel via Hadapsar, Saswad and Jejuri to reach Pingori.

Pingori village has a glorious history. The fore fathers of the villagers were mainly soldiers of great Maratha warrior Mahadaji Shinde (founder of Shinde dynasty of Gwalior). Before Mahadaji also the Shinde ancestors were in army of Maratha emperor Chhatrapati Shahu Maharaj, a grandson of Chhatrapati Shivaji maharaj, a founder of Maratha swaraj. Wagheshwari devi is worshipped as kulswamini. The temple of Wagheshwari devi is built by Bapuji Vithoji Shinde in the year 1812 AD. Rainy season is the most beautiful one to visit Pingori. The Navratri and Dusharra festival is celebrated with lot of joy and happiness. This annual utsav is on Vaisakhi Shhudh Purnima.



Pingori Village is located in Rain shadow areas of Sahyadri Mountain Range. The annual rainfall is approx. 400 mm.

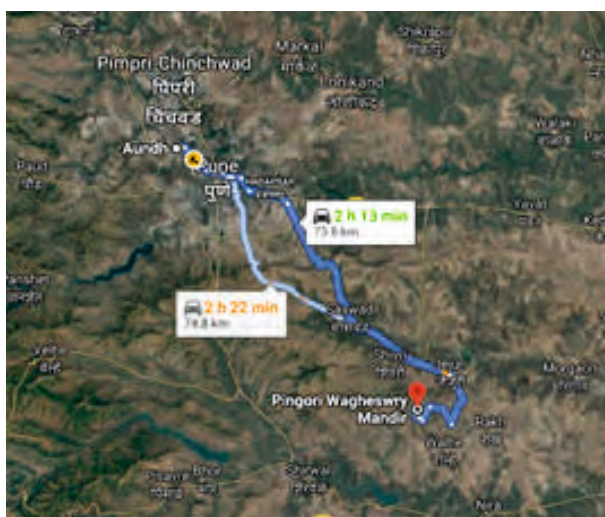


The Wagheshwari Mata temple and Amar Jawan Smarak

There is AMAR JAWAN SMARAK at PINGORI in honour of SHRI. SHANKAR SHINDE, SM of 18 GARHWAL INFRANTORY OF INDIAN ARMY, the only shahid of Kargil war in 1989 from Pune district.

#### The Pingori village before the Rotary :

There was acute shortage of water for drinking for human and animals in the summer. Generally there is acute shortage of water for Irrigation after the month of February every year. The wells and village odhas used to get dry due to low water table. Hardly one crop could be taken. There used to be no grazing grass for Cows and Buffalos adversely affecting the milk production in the village. There was no health facility for the villagers. The school had no computer facility to



teach the students. Students were required to walk long distance to come to school. Village also was lacked cleanliness and hygiene. The income of farmers were also very low as they could take only one crop in a year.

**The Pingori Village after the Rotary :**

The Rotary club Aundh in Pune adopted this village under the happy village programme of the Rotary. One of the member Rtn. Baba Shinde is belonging to this village.

In the year 2013-14 Rtn. Dr. Meenatai Borate from the Rotary Club of Hill side along with Rtn. Datta Deshkar ji from Rotary club of Aundh decided to reconstruct check dam on Darjibuwa cha Nala in Kuradwadi area which was in damaged condition. Under the leadership of Rtn. Dr. Datta ji Deshkar decided to take up the repair to revamp this Check dam. Dr. Meenatai Borate, Rotary Club of Aundh (Rtn. Pravin Lakhe, President) , Mahendra Yadav along with Pingori Gram panchayat raised the required funds of Rs. 5.5 Lakhs to complete this project. After the bandhara was rebuilt it stored almost 30 lakhs liters water in the very first rainy season. Due to this many wells in surrounding farms got recharged and water table in entire zone increased significantly. This helped farmers in surrounding areas to even take Rabi crop.



**The new check dam built by Rotary is being inaugurated**

In subsequent year Rotary club of Aundh implemented cleanliness drive and also mega Tree plantation drive. They even conducted the medical checkup camps for the villagers. Girl students in Wagheshwari School come from very long distance by walking which takes more time and efforts. Because of this many girls used to avoid attending school. Identifying this issue during the Rotary year 2014 -15 and 2015-16 under the leadership of

President Hemant Chaudhary and Rtn. Ravi Ulangwar RC Aundh conducted various projects like Tree plantation, Swachhta Abhiyan and donation of the bicycle to the girl students of the Wagheshwari School.

In the year 2015-16 during the tenure of President Deepak Toshniwal RC Aundh conducted mega tree plantation drive on the hill slopes on outskirts of Pingori village. This has helped to protect the erosion of top layers of soil during monsoon and also helping to charge the ground water table. This has also helped village to improve rains during monsoon season.



**Continuous Contour Trenches (CCT) on foot hills of Pingori**

During the RY 2016-17 Rtn. Dr. Meena Borate again encouraged the Rotary club of Aundh to take massive step to implement the first Global Grant project at Pingori Village bringing many clubs in RID 3131 together.

Under the leadership of Rotary Club Pune Hillside with other partner clubs i.e. Rotary Club of Pune Kothrud, Rotary Club of Mahad, RC Aundh came together for Global Grants to implement unique project for the construction of two huge Water storage tanks each of 4.0 Crs. liters and 2.5 Crs. liters capacity. Rtn. Dr. Meenatai Borate with help from her friend Rtn. Dr. Mansi Nadkarni (Originally from Pune) brought RC Muskatine, USA, RID 8000 as an international partner for this Global Grants. Rtn. Fora Diwanji was the first women President of RC Aundh during this year.

This project was implemented at the cost of Rs. 78 Lakhs. Janhit Patsanstha, a NGO also contributed huge sum of Rs. 17 Lakhs to complete this unique project. As there was very less rainfall and severe shortage of water even for drinking purpose there was dire need to develop

sustainable water source. During the construction of these water tanks very special treatment was given to bottom surface of the tank so that water wastage through seepage is prevented. The large volume of water was exerting huge pressure on bottom of tanks resulting into heavy leakage from bottom. Rtn. Umesh Naik from Rotary Club of Hill side used his expertise in water proofing field to make both these tanks water tight.

These water tanks proved to be lifeline of the village as it provided year long source for supply of drinking and irrigation water. This project immensely helped the farmers in the Pingori village as they could do farming even during Rabi seasons increasing their farm income.



**Two large farm level water tanks of 4 Crores Liters and 2.5 Crores liters capacity built by Rotary Clubs in RID 3131.**

During the same year Dagduseth Halwai Madal also supported Pingori village to carry out the desilting of the Ganesh Sagar Lake which helped to preserve lakhs of liters of rain water. These three big water projects provided the Pingori village good water storage capacity. Thus Pingori village became self-sufficient for water. The availability of sufficient water also helped to increase the agriculture activities significantly in the village.

Once water was available in village then there was need to use this water efficiently so that more and more villagers can be benefitted all around the year. So in the RY 2017-18 when Rtn. Baba Shinde took over as the president of the club. He again approached Rtn. Dr. Meenatai Borate. She connected Baba Shinde with Rtn. Sandesh Sawant from RCP Sports city. RCP Sport city and RC Aundh decided to jointly implement the Drip irrigation



**Jai Ganesh Lake rejuvenated with help from Dagduseth Halwai Ganapati Trust**

system for the farmers in synergy. The drip irrigation project was built under the Global Grant in 40 acres of farmland with Rotary Club of Fort Collins Breakfast (26298) from Colorado USA (RID 5440) was the international partner. This project benefitted many marginal farmers in village to grow vegetables and different Rabi crops. This has helped farmers to increase the income from agriculture.



**Drip Irrigation is completed in 40 Acres of Farmland under Global grants project**

During the same year RC Aundh also established computer lab with 10 desktop computers with internet facility at Wagheshwari School at Pingori. RC Aundh also provided necessary furniture and upgraded the lab with false ceiling with insulation so as to protect the computers from heat. This facility was created in the memory of Rtn. Subhash Saraf from the donation made by his family.



**Computer Lab installed under Happy School Project at Wagheshwari School by RC Aundh**



**ELA FOUNDATION for medical facility and bird century by Rotary Club of Pune West :** Dr. Satish Pande and Rotary Club of Pune West established Ela habitat for birds on eight acre at Pingori by saving of 30,000 liters of water every month. 250 Indigenous Trees and 48 species of Birds are preserved here. Other animals like Fox, Hyena and Chinkara among others come here to drink water. Specially designed bottle saucer dispensers are kept in tree shades for birds, squirrels and rodents. The spilled water from water dispensers for birds are absorbed by tree roots. This habitat has also established medical facility for villagers



In the year 2018-19 when Rtn. Dr. Prashant Khankhoje was the president of the club Rtn. Baba Shinde took one more novel initiative. Baba Shinde started the outlet at Amanora Park for the sale of Farm produce from the Pingori village. Amanora is one-of-the largest gated community in the Hadapsar area of Pune. This received very good response from the residents of Amanora Park as the vegetables and Fruits were fresh and also of very good quality. This provided the direct employment to few youths from the Pingori and also provided direct source of income to many farmers.



Ě Pingori Farm outlet at Amanora Park society

During the same time few Rotarians from RC Aundh also donated few cows to the female farmers in the Pingori villages under the project “Kamdhenu”. Rotarian donated the cows in the name of their daughters, mothers or wives.

In this year during March 2020 lockdown was announced due to Covid. This lockdown disturbed entire economic cycle and affected almost everyone. However the impact of lockdown to the Farmers in Pingori village was very high as their entire supply chain in the Pune city for supply of Vegetables, Milk and other farm produce were disturbed. They lost their source of income and everyone in village were worried. Considering this difficulties RC Aundh came forward and decided to help them by buying the vegetables and fruits directly from the farmers. To facilitate this RC Aundh formed whatts up group so that all the members can place their orders. Youth from the village used to deliver the Vegetables and Fruits twice in a week. Due to good quality and fresh produce this became very popular and many non - Rotarians also started buying from them. Slowly team started bringing tempo and displaying at Akashganga society in Aundh area twice a day. This service also became every popular as citizens could get high quality material at very reasonable cost at their door step.

During the RY.2020-21 Mukund Surkutwar was the president. RC Aundh conducted survey for starting the shop at Aundh so that customer can get fresh produce daily. RC Aundh discussed this idea in the club and invited their members to participate in this new initiative. Nine Rotarians from the club came together and helped to start the shop the name of Pingori Farms in Gaikwad Nagar in Aundh, one of the most prominent locality of Pune. Mr. Rohit Shinde from Pingori village was given responsibility to manage the shop. The idea was to support youth from Pingori to operate the store. Finally Pingori shop was inaugurated on 22nd November 2021. The motto of Pingori shop is your family Farmers.



**Pingori Farm outlet at Gaikwad Nagar, Aundh**



### **Pingori Farm Branding**

The team started selling Fresh Vegetables, Fruits, Grocery and Cereals from Pingori shop as well as providing home delivery to customers. The Pingori shop was equipped with all latest gadgets like POS system, Electronic Weighing Machines with in-built billing memo, all types of digital payments systems like GPAY, Debit and Credit Cards.

This initiative has resulted in all round growth for the Pingori village increasing the

farmers' income, employment generation for rural youth as few youngsters are employed in this venture. Self-help Mahila Bachat Gat from village are also benefitted as they are supplying homemade foods like Pappads, Sevai, Pickles, Chutnyes. Subsequently Pingori farm also started collecting and processing milk from farmers on daily basis to distribute in Pune city. The quality of this milk is very good as it is sourced from cows which graze medicine plants on hill slopes under direct sun lights. Now Pingori Ghee, Paneer and Dahi are also distributed through Pingori farm shop, which is also very popular in customers.



**Tasty and Fresh Pingori Milk from Mountain Cows gazing on hill slopes with Milk collection centre in the village.**



**Milk and various Groceries are sold under the Brand name of Pingori**

Looking at all round growth at Pingori village in the year 2019 then Hon. Chief Minister Shri. Devender Phadanvis visited the Pingori as village was ranked among the top in Pune district under the Jal Yukta Shivar Yojna.





**Pingori Farms mobile shop at various societies in Aundh**



**Water Tanks installed for Drinking Water and Toilets at Wagheshwari School at Pingori**



**Adarsh Gram Purskar under Jalyukt Shivar Yojna by Hon. CM Devendra Fadnis**

Recently under the leadership of present President Bhavanś Ulangwar Rotary Club of Aundh donated the Water tanks for Drinking water and for toilets for Wagheshwari school at Pingori. This will fulfill the basic needs of drinking and water for toilets mainly for the girl students. Rotaract Club of Aundh also donated the bicycles to the girl students who come from far away distances.

It is said that India lives in her villages and true development caŪ only hšppen when every village is developed. Example like Pingori can help to make every farmer Atmanirbhar and there by every village Atmanirbhar. Happy village programme of Rotary International has power and capacity to transform every village in to Atmanirbhar Village fulfilling the vision of our beloved Prime Minister of making Atmanirbhar Bharat.

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..... from page no : 31

Stopping pollution is the only solution  
Rivers and oceans and lakes all around  
Just Vearch one of them and trash can be ūund  
Water gets worse as time ūasses on,  
Just keep on polluting and your drinks will be gone.

TUat one little bag Does'nt seem like a lot,  
But it all adds up into one giant pot.  
Toxins release into fast running waters,  
It enters the oceans and hurts all the otters.  
The water gets murky, it's dangerous to drink,  
Look at the water that comes out of your sink.

Health is affectedĭn hazardous zonesH  
Creatures are left in nothing but bones.  
Water won't clear till we take good care,  
Keep the Earth healthy, it won't kill you, I swear.

Recycle that bottle, pick up that old can,  
If Ūe all work together It could be a good plan.



**Rotary Club of Aundh team at Jai Ganesh Lake @ Pingori**

Pingori Farm is the wonderful example of happy village in the Rotary worŪ. It aŪo demonstrates that how complete transformation of village can be achieved with the consistent and sustained efforts by Rotary Club with support from villagers.

**Water Quality by kbear 1995**



# Aao Nadi Ko Jaane - Report 03

**Shri Vinod Bodhankar**

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In the previous 2 articles, I had posted the context of studying the Sustainable Development in a River Basin and how myself, Narendra Chugh and the Late Dr Sandeep Joshi had spent some time and effort in creating a Citizen's Paper. For all of us at Indian Peninsular River Basins Council and Indian Himalayan River Basins Council the Citizen's paper becomes a preliminary document to refer to. It is understood that each river has a complex geo-cultural, industrial-agricultural, political and socio-economic matrix in which the local people alone can evolve custom made dynamic models of mutually supportive human-river relationships.

From -

## **Citizens Paper on Concepts of Sustainable Development in River Basin**

By (Late) Sandeep Joshi, Vinod Bodhankar, Narendra Chugh

### **The Index -**

1. River Catchment Area Approach (The last article was a presenting of this content of Section no.1)

In this volume of ħ-magazine JALASAMVAAD wħ are presenting Sections no.2 and no.3 of the content of the 'Citizen's Paper on Concepts of Sustainable Development in River Basin'.

2. Removal & Prevention of Encroachment (In this article)

3. Controlling the Pollution of the Lakes and Rivers of India (In this article)

Sections no.4 and no.5 are reserved for the next e-magazine volume.

4. Maintaining Ground Water Balance

5. River Culture and Society

## **2. Removal and Prevention of Encroachment**

### **Present Condition**

Liberalization, rapid urbanization and modernization of cities compelling the population and industries to encroach upon natural expanse of streams, rivers and lakes which should have been normally reserved as "Protected Green River Zones" or "Protected Green Lake Zones"

### **Examples of encroachments on streams, rivers, lakes, and other water bodies**

Dam on Bhagirathi, Ganga Expressway in UP, Commonwealth games village on Yamuna in Delhi and Taj Corridor on Yamuna in Agra, Roads within river bed in Mula-Mutha Pune, Sand mining in Bhima River, Siddhatek to Narsimhapur, Constructions in Mushi river of Hyderabad, Construction of wall, airport, Bandra Kurla Complex on Mithi River of Mumbai, Sabarmati in Ahmedabad, solid waste dumping on Panzara river banks by corporation in Dhule. Such encroachments are found seriously disturbing the flow, health and ecology of all rivers and lakes in all Metros and cities, so much so that not a single



Encroachment along bank choking Mutha

urban nallah escapes the encroachments. Religious trusts have been found encroaching river lands thereby setting wrong precedents before the citizens and seriously weakening encroachment removal policies and laws in our secular nation.

### Issues

- Total failure of existing polity, policies and administrative set up created to check, prevent and remove the encroachments.
- Current “development-without-conscience” model based on government – industry nexus has resulted in relentless encroachments on lands naturally owned by rivers. Legal validation thus granted to unconstitutional encroachments is serving the interests of land grab mafia eg. Mushrooming of SEZs on rivers and coastal areas, unbridled mining in hills in river catchment, ruthless ecosystem damaging sand mining in riverbeds.
- Neglecting and failure by urban local bodies, corporations, municipal councils, and state governments in seriously implementing policies, laws and development plans with respect to anti-encroachments measures.
- Selective implementation of anti-encroachment instruments to blatantly serve partisan interests thereby catering to establishment-landgrab mafia nexus and political interests.
- Inappropriate existing city and regional plans are unable to protect lands naturally belonging to streams, rivers and lakes from encroachments.
- Not only encroachment on riverbeds, and banks, but also ruthless destruction of forest tree cover results in heavy erosion and siltation in the rivers and dams thereby seriously compromising the carrying capacity of river and hydraulic volume of the dam. This is “hydro-ecological-encroachment” without accountability and with continued incremental ecological and financial losses.



- Encroachment on flood plains of streams and rivers and basins of ponds & lakes by governments and industries has resulted massive changes in cities watershed.
- Severe impairment of ground water recharging processes due to encroachment, which inhibit percolation of water through soil layers by paving, cementing, roads etc. e.g. Pushkar Lake.
- No honest efforts and support from government to the public initiatives against encroachments and conscientious anti-encroachment officers.
- Poor and marginalized communities are displaced from their ancestral lands and deprived of traditional occupations. The record and performance of their resettlement and rehabilitation is abysmal.

### What is needed?

- Demarcation maps of lands naturally belonging to rivers and lakes shall be maps in the public domain bearing the sanctity, uniqueness and inviolability of our national map having universal acceptance and respect.
- Nationwide, state wise and region wise demarcation of all streams, rivers and lakes and all other inland water bodies using modern indigenous technologies and human resources with public participation for definitive mapping uniformly shared across every related ministry, departments, planning divisions, media and citizens’ societies.
- Continued compilation, verification, and documentation of information about encroachments. The lands belonging to rivers and

other water bodies shall be notified and declared as “Protected Green River Zones” and “Protected Water Body (Streams, Lakes, Estuarine, Coastal, Wetland) Zones”. River Zone protection policies must be developed on the lines of sensitivity and seriousness involved in defining reserved forest protection policies.

- Restructuring of Development Plans incorporating concepts of reservation of lands for “Protected Green River Zones” and “Waste Management” in every sector like rural, urban, industrial, agricultural, etc considering impacts of encroachments on lands belonging to stream or river or lake
- Efficient administrative and techno-professional institutional mechanism to prevent and comprehensively remove the encroachments from the notified protected river and water body with time bound implementation programme
- Review and modify existing policies, definitions, laws, rules, regulations and guidelines for anti-encroachment measures with inputs from all affected stakeholders especially the women and poor, marginalized populations
- The central, state and local governments shall extend massive support and empowerment of the administrative personnel deputed for the task of preventing and removal of encroachments of river lands.
- Personnel discharging the duties of removal of encroachments shall be publicly recognized and rewarded.
- Responsibility and accountability of existing state and local self governments in time bound implementation of prevention and removal of encroachments of lands belongings to streams, rivers and lakes
- Strengthening of auditing system for evaluation of implementation of anti-encroachment measures by ensuring involvement of societal wisdom and people’s participation
- Local factors affecting the health of river and water body lands unique to an area and identified by societal wisdom and local population must also be considered under the anti-

encroachment laws and rules.

- Encroachment of notified and protected lands belonging to streams, rivers and lakes shall be treated as criminal offence. Anti-encroachment laws, rules and regulations shall be framed and modified to include provisions to prosecute the encroacher as criminal attracting non-bail able warrants.

#### **Solutions to prevent Encroachment of lands belonging to streams, rivers, lakes and other water bodies**

- Definitive demarcation of river lands in the unique comprehensive map must be represented distinctly and visibly on the ground on the both banks of the river through embedded colour coded RCC markers with details of nature and measurements of the river land boundary. The general population must be thoroughly educated and alerted to the significance of above RCC markers as people’s resource to immediately report encroachment upon protected river lands.
- Evolution of stringent legal instruments to empower and protect, from land grab mafias, anti-encroachment programme and personnel, entrusted with the field duties for identification and removal of encroachments on the lands belonging to the rivers.

#### **Action Plan**

- Review and upgradation, if needed, of existing anti-encroachment laws, rules and regulations with definitive time bound programme in consultation with local and affected population
- Hierarchical distribution of responsibilities (identified, allocated and notified for immediate action) to protect the lands of streams, rivers and lakes
- Punitive measures for the agency or department failing to take action against encroachment on stream, river or lake lands
- Record keeping, regular auditing of record keeping by social groups working on anti-encroachment issues
- Demarcation of stream, river and lake lands on ground with visible colour coded RCC markers with scheduled patrolling by anti-



encroachment personnel under strict instructions to alert instantly with core groups of local people and concerned government department

- Orientation, sensitization, and field training for capacity building of all personnel from all types of local self governments, MLAs, MLCs and MPs (LS & RS), Self Help Groups to protect the lands of streams, rivers and lakes
- Quarterly compulsory public hearing on the subject of encroachments to be conducted by people's representatives in presence of local and affected populations, NGOs, Print and Cable Media and concerned department/(s)
- Involvement of educational institutes and religious trusts as watchdog and sensitizers for protecting the lands of streams, rivers, and lakes

### 3. Controlling the Pollution of Rivers and Lakes of India

#### Present Condition

14 major river basins total population more than 100 crores provided with 24% sewerage facility (Class I cities) and class – II do not have sewerage at all. There are plans on the anvil and only a few have taken off.

#### Examples of severe river and lake pollution

Mula-Mutha in Pune, Musi in Hyderabad, Yamuna in Delhi, Agra, Ganga in Haridwar, Kanpur, Varanasi etc., Waldhuni in Kalyan, Mithi in Mumbai, Hussensagar and other 169 lakes in Hyderabad, Anasagar in Ajmer, Pushkar, Ujjani Reservoir, Umiam lake in Shillong etc.

#### Issues

- Total failure of existing policies and infrastructure created for pollution control
- Neglecting and failure by urban local bodies- corporations & municipal councils in providing clean water supplies.
- Failure of urban local bodies in collection, conveyance, treatment of wastewaters generated in their notified areas.



#### Pollution at Siddheshwar Ghat, Mutha River, Pune

- Inappropriate existing standards for waste discharges have completely failed to curb the pollution of streams, rivers and lakes
  - Poor implementation of pollution control laws in urban and industrial sectors
  - Not only wastewaters but also solid wastes are disposed off near or in the water bodies.
  - Encroachment on flood plains of streams and rivers and basins of ponds & lakes by governments and industries has resulted massive changes in cities watershed.
  - Severe pollution of ground water near polluted rivers & lakes.
  - No honest efforts and support from government in developing and implementing indigenous technologies to revitalize and rejuvenate water resources.
  - Poor communities are deprived of livelihood and exposed to various diseases due to chemical and biological pollution especially down stream of the cities.
- What is needed?**
- Nationwide, statewide and regionwise compilation, verification, documentation of information about quality and quantity of India's surface waters—streams, rivers and lakes
  - Restructuring of Development Plans incorporating concepts of reservation of lands for "Protected Green River Zones" and "Waste Management" in every sector like rural, urban, industrial, agricultural, etc considering environmental pollution impacts of development on stream or river or lake
  - Efficient administrative and techno-

professional institutional mechanism to control and treat the discharges from the industries, agriculture and urban areas to achieve zero pollution discharge target

- Review and modify existing standards considering the ecological quality of streams, rivers and lakes and its impacts on human health and livelihood
- Massive support by the central, state and local governments in developing indigenous decentralized, community driven, water & wastewater technologies
- Initiatives by state and local self governments in maintaining the quality of rivers and lakes
- Strengthening of auditing system in water use & wastewater treatment sectors with societal wisdom and people's participation
- People's active and effective participation especially the women in decision making for allocation of water for use and controlling of waste discharges

**Solutions to prevent pollution of rivers, lakes and ground waters**

- Sewage treatment should be based on indigenously developed ecological restoration principles to reduce the ineffective functioning due to frequent electricity failures and machinery breakdowns
- Decentralized application of eco-technologies, ecological engineering to treat the pollution at the source only
- Every stream, river and lake shall have an institution with people's participation to monitor the functioning of treatment systems focusing quality watch, ecological health, pollution treatment and human health.
- Appropriate budgetary allocations for water and wastewater management to achieve zero pollution discharge into streams, rivers and lakes
- Polluting of streams, rivers and lakes should be treated as a non-bailable criminal offence

**Action Plan**

- Lakes and Rivers Remediation Authority with pollution treatment experts and community participation
- Water discharge quality monitoring and auditing shall be done regularly by the independent unbiased experts
- Increase in People's participation in Segregation at Source and in Recollection and Recycling programs that involves tens of thousands of people in service to their River health.



- Remediation and Restoration River Authority should be equipped with monitoring laboratory sufficiently manned with scientific and technically competent personnel empowered with to take any action to restore purity and sanctity of streams, rivers and lakes.
- Financial support for correcting the ecological quality index of water bodies
- Sustainable Management Plan of lakes and rivers for next 50 years

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## Jeevitnadi : Activities in the month February, 22

Smt. Shubha Kulkarni

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Jeevitnadi is based in Pune and works for the rejuvenation of rivers along with citizen participation. In the last month, we undertook the following activities.

- We conducted an intensive 2 day Training the trainers workshop of Toxin Free living for 22 people. The idea being, to train new Trainers who would take the baton forward and spread the knowledge of Toxin free living in the society at large. The session covered Introduction to toxins in everyday life, Economics behind toxins, Guest speakers who spoke on topics of sustainable living and Life cycle analysis of products.



- In our Adopt a Stretch location of Ram Mula confluence (Aundh, Pune), we release a newsletter every month called 'Know your stretch', which explains in simple language one species found in that physical location. This month we featured 'Common Mormon' and 'Tawny Coster', two from the butterfly family.



- Jeevitnadi won 2 awards in the Swachh Sarvekshan 2022 competition conducted by Pune Municipal Corporation. We were awarded the third prize in both Street Play and Murals category. The

competition in the respective categories, was for spreading awareness through citizen participation. Our art installation done through coconut shells won the prize in the murals category and the play done on solid waste management won in the category of street play.



- In our Aundh stretch ( Rajiv Gandhi Bridge, Aundh ghat), in the month of February, we had a plantation drive. Fence was made from the debris stones thrown nearby. The team planted Shindi, Ghaypat, Mehendi and Nirgudi plants. A team of Rotarians who were there for watering that Saturday helped in the plantation drive. Another Saturday 2 corporate teams from KPIT and Concentrix joined the stretch volunteers for cleaning and watering.





- An experiential school in Mundhwa area of Pune, reached out to us to collaborate and work together with their kids. After couple of zoom calls, we finally met the teachers, saw the school and interacted actively with the kids ranging from age group 8 to 16 years. The discussion ended in the kids wanting more and us inviting them over for a Nature walk that we take in our Ramnadi Mula stretch. 20 of them came for an entertaining and enlightening walk by the riparian zone of Mula river. The school has decided to adopt a stretch of the river nearer to their school and work towards its rejuvenation.



- We also had a group of 45 students from Symbiosis school of economics, who did the Nature walk with us. It was an interesting group who were asked to look at the river, nature around her in a very different framework from what they usually do. The toxins released into the sewage treatment plant triggered a big discussion on Economics Vs Environment.



- Like we have the Nature walk on the banks of Mula river, we also have the River walk we conduct on the banks of Mutha river. This walk takes you through the main city of Pune and talks about culture, history and ecology all meshed into one. In the last month we had 3 walks both in the virtual and physical format, reaching out to around 100+ people.

- Our regular cleanup activities continued at the stretches where our volunteers continued to spend the dedicated one hour a week for our rivers!



- Pune Municipal Corporation is coming up with the new River Front Development (RFD) project which is aimed at creating a facelift for a 44 km stretch along both the Mula and Mutha rivers. After studying the plan and understanding the aspects that can go wrong in this project, we have gotten all the environmental agencies of the city together and begun our opposition to the project. We are requesting all concerned river well wishers to join in our movement.

For more information on the campaign against the RFD or to participate in the campaign, please click on the following links:

<https://linktr.ee/RFDHataoPuneBachao> (All information about RFD & the campaign)

<https://puneriverrevival.wordpress.com/> (link to mail officials about RFD)

<https://t.me/+zzibYc0vXxo3MzBI> (to join the Telegram group)

To know more about us: [www.jeevitnadi.org](http://www.jeevitnadi.org)  
Shubha, for Jeevitnadi

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## PERMANENT SOLUTION FOR SALINE TRACT OF

VIDARBHA REGION IN MAHARASHTRA,INDIA - Part 2

(ANGIOPLASTY OF STREAMS)

Suresh Khanapurkar, (M) : 9822363639



TOTAL NO OF CNB IN SALINE TRACT OF AMRAVATI,AKOLA AND BULDHANA  
DIST AND APPROXIMATE COST IN CRORES

DIST	TOTAL AREA OF SALINE TRACT IN SQ.KM.	TOTAL AREA OF SALINE TRACT IN Ha	NO OF CNB TO BE CONSTRUCTED CONSIDERING ONE CNB FOR 5 SQ.KM.	APPROXIMATE COST OF EACH CNBIN CRORES INCLUDING DEEPENING & WIDENING	TOTAL COST IN CRORES
AMRAVATI	1670	167000	334	1.5	501
AKOLA	1902	190200	380	1.5	570
BULDHANA	973	97300	195	1.5	293
TOTAL	4545	454500	909	1.5	1364

B.C.RATIO OF SHIRPUR PATTERN PROJECT IN SALINE TRACT OF VIDARBHA

DIST	TOTAL AREA OF SALINE TRACT IN SQ.KM.	TOTAL AREA OF SALINE TRACT IN Ha	GEOLOGICAL FORMATION	NO OF CNB TO BE CONSTRUCTED	CAPACITY OF CNB IN TCM	GROUND WATER STORAGE INCREASED DUE TO SINGLE CNB IN TCM	TOTAL STORAGE BY ONE CNB IN TCM	TOTAL STORAGE BY ALL CNB IN TCM
Amravati	1670	167000	Purna Alluvium, Saline Tract	334	450	1200	1650	551100
Akola	1902	190200	Purna Alluvium, Saline Tract	380	450	1200	1650	627000
Buldhana	973	97300	Purna Alluvium, Saline Tract	195	450	1200	1650	321750
	4545	454500		909				1499850

**B.C.RATIO OF SHIRPUR PATTERN PROJECT IN SALINE TRACT OF VIDARBHA**

Dist	Additional Area to be Brought under irrigation @ 5 TCM / HA	Incremental Annual Income due to Assured irrigation @ 0.015 Crore (Rs. in Crore / ha/yr)	Approximate cost of Each CNB in crores including Deepening & Widening	Total Cost of All SNB in Crores including Deepening & Widening	Life of Structure in years	Annual Investment for Construction including Deepening & Widening (Rs. in Crores)	Benefit Cost Ratio
Amravati	110220	1653.30	1.5	501	30	16.70	99.00
Akola	125400	1881.00	1.5	570	30	19.00	99.00
Buldhana	64350	965.25	1.5	293	30	9.77	99.80
	299970	4499.55	1.5	1364	30	45.47	98.95

**B.C.RATIO OF SHIRPUR PATTERN PROJECT IN SALINE TRACT OF VIDARBHA ASSUMING NO PERCOLATION**

Dist	Total area of saline tract in sq.km	Total area of saline tract in Ha	Geological formation	No of CNB to be Constructed	Capacity of CNB in TCM	Ground Water storage increased due to single CNB in TCM	Total storage by one CNB in TCM	Total storage by all CNB in TCM
Amravati	1670	167000	Purna Alluvium, Saline Tract	334	450	0.00	450	150300
Akola	1902	190200	Purna Alluvium, Saline Tract	380	450	0.00	450	171000
Buldhana	973	97300	Purna Alluvium, Saline Tract	195	450	0.00	450	87750
	4545	454500		909				409050

Dist	Additional Area to be Brought under irrigation (ha) @ 5 TMC / Ha	Incremental Annual Income Due or Assured Irrigation @ 0.015Crore (Rs. in Crore /ha/yr)	Approximate Cost of each CNB in crores including Deepening & Widening	Total Cost of all CNB in crores including deepening & widening	Life of structure in years	Annual investment for construction including deepening & Widening (Cr)	Benefit cost Ratio
Amravati	30060	459.90	1.5	501	30	16.70	27.54
Akola	34200	513.00	1.5	570	30	19.00	27.00
Buldhana	17550	263.25	1.5	293	30	9.77	26.95
	81810	1227.15	1.5	1364	30	45.47	26.99



## RESULT OF THE PROJECT

Same type of work with same dimension of deepening and widening is carried out in Tapi Alluvium of Khandesh area, which is without saline tract by Shri Amrishbhai Patel M.L.C. from Shirpur since 2004. In 10 villages in Tapi Alluvium 40 CNB are constructed with deepening upto 15 metres and widening upto 30 metres. Results are promising. Water levels of the tubewells has risen from 100 metre to 20 metre. Today in Shirpur taluka of Dhule dist. Irrigation % is 80 in the project area. If all these 940 CNB completed with the deepening and widening as suggested rain water, which is sweet water will not percolate below 15 metre and 14 lakh population from 894 villages will get sweet water to drink in ample quantity. Ground water will be available within 15 metres from ground level. About 1551000 TCM i.e. 54.77 TMC SWEET WATER WILL BE CONSERVED BY THIS PROJECT. Near about 299970 Ha land will get sufficient sweet water for irrigation throughout the year irrespective of less rainfall.

## B.C. RATIO OF THE PROJECT

Assuming that water arrested in 940 CNB will percolate in sand aquifer then this water will irrigate 299970 Ha irrigation increasing annual income by 4499.55 crores Rs. Considering the total cost of the project to the tune of 1364 crores and the life of the structures 30 years the Annual Investment comes to the tune of 45.50 crores. then B.C. Ratio comes to 99. In worst condition suppose there is Zero percolation in that case also B.C. Ratio comes to 27. This is described in details in above statement.

## NEED OF THE PILOT PROJECT

To convince the concerned people it is necessary to implement a Pilot Project in the Saline Tract of Akola dist. by the Govt of Maharashtra. The probable cost of the PILOT PROJECT is about Rs. 1.5 Crore. I suggest that govt should give a special grant of Rs. 1.5 Crore to Commissioner Amravati. A Three Member Committee comprising Commissioner Amravati, Collector Akola and Suresh Khanapurkar, Hydrogeologist should be constituted. All technical powers should be given to this committee. The

Committee will complete this work as per the technical guidelines given in this Project Report. Such committee comprising Commissioner Aurangabad, Collector Jalna and Suresh Khanapurkar, Hydrogeologist was formed by Govt. of Maharashtra when a special grant of Rs 8 Crores was sanctioned to construct 8 Check Dams on Kundalika river to remove the scarcity of Jalna city in 2012. That work was successfully completed.

## ATTRIBUTES OF THE PROJECT

- No Land Acquisition, No Rehabilitation, No Migration. No canals required. Sand Aquifer below ground will act as canal.
- Main problem of saline water will be solved and sweet water will be available to 20 lakh rural population. 310200 Ha land in 894 villages in Saline Tract will be irrigated perennially.
- Flood will be controlled.
- No scarcity even there is no rain for one year. Water tanker will not be required.
- Irrigation % will rise up to 66 %
- Village and farm roads will be completed out of excavated material from the CNB.

## CONCLUSION

- Considering the geological formation and multiaquifer system, the area appears as feasible for artificial ground recharge by constructing series of Cement Nala Bandhs and deepening of upstream side upto 15 meters and widening upto 30 metres. The length of deepening and widening should be about one km. in length. in the streambed.
- Artificial ground water recharge to the extent of highest runoff during flood will keep the water levels stable even during the drought.
- Hydrostatic pressure of 15 meter water column standing against the sand aquifer will augment ground water recharge process even during post monsoon period.

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## Organization- ASSAR

Organization- ASSAR Adaption at Scale in Semi Arid Region

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Home of hundreds of millions of people in the semi-arid region of Africa and Asia are vulnerable to climate related impact and risk. People in this area may further suffer from high levels of poverty, inequality. These problems are likely to increase in the coming decades. Therefore it is essential to understand what facilitates the empowerment of people, local organizations and governments to adapt to climate change that minimize vulnerability and promotes long term resilience. Philosophy and research objective of ASSAR is to use insights from multiple scale, interdisciplinary work to improve the understanding of the barriers, enablers and limits to effective, sustained and widespread adaption in semi arid region by 2030.

Procedure adopted to achieve objective by 2030, ASSAR laid down steps to be followed. And they are.

- 1) Undertake high quality, innovative, transdisciplinary research to generate new stakeholder and adaption to climate change in SAR's (Semi-arid regions).
- 2) Develop strategies for adaption that inform and influence key stakeholders.
- 3) Create innovative communication approach for effective knowledge sharing on climate change adaption in SAR's.
- 4) Enable total capacity strengthening for adaption in SAR's in research, policy and practice.
- 5) Ensure that ASSAR research is used during policies shaping and practice that enable vulnerable population and sector to adapt climate change.

ASSAR works in a coordinated manner across seven countries in India, East Africa, West

Africa and South Africa. Countries are India, Ethiopia, Ghana, Kenya, Mali, and Namibia.



Focal research themes in each region are,

- West Asia – Agro intensification
- East and south Africa- Land water access.
- India- land use, land cover and livelihood.

ASSAR having a team consisting of project management team, regional team in East Africa, South Africa, West Africa, South Asia and a cross regional team. ASSAR program works in semi-arid region with focus on six countries in Africa (Mali, Ghana, Ethiopia, Kenya, Namibia and Botswana) and three states in India ( Karnataka, Maharashtra and Tamil Nadu). People living in this area face complex challenges including high level of poverty, inadequate natural resources and food insecurity. Most depend on agriculture and livestock farming as their primary source of food and income. These primary sources are at risk due to impacts of climate change, changes in timing of rainfall, lengthier droughts and more from frequent floods. Team of ASSAR study these vulnerability as well as factors and conditions that enable effective adaption.

Countries where ASSAR works are in the most vulnerable areas in the world and they rank in the bottom 70 in the world for the vulnerability of their food, water, health, ecosystem, human habitat and infrastructure sector. As per 2014 data, ranking of following countries among 180 countries surveyed,

Country	Position
Botswana	110/180
India	115/180
Ghana	126/180
Namibia	127/180
Ethiopia	146/180
Kenya	148/180
Mali	174/180

ASSAR's programs,

- Understanding and promoting climate change adaptation in semi-arid regions.
- Advancing local and regional climate change knowledge for informal decision making.
- Increasing the capacity of developing countries scientists to access and use satellite data.
- Advancing knowledge on climate change and adaptation in South-East Asia.
- Improving access to resources and quality of life in urban areas.
- Building leadership for disaster and leadership for disaster risk reduction in Asia-pacific.
- Advancing knowledge on climate change and adaptation in South-East Asia.

Five years experience( 2014-2018) enable ASSAR to develop a unique and systematic understanding of the process and factors that

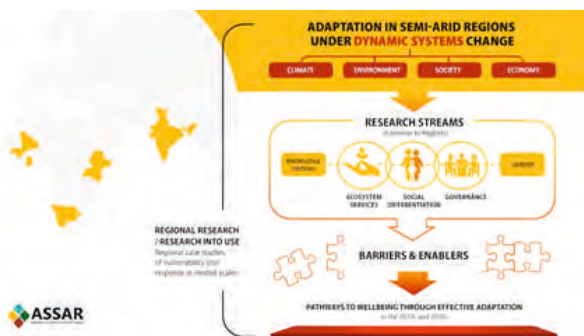
hamper adaptation and cause vulnerability to persist.

There are two things to know, first what is semi-arid region and second Why ASSAR focus on semi-arid region? Answer to the first is, semi-arid regions are areas that lose slightly more water through evaporation than they gain through precipitation. Answer to second why ASSAR focus on semi-arid region. As the global impacts of climate change become more understood so it needs for people to respond effectively and become accustomed to these changes. Home of hundreds of millions of people in the semi-arid region of Africa and Asia are vulnerable to climate related impact and risk. People here may further suffer from high level of poverty, inequality and rapidly changing socioeconomic order. Therefore to understand what facilitates the empowerment of people, local organization and government to get used to climate change which minimizes vulnerability and promotes long term resilience. To ensure that project case study are aligned with the need and realities of the people living and working in semi-arid region ASSAR seeks to build meaningful and long lasting relationship with stakeholders from communities, civil society organizations, research institute, government and NGOs.

The University of Cape Town is working with ASSAR in Southern, West and East Africa as well as in India to investigate how to adapt to climate change in semi-arid region. They have identified four types of changes to mitigate water scarcity and can help increase water supply, improve efficiency and reduce water use. These are,

- To introduce new technologies or practices for reuse of wastewater.
- Installation of more rainwater tanks at peoples home.
- Changing the way water is governed.
- Changing social value and attitudes.

Water needs to be secured for use in agriculture and by the residents of towns and cities. As rainfall declines and water demand from growing population increases available water is becoming more limited. This needs new



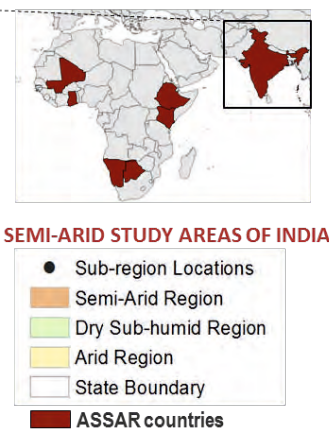
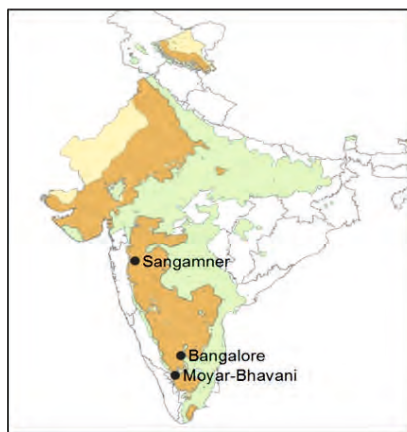


technology and practice to meet water scarcity says ASSAR. Desalinizing of seawater is one technology that can help to bridge gap. A plant in South Africa cost UD\$ 21 million providing 10 million liter of water daily but it requires lot of energy. Wastewater to potable water is another method which produces 21 million liters. To improve availability of water it is important to use practice which reduces demand, increases availability and increases efficient use of water. Rain water harvesting has the potential to reduce water demand by over 20 percent. In Bermuda all houses are built with rainwater storage. As per ASSAR better seasonal forecasting and early warning information can play for water scare times. In India information like crop calendar and mobile apps, incorporating local knowledge have improved forecasting. Similarly trees like eucalyptus grow in water catchment area use huge amount of water, there removal can increase water availability in catchment area. Enforcement of water restriction rules by local authorities also matters , like penalize excessive water users, praising water savers etc..

ASSAR about India – Though India shown remarkable economic growth in last two decades, country still faces sluggish

risk make people in these regions highly vulnerable. Within India ASSAR worked in Bangalore in Karnataka, Sangamner in Maharashtra and Moyar Bhavani of Tamil Nadu.

Climate change is affecting people’s wellbeing’s in India. Rural India is reeling under misery due to drought. Rain fed region of country also has high level of poverty, small farm size and low agriculture productivity. High temperature and high rate of evaporation also affects agriculture productivity. So food insecurity becomes another problem. With agriculture no more profitable farmers diversified themselves into non-farm



labour or migrated. As per census there is significant drop of cultivators and rise in agriculture labours. A team of ASSAR visited water scarce district of Kolar in Karnataka known for erratic rainfall patter. People in this village talked about shrinking water level, drying bore wells, lower soil fertility. More and more village youth are choosing non-agriculture occupations and migrating to urban areas for work. This is becoming a pattern in semi-arid India.

agriculture growth, rising regional and sub-regional inequality, unemployment. Semi-arid region of India faces a climatic and non-climatic risks. These

Impact of climate change affects India’s urban also but here problems are more due to unplanned urbanization and poverty. Frequent incidences of extreme rainfall

events in Chennai, Srinagar and Haridwar and other cities have exposed the vulnerability of cities to climate change. People have to face these hazards in different ways. Flooding associated with heavy rainfall leads to greater incidence of water borne diseases. Affected group of people are urban poor who have limited health care units and limited means to pay for medical treatment. ASSAR India is doing intensive work in urban and rural areas towards improvement of people's wellbeing in climate change scenario.

ASSAR focus on Maharashtra –The area of Maharashtra also faces serious institutional and governance challenges in addition to rural urban migration. These challenges are amplified by climatic variability. Maharashtra's main challenges are related to groundwater availability and management. The state is mostly semi-arid region and a quarter of India's drought prone districts. More than 30% of state suffers from scanty and erratic rainfall. Over exploitation of ground water has led to falling water levels which put pressure on sustainability of agriculture economics. Maharashtra government initiated 'Maharashtra Groundwater Development and Management bill 2009' to regulate groundwater. The bill prohibits drilling of deep wells and also puts restrictions on withdrawal of water from existing deep wells. It is also mentioned in the bill that tubewell owner and contractors should be registered and contractor should obtained permission before drilling tubewell. But implementation of rule is again a problem.

The Watershed Organization Trust a NGO is actively working with communities in Maharashtra from last 25 years in the area of natural resources management, watershed development and climate change adaptation. Research team of ASSAR and WOTR worked with number of stakeholders, farmers, village level elected representatives, state and district level government organizations to develop strategies to strengthen & help farmers and rural households against climate risk. They also worked for strengthening local level water management and groundwater management group.

ASSAR worked across four districts in Maharashtra, Mula- Pravara is one of them of Ahmednagar district. Between 1991 and 2016 Mula- Pravara has seen increase in land used for agriculture and horticulture by about 98% to 160% respectively. These changes are due to increase access to groundwater, irrigation projects and watershed development program. To talk about Sangamner this area's, major block of the region falls into "overexploited" due to increased dependence on groundwater. Over dependence on groundwater could have serious implications on agriculture sustainability. ASSAR recommends

1) State government needs groundwater management by implementing it's Act-2009 of Groundwater Development and Management as a step towards groundwater governance and reduction in subsidies which leads to groundwater overexploitation.

2) Irrigation practices like flood irrigation should be reduced and water intensive crops such as sugarcane and sweet lime should be avoided.

3) Generate knowledge about groundwater status at the local level create awareness among different stakeholders. Etc.



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Impact of climate change is widely elaborated by ASSAR as shown in following table,

CLIMATE CHANGE IMPACT	RESULTING VULNERABILITIES
Crop failure, lower food production Fuel shortage Shortage of safe, clean water	Reduced food and nutritional provision food-fuel conflicts, impact on food consumption, and nutrition levels Household water provision, drudgery in collecting water over long distances, exposure to contaminated sources
Resource insecurity	Economic drawbacks, erosion of natural resource-dependent livelihoods, pressure on time to diversify livelihoods, school dropouts
Extreme events and disasters (water-logging, floods, drought)	Greater incidence of mortality and morbidity, reduction in life expectancy, longer walks to get water and fuel, loss of fodder and livestock, drought leading to harder soil for manual work
Higher temperatures	Lower milk production, increased effort to work in fields, longer working hours (women wake up early because afternoons are too hot to work)
Higher rainfall Species loss	More weeding required, less fodder fuelwood available, Some medicinal herbs and fodder unavailable or difficult to find
Health and disease	Lack of access to healthcare, increased burden of caring for young, sick and elderly, malnutrition, limited healthcare options for pregnant women
Distress migration	Loss of livelihoods, lack of adequate shelter, conflicts, more workload on women when men migrate, reduced social capital if moving to urban centers for work

There are five organizations which leads ASSAR and they are 1) University of Cape Town, 2) University of Anglia, 3) OXFAM, 4) START and 5) iihs ( Indian Institute for Human Settlements. Twelve organizations are partner of ASSAR. As far as India is concern there are four organizations which are associated with ASSAR , WOTR is one of them whose head quarter is at Pune.

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Bangalore ASSAR team



## Let's find the solution and stop this water pollution

Miss Shruti Phate

(Essay submitted for competition)



Many major cities around the world have their origins on river banks, so rivers play an important role in shaping their development (civilization developed on banks), The Mutha river begins in the Western Ghats in the village of Vegare and flows eastward until it meets the Mula River in Pune city. The Mutha River has been dammed twice, once at the Panshet Dam and again at Khadakwasla, and is a vital source of drinking water for Pune. The Mutha River runs through the city for 15 kilometers, with an average width of 150 m and a depth of 2 m.

The Mutha riverfront in Pune city is multi-functional, with the majority of its premises consisting of residential, commercial and institutional structures as well as some heritage structures. A stretch of the Mutha River has Nalas and several drainages connected to the river on their respective stretches. Numerous manufacturing or production cells belong near the river stretch, and their waste water outlets are also attached to the river.

Pollution of river water is one of the biggest environmental problems. Mutha River water is the source of water for drinking and for domestic, agricultural, commercial, industrial and recreation uses. Water quality management depends on the strict policy controls for discharge of solid waste, waste water, storm water and standards of treated or untreated wastewater, which requires cost and time for successful execution. Therefore, water management plans must consider sustainable strategies and policies for the successful remediation of polluted water.

Remove the trash, let the water splash :

Uncontrolled, unplanned, rapid and extensive growth of urbanization and industrial activities generate large amounts of solid and liquid waste in Pune city. Disposal of untreated solid waste, storm water and agricultural runoff, along with municipal and industrial wastewater, into the river is the main cause of physical, chemical (nutrients, metals, organic matters, Nano materials, etc.) and microbial contamination of river water. Sources of these wastes include industrial production, sewage, domestic waste, municipal waste, shopping markets, restaurants, agricultural waste etc. In Pune, about 50 % of total human waste is discharged into the river without proper treatment. Agrochemicals (fertilizers, pesticides, herbicides etc.) used in agricultural activities discharge different chemicals, including nutrients (nitrate and phosphate), into the river water. These contaminants transport route, which brings treated and untreated sewage, industrial waste, petroleum hydrocarbons and road dust into the river water.

There are some primary solutions e.g. always avoid releasing sewage into rivers as it gets mixed with water and pollutes it. Don't throw any solid waste into the water streams as it clogs the flow of water thereby leading to pollution. Avoid releasing construction waste into the river.

Use organic gardening techniques and avoid using pesticides and other herbicides. Avoid releasing harmful chemicals and oils into storm drains or rivers. Create public awareness regarding water pollution. These are not sufficient for Mutha river restoration. So Selection of appropriate river water treatment methods is important for the

restoration of Mutha river ecosystems. The remediation of contaminated river water is a burning issue in Pune city due to the high level of pollution. Polluted river water can be remediated by either in - situ water treatment or pollution control at the source point. Different methods that can be applied for remediation of polluted river water are categorized into physical, chemical, biological, ecological and engineering techniques, but a single method is not sometimes effective for the purification of heavily contaminated river water. Therefore, hybrid techniques, which combine two or more single methods, are more widely recommended for their efficient treatment.

Engineering and physical treatment processes include mechanical aeration processes, water transfer or diversion and dilution, mechanical algae removal, building hydraulic structures, dredging river sediment, etc. Application of those engineering processes can effectively improve river water and sediment quality, resulting in river restoration. Some of these methods may exert adverse effects, such as the destruction of natural ecosystems and an economic burden from their high capital and maintenance cost. Therefore, these methods should be applied together with biological, chemical and ecological process to accelerate their remediation actions in a sustainable way.

Chemical treatment of polluted water by flocculation, precipitation, oxidation and algicides can remove suspended solids (SS) and algae. Chemical processes provide a quick remediation of polluted river water, but they are temporary and may produce secondary wastes, which can create other hazards. Therefore, flocculation or precipitation processes should focus on the use of environmentally safe chemicals for destruction of suspended solids and algae by chemical environmentally safe chemicals for destruction of suspended solids and algae by chemical treatment. Wang et al. reported that poly aluminium chloride can be used as non - polluting flocculation foam, which can effectively separate algae from water. Adsorptive removal of

contaminants by minerals or material surface from river water is commonly observed in hybrid remediation techniques.

There are several biological - ecological treatment technologies such as microbial bioremediation, biofilms, contact oxidation, membrane bioreactor technology, ecological ponds, plant purification treatment, ecological floating beds and constructed wetlands. These processes used both microbial dosing and in-situ microbial techniques. Un-situ microbial techniques, which use native bacteria, are more environmentally sustainable and economically feasible. Consequently, in-situ microbial techniques are widely acceptable and applicable and have attracted more attention in wastewater treatment. The most common in-situ microbial techniques used for the treatment of river water are the plant - assisted floating bed techniques and constructed wetlands. These techniques can naturally produce bacteria, fungi and fauna, which play important roles in biodegradation of organic contaminants in river water. Biological methods are more environment - friendly, self - sustaining and less expensive than the physical and chemical processes. However, the processes need an extended time, ranging from several months to years for microbial growth and, sometimes, different environmental factors such as temperature and rainfall affect their performance. Some of these technologies require high cost, labour and maintenance as well. Ecological engineering - based techniques, such as plant purification treatment, ecological floating beds, artificial floating islands and constructed wetlands, have attracted the greatest attention due to their overall economic, environmental and ecological benefits, but these methods demonstrate variable performances to remediate polluted river water. The remediation of river water is a critical process which needs the combination of engineering and ecological technologies for successful treatment of river water.

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## World Water Day-2001

### Water and Health

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(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.)

"Water and Health" was the main theme of World Water Day 2001. Given the close relationship between water and health, sufficient and pure water is essential for people to survive and alternatively sustain their planet and it was emphasized that solid efforts were needed to provide clean water.

Water is life! That is why the importance of clean and pure water in human life is unique. It is very important to know about water borne diseases and water quality to prevent them. Water quality is the determination of the physical, biological and chemical composition of water and its suitability for drinking, agriculture and industry. Water quality and sanitation are closely linked. It is said that where there is cleanliness, there will be health, where there is health, there will be prosperity.

We all know that for our health we need clean air, clean surroundings and clean drinking water along with nutritious food. For the economic and social development of the country, all the society should be healthy, for which there should be abundant and perennial supply of pure water.

Water that looks clean and pure to us is not necessarily pure and safe. Water that looks clean and pure can contain billions of germs that can be harmful to humans. Therefore, it is very important to disinfect water for drinking and cooking regularly.

#### **Waterborne diseases :**

Typhoid, cholera, diarrhoea, polio, jaundice, dysentery, intestinal diseases, various types of worms are the cause of many types of diseases.

#### **Causes of water contamination :**

Water from rivers, streams, streamlets, springs, ponds, dams is polluted in the many ways. By defecating in a river banks, by bathing, by swimming, by washing clothes, by washing livestock, by washing vehicles, by discharging factory wastes, by discharging chemicals into rivers, by discharge of sewage, excrement and sewage from the village into the river, discharge of human, animal and bird carcasses into the water, immersion of idols in religious rituals, dumping of worship materials, flowers in the river and also if there is a settlement or animal herd near river banks.

#### **Causes of Bore well Contamination :**

Bore well water is contaminated due to various reasons. If there is a manure pit or a toilet or a sewerage within 100 feet of the area around the bore well not having proper cement platform around the hand pump, if it is cracked, washing clothes or utensils on the platform near the hand pump, the bore well is located in a deep drain or if there is a leakage in it, improper maintenance of the bore well, faulty construction of the bore well are the probable reasons of bore well contamination.

#### **Causes of piped water scheme contamination :**

Valve leakage, leakage pipeline, seepage of sewage water into the pipe line, lack of faucet, pipeline passing through gutters, drains, manure pits, sewers can lead to contamination of the entire



piped water supply. The water can also be contaminated due to non-regular cleaning of piped water tank, lack of water tank cover, falling of mulch, birds and animals in to storage tank. Failure to prevent people and children from entering the water tank may result in contamination of water. The main source of the water supply scheme is unsafe, can also be one of the reasons of contamination.

**Groundwater is basically pure, but it becomes impure because of the following reasons -**

Wells : In case of mulch falling in open wells, sewage water entering into wells having no parapet walls, surrounding garbage goes with rain water in to well, swimming in the wells, fetching water by standing on the banks of the wells, fertilizer pits within 100 feet of wells, cattle sheds, their excrement all seep into the soil, mixing of hand, foot and pot dirt in the water, poor construction of the well, field pesticide mixed water entering the well, washing of hands, feet and implements on the edge of the well.

**Causes of Household water Contamination :**

Water is contaminated due to various reasons like hand contact with water vessel, storage tank is not clean, the water vessel not kept high, the drinking water is not covered, not using the separate long rod utensil for fetching water. Use of water without hand washing with soap after defecation or not washing baby's hands, not cleaning the vessels regularly, not washing hands with soap before meals etc; drinking water in the house becomes unclean with dirty hands.


**Effective measures need to be implemented through public participation :**

In order to overcome the problem of water pollution, it is necessary to implement a large number of initiatives through public participation along with the help of government. For this it is necessary to increase the participation of people in quality control monitoring, repair and survey of all water sources in rural areas, enabling Gram Panchayats to participate in the implementation of the program and enable them. It is necessary to implement measures such as raising public

awareness about the adverse effects of contaminated water.

Water contributes a lot to health. Good health is the essence of development. Therefore, water and health - these two valuable resources together is the key to development. What is needed is full public participation in water management, planning and development.

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<p><b>Stockholm Water Prize 1999</b> <b>Prof. Werner Stumm and James Morgan</b> <b>Gajanan Deshpande, Pune</b> <b>+91 9822754768</b></p>	
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(An article series has been launched in August 2020 to learn more about the World Water Prize winners and their work.)

The winners of the 1999 Stockholm Water Prize were the scientist duo Prof. Werner Stumm of Switzerland and Prof. James J. Morgan of the United States. These two researchers from different countries have been working in association of one another living in their respective countries continuously for forty years.

James Morgan worked at the prestigious California Institute of Technology (Caltech) in Pasadena, USA, while Werner Stumm worked at the Swiss Federal Institute of Technology (ETH) in Zurich from 1934 to 1999. But unfortunately, in the year of water prize in the spring, Professor Stumm died.

Morgan is a one-time PhD student of Stum. He received the award at an awards ceremony in Stockholm. When James Morgan was 20, he became particularly interested in how pollution affects the oxygen balance in rivers. The United States first passed a water law in 1948 and since the mid-1950s it has been forcing paper manufacturers and pulp manufacturers to find ways to prevent pollution from their industry.

In his award speech, Morgan said, recalling his memory "At that time, the foam of phosphate-containing detergents was reaching as high as the waist on the surface of the water, and looking at that undesired view, while I was on the job I was determined to study chemistry for four years."

This led to Morgan's research on aquatic iron and manganese. At the same time, Morgan heard about Werner Stumm, a professor at Harvard who had a keen interest in the subject. Morgan met Werner Stumm immediately, and in 1960 he became his PhD student. Professor Werner Stumm was originally a Swiss citizen. At Harvard, he mentored young Morgan and nine other PhD students in teaching and research in aquatic chemistry. These 'Educational Children and Grandchildren' of Prof. Stumm are pioneers in the field of hydrochemistry and work mainly in the world's leading water research centres.

Since then, Stumm and Morgan have studied the science of coagulation as a tool to eliminate pollutants from water. His research papers in this regard are still leading and are still widely quoted. Contaminated water particles carry toxins and are therefore unhealthy. His joint scientific dissertation on the elimination of chemically active contaminants in water and the consequent practical use of that water received a scientific award in 1962 from the American Water Works Association.

"How can manganese (MN) be extracted from water?" They were thinking about this, day and night. Ultimately, their solution for this was to oxidize it into solids.

The oxides in the solution of  $Mn^{2+}$  ions are found to be absorbed on the surface of solid particles of  $MnO_2$ . This reaction was greatly enhanced by the high pH value - that is due to the increased salinity. As a result of an increase of one pH unit (e.g. due to pH 8 instead of pH 9) the reaction became a hundred times faster. The adsorbed manganese in it was oxidized by oxygen. Furthermore, it was discovered that  $MnO_2$ , the substance produced, was itself a catalyst - which triggered this reaction. These findings also apply to other contaminants such as phosphorus and arsenates.

Asbestos fibre was once found in water in California. By increasing its pH value and adding aluminium, it was possible to remove 99.99% of harmful asbestos in it.

In addition to their studies of coagulation and flocculation, Stumm and Morgan carried on the education of future scientists. Versions of their book, *Aquatic Chemistry*, have become a bible for scientists and students in the field and are quoted worldwide as scientific references. Over the years, Stumm and Morgan have combined to produce about 75 PhD students. These seventy-five messengers are spreading their vital knowledge around the world.

The following year, James Morgan was promoted to Professor Emeritus at Caltech. Since then, he has given numerous lectures and written extensively on his research into the chemistry and technology of water treatment and the scientific basis for establishing standards and norms for water quality protection as well as the rate of conversion of manganese to freshwater and seawater.





## Traditional Practices & Water :



- We always speak of our rich heritage and culture. With the growth of culture so many costumes and practices came into being. It is not necessary that all of them are good. Many are good and many are bad. One person does something. Others follow and in course of time that becomes a practice.
- In one case, after the death of her husband his wife might have jumped into the pyre. Later, more women might have followed that practice and out of that, the SATI system came into being. It became a ritual. We blindly follow such practices without thinking what we are doing. Imagine, what efforts were required to eliminate this practice. Number of social reformers toiled hard to stop that practice.
- In Rigveda water was called a divine power. And even after 4-5 thousands of years we follow the same practice. In almost all Hindu rituals, water plays a very important role. Right from birth to death, water, in one way or the other is associated with human life. Rich practices have come into being which are followed year after year. In Khandesh there is one river by name Nesu. Every year a big function is held there by name Nesu Nadi Poojan. Similarly Ganga Poojan also is regularly done.
- Like good practices, bad practices also are being continued. It was British Government which was responsible to put sewage water in river Ganges at Benaras. In course of time, it became a common practice everywhere and now, big or small, every city or town is following the same practice. Not a single river in the country is free from this trouble. In place of Gangas we are tempted to call them gatar-gangas.
- In Banaras, there is a regular practice where half burnt dead bodies are thrown in the river Ganges. It is said that if such practice is followed that dead person gets MOKSHA. It is ridiculous that for the Moksha of one person, thousands have to suffer as they are required to consume such polluted water.. Should we not stop this practice?
- Lokmanya Tilak started the movement of Ganeshotsava to organize people against the British rule. But see, what we are doing today. The basic purpose of starting this Utsava itself is defeated. We immerse lakhs of Ganesh idols in rivers and thereby pollute water. Not only that, the Nirmalya of ten days also is put in the rivers. Now of course, some change is noticed. The city municipal bodies have started collecting these idols and nirmalya near the bank of rivers itself. Number of voluntary bodies have started assisting the civic bodies in this work.
- A friend of mine attended the Kumbh Mela held at Allahabad last time and recorded the quality of water in the river every day. When the mela was over, he wrote one article showing how the quality deteriorated every day. That article was published in Jalasamvad Magazine. The intention of holding Kumbh Melas is different but the effect of this gathering on the community is hazardous. We spend crores of rupees on purification of river water but on the other hand whatever is done by the Government is undone by the people.
- We call rivers as our mother. Would you like this treatment given to our river mother? The rivers want your answer





Visit of Rotary Club of Aundh to Pingori



Adarsh Gram Purskar under Jalyukt Shivar  
Yojna by  
Hon. CM Devenrda Fadanvis

Bicycles donated to the girls of the school at  
Pingori. They have to travel a lot of distance to  
reach the school



Panoramic view of the recharged and desilted Pingori Lake

