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Jalasamvad

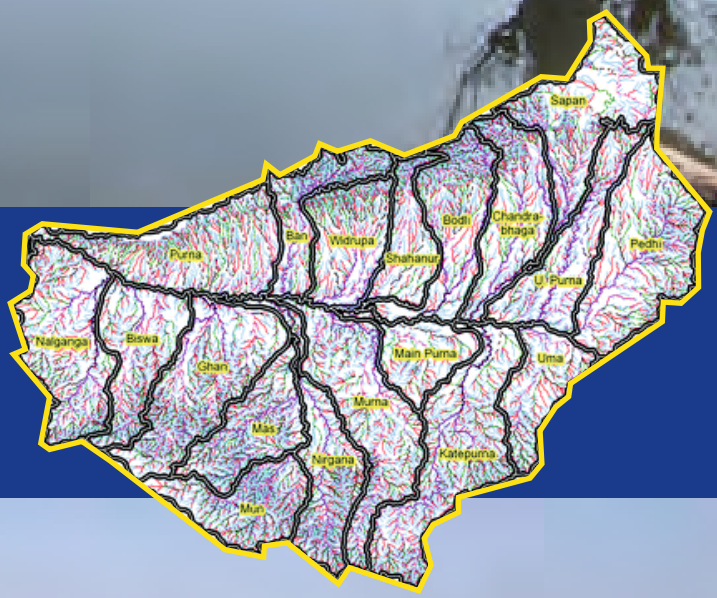
A Dialogue on Water

Editors: Dr. Datta Deshkar, Shri Satish Khade

Cover Story:

Permanent Solution for Saline Tract of Vidarbha Region of Maharashtra

Shri Suresh Khanapurkar



Desalination of water:

- We know that out of the total quantity of water on the earth only limited quantity of water is available for human use. But just few kilometers away, there is a huge storage of water in the sea. However we cannot use it because there is a lot of salt in it. But man has learnt a technology where that salt can be removed from that salty water by the process of desalination and make that water potable.
- Israel and Singapore are the masters of this technology as they are practicing it for last several years. Singapore's example is noteworthy. For this developing country, water was a great constraint. It was required to import water from Malaysia. It had entered into a long term agreement with that country. But for different reasons, that country, Malasia, decided to restrict that supply of water to Singapore. As there was no way, Singapore developed the technology to convert sea water into potable water and now it is satisfying 35 percent of its demand for water by this new technique. Israel also is doing the same thing.
- This is also true in Arabian countries also. They receive scanty rainfall. Most of them have huge natural oil deposits but unfortunately they do not have enough water. There is no other go for such countries but to take resort to this desalination technology. They have raised huge plants to desalinate water.
- In our country, for last several years, Chennai is the worst sufferer. It is not blessed with adequate rainfall. Too much dependence on ground water resulted in heavy withdrawal of ground water. Since the sea coast is very close, there was a heavy seepage of sea water in the wells and bore wells in and nearby Chennai. Various measures were taken by the municipal authorities to augment supply of water but they miserably failed. Realizing the gravity of the situation, the Government took a very bold step and established one Desalination Plant in the sea and water problem in Chennai could be solved to some extent. On similar lines such plants are being set up in Gujarat as well.
- Till now there was a wrong notion that such water is very costly. But improved technology is developed where this cost has been brought down considerably. It is very negligible, just five paisa per liter. If solar energy is used in this process, this cost can be further reduced. This method can be used at very many places where sea shore is very close.
- We can take the example of the city like Mumbai. In Mumbai, drinking water is brought from a very long distance, i.e. Virar lake or Tansa lake. By bringing this water from that area, we are doing injustice to people living there. In such a situation, why not take the advantage of desalined water processed very close to the city?
- There is a big team of environmentalists who are against this process of desalination. They are against construction of Dams, Linking of rivers also desalination. They always create a huge hue and cry against any such step taken. When the area is suffering from shortage of water, we cannot and should not take a note of such protests.

Jalsamvad

Mouth Piece of Bharatiya Jala Sanskriti Mandal

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Editorial .....

Connect emotionally with water

We need food, air and water to survive. We make a variety of foods to pamper the tongue. We eat it with gusto and taste and get a lot of pleasure. But more than that, we forget that water and air keep us alive. Do we know the reason behind this? The reason is, we have taken them for granted. We assume that they are always there for us. If they are not there, will we realize its importance only when our lives are lost due to lack of water? It is unfortunate that we never tried to have an emotional bonding with them.

We keep water of the Ganges in a holy vessel in the temple of God. It is not about giving importance to water but it is kept there in a view of putting a couple of drops of it in our mouth when we die and to get a ticket to heaven by its virtue. How ungrateful we are? In fact, we should consider ourselves very lucky if there is a river flowing through our city. But we constantly keep insulting the river by our actions. In the present context, it should not be mistaken, if somebody defines the river as the only place to throw away all the unwanted things.

When we were young, we used to go to our grandpa's place, the town of Bhandara. The main reason for going there was to enjoy immense pleasure of playing in the river Wainganga. After playing for a reasonable time, the elderly persons with us would loudly ask us to get out of water, as it was the time to return back home. In spite of their repeated shouting, we would never wish to come out of river. Today, after sixty years, I have forgotten almost everything in the town of Bhandara; however, I still remember the utmost pleasure of playing in the river.

Even though there are five rivers flowing through the city of Pune, still why don't we feel like going down into a river and playing in the water? Shall I ask a more pointed question? Do you at least know the names of these five rivers? Do you know which river you are crossing while crossing the "Lakadi Pul" bridge? Why don't you wish to know as to which river the water you drink every day belongs to? Why so much apathy? The real reason for this is that we have not formed an emotional relationship with that river.

Let me tell you a story. I was once going to Bhopal from Indore by bus. A young man was sitting next to me. When the discussion among us started, he asked me as to what was my profession. He was excited to hear that I was currently working in the field of water development. He told, in a little while we will have a lake on the way. Eight or ten of us friends have formed a movement there and we had also made the whole village connected with that movement. Today that lake has become a glory of the village. We have given a new identity to it as "A lake having clean and pure water". He further said, whenever he visits the village, he goes to the lake alone for a walk and sits there in the evening. He said, he is currently working in a factory in Bhopal, but, he will never forget the emotional connection he has built with that lake. Love is created through contact. If you don't connect yourself with the river or with the lake, how will that love, that affection be created for it?

If this is the situation, how will the children in our household be connected to that river? Will they not live in the belief that they get water through tap, not through river? Our ancestors wrote the Vedas. What is there in the Vedas? There are many "Rucha's" in it that praise the various things that nature has gifted us. I have a request to the Irrigation Department and the Municipalities also. There should be an information board on every bridge on the river displaying information like the name of the river, its length, its origin, its discharge etc. in bold letters so that the community would at least know which river flows through their village / town.

I would sincerely request you to get connected to a nearby river, lake or a stream.

Dr. Datta Deshkar
Editor

Story of Water. Part 8 - The Progress so far

Shri Chetan Pandit

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Hi, it is me again, with the 8th part in the series. In the seven parts so far, I have narrated how the water moves in the nature, the hydrologic cycle; how rainfall and river flow are measured; India's water budget; hydraulic infrastructure like dams, barrages, hydro-power plants; the dams versus no dams debate; and finally the trans-basin water transfer, also known as river linking. In this 8th part, I will review the progress made so far, and introduce some landmark projects.

Irrigation means supplying water to the crops, when they need it. Agriculture without irrigation is rain-fed agriculture, where crops get water if and when there is rain. Productivity of rain-fed agriculture is very low. Irrigation increases production per hectare. Development of irrigation in India can be traced back to more than 2000 years ago. In AD 150, the Chola king Karikalan constructed a barrage in Thanjavur district on the river Cauvery. This barrage, now known as the Grand Anicut, is very likely the oldest irrigation structure in the world, that is still in use.

In the North, some canals were built during the Mughal era. As construction technology progressed, a few dams and irrigation systems were built during British time too. However, overall, the progress wasn't much. Whatever large irrigation works were developed in the North, many were in what is now Pakistan and with the partition of the country, India lost all that irrigated area overnight. At the time of independence though India's population was just about 34 crores, the land productivity was less than 1000 Kg/Ha and India was not able to produce sufficient food grains for her people, and had to depend on imports. The hydro-power installed capacity in 1947 was just 508 MW.

The Government of independent India took up an intensive program of construction of several large multipurpose projects and irrigation systems. With irrigation, and also with the use of chemical fertilizers and high yielding variety of seeds, the land productivity increased by more than 3 times. Today we are not only self-sufficient in food production, but we have a surplus which we have difficulty in storing, and we are exporting food grains. As most of the large projects are multipurpose, the hydro power capacity has also increased from just 508 MW in 1947 to 46,000 MW in 2020.

Some of the earliest dam projects are Mulla-Periyar dam on Periyar river in Kerala, constructed in 1895; Krishna Raj Sagar dam on Cauvery about 15 Km North-West of Mysore, constructed in 1932; and Mettur dam, also on Cauvery, about 100 Km North-East of Coimbattur, constructed in 1934. All these dams are almost 90 years old, and Mulla-Periyar is 127 years old !! Since doubts were raised about safety of Mulla-Periyar dam, a committee of experts has examined the dam and declared it to be in good health and safe. Don't believe the malicious propaganda that dams have a life of just 30 years or so.

The two most well-known and landmark projects immediately after independence are the Hirakud and the Bhakra. Then Prime minister Pandit Jawahar Lal Nehru called them "temples of modern India". Hirakud dam on river Mahanadi in Odisha, near the town of Sambalpur, was completed in 1957. It is an earth dam 25.8 KM long and is said to be the longest earth dam in the world. With a storage capacity of 5.9 BCM, Hirakud's main

function is providing flood control to the town of Cuttack. In addition, the water stored in it also provides assured irrigation to large area in Odisha, and it has a hydro-power installed capacity of 347.5 MW.

Bhakra Dam. photo Toi

Bhakra dam on river Sutlej in Himachal Pradesh, was completed in 1963. It is a concrete dam 226 M high. At one time it was the second tallest dam in the world, but after that some other taller dams have been constructed, including one in India, the Tehri. Still, Bhakra continues to be one of the very tall dams. Bhakra has a storage capacity of 9.3 BCM and provides irrigation and drinking water to Punjab, Haryana, Rajasthan, and Delhi. Although flood control is not an intended function of Bhakra, but because of its very large capacity it does provide flood control to downstream areas in Punjab. Bhakra hydro-power installed capacity is 1325 MW.

Beas Sutlej link is a wonderful project that hugely increases the hydro-power generation with very little investment and intervention. Pandoh dam on Beas near the town of Mandi diverts Beas water to Sutlej, through two tunnels and one canal. This water drops in to Sutlej at a place called Dehar, generating 990 MW of electricity. But Dehar is upstream of Bhakra. Therefore this additional water becomes available to all the power houses on Sutlej, at Bakra and further downstream of Bhakra, augmenting electricity generation in all power houses.

Tungabhadra dam in Karnataka was constructed in 1953 on the Tungabhadra river, a tributary of Krishna. It has a storage capacity of 2.8 BCM, and hydro-power installed capacity of 127 MW. Koyna dam on river Koyna in Maharashtra, near Mahabaleshwar, was constructed in 1964. It is a 103 M high dam for hydro-power, with an installed capacity of 1960 MW. Koyna is an east flowing river, in Krishna basin. Krishna flows through Maharashtra, Karnataka, Andhra, Telangana and finally meets Bay-of-Bengal. But in Koyna the power house is located on the western side of western ghat and after generation of power the water goes to Vashishthi river which is a west flowing river, and then to Arabian sea.

Two other large projects in Maharashtra are Jayakwadi and Ujani. Jayakwadi dam on river Godawari in Aurangabad district, completed in 1976, is primarily an irrigation project with a storage capacity of 2.9 BCM. Ujani dam on river Bheema in Solapur district, was constructed in 1980. Ujani is also primarily an irrigation project with a storage capacity of 3.1 BCM.

Srisailam dam, constructed in 1981, is a 145 M high dam on river Krishna, with a storage capacity of 6.1 BCM and hydro-power installed capacity of 1670 MW. Its main purpose is as a backup storage for the Nagarjun Sagar dam which is

Srisailam Dam. photo - the hindu.com

also on Krishna, about 60 Km downstream of Srisailam. Nagarjun Sagar was constructed in 1967. It has a storage capacity of 5.44 BCM, and a hydro-power installed capacity of 816 MW. It provides irrigation to large areas in Telangana and Andhra. Both these dams are at a place where Krishna forms

the boundary between Telangana on left and Andhra Pradesh on right. Thus left half of both dams are in Telangana and the right half in Andhra.

Damodar river originates in Jharkhand and flows through Jharkhand and West Bengal. This river used to cause large flood devastation in WB, so much that the river became known as "sorrow of West Bengal". In a similar situation in the Tennessee valley in USA, an agency called Tennessee Valley Authority (TVA) was created to bring about cooperation between many states for construction of a series of projects to provide flood control, electricity generation, and navigation. The Damodar Valley Corporation (DVC) was modelled on the TVA. Between 1953 and 1959, four dams were constructed in Damodar basin. Tilaiya and Maithon on River Barakar; Panchet on River Damodar; and Konar on River Konar. (Note – it is Panchet, not Panshet, which is on river Mutha near Pune). The four dams together store 0.87 BCM of water which provides effective flood control. They also have installed capacity of 147.5 MW of hydro-power. A barrage downstream at Durgapur uses the storage in the dams to provide irrigation.

Narmada is a large west flowing river. But there was a dispute on sharing of the Narmada waters and therefore development of water resources on Narmada was delayed. The dispute was resolved in 1978 and only then the development of Narmada's irrigation and hydro-power potential could begin. There are four large projects on main Narmada. These are, from upstream to downstream, Bargi near Jabalpur; Indira Sagar near Khandwa, Omkareshwar near the town of the same name, and Sardar Sarovar near Vadodra.

Constructed in 1988, Bargi dam has a storage capacity of 3.9 BCM, and hydro-power installed capacity of 105 MW. The next dam, Indira Sagar, has a storage capacity of 12.2 BCM, which is the largest of all storages in India. It also has a hydro-power installed capacity of 1000 MW. Omkareshwar was constructed in 2007. This is a very small dam with a nominal capacity of 0.987 BCM. It is essentially a hydro-power project, with an installed capacity 525 MW.

The last in the series is Sardar Sarovar. The dam is located in Gujrat but the submergence extends to Madhya Pradesh and Maharashtra. Sardar Sarovar is a 164 M high dam with a live storage capacity of 5.86 BCM and hydro-power installed capacity of 1450 MW. It provides irrigation to 18 lakh Ha in Gujarat benefitting 10 lakh farmers; provides drinking water to 9490 villages and 173 towns benefiting 300 lakh people; and also provides irrigation to 1 lakh Ha in Rajasthan.

Sardar Sarovar work started in 1985. But work on it came to a stop in 1994 as an NGO Narmada Bachao Aandolan filed a PIL against it, and against large dams in general, in the Supreme Court. After a trial that lasted 6 years, the Hon'ble Supreme Court summarily rejected all contentions by the petitioners, and not only cleared the project but also gave directions that it be completed at the earliest. Displacement of the people was the key issue in Sardar Sarovar case. The project authorities had formulated a rehab package that is one of the best ever. However, a very rigorous process was stipulated to ensure that the rehabilitation is carried out as planned. Due to this, and also due to some other secondary litigation, the project took a long time to complete and was finally completed in the year 2017.

The Statue of Unity is located in Narmada river about 5 KM downstream of Sardar Sarovar dam. This too was opposed by some. It is strange, and sad, that Indians spend lakhs of Rs to travel to New York and visit the Statue of Liberty. But when a similar monument is planned in India, it is opposed in the name of environment and rights.

Another major project that was similarly opposed with PIL, is the Tehri dam in Uttarakhand. Tehri dam is just at the confluence of two rivers, Bhagirathi and Bhilangana. It has a storage capacity of 4 BCM and hydro-power installed capacity of 1000 MW. Completed in 2006, Tehri is now the tallest dam in India.

A large dam that is presently under construction is Pollavaram on river Godawari in Andhra Pradesh. When completed this will provide

a live storage capacity of 4.9 BCM, and hydro-power installed capacity of 960 MW. It will also enable transfer of water to Krishna and Pennar basins that are water-short, as a part of National Perspective Plan for inter-basin water transfer.

Construction of dams requires a suitable site, with a certain appropriate topography and good geology. Dams have already been constructed on most of the suitable sites in peninsular India. Some of the large dams proposed or under construction now are hydro-power projects, mostly in the North-East and some in J&K. The projects in various stages of completion and their installed capacity, are Pare 110 MW, Kameng 600 MW, Lower Subansiri 2000 MW, Teesta Stage IV 500 MW, Rangit 120 MW, and Ranganadi 405 MW.

India's largest hydropower project, Dibang, is planned in Dibang Valley in Arunachal Pradesh. With a height of 288 M, Dibang will be world's tallest concrete gravity dam. The installed capacity will be 2880 MW. As is expected for any large project that benefits India, Dibang project is also facing opposition from the environmentalists.

The projects in Brahmaputra basin, and particularly in Arunachal Pradesh, have an additional importance. As you would know China has been claiming that Arunachal Pradesh is theirs. It is therefore utmost necessary for India to increase our physical presence in Arunachal, with development and infrastructure. And hydro-power projects are an important part of this strategy. Another reason is, China has been developing the use of Brahmaputra waters in a large way, and to sustain our claim on Brahmaputra waters, we too must develop its use immediately.

The projects I described up till here, are all dams. There are also some landmark barrage projects, with large canals. The Harike Barrage is in Punjab, at the confluence of the Beas and Sutlej rive. One of the largest canal systems, the "Indira Gandhi Nahar Pariyojana" takes off from this barrage. The main canal is 640 km long and provides irrigation to 6 lakh hectares in the desert area in western Rajasthan.

Tajewala bŠrrage across Yamuna in Haryana near Yamuna Nagar, was constructed in 1873, 149 years ago. Two canals take off from this barrage. The Western Yamuna Canal provides water for irrigation and domestic use in Haryana, Rajasthan, and Delhi. The Easter Yamuna Canal provides irrigation in Western UP. As this barrage was getting old, a new barrage called Hathanikund barrage was constructed about 3 Km upstream of Tajewala, in 1996. The Prakasam Barrage across the Krishna River, near the city of Vijaywada, is over 1.2 KM long. This barrage was completed in 1855, and

Farakka Barrage photo scroll.in

is now 167 years old. Canals taking off from Prakasam barrage provide irrigation to 4.8 lakh Ha. Farakka barrage is on river Ganga just 18 Km before the Ganga enters Bangladesh. The Hooghly port near Kolkata was getting blocked by sediment. The 2 Km long Farakka barrage was constructed to divert water in to a canal to Hooghly port to flush out the sediment.

Finally, we take note of Kaleswaram, world's largest lift irrigation project. Usually, water flows from a dam or a barrage to the farms, by gravity. But sometimes water is to be supplied to farms that are at a higher level than the river. In such cases water is lifted to the farms by large pumps. Such projects are called Lift Irrigation Schemes, or LIS. The LIS projects are quite common. What makes Kaleswarm special, is its large size.

Telengana has a certain share of Godawari waters. But the locations in Telengana where water is to be used are at a much higher level than the Godawari river. The Kaleshwaram project is a complex system of barrages, tunnels, pump-houses, and canals, to lift water over 618 M height, to irrigate 18.25 lakh Ha.

River engineering is a domain where India is at par with the rest of the world. In other engineering domains, electronics, mechanical, aviation, chemical, etc. there are technologies that are still not mastered by engineers in India, and we have to import these technologies. But in river engineering, there is nothing that India can not do. Very tall dams, long dams, canals that are larger than some European rivers, tunnels, very large under-ground power houses, large pumps, Indian river engineers have acquired and mastered the know-how to do it all. This is something that we should be proud of.

With that I end the narrative on engineering aspects of the story of water. Next article will be on management of floods and droughts. Till then, take care and stay safe.

*****

Aao Nadi Ko Jaane - Report 03

Shri Vinod Bodhankar

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The act of Sandeep discovering and developing the Green Bridge Eco-Technology was, by itself, exceptional. Finding people in Rajasthan who had already committed themselves to river-health, who were already in the midst of creating collaborative efforts and who were open to an innovation like Green Bridge was Probir's brilliance. Probir Sinha and Bhupendra Maniyar stand out as team members who were absolutely one in spirit with Sandeep and his SERI team - of Sayali Joshi, Dr. Salaskar, Pallavi, Pradnyesh – all of whom were infused with the passion and dedication that comes only in genuine pioneering. It is this Sandeep Joshi who still lives with me and Narendra Chugh, in spirit and insight, as we share this document created by the three of us - still so relevant to ANKJ and IPRBC field work:

Citizens Paper on Concepts of Sustainable Development in River Basin

By (Late) Sandeep Joshi, Vinod Bodhankar, Narendra Chugh (2010; pics from 2010)

Nurturing the ecological wisdom of multi-intelligent social dynamics of a truly alert, integrated and pro-active humanity - which can begin its repositioning as custodian of this planet by preserving the rivers and ecosystems….

(Note : In this ANKJ Report-03 we are sharing only section 1, of 5 sections. What may seem to be NOT covered in Section 1, will be covered in the remaining 4 Sections to be published in subsequent reports in this e-magazine. We request you to understand that the text below is abbreviated in grammar to fit into a tabular-grid format that is too wide for the e-magazine. The text and grammar is kept intact and unchanged to the time-space of 2010, one year before the founding of Sagarmitra Abhiyaan in 2011. The document is also mostly Pune-city-centric as well as Upper Bhima River Basin centric. However it raises generic issues which can be seen in context of other rivers - after due customization to that river basin's realities.)

1. River Catchment Area Overview (The 1st of 5 Sections in this series)

Present Condition:

Sustainability of the river catchment area under pressure due to imbalance in developmental and subsequently environmental processes having far-reaching adverse impacts in time and space especially resulting in natural-rural-urban conflicts

Examples of adverse impacts of skewed developmental model on river catchment area :

60% population of Pune's urban and industrial area is on 4% of Pune district land due to abundant water from 5 dams in Mula river catchment. Farakka Barrage is known for siltation problem resulting in major shifting in river courses and destabilization and displacement of population and their livelihood. Urbanization through satellite cities in the catchments of Powai

Lake, Mumbai, Sahara City near Lonavala and Lavassa on Varasgaon Reservoir etc. Mining in Sariska, Massive deforestation in Himalaya ranges for various reasons leads to siltation of rivers and seriously compromises the capacities of dams. Highly polluting industries like paper, distillery, textile, chemicals in the catchment areas like Vashishti in Konkan, Kanpur, Noyyar river, Tirupur, Hindan river Bhilwada

Issues :

▪ Absence of holistic river basin vision resulting in inadequate plans, policies and implementation for catchment area development.

▪ Current "development-without-foresight" model of ad-hoc development based on limited river basin vision ignoring the equitable sharing of benefits by entire population.

▪ Concentration of wealth by a few and deprivation of many in the river catchment area duŤ to non-inclusion of each individual as a resource consumer and/or resource dependent entity.

▪ Absence of integrated interstate catchment/reservoir management leads to disastrous floods and subsequent losses

▪ Neglecting, ignorance and failure by urban local bodies, corporations, municipal councils, and state governments in seriously implementing/updating policies, laws and development plans with respect to catchment area development.

▪ Selective implementation of catchment area protection instruments to blatantly serve partisan interests thereby catering to establishment privatization and political interests.

▪ Inappropriate existing city and regional plans are unable to protect forests and streams, in the catchment.

▪ Ruthless destruction of foUest trŤe cover in river catchment area 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-imbalance of catchment area" without accountability and with continued incremental ecological and financial losses.

▪ Encroachment on urban watershed by governments and industries has resulted in severe impairment of ground water recharging processes.

▪ No honest efforts and support from government to the public initiatives against deforestation, encroachments in catchment area.

▪ Poor and marginalized communities are displaced from their ancestral lands and deprived of livelihood due to skewed catchment area development. The record and performance of their resettlement and rehabilitation is abysmal.

What is needed? :

▪ Scope of riverĚcatchment area development, policy and planning must include – river culture, river science, river engineering, river technology and objective evaluation of sustainable livelihood and growth of every stakeholder inclusive of man, ecosystem and river body.

▪ Demarcation of river catchment area 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 developmental processes significantly altering the river catchment area.

▪ Integrated water resources conservation and management for achieving the water balance by

implementing afforestation, rainwater hŠrvesting, water recharge, and pollution treatment to avoid the water scarcity leading to inter basin transfers and linking of rivers.

▪ Efficùent administrative and techno-professional institutional mechanism to involve the entire river catchment area populations and organizations in catchment-friendly lifestyle.

▪ Review and modify existing policies, definitions, laws, rules, regulations and guidelines for catchment conservation, protection and development measures with inputs from all affected stakeholders especially the women and poor, marginalized populations.

▪ In the wake of limited success of conventional technologies and chemical intervention in maintaining the river clean for sustainable development, the natural eco-remediatiŬn bio-remediation potential in the river catchment area must be harnessed and optimized.

▪ The Şentral, state and lŏcal governments shall extend specific support and empowerment for the tŠsksI projects like – terrace-faLming of hill slopes to check erosion and optimize land use, control of encroachments of river lands, afforestation, protection of biodiversity hot spots in the catchment area, revival of ecological health of the river, sensitizing and awakening of river-basin populations to catchment-friendly life-styles and the rehabilitation of displaced and restoring of affected population's livelihood.

▪ Personnel discharging the abovePproject duties of sustaining and protecting catchment area eco-lŬgical health shall be publicly recognized and rewarded.

▪ Responsibility and accountability of existing state and local self governments in time bound implementation of industrial siting, township locations and agricultural cropping and pricing patterns to ensure inter-generational equity and sustainability.

▪ Strengthening of auditing system for evaluation of river-catchment area development projects/initiatives by ensuring involvement of societal wisdom and people's participation

▪ Local geo-cultural factors affecting the health of river catchment area unique to a river basin and identified by societal wisdom and local population must also be considered under the catchment-protection and development laws and rules.

▪ Violation of rules and regulations Ŭf notified and protŤcted river-catchŬent areaV and components shall be treated as criminal offence. Laws, rules and regulations shall be framed and modified to include provisions to prosecute the violator as criminal attracting non-bailable warrants.

Solutions to achieve ecological health and water balance within the river catchment area, leading to protection of livelihood and to sustainable growth:

▪ A definitive shift, in the perceptions/planning, decisions/policy-making and actions/ implementations of individuals, institutions and governments, from a limited view of catchment-components to a holistic, inclusive and integrated vision of entire river catchment area as a planning unit. This vision, based on effective publication and dissemination of developmental space-time maps of the catchment, must be seeded into the consciousness and conscience of the entire river-catchment area population through schools, colleges, cultural, general educational and media initiatives which are time-bound and include feedback mechanisms to check the actual impact on the health of the river catchment area under consideration. The general population must be thoroughly educated and alerted to the significance of above river-catchment-area maps as people's resource to immediately report disruption or disturbance of river catchment eco-system.

Evolution of stringent legal instruments and accountability audits to precisely implement plans and policies which are intended to ensure the holistic development of the river-catchment area.

The choice of technology and planning tools should be governed by a study of the natural self -restoration potential of the river-catchment area, the societal memory and wisdom of the local inhabitants and an openness to experienced innovative field-implementation of the above in

the light of current local circumstances.

Action Plan :

▪ Framing of new and the review & upgradation of existing river-catchment area protection and development 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 implement tasks/projects like – protection of terrace-farmed hill slopes to check erosion and optimize land use, control of encroachments of river lands, afforestation, protection of bio-diversity hot-spots in the catchment area, revival of ecological health of the river, sensitizing and awakening of river-basin populations to catchment-friendly life-styles and the rehabilitation of displaced and affected population's livelihood etc.

▪ Punitive measures for the agency or department failing to take action against violators of revised river-catchment area protection and development laws and regulations.

▪ Record keeping, regular auditing of record keeping by social groups working on river-catchment area protection and development issues.

▪ Change in syllabus of schools, colleges and general educational initiatives to include active participation as an intelligent-unit in realizing the holistic vision of sustainable river-catchment areas. Every such intelligent-unit must understand and get a reflection of – changes in the river catchment area, impact of these changes and the personal and team responses needed to restore the balance.

▪ Mapping of river catchment area showing most important components which must be under constant surveillance and protection with scheduled patrolling by personnel under strict instructions, to alert instantly, the appointed and alerted core groups of local people and concerned government departments, when there is a natural disruption or human violation.

▪ Orientation, sensitization, and field training for capacity building of personnel from all types of local self governments, MLAs, MLCs and MPs (LS & RS), Self Help Groups to protect and develop the river catchment area and the interests and rights of all the people to its benefits and to their sustainable livelihood.

▪ Quarterly compulsory public hearing on the subject of protection and development of river catchment area - 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 and implementing development plans for the river catchment area.

Development plans should be prepared for all individual river basins and river catchment areas in the country ensuring local Community Participation and protection and development of their local Natural Resource based livelihood.

(The extract Section 1 of 5 is complete here. IN ANKJ and in IPRBC as well as in all our field works and projects and people's initiatives, this document is a kind of preliminary check list for us writers, inclusive of the remaining 4 Sections. The extract from the document has been shared with this relevance to current times in mind and heart and anticipation of the future teram-work to facilitate.)

(~ will be contnd in next issue ~)

Citizens Paper on Concepts of Sustainable Development in River Basin

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

1. River Catchment Area Approach (Shared above)
2. Removal & Prevention of Encroachment
3. Controlling the Pollution of the Lakes and Rivers of India
4. Maintaining Ground Water Balance
5. River Culture and Society

Vinod Bodhankar, Narendra Chugh and (Late) Sandeep Joshi
9850230064, 9850074952

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United Nation's Sustainable development

Goals and water literacy

Shri Upendra Dhonde - (M) : 9271000195

This article is a written transcript of the lecture delivered by Upendradada Dhonde during an event "Self actualized Leaders Network Global Summit 2021".

As you all might know that SDG-6 is one of those 17 United Nation's Sustainable development Goals that established by the UN General Assembly in 2015, the official wording of this SDG-6 was "Ensure availability and sustainable management of water and sanitation for all". So, I am going to enlighten this issue with some of examples which we are doing as "Mission Easy Water literacy".

Everyone knows the critical importance of hygiene, sanitation. According to the WHO guidelines hand-washing is one of the most effective actions you can take to reduce the spread of pathogens and prevent infectious diseases, especially the current COVID-19 pandemic has demonstrated it again with more emphasis "that how hand-hygiene saves the lives and how adequate access to clean water is important for preventing and containing this disease".

While lots have been said about, that worldwide substantial progress has been made, in increasing access to clean drinking water and sanitation, but the real fact is, that the population growth, urbanization and frequent extreme weather conditions have cumulatively affected the water availability especially ground water and resulted in an unfavorable hydrological, ecological, and environmental changes. Particularly, the rural communities are heavily affected because of their poor adaptive capacities. Billions of people, mostly in rural area still lack the basic needs of clean water and hygiene. Worldwide, 01 in 03 people do not have access to safe drinking water, 02 out of 05 people do not have a basic hand-washing facility with soap and water.

The issue of keeping hygiene and availability of clean water is inter-connected. I would like to give one example here, Government insists hygiene time & again. Take many initiates like subsidized schemes, like toilets at every household but Inspite such initiatives more than 673 million people still practice an open defecation, why? because people discouraged to accept such schemes just due to non- availability of enough water to use in such toilets.

Currently around one-third of world's population (about 2.4 billion people) is living in water-stressed countries, which will increase to two-third by the year 2025. On the other hand, economic growth and urbanization due to rapid population increase are putting further stress on fresh water supplies. Out of the limited existing freshwater reserves, about 50% of the world population depends on groundwater to meet their potable water demand. It is reported that about 1/4th of the world population has to travel at least a round trip of 30 min or more, from their premises to fetch the potable water. Considering the finite volume of freshwater resources, its sustainable management is a global challenge.

Hence in my opinion, we have to think upon need of change in the Governance system, the world need big environment friendly reforms by considering that the focal point for the vulnerability of this serious issue lies in the water resources availability and the future interaction between human and water systems. and Our work, Mission Easy Water Literacy insists the same and

we are trying to give a solution in this regard.

We sincerely feel that the SDG 6 cannot be achieved with current pattern of Government schemes and rules which tends to make long term predictions unrealistic, as interactions and bi-directional feedbacks between human and water systems cannot be captured here. We claim that a significant progress towards water security will rely on people's participation and what needs to change is people's participation for getting robust data on the current local landscape to ensure environmental sustainability on water.

In response to global changes as referred above, rivers are exhibiting significant changes in annual runoff as well as quality deterioration, and this water shortage/scarcity causes a change in socio-cultural practices at local level. In addition, examining and understanding the link between mental health and water scarcity is very important from the human well-being perspective but despite its high importance such issues are often ignored in the policy planning process. Yes, we strongly believe that issues of water resource management and its relation with human well-being is understudied.

Now let's have a brief, about what we are doing in our mission for this. Our mission, Mission Easy water literacy is a "socio-hydrogeological approach to inspire and increase people's participation for the smooth implementation of different Govt. Or non-govt. Schemes in water sector".

This all started during 2014 when an ambitious scheme called "Jalyukt Shivar" introduced in Maharashtra state. As a Ground water Scientist, that time I gave a very clear-cut warning to the government that "An approach to manage ground water resources by involving celebrities of different fields for peoples participation can give short term results, but same will certainly result in an unintended but very harmful consequences in the long-term, the reason is "limited technical knowledge and No accountability" and very unfortunately this warning has been found correct within few years.

There was flood of non-technical persons in water sector as celebrity who were involved in making water structures in the name of encouragement for people's participation. Yes, everyone agrees that, 'people's participation is must for any Government scheme to be successful' but whether such people's participation be ensured with sound technical knowledge? It was an irony that this important aspect is being continuously ignored and thus invited trouble. These raw hands had disastrous effect in water sector. This not only harmed govt. scheme but also resulted in setback to water literacy.

So we decided to give an alternative and as a remedy to above, we started this movement Called 'Sahaj Jalbodh Abhiyan' i.e. Mission Easy Water Literacy.

This mission aims, "to literate the stakeholders by using the tools like making scientific knowledge of hydrogeology available in easy to understand local language and ensuring a long drive to reach the stakeholders". Under this mission, we started with writing and publishing of 08 books on hydrogeology and also made available online 51 books as free pdfs which covered all technical knowledge requirements of water sector understandable to layman. Also more than 1000 articles were posted on social media so that readers can get this knowledge easily and for free.

During year 2014 to 2021, we arranged more than 200 lectures and more than 100 workshops at different places in Maharashtra but after emergence of CORONA pandemic we have to rely on delivering lectures online and till date delivered more than 200 lectures in 02 years. Also under this mission, we run an online 10 day's basic hydrogeology course and till date completed 10 batches. We have many videos, interviews on various hydrogeology sub-topics available on social media platform.

Though I am a government officer, I have decided to fully devote my life for this water literacy mission. I am using all the Saturday –Sundays and other holidays for this literary work. I also always tried to be available online in morning early hours

and evening late hours. This dedication has resulted in creation of massive number of water literate youth in Maharashtra.

Under this Mission, we insist 03 basic ideas. Nisargbet i.e A plantation method which includes water harvesting as mandatory part, Jal Arakhada i.e. water security plan of micro-watershed area and tristariya punarbharan i.e. recharge techniques considering all 03 layers of aquifers i.e. shallow, medium and deep aquifers. These 03 ideas are based on sound technical aspect i.e. understanding hydrogeology.

Till date 22 Nisargbet sites, 50 tristariya punarbharan sites , 125 jal arakhada and thousands of followers who are now technically educated and working as Nisargrakshaks. There is a drastic change in attitude as sound technical knowledge is a must crieteria in people's participation. Now there is no blind faith on so called celebrities who are not having expertise in hydrogeology subject. Now there is an increasing faith in Govt. system especially now people turning towards hydrogeologists for taking advises for many technicalities. The idea like Ek gaon Ek Talaav i.e. Pond/ Lake in every village is now an increasing trend in Maharashtra which is inspiring people to take-up village pond revitalization. More than 100 organisations and thousands of individuals have been benefited with this literacy mission.

The major impact of this mission is, that now everyone working in water sector has understood the importance of technical knowledge in water sector. Even Maharashtra government in 2018-19 issued revised guidelines and made preparation of Jal arakhada mandatory in it and center's current Atal Bhujal scheme also insists the same. The concept of Nisargbet is now very popular in Maharashtra wherein every plantation scheme now involves water management part. The tristariya punarbharan idea also has been accepted at many places.

We are offering 03 basic motivations to nature conservationists or water activists taking part in this mission

A) Promoting water literacy. B) Link for implementation in government scheme. A) Direct action program.

A) Promoting Water Literacy: Though your main job or business for subsistence is different, there is a lot of scope to work in spreading water literacy in society but this requires knowledge and eloquence. So there are about 70 subjects in Sahaj Jalbodh course. You can choose some of these topics and study them in depth. For example, a workshop on pond construction, a workshop on village planning, a nature cure workshop, a workshop for students and women role, a workshop on a government scheme guidelines, a well dugwell/borewell recharge workshop, a watershed treatment workshop, etc. The group of people that will participate in suchworkshops can be connected as the actual action program performers.

B) Link for implementation in government scheme: Many government departments implement various schemes related to water but the general public many times are not aware of the detailed guidelines of such schemes, criteria for funding, various laws and regulations pertaining to the scheme. Water literacy in Maharashtra is in such a state of decline that if you decide to prove your worth in this regard, then people will come searching you. There are not even a handful of people in Maharashtra who are well versed in all the old and new government schemes and laws and regulations. We have to follow these things very carefully and prove ourselves. We just have to see all the government websites and orders issued from time to time and keep in touch with the organizations working in the field of water as well as government department officials. If we want to control corruption and make people wise and there is a great need for people working in this field.

C) Practical Action Program: Many times people get jobs –works in water sector using political affiliations and corrupt connections even though they do not have complete technical knowledge and at the end they gave very inferior results. We still give the example of a bridge or a dam or a lake built in the time of Chhatrapati Shivaji, but we have to search about a good worthy water structure built

just fifty years ago. We in our mission run a course where we teach that in order to enter this field, one has to take a single structure, understand its in-depth technicality and then acquire the skill to carry out the work in a perfect manner. Individuals who do not have a fixed income job or business should take part in a practical action program in the water sector.

Mission easy water litewracy motivates youth to decide their life's goal, Choose one of the above topics in order to fulfill responsibility towards the society and nature after guessing their own passion and strength while choosing the subject. We teach them not be overwhelmed by success and be sad if they fail. We assure them that if they decide their goal as taught in mission, they may or may not achieve success in the future but they will surely live in the satisfaction that they have fulfilled their responsibility as a nature conservator or water activist. And most importantly, one can certainly do something for the society with a lot of foresight, rather than blindly following a person or an organization just because it is famous, nominated, rather than falling prey to the maze of position, money and prestige.

Why we feel this mission so important and a guaranteed success as solution to present day water challenges?

Mission easy water literacy is a socio-hydrogeology experiment which presents challenges for water security to manage water scarcity and human well-being for adaptive management cycle. Here we stress upon the holistic understanding of the complete system as a main objective. Such developed models at watershed level could be used to anticipate what trajectories might occur in the coming decades, depending on the present conditions of a human-water relation systems. And later on can be used in policy formation and decision making, whereas it could be really useful in pre-disaster planning.

In traditional hydrogeology approach, human activities are typically described as boundary conditions or external forcings to the water systems i.e. a scenario-based approach. Here in Mission easy water literacy we aim to describe the interactions and feedback between social and hydrological systems. There are three main areas where such socio-hydrological appraoch is used.

1. Understanding the Watershed System and collecting water related data at micro-watershed level.
2. Correct forecasting and prediction of issues after analyzing the collected data and then policy or decision making.
3. Finally, proper implantation of the accurately designed scheme that too with impartial assessment of its results.

Understanding the dynamics of cultural evolution is important as it strongly shapes human interactions both with one another and with the environment and thus outcomes of human-water interactions in long run. What we observed during last 05 years that participation in this mission is constantly increasing. Among the trainees of Sahaj Jalbodh course, everyone from 10th pass youth to class one officer, common farmer brothers and even people who are experts in various subjects are coming forward to learn Sahaj Jalbodh course.

We don't really claim to teach a very big rocket science in this course, we just teach very basic simple things of traditional and cultural hydrology. In the field of water / environment nowadays, it is really sad to see that the celebrities lure youth to make a millionaire, to get a job, to get a position, to get an award, at least to get fame. But in our mission we don't show any such lure to the trainees, like for any position, fame with celebrity, award, opportunity in an action program, government scheme job etc. Our only aim is that the member who participated in the mission from first day of the training must take a new approach towards the socio-hydrology in his heart.

The nexus of human–water relations could be applied to improve adaptive measures to manage local water needs while mitigating undesirable changes to the hydrological cycle and for that Sahaj Jalbodh ideas can be used as an integrated tool to quantify the feedbacks between water resources and society at multiple scales, with

the aim of expediting stakeholder participation for sustainable water resource management.

The proposed idea in our mission will be helpful to sketch projections of alternatives that explicitly account for plausible and co-evolving trajectories of the socio-hydrological system, which will yield both insights into cause–effect relationships and help stakeholders to identify safe functioning space.

It also explores how the nexus of human–water relations could be applied to improve adaptive measures to manage local water needs while mitigating undesirable changes to the hydrological cycle. Socio-hydrological models as an integrated tool can be used to quantify the feedbacks between water resources and society at multiple scales, with the aim of expediting stakeholder participation for sustainable water resource management.

I expect from the organizers and audiences of today's programme to come forward and think upon the idea proposed. I will be happy to work with you all. Thank you very much for giving me this opportunity to express my views.

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World Water Day-2000
Water for the 21st Century

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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 for the 21st Century" was the main theme for World Water Day 2000. We all know that the availability and quality of water is under constant stress and there is no indication that this will change in the future. Therefore, the picture is that a large part of the world will be plagued by water problems in the near future. A conference of world-class water experts, rulers and high-ranking officials was held in Hague from 17 to 22 March 2000, taking the opportunity of World Water Day to find a solution. It discussed what the world should be like after 25 years if the world takes immediate action on these issues - and with that in mind, action plans for the future were drawn up.

Only 2.5% of the total water on earth is pure usable water and only 0.26% of it is available for use from lakes, rivers, streams and dams. With so much water available for domestic, industrial and agricultural use, tensions and problems are mounting in various communities to obtain it. Water pollution is adding to this.

Today, available water resources in many parts of the world are under great stress due to population and economic growth. As our world population grows and becomes richer, the demand for water will increase exponentially. At the same time water availability and quality will also come under increasing stress due to climate change, energy scarcity, types of land use as well as requirements for industry and mineral processing.

As water consumption is increasing day by day, everyone has to think seriously about its availability and especially its value. The work of drawing people's attention to this has been done through this theme.

Water Challenges in the 21st Century :

Many regions do not have access to safe, good quality and affordable water to meet basic human needs. The wars and conflicts of the next century are said to be about water.

The major problems in the world regarding freshwater in the 21st century are 1) Lack of renewable supply 2) Unequal distribution of supplies 3) Water quality and health problems 4) Human rights 5) Not considering water as an economic commodity 6) Irrational use of water 7) It is not understood by many people that water is a common commodity; so are many other things.

1. Lack of renewable supply:

Like other ecological resources as forests and coal, water is a renewable resource. This

means that its availability varies according to its position in a continuous hydrological cycle. One exception is groundwater - which is not as renewable as other water sources.

2. Uneven distribution of supplies :

From what was once considered an abundant resource, water is increasingly seen as a 'rare' resource that needs to be managed prudently. Today there is a huge disparity between water resources and the control of people over them. Scarcity is felt by everyone and everywhere. In western India, where water is scarce, irrigation pumps work 24 hours a day. At the same time, the drinking wells of the poor are dry. Urban society is also not cohesive. Slum dwellers and low-income families use far less water than the rich, and often do not use even half the amount needed to maintain basic health.

3. Water quality and health issues :

According to UNICEF and WHO, 1 in 3 people worldwide do not have access to safe drinking water. Lack of political will, low investment, inefficient allocation of water, changes in land use, population growth and lack of awareness of policy makers on serious water quality issues have left water quality issues unresolved and serious in developing countries.

About 80 percent of the world's wastewater is discharged untreated into rivers, lakes, and oceans - that is into our environment in large quantities. This widespread problem of water pollution is endangering our health. Such unsafe water kills more people each year than war or other forms of violence.

Due to our improper social habits, water sources, rivers, streams, reservoirs are getting polluted on a large scale. Municipalities and factories discharge their effluents into these sources without any treatment and this greatly pollutes the rivers and streams. This leads to constant health problems. Now we have to make special efforts to maintain this declining quality of water. Improper human practices, excessive use of chemical fertilizers, improper disposal of plastic waste are also increasing adverse effects on aquatic life in rivers, reservoirs and seas. There has been an era of total neglect or over-exploitation instead of conservation and protection. It is now imperative to stop this.

4. Water as Human Rights:

In the 1970s, international debates highlighted the importance of water in meeting basic health and hygiene needs. Responsibility for public health was seen as a fundamental right of the national government.

5. Water is an economic commodity:

Seeing water as an economic commodity and turning to demand management generally means that water must have a price. Free water is considered 'wasted water'. Lack of cost or insufficient cost is seen as a major factor in inefficiency of water use.

6. Discretionary use of water is everyone's responsibility:

As water is an important resource for all, there are many tensions and conflicts in communities, states and countries. Therefore, prudent use of water, hopeful care of this resource in all respects and strict attention to its proper management and regulation - is the primary duty of everyone who depends on the water resources of the place. If there is social inaction in this regard, the cost of this would be very high.

7. Water - A common commodity:

Water should be viewed as a commodity shared by the people and its management and ownership should be jointly ensured by the local water users. Thus, local people need to have control over their own rivers, watersheds or watersheds.

This world is not only for us, but also for future generations. So it is important that we leave behind a warm and fresh environment for future generations. For that, water is as valuable as gold and we need to be aware that we will not waste it unnecessarily. As a conscious citizen we can play a great role in creating this awareness in the society. That should be the first responsibility of every citizen of the world.

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PERMANENT SOLUTION FOR SALINE TRACT OF

VIDARBHA REGION IN MAHARASHTRA,INDIA

(ANGIOPLASTY OF STREAMS)

Suresh Khanapurkar, (M) : 9822363639

ABSTRACT :

Purna valley in Amravati,Akola and Buldhana Districts is one of the major alluvial deposits of Maharashtra,India.A part of Purna alluvial valley is characterised by insitu salinity which created the problem of drinking water as well as other problems.The drinking water supply situation continues to be critical in this belt due to lack of surface water development.The non-availability of potable quality of water for drinking and other purposes ,necessitated the implementation of costlier regional pipe water supply schemes based on tubewells located outside the saline tract.This is a rainfed area.Only one crop is possible on rainwater that to if rainfall is good. It was thought that the fine textured alluvium soil in this saline tract ,is not suitable for foundations of the structures .Due to this and due to non availability of construction materials such as sand and coarse aggregate within a reasonable distance surface water development has not taken place .Therefore ,though average annual rainfall is 800 mm,a large part of it is wasted to the sea as surface runoff.In short neither surface water which is sweet nor groundwater which is saline can be used for irrigation purpose .

The present paper deals with this problem which was not yet solved .This is a geological problem and can be solved by the angioplasty of the small streams as done in Shirpur Pattern in Shirpur Taluka of Shirpur Tahsil of Dhule district in Maharashtra ,India.This paper deals with the fact that the implementation of artificial recharge by constructing series of Cement Nala Bandhs and deepening of upstream side upto 15 metres and widening upto 30 metres .The length of deepening and widening should be about one one km. In length.It is observed that the thickness of impervious yellow soil is about 12 meters from the surface followed by 3 meters of sand bed and again impervious yellow soil .Due to this Sweet water stored in the deepened and widened Cement Nala Bandhs will not come into the contact of saline water below.By this method sweet water can be provided to all the 894 villages in this saline tract through out the year.

INTRODUCTION

The alluvial valley of Purna and its tributaries occupy parts of Amravati ,Akola and Buldhana districts of Maharashtra .Out of total geographical area of 7500 Sq.Km.,an area of 2955 Sq. Km.extending over a distance of 120 Kms from Bawanbie (Buldhana)in West to Chandur Bazar (Amravati) in East yields sweet water while remaining 4545 Sq.Kms restricted to the central axial zone is marked as saline zone.The Purna river valley is a structural valley formed due to faulting of Satpuda with tilt towards North.The groundwater slope is parallel to topography and river Purna is effluent in some sections.The Pedhi, Chandrabhaga, Shahanur, Wan, Katepurna, Nalganga, Dhnyanganga Morna and Mun are the important tributaries of Purna.

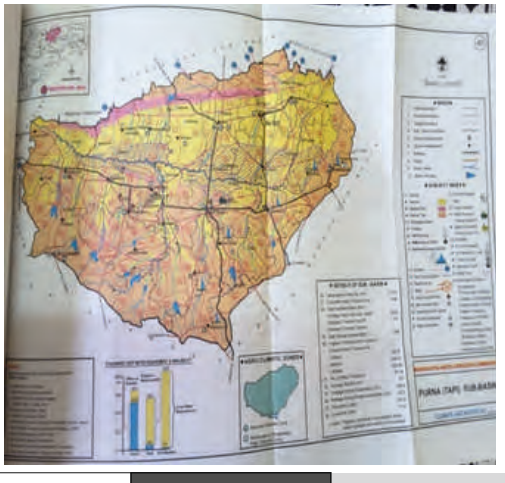
Inland salinity of groundwater in parts of Purna alluvial tract is historical phenomenon,as the highly saline groundwater was being used for manufacturing common salt in the past.Purna river originates from Bhaisdehi village in Betul dist .of Madhya Pradesh.It first flows from North to south and then takes sudden westerly turn near village Amla in Amravati dist.and flows from East to West.The entire course of the Purna river is

structurally controlled.The groundwater is saline with an electrical conductivity of more than 2000 micromhos / cm and is mainly confined to the northern bank of the the river Purna.

Because of the saline nature of groundwater ,the villages falling in the zone are served with drinking water supply through regional pipe water supply schemes from distant tubewell sources outside the saline zone.The villagers are not getting adequqate water supply through regional pipe water supply schemes due to various reasons and they have to face severe drinking water problem particularly during summer months.There are 894 villages in this saline tract from Amravati,Akola and Buldhana dist.The talukawise details are given below.

TALUKAWAISE ABSTRACT OF VILLAGES INCLUDED IN SALINE TRACT OF PURNA VALLEY OF MAHARASHTRA

Sr No	Name of Dist	Tahsil	Total Villages Included	Saline Area in Ha	Saline Area in Sq.Km.	Population
1	Amravati	Amravati	18	14728.80	147.29	68000
2	Amravati	Bhatkuli	111	46065.66	460.66	150000
3	Amravati	Chandur Bazar	27	8481.64	84.82	35000
4	Amravati	Anjangaon	48	20049.88	200.50	75000
5	Amravati	Achalpur	5	2082.00	20.82	7000
6	Amravati	Daryapur	146	75610.70	756.11	220000
			355	**167018.68**	**1670.19**	**552000**
7	Akola	Akola	106	49513.00	495.13	150000
8	Akola	Akot	82	39493.00	394.93	132000
9	Akola	Telhara	47	27432.00	274.32	86000
10	Akola	Murtijapur	94	46971.00	469.71	148000
11	Akola	Balapur	44	26815.00	268.15	86000
			373	**190224.00**	**1,902.24**	**602000**
12	Buldhana	Jalgaon Jamod	45	19585.00	195.85	88000
13	Buldhana	Malkapur	9	8518.00	85.18	20000
14	Buldhana	Nandura	30	19122.00	191.22	90000
15	Buldhana	Sangrampur	38	17716.00	177.16	80000
16	Buldhana	Shegaon	44	32339.00	323.39	72000
		Total	**166**	**97280.00**	**972.80**	**350000**
		Grand Total	**894**	**454523.00**	**4545.23**	**1504000**



MAP OF PURNA SUB BASIN
Alluvium is shown by yellow colour

GEOLOGICAL MAP OF PURNA VALLEY

MAP OF PURNA VALLEY SHOWING SALINE WATER ZONE

ANNUAL RAINFALL DATA FOR SALINE TRACT (2002-2011) (IN MM)

DIST	TALUKA	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	AVERAGE RAINFALL
Amravati	Amravati	672	682	511	886	931	1112	788	677	1405	900	856
	Bhatkulil	582	519	538	711	1063	1274	752	622	1029	787	788
	Chandur Bazar	860	851	418	1048	1029	907	479	646	1309	715	826
	Anjangaon	687	604	492	628	1168	1266	184	683	741	646	740
	Achalpur	646	625	572	654	1030	1334	384	656	1248	743	789
	Daryapur	614	415	510	696	912	963	794	574	975	676	712
Akola	Akola	726	422	460	735	1092	754	660	693	1069	661	727
	Akot	698	721	426	727	929	934	589	811	1013	729	758
	Telhara	757	789	329	760	953	964	510	752	797	521	713
	Murtijapur	644	515	483	866	1063	1013	501	535	1038	881	754
	Balapur	794	463	449	535	884	610	535	567	703	483	602
Buldhana	Jalgaon Jamod	1109	702	521	409	756	729	572	582	924	604	691
	Malkapur	1029	702	678	446	916	662	393	962	903	524	721
	Nandura	1075	496	465	376	729	651	478	1108	1068	390	684
	Sangrampur	905	922	380	543	976	919	708	644	905	517	742
	Shegaon	1007	557	379	592	1048	749	561	791	981	588	725

It is observed from the Study of rainfall data of 10 years (i.e. from 2002 to 2011) that every after three years there is heavy rainfall causing flood.In this way there is scarcity due to flood (Because all water ran away)and there is scarcity due to less rainfall .Water required for three years for drinking and irrigation should be conserved in to the ground during heavy rainfall years with the full study of Geology ,Hydrogeology and rainfall data is the only solution to get rid of scarcity.If this is adopted in the Saline Tract of Purna Alluvium having peculiar section as described earliar sweet water will be available in huge quantity that too at a depth of 15 meters only.

GEOLOGY

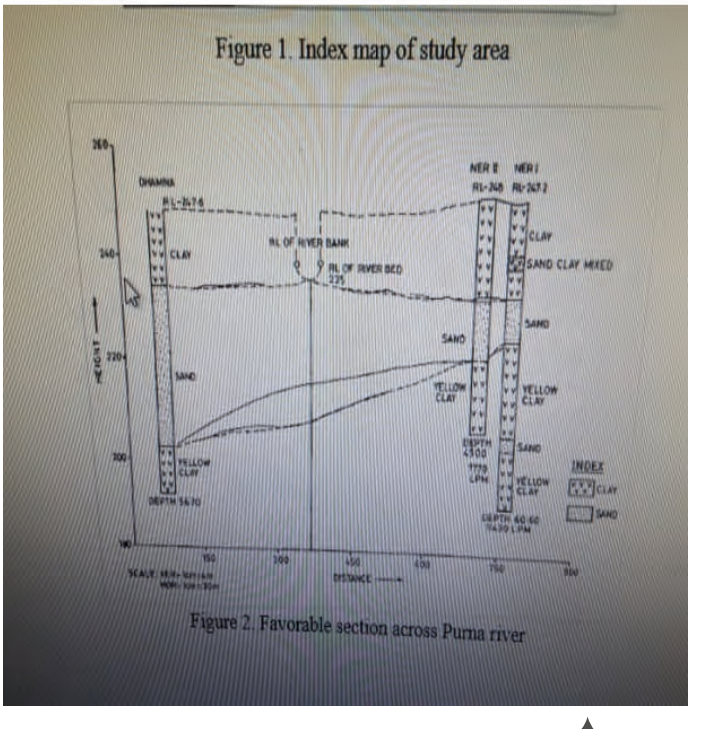
The entire saline tract is covered by Alluvium.The Alluvial deposits are termed as Purna Alluvial deposits,as they have been deposited in the Purna valley during Pleistocene to Recent period.Saline tract in this Purna Alluvium occupies 4692 Sq.Km.Alluvium is divided into younger and older. Alluvium with the younger one being more granular and the older more clayey. Ground water occurs under phreatic and semi-confined conditions down to a depth of 80 m i.e., in the younger Alluvium consisting of alternate beds of clay and sand. Two to five beds of coarse sand and gravel are encountered within the younger

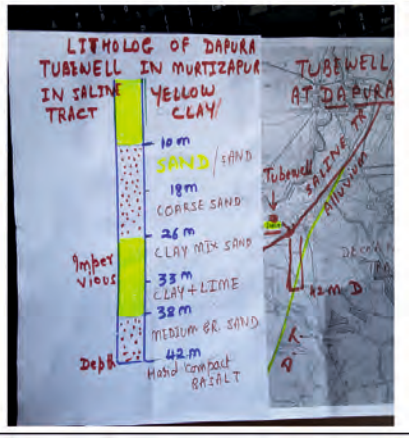
Alluvium, which forms the productive aquifer. The older Alluvium is mostly clayey with only one or two thin beds of gravel at the base near the trap basement. In the deeper aquifers, ground water occurs in confined state. Younger Alluvium is lacustrine and older is marine in nature. The basement for Alluvium is Basalt met with at different depths, which may be due to pre-trappean topography or due to faults with up thrown and down thrown blocks. Predominant slope of trap basement is northwards.The present paper deals with the younger alluvium.Survey results and information gathered from different sources reveals that in this Saline tract of Purna River section of 15 meters from ground level is useful for surface water storage without contamination with the Saline Water below.There is 12 meter thick impervious Yellow and Black cotton soil from the groun level.Then follows a 3 meter sand and gravel bed underlained by thick impervious Yellow soil.Due to this typical soil section surface water collected in different water conservation structures constructed does not percolate in to the ground.Very little water is stored and rest all surface water which is sweet flows away in the form of flood and goes to Arabian Sea.

Considering the above facts, available geological formation, and saline nature of groundwater, it is clear that in Saline Tract of Purna basin there is no alternative except to arrest rain water in huge quantity and make it to percolate into the aquifer below ground piercing the aquifuge in between without allowing water to come in contact of saline water. The thickness of aquifuge is about 12 metres. Many no of small Cement Nala Bandhs will have to be constructed in series formation on all the 1st order to 4th order streams and deepening of upstream side of each CNB upto 15 metres and widening upto 30 metres .The length of deepening and widening should be about one km.If this is done sweet water will be available in each and every village of Saline Tract that to at adepth of 15 metres.Even in excess rainfall there will not be flood and water will not be wasted.

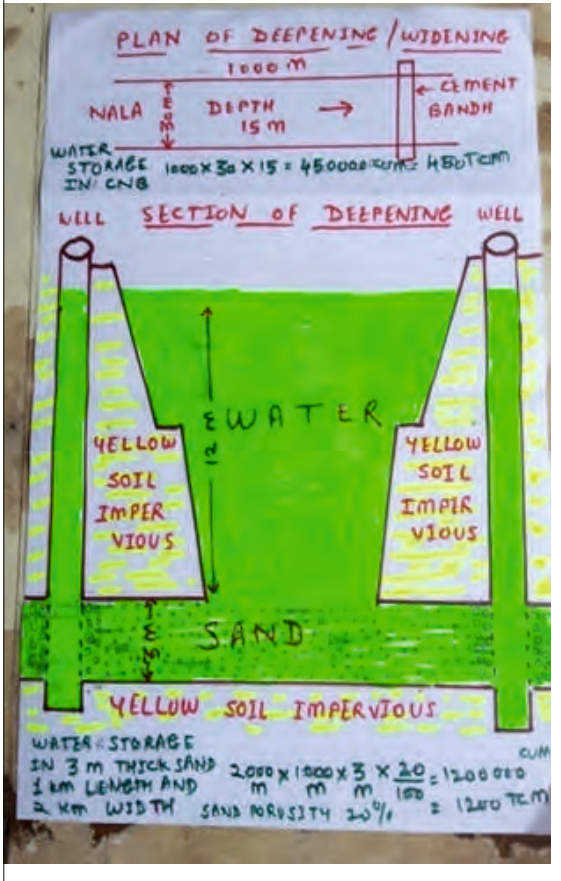
RAINFALL IN PURNA SUB BASIN(Water Availability for conservation)

The total area of Purna sub basin is 17575 Sq.Km. The average annual rainfall of Purna Sub-Basin is 750 MM. Considering this rainfall the total precipitation is to the tune of 13181 Million Cubic Metre. Average dependable yield of this Purna sub basin is 2163 Million Cubic Metre. As on today storage created is 584 Million Cubic Metre. Still 1579 Million Cubic Metre water is available in Sub-Basin which can be conserved in Saline Tract. In this project plan is made to conserve 1551 Million Cubic Metre water. In short I wanted to state that there is water shortage for conservation. On the other hand this 1579 Million Cubic Metre water is going to sea causing flood.





In the above two representative pictures Borewell logs in the Saline Tract can be seen.In both the figures it can be seen that there is 10 to 12 metre thick impervious clay followed by sand having thickness of about more than 20 metres and sand is underlain by thick impervious clay.An ideal situation to conserve sweet rain water in the sand zone within the depth of 20 metres. About 30 metre blank casing is inserted in the prevailing tubewells in this Saline tract. Due to impervious clay below sand aquifer and blank casing in the tubewells up to 30 metre the sweet conserved in sand aquifer will not intermix with the saline water below.



HERE IS A PLAN

A cement nala bandh is to be constructed on small stream of 1st to 4th order type.Upstream side of the CNB should be widened up to 30 metre and deepened upto 15 metre upto the length of 1000 metre.After rainfall 450 TCM water will be stored in deepened and widened part of the nala upto one KM.This will be sweet water.Due to hydrostatic pressure water will percolate into the sand bed having thickness of minimum 3 metre .Assuming water will spread upto one KM in length on either side of the stream.Assumtion is based on the experience of the same type of work done in Shirpur taluka of Dhule dist of Maharashtra. Length of deepened and widened part of the nala is 1OOO Metre.Total volume of sand will be (2000m*1000*3=6000000 CUM) 6000000 CUM.Considering porosity of sand as 20 % the total voume of water stored in sand bed will be to the tune of (6000000 *20/100= 1200000 CUM i.e.1200 TCM) 1200 TCM of sweet water .This sweet water will be available within the depth of 15 Metre from ground level.Water stored in the sand bed will not percolate below because it is underlain by again hard impervious yellow soil.This way every year of good rainfall one CNB will conserve 1650 TCM of sweet water which will be sufficient to irrigate 330 Ha area.Max expenditure will be including the construction of CNB about 1,50,00000.Per TCM cost will be Rs. 9090.Per Cubic Metrecost will be Rs.9.09 and per litre cost of sweet water conservation will be only Rs 0.009.Even in worst condition of not percolating a single drop of water 450 TCM water will be stored in nala.In that case per TCM cost will be Rs 33333 and Per Cubic Metrecost will be Rs.33.33 and per litre cost of sweet water conservation will be only Rs 0.03.i.e. Three Paise only.

Contd.....

Organization- CGWA

(Central Ground Water Authority)

Shri Vinod Hande - (M) : 9423677795

'Central Ground Water Authority' (CGWA) has been constituted under Section 3 (3) of the Environmental Protection Act. 1986 to regulate and control development and management of ground water resources in the country. CGWA a subordinate office of the Water Resources, River Development and Ganga Rejuvenation, Government of India. It is the National top organization with the responsibilities of providing scientific inputs for management, exploration, monitoring, assessment, augmentation and regulation of ground water resources of the country. CGWA was established in 1970 by renaming the Exploratory Tube Well Organization (ETO) under the Ministry of Agriculture, Government of India. This organization is headed by Chairman. Dr. Nandakumaran P is the chairman of CGWA.

CGWB is a multi disciplinary scientific organization consisting of Hydrogeologists, Geophysicists, Chemists, Hydrologists, Hydrometeorologists and Engineers. Head quarter of CGWB is at Faridabad, Haryana. It has four wings, namely 1) Sustainable Management & Liaison (SML), 2) Survey, Assessment & Monitoring (SAM), 3) Exploratory Drilling & material Management (ED&MM) and 4) Water Quality & Training and Technology transfer(WQ&TT). The board has 18 Regional offices headed by a Regional Director, supported by 17 Engineering Divisions and 11 State Unit Offices for undertaking various field activities. Rajiv Gandhi National Ground Water Training & Research Institute is at Raipur. Table below elaborates 18 regional offices and states covered by them,

Sr.	Regional Office	States covered
1	Chandigarh	Punjab, Haryana & Chandigarh
2	Jammu	Jammu, Kashmir & ladakkh
3	Dharamshala	Himachal Pradesh
4	Ahmedabad	Gujarat, daman and Diu
5	Bhopal	Madhya Prasesh
6	Jaipur	Rajasthan
7	Lucknow	Uttar Pradesh
8	Deharadun	Uttarakhand
9	Kolkata	West Bengal, Sikkim, Andaman & Nicobar
10	Guwahati	Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura.
11	Patna	Bihar and Jharkhand
12	Bhubaneswar	Odisha
13	Raipur	Chhattisgarh
14	Nagpur	Maharashtra , Pune, Dadra & Nagar haveli
15	Bengalore	Karnataka & Goa
16	Chennai	Tamil Nadu & Pondicherry
17	Hyderabad	Andhra Pradesh & Telangana
18	Thiruvananthapuram	Kerala

Major activities of CGWB include ground water management studies, exploratory drilling program, monitoring of ground water levels and water quality, demonstration for artificial recharge and rainwater harvesting for rise of ground water level.

The mandate and objectives of organization is to develop and circulate technologies, monitor and implement national

ground water by industries / projects in 802 Over exploited and 169 critical assessment units. CGWA has notified 162 critical/ over exploited areas in parts of NCT Delhi, Haryana, Punjab, Andhra Pradesh, Rajasthan, Madhya Pradesh, Gujarat, West Bengal, Uttar Pradesh, Karnataka, Tamil Nadu, Puducherry and Diu. Construction of new ground water structures prohibited in the notified areas. Permission of drilling tube wells is being granted only to the Govt. agencies responsible for drinking water supply.

policies for scientific and sustainable development and management of India's ground water resources including ground water exploration, assessment, conservation, augmentation, protection from pollution and distribution based on principles of economic and ecological efficiency and equity. The following objectives are also laid down for CGWB,

- Aquifer mapping to prepare aquifer maps and management plans.
- Long term monitoring of ground water through existing and enhance ground water observation wells.
- Capacity building in ground water development and management.
- To enhance ground water sustainability through artificial recharge and rain water harvesting measures for arresting the depleting trends of ground water.
- Management of ground water resources in coordination with State Government Organizations.
- Technical assistance to Defence and Govt. Organizations for providing feasible sites for ground water sources for their water supply schemes.

The CGWA is regulating withdrawal of

A report was published by CGWA about the steady decline of ground water quality in the country. Report of 2013 was released in 2017 and summarized in following table,

Year	Percentage of districts			
	Safe	Semi- Critical	Critical	Over exploited
1995	92	4	1	3
2004	73	9	4	14
2009	72	10	4	14
2011	71	10	4	15

Table indicates fall in safe districts where as rise in semi-critical, critical and over exploited

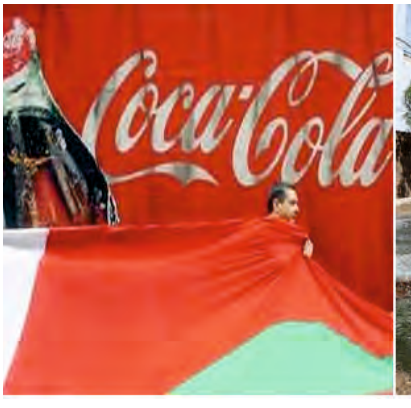
districts. Model bill to regulate and control development of groundwater has been circulated by Ministry of Water Resources to all states and UTs. States that have implemented ground water legislation so far are Andhra Pradesh, Goa, Tamil Nadu, Kerala, West Bengal, Himachal Pradesh, lakshadweep and Pondicherry UT.

CGWB initiated National Aquifer Mapping and Management in 2012 for 25 lakh km² of area identified of the 32 lakh km² of area of the entire country. It was done in phases. During XII plan (2012-17) area of 5.26 lakh km² covered in the eight states of Haryana, Punjab, Rajasthan, Gujarat, Andhra Pradesh, Telangana, Karnataka and Tamil Nadu because of over-exploitation and ground water contamination. During 2017-20 mapping area was targeted for 6.6 lakh km² and during 2019-20 mapping plans were developed for an area of 2.16 lakh km².

Ground Water Exploration by drilling is one of the major activities of the Board for determination of their hydraulic parameters. Priority was given for exploration in over exploited, critical, semi critical and drought prone area. Area affected with ground water pollution were also given priority. As on March 2020 Board has drilled 42149 bore holes for ground water development in the country.

Increasing salinity in ground water is also a point concern for the Board. What is saline water ? Water having salinity in excess of 2500 µmhos/cm at 25°C. Salt concentration Can be measured by evaporating a sample and measure the dried salts left behind(Total Dissolved Solids or TDS). The water considered to be good for drinking with a TDS level of about 600 mg/L. Water with TDS level of about 1000 mg/L becomes unfit for drinking. Units of measurement of salinity. Salt concentration is described in units of parts per thousand (PPT), parts per million (PPM), milligram per liter (mg/L) or percent. The relationship between these units is, 1 ppt=1000ppm=1000mg/L=0.1 percent.

Conductivity Method for Salinity - The electrical conductivity of water is proportional to its concentration of electrically conductive salt ions. This can be measured by with a hand held device called conductive probe or meter. Conductivity can be converted to salinity if temperature and pressure are known.



Groundwater utilization permission from CGWA- Groundwater is one of the most important water sources in India and accounts for over 400 km³ of annual utilizable resource in the country. Due to very high consumption, CGWA has restricted use of groundwater for industrial and infrastructural projects. Under regulation of groundwater resources, it has become mandatory to take NOC from CGWA for construction of tube wells. For this purpose the study on groundwater availability and equivalent recharge is required. Board provides such NOC's. With the direction of Hon'ble Supreme Court issued orders in 1996, CGWA is regulating groundwater development and management in our county. In 2015 National green Tribunal issued directions to CGWA to ensure that any person operating tube well or any means

to extract ground water shall obtain permission from CGWA and authority will also ensure sealing of all illegal and unauthorized ground water tube wells.

As per Environmental Protection Act.1986 authorities who can exercise the power to issue NOC are District magistrate, Deputy Commissioner, State groundwater authority, State Nodal agency for various uses. Powers are shown in following table,

Quantum of ground water extraction		
Safe & Semi –critical	Critical & Over exploited	– Authorized Officer/ Organization
Up to 50 m^3/day	Up to 20 m^3/day	District magistrate/ Deputy Commissioner
>50- 500 m^3/day	>20- 200 m^3/day	State groundwater authority, State Nodal agency

Extraction of water for >500 m^3/day in Safe & Semi –critical and >200 m^3/day Critical & Over –exploited areas NOC cases concern authority is CGWA. There are few states where CGWA does not issue NOC for extraction of ground water, there it is regulated by State Ground Water Authority. These States are Andhra Pradesh, Goa, Himachal Pradesh, Jammu & Kashmir, Karnataka, NCT Delhi, Tamil Nadu, Telangana, West Bengal, Chandigarh, Puducherry and lakshdweep.

Extraction effect on groundwater quality :

This is about areas where groundwater quality has severely deteriorated due to excessively extraction of ground water. CGWA has revealed that level of fluoride and chloride have steeply increased along with salinity.

As per CGWA's report chloride increased by 40 percent, fluoride by 90 percent and salinity of water increased by 194 percent against the permissible limit of chloride 250mg/l, fluoride 1.5 mg/l and salinity less than 1000 mg/l. These figures points to illegal extraction of ground water. CGWA regulates the use of groundwater across India by issuing guidelines to states for implementation and monitoring.

Quantification of ground water resources is one of the major inputs in planning groundwater development and management in the country. In order to standardize methodology for computation of groundwater resources various special studies have been carried out in different hydrogeological conditions throughout the country. In this regard CGWB carried out 3 domestic and 9 bilateral projects with assistance from UNDP, SIDA, UK and Canada during 1974-1985. These projects covered both soft and hard rock places throughout the country for assessment. Assessment involves estimation of annual groundwater resources (recharge) annual groundwater utilization and percentage of utilization with respect to recharge. These assessments are carried out by Ground Water Resources Estimation Methodology, 1997(GEC'97) guide line.

Ground Water Quality Monitoring :

Monitoring of ground water quality is to obtain information on chemical quality through sampling in different hydrological units. The chemical quality is being monitored by CGWB once a year through a network of 15000 observation wells located all over country. Apart from these observation wells the quality is also monitored

through various studies like ground water management studies, ground water exploration etc. The main ground water quality problems in India are as follows,

Salinity :

salinity in ground water can be of two types, i.e. **Inland salinity and Coastal salinity.**

Inland salinity :

Inland salinity in groundwater exists in the arid and semi arid regions of Rajasthan, Haryana, Punjab, Uttar Pradesh, Delhi, Andhra Pradesh, Maharashtra, Karnataka and Tamil Nadu. In some areas of Rajasthan & Gujarat ground water salinity is so high that the well water is directly used for salt manufacturing by solar evaporation. Inland salinity is also caused due to practice of surface water irrigation without consideration of ground water status.

Coastal salinity :

India has a coastline of about 7500 km.. Sea water ingress, leach from canals constructed along coast, leach from salt pan etc.. In India, salinity problems have been observed in a number of places in coastal states of country. Problem of salinity ingress has been noticed in Tamil Nadu and saurashtra coast.

Fluoride :

85 percent of rural population of the country uses ground water for drinking and domestic purposes. High concentration of fluoride in ground water beyond permissible limit of 1.5 mg/l poses the health problem. State's districts where fluoride concentration is >1.5 mg/l. are,

States	Districts	States	Districts
Andhra P	19	Jharkhand	6
Assam	4	Karnataka	20
Bihar	9	Kerala	1
Chhattisgarh	12	Madhya P	19
Delhi	6	Maharashtra	8
Haryana	14	Orissa	11
J&K	2	Punjab	11
Rajasthan	30	Tamil Nadu	16
Uttar Pradesh	10	West Bengal	8

Arsenic :

Arsenic occurs naturally in the environment as an element of the earth on the outer surface with large quantity. Arsenic combines with elements like Oxygen, chlorine and sulphur to form inorganic arsenic compounds. Arsenic and its compounds are widely used in agriculture, livestock feed, medicine, electronics, metallurgy, etc. Through drinking water arsenic enters human body. As per BIS permissible limit of Arsenic is 0.05mg/l. In India high concentration of Arsenic beyond 0.05 mg/l has been reported from 86 districts of 10 states. And those states are Assam, Bihar, Jharkhand, Chhattisgarh, Haryana, Karnataka, Manipur, Punjab Uttar Pradesh & West Bengal.

Iron :

High concentration of iron i.e. >1.0mg/l has been observed in more than 1.1 lakh habitation in the country. Affected states are Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, J&K, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal & Andaman & Nicobar.

Nitrate :

Nitrate is very common in shallow aquifer. High concentration of Nitrate beyond permissible limit of 45 mg/l causes health problems. High Nitrate concentration found in ground water in almost all hydrological formations.

Further details and queries can be had from contact details of Board.

Central Ground Water Board,
Bhujal Bhavan,NH-IV,
Faridabad-121001

Email- chmn-cgwb@nic.in
www.cgwb.gov.in

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Environment ministry finalises coal thermal power plant categories: What does it say about emission norms compliance

The Union ministry releases list of coal thermal power plants and their categorisation in line with its April 2021 notification

Nearly 78 per cent of the coal power capacity in India is not liable to meet emission norms before 2024.

The Union Ministry of Environment, Forest and Climate Change (MoEF&CC) has released the final list of the coal thermal power plants and their categorisation in line with the ministry's April 2021 notification.

In April 2021, the MoEF&CC amended the 2015 notification to put coal thermal power plants under three categories, determining the 'third-time' revised deadline for meeting emission norms.

After eight months of delay, the task force appointed to categorise the plants has finalised the list.

Coal thermal power plants contribute to over half sulphur dioxide (SO2) concentration, 30 per cent oxides of nitrogen (Nox), 20 per cent particulate matter (PM) in the ambient air.

In 2015, the Union Ministry of Environment, Forest and Climate Change (MoEF&CC) introduced a notification directing coal-based thermal power plants (TPP) to comply with stringent emission norms. The deadline was initially set as 2017. Since then, there has been constant push from the industrial lobby to delay the deadline.

As the 2017 deadline approached, the Union Ministry of Power in consultation with the thermal power plants, submitted another phase-in plan to MoEF&CC and requested for an extension of seven years (till 2024) to meet the norms.

After much deliberation in the Supreme Court, the power plants were granted a five-year extension (till December 2022) to meet the deadlines in a phased manner. The 11 plants in Delhi-NCR were directed to comply with the norms by 2020.

This, however, did not deter the pushback by power plants to meet the emission norms. The norms have already been relaxed for two of the five parameters for which they were revised or formulated since the deadline was extended.

- In June 2018, water norms for units installed post-January 2017 were diluted from 2.5 cubic meters per megawatt-hours (m3 / MWh) to 3 m3 / MWh
- In May 2019, NOx norms for units installed between 2004 and 2016 diluted from 300 milligrams per cubic meter (mg / Nm3) to 450 mg / Nm3

The dilution in norms and unwarranted deadline extensions of compliance was dissented and in February 2020, the Central Electricity Authority (CEA) submitted a paper urging flue-gas

desulfurisation to be installed only in those plants where SO2 concentration in ambient air was over 40 microgram per normal cubic metre (µg / Nm3).

It criticised the MoEF&CC for framing uniform norms for all TPPs across India and advised different norms be set for different TPPs.

Finally, on April 1, 2021, the MoEF&CC released an amendment, superseding the 2015 Notification on new emission norms. The amendment to the notification served to revise the

Parameter	SOx (mg / Nm3)	NOx (mg / Nm3)	PM (mg / Nm3)	Water (m3/MWh)	Mercury (Hg) (mg / Nm3)
Units installed before December 31, 2003	600 (<500 MW) 200 (≥ 500 MW)	600	100	3.5	0.03 (≥ 500 MW)
Units installed between 2004 and 2016	600 (< 500 MW) 200 (≥ 500 MW)	Initial: 300 Revised: 450	50	3.5	0.03
Units installed from January 1, 2017	100	100	30	Initial: 2.5 Revised: 3	0.03

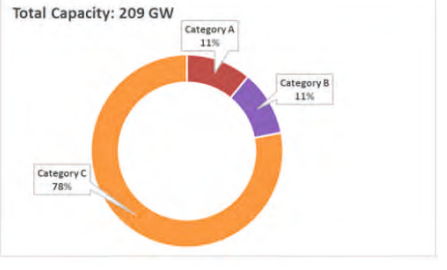
compliance deadline for the third time now.

It puts coal thermal power plant units into three categories:

Taskforce work

A task force was constituted by the Central Pollution Control Board (CPCB) April 16, 2021, to disaggregate 596 coal thermal power plant units into three categories: A, B and C.

Category	Criteria	Deadline for compliance
A	Within 10 km radius of the National Capital Region (NCR) or cities having million-plus population	2022
B	Within 10 km radius of critically polluted areas or non-attainment cities	2023
C	Remaining plants	2024



The country's 596 coal thermal power plant units have been put under three categories: A, B and C. Source: CEA

Independent power plants: Categorised by CEA in association with the concerned state pollution control boards (SPCB). The boundary details of the critically polluted areas were provided by SPCB.

Captive thermal power plant: Categorisation done by the SPCBs concerned in consultation with the CEA.

The draft list compiled by the task force was initially circulated to the power plants for further comments by September 10, 2021. And now finally, the list has been released by the Central for Pollution Control Board in the public domain and to be shared with the coal thermal power

plants.

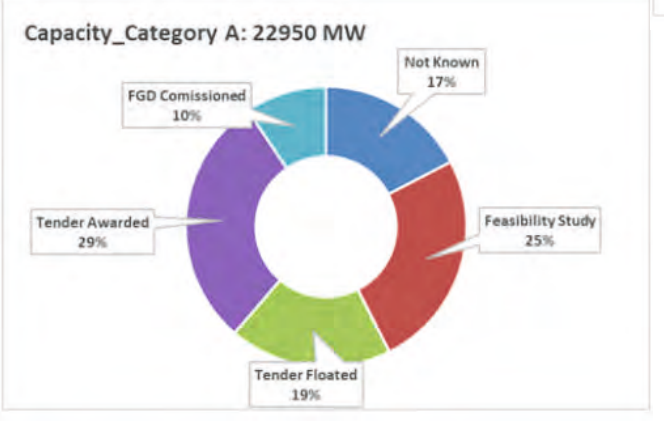
The categorisation by the task force puts approximately 11 per cent of the capacity in Category A and Category B. Nearly 78 per cent of the coal power capacity is placed under Category C.

Status of category-wise compliance status

The CEA tracks the status of compliance with the SOx norms in terms of installation of a sulfur removal technology: Flue Gas Desulfurisation (FGD).

The installation status can be traced under four progressive stages: Feasibility study, tender floated, tender awarded and FGD commissioned.

An analysis of the December 2021 compliance status according to the CEA showed that only 10 per cent of the capacity of Category A units has so far complied with the emission norms, another 29 per cent has awarded bid but it is not clear if work has been initiated in these units.



Status of Category A power plants and capacity. Source: CEA

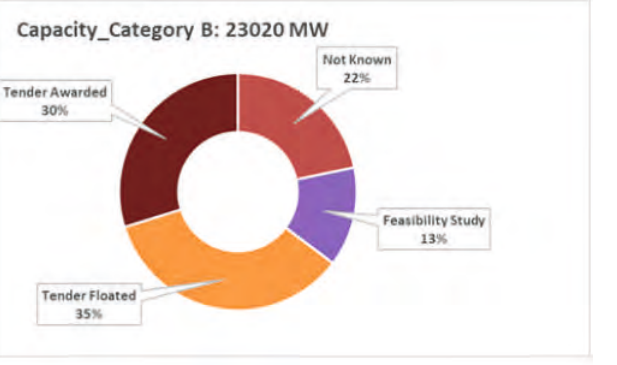
There is no plan / or it is not reported by CEA for 17 per cent. Another 25 per cent is at various stages of the feasibility study and 19 per cent has floated the tender but is yet to award the bid.

It takes two years from award of the bid to commissioning of FGD. Considering this, a minimum of 61 per cent of thermal power plants in Category A will miss the 2022 deadline.

An ownership-wise analysis shows that a majority of the coal thermal power capacity that is likely to meet the norms belongs to the central sector, followed by the private sector.

The plants belonging to the state sector: Some have floated the tender or at various stages of feasibility study or simply have not framed any action plan so far.

None of the Category B plants so far have been complying with the emission norms. At least 30 per cent of the capacity has awarded tender, 35 per cent has floated the tender and 13 per cent are at various stages of feasibility study.



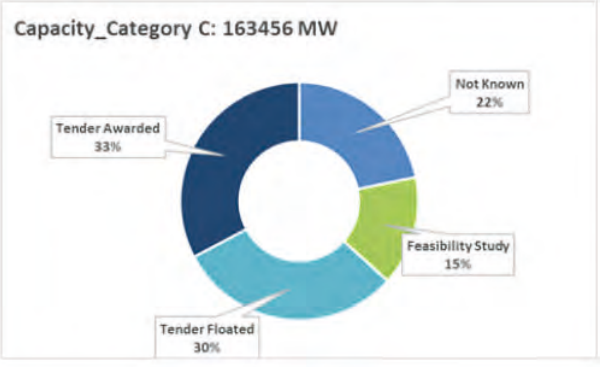
Status of Category B power plants and capacity. Source: CEA

There is no plan to meet the norms for 22 per cent of the capacity. The deadline for Category B plants is 2023. Down to Earth's analysis shows that 35 per cent of this capacity will miss the deadline again.

For category C plants, 33 per cent of the capacity has already been awarded tender. This means that this capacity could have easily complied with the emission norms by end of 2022.

However, the deadline for these plants has been postponed to 2024. Tender has been floated for 30 per cent of the capacity and 15 per cent is at the feasibility stage. Status is unknown for another 22 per cent.

Assuming that tender is awarded by next year for the plants where the tender is already floated, it is safe to say that the 32 per cent capacity in Category C will still not comply by 2024.



Status of Category C power plants and capacity. Source: CEA

Push to do away with emission norms

The emission norms introduced in 2015 by MoEF&CC have been made a mockery of. The norms have been diluted, deadlines missed and revised to accommodate coal thermal power plants.

Allocation of a minute 22 per cent in Category A and B and 78 per cent in Category C is in itself a clear indication that both MoEF&CC and CPCB are not serious about the implementation of the new emission norms, said Nivit Kumar Yadav, director, Industrial Pollution Unit, Centre for Science and Environment.

The delay in announcing the categorisation has resulted in stalling progress in the implementation of an action plan for compliance with the emission norms, particularly SOx norms.

Even the plants in Category A with a 2022 deadline have not made any progress since the announcement in April 2021 about the revisions in deadline (as reported by CEA).

It is clear from the categorisation list and compliance status given by CEA for December 2021 that 35 per cent of the total coal power capacity belonging to all three categories is going to miss their respective deadlines. Of this, 19 per cent would be category A; 11 per cent from Category B and 70 per cent from Category C.

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Stockholm Water Prize 1998
Prof. Gideon Dagan, Israel
Gajanan Deshpande, Pune
+91 9822754768

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

Groundwater resources are not bound by political boundaries. However, they are an essential source of water for all who have homes on it. The reservoir does not depend on the country or the political system in which they live. Therefore, research is very important to find out the properties of this water in such a state.

Gideon Dagan, a professor at Tel Aviv University, was awarded the 1998 Stockholm Water Prize for his unique research on groundwater. Dagan must have had an in-depth knowledge of the invisible underground aquatic life, and because of this, his research in the aquifers spread over west bank region, in the interior of mountain ranges is very important.

Groundwater is of paramount importance - especially in arid regions such as the Middle East and North Africa. The prudent management of these limited and important natural resources requires close international cooperation.

Professor Gideon Dagan says - the problem is that we can only record measurements and observations at certain points, which should actually be in a sufficiently large area. Another problem is that groundwater rocks and silt are extremely heterogeneous.

Over the last twenty years, Dagan has developed a number of mathematical models, known as the 'stochastic model' - which provides information on how groundwater flows through porous substances and how pollutants and other substances are transported in it eliminating misunderstandings thereby improving the decision making process. There were improvements. Since this whole process is based on probability, decisions tend to be as realistic as possible.

According to Prof. Gideon, "It takes a long time for the subterranean surface to change, and this means that when it comes to preventing pollution, the consequences are pronounced even more late."

A working model makes it easier for you to solve problems that arise. It gives us the ability to cash in on pollution or reduce its spread with better forecasting. This kind of advance warning is always useful - since the decision is ultimately up to the politicians, any proposal for action on pollution is even more delayed.

Predictions of possible movements of chemicals, metals or radionuclide can be obtained. For example: Sweden may face some problems in its nuclear program in the future, for eg. when this waste is stored in rocks in the soil, the radioactive

material there can then spread through the groundwater. "

Carcinogenic radioactive substances released from nuclear explosions pose a major threat to groundwater. It was recently discovered that plutonium spilled from atomic bomb tests carried out in the 1970s near Las Vegas, Nevada, had spread to the ground within a few kilometers of the test site. In the case of Russia too, there are fears that the scale of such problems could be huge.

Dagan emigrated from Romania to Israel in 1962 as a young engineer. After working for twelve years at the Israel Institute of Technology in Haifa, he became a professor. Two years later, in 1976, he joined the engineering faculty of Tel Aviv University. Prof. Gideon Dagan conducts his research work in collaboration with researchers and universities around the world. In his illustrious career spanning over forty years, he has served as a visiting professor at ten universities. During his tenure, he was drawn to prestigious institutions such as the University of California at Berkeley, Imperial College, London, Ecole Des Moines, Paris and Princeton University; considering his wisdom in higher education.

Professor Dagan's recent achievements have been recognized by the Institute for Scientific Information, which has named him one of the most outstanding researchers in the field of environment and engineering. Professor Dagan has been honored by the American Geophysical Union with the 2005 Horton Medal.

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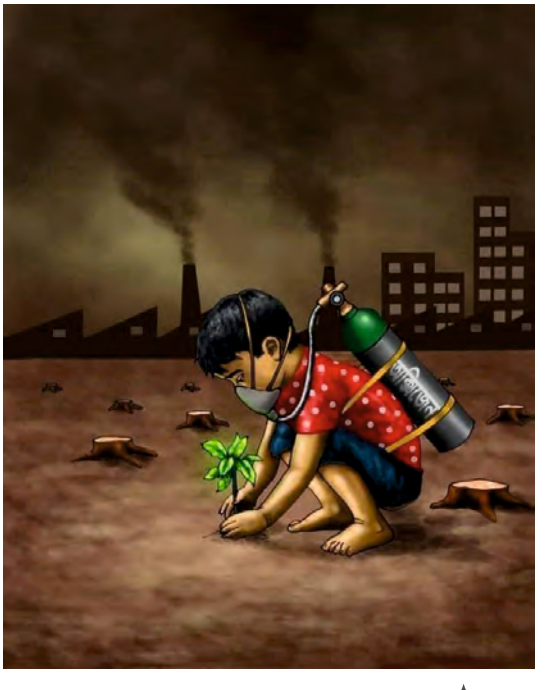

Success story of Gujarat:

- Few years before I read a news in one newspaper that the State of Gujarat has solved water problem to a great extent. I failed to understand how that state could solve water problem even when the rainfall position there is not very satisfactory. I therefore decided to take a trip to Gujarat and find out the reality in that statement.
- In a trip of nearly 12 days, I visited at least 10 to 15 villages to study the situation. I came to know that there is one voluntary agency by name Saurastra Jaladhara Trust which is responsible for this magic. It purchased good many earth removing machines and dumpers and started giving them free of charge for use for deepening and widening of Nallas in every village. Only charge the villagers had to bear was the diesel charge required for the operation of these machines.
- That institute had appointed consulting engineers also who were expected to prepare the plan of work for each village. That service also was free of any charge. The engineer used to prepare a plan and the villagers used execute it. The plan consisted of (1) preparing a map of nallas flowing in the village boundaries. (2)widening and deepening of those nallas. (3) construction of check dams.
- For this execution villagers came together forgetting their caste and creed, political leanings, contributed financially as well as physically. The result was apparent. More than 5,00,000 check dams was the outcome. Water stopped flowing and the result was percolation in the soil increased. Ground level started coming up and where one single crop also was difficult, cultivators started cultivating three crops every year.
- Saurashtra Jaldhara Trust arranged meetings of steel bar manufacturers and cement factories and requested them to supply steel bars and cement at a reasonable price. Since this project was for the benefit of all, they readily agreed and the check dams could be constructed at a reasonably low cost. Government also came forward and started giving financial assistance to the project.
- Farmers paid more attention to grass and ground nut cultivation. That gave a boost to ground nut oil and milk. That is the reason why Dhara oil and Anand dairy could flourish. Today these two brands have become the fighting brands of Gujarat. When so much water was available, cultivators could easily shift to sugar cane cultivation. But they preferred three different crops per year rather than cultivating a single crop for one year.
- I was surprised to note that the cultivators started appointing consultants for proper crop planning on payment of handsome fees. These consultants- agricultural experts- paid regular visits to the farms and gave written instructions for improvement in the management of the field. That gave a big fillip to agricultural growth.
- Can other states in the country follow this model? If such radical steps are taken farmers would lead a comfortable life and would be financially well off. Note that the problem of farmers suicide is not seen in Gujarat.

Heartiest greetings from the Jalasamvad family

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