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Jalasamvad

A Dialogue on Water

Editors: Dr. Datta Deshkar, Shri Satish Khade

ALERT! EXTREME WEATHER EVENTS AHEAD!




Supply of Water :

- Right from the morning till evening, we use water for various activities. Do you know from where it comes? Nature has given us five important resources. They are: Land, Minerals, Forests, Water and Air. We call water as life because we cannot live without it. If we do not get food we can survive for some days but if water is not available we cannot survive for long.
- Nature has given us unlimited quantity of water. But a major portion of it, we cannot use. That major portion is sea water. Nearly 97 percent water falls in this category. Sea water can be converted in potable water but that is a costly process. 3 percent is potable water.
- Out of that 3 percent, 70 percent is in the form of ice. That is in Antarctic and Arctic area and also on high mountains like Himalayas and 30 percent under the soil in the form of ground water. Then what is left for us?
- These 70 and 30 percent are approximate figures. In them, there is a small gap of 0.3 percent which is potable water available in rivers, lakes and ponds. But these rivers and lakes get water from rain God.
- For the benefit of human beings, Nature has created a water cycle. Due to sunlight, sea water gets heated and gets converted into vapor. Vapor is light in weight and it rises to the sky. There, clouds are formed. With the flow of winds they move to the lands. They become heavy because of the water in it. Due to cold air, water from the clouds falls on the earth in the form of rains. This is a continuous process and that is why there is a continuous supply of water we are getting.
- With the fall of water on the ground, rivers and lakes are formed and thus potable water is made available to human beings. River water, if not stopped, ultimately flows back to the sea and the water cycle is complete. But realizing the importance of water, major portion of water is stored and used for agriculture and other activities.
- When the human being realized the importance of water, he tried to stop the flow of rivers by constructing bunds, check dams, dams etc. and started diverting it through canals to the fields. The entire economic development has become possible due to the wise use of water. Water is converted into energy (hydel energy and thermal energy) and by using that energy factory system could come up. Since time unknown, water is being used for transportation also.
- Supply of water can be increased by treatment and recycling. Sea water can be treated and converted into potable water. Similarly waste water can also be reused after recycling. These methods have become popular in those countries (like Israel and Singapore) where adequate water is not available. Arabian countries get scanty rains and there is no alternative for them but to use desalinated water.

Jalsamvad

Mouth Piece of Bharatiya Jala Sanskriti Mandal

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Editorial .....

Sugar factories to get an assistance of Rs 3,000 crore from GOM

The only question is how much to pamper a beloved child. It was learned that the government of Maharashtra has accepted the responsibility of repaying the loan of Rs 3,000 crore, taken by the sugar factories from the banks, as it could not be repaid. And now, it would be repaid from the government's coffers. Sugarcane production and sugar factories have, now become a pain in the ass for the government.

A couple of days ago, a news item was read. It was reported that, the sugar factories in Gujarat were paying farmers at a higher rate than the guaranteed price. In fact, the sugar yield there in Gujarat is less than that of Maharashtra. If Gujarat can afford this, why not Maharashtra? This is the real question. Yesterday's news was that the price of sugarcane has not been paid to the farmers as yet. It was also read that the sugar factories have arrears of Rs 18,000 to be paid.

Our political leaders are coiled around the co-operative sugar factories like snakes. They are not been able to run the government properly and also they have ruined the sugar factories. Their private factories are run properly, they also make a profit as well. But when the same people run co-operative factories, they suffer a loss. This is incomprehensible.

This is not just a matter of co-operative sugar factories. The same is true for co-operative yarn mills and co-operative banks also. The private wealth figures of all these political leaders are increasing. But, on the other hand, the co-operative institutions are begging. In the case of co-operatives, there is a rule that the board of directors have to buy excess shares. In English this is called qualification shares. This means that if the organization is losing money, they should suffer more and for this reason, they will run the organization more responsibly. But, that is not the case here. No one is responsible for the damage caused. Such inefficient management increases production costs. For this reason, they cannot compete in the world market. However, the government is always there to support them like a father. They get subsidies for sugar exports.

There is an important principle of co-operation - it is the responsibility of the organization to develop the members holistically. This includes not only the economic development of the members but also other ancillary developments as well. But, it's a pity that since all the members are being ignored carelessly, they are pushed into a bad situation. You will not see even one sugar factory who has guided the farmers in increasing the sugarcane productivity or assisting them in supplying fertilizers and other inputs and helping them in getting credit facilities. Instead, they are deceived by taking out loans on their own land without their knowledge. As a result of all this, the trust in cooperation seems to have faltered.

The government must help in order to have a proper development of sugar industry. Not only that, but it also needs to be helped uptill it strengthens its foundation. However, there should also have some limitations. We know that a wheelbarrow is used to teach a child to walk. But, that too to a certain extent. If the child grows up and continues to use the wheelbarrow, deformities might occur in him. Therefore, it has to be removed at a certain stage. There is a saying in English, which tells "Nurse the Baby, Protect the Child and free the Adult". Even after so many years, the sugar industry has not been able to stand on its own feet.

This protection of the sugar industry has become a costly affair for the common man. The price of sugar in the world market is comparatively much lower. But, we have been buying sugar at a high price for years. If there was an open market, we would have got sugar cheaper by at least Rs.10 for a kg. In short, it doesn't matter if you say that these sugar millers are filling their own pockets on our cost.

In fact, farmers are the owners of sugar factories. But, their condition is worse than that of a servant. We are looking at this with open eyes. In the meantime, these same thieves have deceived the farmers, the government, the banks and the society by auctioning off the co-operative sugar factories and buying them themselves and still they are in the limelight today.

Charting India's Water Future - Vision, Mission and Passion

The Mission - The Passion - Glorious Future is Now !

Sharad D. Mande (M) : 9860982825

1. India's Specific Water Challenges - Needing Solutions :

Safe water for public health and clean water for the environment are significant issues in India. The water professionals of India are highly skilled and talented, therefore water solutions that come as a result of extreme situations can provide guidance to other countries too. Thus, we have to get lessons from those nations who have successfully solved their problems and become rich. If we consider, for example, some indicative statistics, it will gather that during last 5 decades changes (1963-2013), India's Average Annual Population Growth rate is 1.9%, (1963 - 47,76,15,992 2013 - 1,25,21,39,596), USA - 1% (1963 - 18,92,42,000 2013 - 31,61,28,839) and the Canada 1.2% (1963 - 1,89,64,000 2013 - 3,51,58,304) and the life expectancy at birth has been changed for India's from 43.6 yrs. to 66.2 yrs., while USA 69.9 yrs. to 78.7 yrs. and Canada's 71.4 yrs. to 81.2 yrs. i.e. improvement is 52%, 13% & 14% respectively. After independence, India is marching for better future, but it is still hard period to satisfy for adequate water, liveable housing shelter, safer & quick transportation, enough food, luxury with leisure, smart cities i.e. the parameters encountered for calculating "World Happiness Index".

2. The China's Great Leap - how to respond and to deal with :

In the earlier "The Mission" part of this theme paper, examples of Israel & Singapore were quoted, similarly in forgoing para America & Canada's statistics are referred, but when compared with China - the "Roaring Eastern Tiger" - we have to adopt paradigm shift very rapidly, to compete with China.

The Communist Party of China - (CPC) is celebrating centenary from 1st July of this year. After establishing the Party in 1921, later in the year 1949, - Mao Zedong transformed Communism ideology and then in 1978 Deng Xiaoping, keeping communism by the side, moved to market oriented development. In last 3 decades, with new ideology adopted, surprisingly success achieved in each and every field of life. Nearly, 80 crore poor population of 1978 has been upgraded and brought above the poverty line. Take the case of Bullet train - first train started in 2007, today laid fast track network is of 37900 Km, it happened in case with Space Research field, Smart Cities, Sky Scrapers, Universities, Cultural & Sports activities. Artificial Intelligence, Block Chain, Robotics and such latest tools become the keywords for development. Most important is concentration in basic fields like multipurpose water storage projects. More than 25000 big dams and hydro-electric projects have been built during last half century and resolved water scarcity problem.

Today, China is planning to construct "Belt Road Initiative" on the lines with earlier Silk Route amalgamated with later Maritime Silk Route, and many projects on Yangtze river (i.e. in our country the river is known as Brahmputra basin), adopting "Blue Sky, Green Mountains & Clean Rivers" as a thematic slogan. China is now much deviated from its earlier principles, switching over to appropriate technology, competitive market policy and implementing quickly big Water - Irrigation & Hydroelectric projects. This incoming century will be totally different from the earlier primitive human development revolutionary stages.

Therefore, the lessons left behind this great achievement are required to be learnt -

a) Well educated, experienced, higher skilled staff is selected, posted strictly on merit basis and then entrusted with the independent responsibility.

b) Made compulsory for higher core to work in every corner of the country during its service period, so as to get regionwise experiences plus simultaneously developing country as a whole vision.

c) The decision makers conduct joint meetings frequently, review the situation and adopt suitable policies required as per time needs.

d) Trying to save "Time over run - Cost over run".

e) The political will, administrative skill & public involvement accelerating at every stage.

f) The CPC has given prominence to upgrading the Science & Technology to march with the future requirement.

This is the new "ism", a combination of "Socialism, Communism and Capitalism".

Mr. Henry M. Paulson Jr., a head of Goldman Sachs and who later become Treasury Secretory of USA, created the strategic Economic Dialogue with China. The enumerated guided principles covered in his book "Dealing with China", which India, can also adopt with new strategic foresights.

I) Help Those Who Help Ourselves -

ii) Shine a Light : Nothing Good Happens in the Dark

iii) Speak with One Voice -

iv) Find India a Better Seat on the Table -

v) Demonstrate Economic Leadership Abroad -

vi) Find More Ways to Say 'Yes' -

vii) Avoid Surprises but Be Alert for Breakthroughs -

viii) Act in Ways That Reflect Indian Realities -

India having quite large land, abundant rainfall, 3000 km seashore all mining, biodiversity, young generation, can meet the challenges.

3. Fourth Industrial Revolution and its reflections on Water issues :

On the verge of Fourth Industrial Revolution, when we review the past, it will recollect that around 1785 First Industrial Revolution has taken place after invention of "Steam Engine" by James watt, later by 1923, Second Industrial Revolution happened through generation of "Electricity", then by 1969 due to "Electronics & Computer Technology", transformation developed which was the Third Industrial Revolution and now by "Internet", 4th Industrial Revolution is approaching through Cloud Technology, Big Data Analytics, Blog Technology, Artificial Intelligence (AI), Three-D-Printing (TDP) etc. Characterized by new technologies fusing the physical, digital and biological worlds, the Fourth Industrial Revolution will impact all disciplines, economies and industries - and it will do so at an unprecedented rate. Already nanomaterials 200 times stronger than steel and a million times thinner than human hair are in development, as is the first transplant of a 3D-printed liver. And this is just the beginning. Due to each revolution, humanity has developed substantially and now robotics are replacing human efforts. Klaus Schwab, President, World Economic Forum, USA in his book "Fourth Industrial Revolution" states that due to this revolution there will be remarkable change in work culture, henceforth, 50 to 70% present jobs will be lost, 40% jobs will be replaced by higher technology and only 9% to 10% will be new skillful jobs. While acquainting the shocking "Fourth Industrial Revolution", next Fifth Industrial Revolution is waiting in que. Japan is now introducing new idea of "Society-5". "Society-1" means "Primitive Human" who was living on natural fruits/roots & killing and eating animals, "Society-2" is the "Cultivator Human", "Society-3" is "Industrial Human"- covering erstwhile Industrial Revolutions (1) and (2), and "Society-4" "Knowledge base Human" comprising Industrial Revolutions (3) & (4). In these Industrial Revolutions, there was development in technology & production thereon, but no Environmental & Gross Happiness was considered. Therefore, Japan's "Society-5", is important which relates to "Kobot" - i.e. Human brain plus Robotics working in co-operative combination – where the man's brain will do multidimensional intelligent and innovative jobs & Robotics deal with repetition of the same. The "Industry-5" adds Bioeconomy - mainly Water & Environment i.e. Agriculture, Green House

Gases, Pollution, biofuel, the synthetic biology covering DNA & Chromosome in addition to Quantum Computing, Zeno Bot, Transhuman etc.

Thus the incoming "Fifth Industrial Revolution" or as per Japan's terminology "Society-5" will drastically transform the Life Style and humanity parameters nomenclating "Super Human". Henceforth, instead of present hardware technology prime focus will go towards software applications, i.e. instead of uniform multidimensional education, apart from collecting information need will be to analyze data collected & to process suitably, instead of "IQ" importance will be given to "EQ" & skill development. All these factors shall automatically help improving water use efficiency in Irrigation, cutting NRW in Domestic uses, structural reforms in various water fields, Remote Sensing, GIS mapping, Hydraulic Modelling, equitable allocation & further distribution, comprehensive reuse etc. Thus, uptill now water is considered as Physical & Hydrological matter, but henceforth it will be valued as theoretical water requirements associated with its translation in "Virtual parameters". This is the message for new "Water Era".

4. Valuing Water & Skill Development in Water Domain :

To achieve the ambition "Vision", it is ought to formulate appropriate "Mission" based on "SWOT" analysis & then synthesizing it to the current status, delivering "Passion" for future. In case with Water, knowing problems, policies should be reformed applying following Four principles of "Integrated Water Resources Management "(IWRM) formulated in the International Conference on "Water & the Environment", held in Dublin, Ireland, in January 1992.

1. Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
2. Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels.
3. Women play a central part in the provision, management and safeguarding of water.
4. Water has an economic value in all its competing uses and should be recognized as an economic good.

In this respect, covered these principles and made definition Global Water Partnership has as "A process which promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment."

What is Water Worth? There is no easy answer to this deceptively simple question. On the one hand, water is infinitely valuable - without it, life would not exist, on the other hand, water is taken for granted - it is wasted every single day. According to economic theory, the value of a good is determined by scarcity - the gap between limited resources and unlimited needs. Adam Smith, mentioned in his book "The Wealth of Nations" (1776) that the diamonds which are rarely required in life and not easily available are priced highest value, while water which is daily need is considered free as a God's gift, since it is abundant in nature. The dawn of 21st century, water is achieving price of diamond !

Water is a finite and non-substitutable resource. As the foundation of life, societies and economies, it carries multiple values and benefits. But unlike most other natural resources, it has proven extremely difficult to determine its true 'value'.

The United Nations have declared "Valuing Water" as a theme for "World Water Day 2021" and released World Water Development Report, titled "Valuing Water" which assesses the current status of and challenges to the valuation of water across different sectors and perspectives, and identifies ways in which valuation can be promoted as a tool to help improve its management and achieve global sustainable development.

Methodologies and approaches to the valuation of water are described through five interrelated perspectives: valuing water sources and the ecosystems upon which they depend; valuing water infrastructure for water storage, use,

reuse or supply augmentation; valuing water services, mainly drinking water, sanitation and related human health aspects; valuing water as an input to production and socio-economic activity, such as food and agriculture, energy and industry, business, and employment; and other sociocultural values of water, including recreational, cultural and spiritual attributes. These are complemented with experiences from different global regions, opportunities to reconcile multiple values of water through integrated and holistic approaches to governance and financing mechanisms, and prospects to address knowledge, research and capacity needs.

For achieving the "Passion", skill development in Water Domain with the mission "to reduce the risk of water scarcity to food security, energy security, economic development and environment," will achieve its objectives by supporting the public sector service providers with skilled technicians, up-skilled professionals and socially conscious users. It will bridge the gap between the existing capacities and what can be achieved by them using latest technologies and techniques.

Some of the specific benefits of setting Skill Development Council for water Domain are:

a.Implementation of National Water Policy provisions by supporting the IWRM process, Inter-state water disputes resolution thereby reducing conflicts, and establishing stakeholders' managed river basin organizations;

b. Availability of professional and skilled workforce through vocational training and certification process to service providers as well as general public, including the water regulatory authorities;

c. Better water services to farmers by Irrigation Departments, improved functioning of Water User Associations and improved agriculture water use efficiencies;

d. Better water and drainage services for the urban population by Urban Local Bodies, rejuvenation of urban water bodies, and saving of water by reducing wastage;

e. Narrowed skill gap for implementing a number of GOI initiatives/programs such as: Swatch Bharat, Clean Ganga Mission, Smart Cities, PMKSY, Har khet ko paani, More Crop per drop, Jal Samwardhan, Har ghar jal, Jal Shakti - Jan Shakti;

f. Improved and sustainable rainwater harvesting both in urban areas as well as in rural watersheds;

g. Better support to reduce, recycling and reuse programs and help attain zero effluent solutions in the industry;

h. Increased water saving by facilitating availability of water efficient gadgets, latest tools, and industrial processes; and

I.Provision of technical support to teachers in bringing water education to children and youth in schools and to different water awareness campaigns.

5. India's Water Culture and the Passion :

In the year 2006, United Nations has declared "Water and Culture" as the theme for Annual "World Water Day" celebration. This shows that how the world has become conscious about the intricacies in the special relationship between the people and their waters – in rivers, lakes, acquifers & man made systems. The enlightened relationship will find an elegant expression through appropriate water related institutions, water laws, ceremonies, rituals, personal habits and social hygiene. The India's water culture already inherits a glorious assemblage of well planned historical water structures. A description of these well knit past around them and the lessons therefrom for a modern technological society are covered in the elaborate treaties "Bhartiya Jalsanskriti - Swarup Ani Vyapti" (Marathi - July 2006) and later in the English version (June 2009) titled "Indian Water Culture" by Dr. R. S. Morwanchikar, former Head of Dept., History and Archeology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. He was the vice-chairman of "Indian Water Culture Association, Aurangabad". As early as in 2000 Sri Lanka, Pakistan & Nepal made presentations. Prof. Asit K. Biswas, Stockholm Water Prize Laurette & Chairman, Third World Water Forum, Mexico & Naser I. Faruqui, Murad J. Bino have published book "Water Management in Islam". But Dr. R. S. Morwanchikar's, contribution proved to be the pioneering & extensive in this faculty of humanities

and the extensive coverage is world wide recognized. The chronological landmarks in the historical perspective of water heritage as enumerated in this book, are summarized as below for focusing glimpse on our rich cultural heritage and to upgrade us for the future -

a. Sindhu - Harappa Civilizations (2750 B.C. - 1650 B.C.) : These civilizations were spread over the North-Western region of India, influencing of Punjab, Rajasthan and Gujrat etc.

b. Late Harappa Civilization (1650 B.C. - 600 B.C.) : This includes Bronze Age, Tribal Farming, Neolithic Age adopted and gathered from early farmers, agricultural colonies e.g. at Inamgaon, Dayamabad, Jorve, Malwa and their contribution to water management.

c. Early Ancient Period (600 B.C. - 400 A.D.) : This period incorporates dynasties of the Northern and North-Eastern parts of India, mainly the Nandas, the Mauryas, the Shungas and from the South the Satavahanas, the Kshtrapas, the Pallavas and the Cholas etc. These dynasties undertook positive & subject oriented schemes with the help of thinkers like & hydrologists Arya Chanakya, Manu, Varahamihir and Krishi Parashar etc.

d . Late Ancient Period (400 - 600 A.D.) : This period, mainly dominated by the Gupta era, is known as the "Golden Age" in Indian History. The Vakatakas, the Nagas, the Cholas, the Pallavas etc. were their contemporaries. The Gupta Dynasty has left no such record, but nevertheless the coins referring water is strong proof to depict their contribution to the field of water management. At the same time the graceful and rich sculptures of this period speak volumes about their relation to water culture. The great hydrologist Varahamihira belonging to Gupta period released the "Brihadsamhita" an exclusive writing on water management.

e. Early Medieval Period (600 - 1200 A.D.) : The contemporary cultural life has been dominated by the Pauranic life style, considerable increase in population, growth of urbanization and the negative change in natural water cycle affecting the monsoon adversely. This resulted in a drastic change in religious thinking with a new Temple Cult (Bhakti Movement) appearing on the scene. Large number of Puranas and Smrities were composed, the Rituals and religious deeds for water were on the rise.

f. Late Medieval Period (1200 - 1800 A.D.) : During this period India faced a lot of Islamic invasions from the Middle East. Later the Sultanate was established in Delhi (1206-1526). They were succeeded by the Mughals who ruled from 1526-1750. They expanded their rule almost all over India. After 1750, the Mughal empire was reduced to many smaller fiefdoms. In 1646 Chhtrapati Shivaji successfully established the Maratha rule in Maharashtra which lasted till 1818. The East India company gradually took the reigns of the entire India in the 19th century. In 1857 there was a strong collective effort to overthrow the British rule, but unfortunately it did not succeed.

g. Pre & Post Independence Period (1800 - 2020 A.D.) : Through the East India Company, Britishers expanded their control over the country comprising of 600-800 states. For strict administration, the Britishers implemented developmental works. After Independence, through 12 FYPs our govt. has brought India on Global level, by way of constructing nearly thousands of Dams like Bhakra-Nangal, Hirakud, Sardar Sarovar, Koyna, Nagarjun Sagar etc. and setup network of canals, institutions like Central Water Commission, NWDA, ICID, CWPRS, DVC etc.

It is the water that not only gave a full stop to man's nomadic life but made it more meaningful, cheerful and colorful. As a result, large no. of cultures cropped up in the vicinities of water bodies and after a passage of time civilization emerged in the valleys of World's major rivers like Indus, Nile, Tigris, Euphrates, Yangtze etc., but out of all these cultures achievements of Indian Hydraulic Civilization far surpass the rest. From this heritage, we have to learn lessons. It is not expected to implement the projects in earlier heritage style by only copying, but to remould them in to the requirements in present context. Exploding Population, Increasing Industries, Urbanization, improved living standards & habits etc. result in expanding current water management systems.

Therefore, within democratic framework, considering total availability of water, we have to manage giving justice to all beneficiaries in all sectors of water simultaneously. Keeping proud of our heritage as mentioned above, we have to accelerate the present water related practices to meet the requirement for better future, by harnessing ambitious "Vision", transforming to glorious "Mission", based on optimistic "Passion". Then and then only, we can say that we have left better future for our incoming generations.

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Along Palar river check dams hold key to agri revival - Shanmughasundaram J

A check dam across the river Palar in Kodayanchi in Tirupattur district is all that 79-year-old farmer K N Dharmarajan has been demanding for decades. Like him, several thousands of farmers depending on agriculture in the upper Palar river basin — the lifeline of northern districts - have been pleading in vain with successive governments to construct check dams, at every five kilometre along the river.

Chief minister M K Stalin's direction to the water resources department to construct check dams wherever feasible has revived their hopes to get back to their preferred livelihood. If constructed, the check dams could breathe life into the fading agricultural practices in this part of the state that is solely dependent on the river. Farmers have petitioned the CM special cell also to get their longpending demand fulfiled.

An example of how check dams can transform the lives in a region is in the Palar basin itself. Two years after check dams were constructed across the river in Isur-Vallipuram and Vayalur in Kancheepuram district, farmers in the surrounding villages are now raising crops in all three seasons. The lush green paddy fields on either side of the river are a testimony to water conservation practices. According to PWD officials, the 222km stretch of Palar riverbed in TN irrigates around 4.5 lakh hectares of land in northern Tamil Nadu, particularly in Tirupattur, Vellore, Ranipet, Kancheepuram and Chengalpattu districts. However, the state government's failure to construct check dams has left the farming community in the lurch. Several hundred acres of fertile land are left uncultivated and they are being used as grazing fields by farmers, for close to three decades.

Dharmarajan, recounting the farming activities, said paddy and sugarcane were the main crops in the region, which was part of the erstwhile Vellore district. Traditional rice varieties — Kichili Samba, Seeraga Samba, Karuppu (seeraga) Samba, and Motta — were raised decades ago. "We used to cultivate paddy and sugarcane as alternate crops. The yield of sugarcane was 30 to 40 tonnes per acre in those days (till 1980)," he said, bemoaning the four acres of land he sold due to water scarcity.

In 2002, a proposal was submitted to the TN government, to construct check dams at 13 places across the river, and the cost was estimated at around ₹ 26 crore. Experts from Anna University aided the TWAD board to identify the sites using remote sensing technology.

"The TN legislative petition committee had also recommended the same to the TWAD board, following representation from farmers, but nothing has happened till date," Palar A Ashokan of Ambalur said. A senior official of the Water Resource Organisation said the department would take up construction of check dams across the river at Ambalur, Vengili, Iryankadu, Poigai, Vegamangalgam and Athipattu Valavanur. Two dykes would be constructed at Shenbakkam and Puttuthakku in upper Palar reaches.

Officials have finalised the sites for the check dams in a bid to store rainwater from the catchment areas of Palar's tributaries — Agaram river, Malatar, Mannar, Goundaniyanathi, Ponai and Cheyyar.

"We have completed site inspections and commenced preparing project reports. The proposals for the identified sites will be submitted to the government within a month," said the official.

The Indian Council for Water and Culture, Aurangabad

(Bhartiya Jal-Sanskruti Mandal, Aurangabad)

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The work of the Indian Council For Water & Culture is now well known to many in the society. (It is also known by the name : Bharatiya Jal-Sanskriti Mandal in Marathi.) We come across various water related issues almost everywhere. However, we will find that these water crisis mostly are not because of having less water. The main reason behind this is that its management is not good. There is lack of coordination in its management and also due to the way how water is used by people.

Although, our country has a glorious tradition of water management; today it is in dire states. We are very much saddened that these traditions are being ignored due to the attitude that modern is only the best. It is because of such wrong thinking, our precious water culture is being neglected day by day. Therefore, it has become necessary for us to understand the importance of this glorious water culture critically.

The recently carried out exercise by the Second Maharashtra Irrigation Commission has brought to the fore, the possibility of unearthing countless guiding principles through that data, which may prove useful in the context of structures being conceived in the new environment of India even today. Innumerable inspiring examples - such as the millennium old canals off-taking from Kaveri near Tanjawar in Tamilnadu, the water supply system existing in the empire of Vijanagar, the method of guaranteeing water in drought-prone area of Rashtrakutas and Yadawas, the Phad irrigation system ensuring equitable distribution of water existing in Kanhadesh (Khandesh) etc. are spread all over India.

This work can assume a proper shape only if it could muster participation of specialists and amateurs in all areas like historians, archaeologists, engineers, scientists, philologists who are well-versed in Sanskrit - Pali - Ardhamagadhi languages - all in diverse fields. The Council intends to embark upon a programme of bringing out a book series highlighting important milestones and principles in water resources development which are evident through ancient structures and systems on the basis on information made available so far and likely to be made available here-in-after from various places in this respect.

Moreover, it is the intention of the Council to pursue works such as preparing bibliography of history of India's water resources development, compiling treatises and articles bearing on this subject, bringing out translations of excellent and scholarly master-pieces elucidating the glorious heritage of India's water and culture for the various tongues being spoken in India. From this viewpoint, the Council is expecting involvement of all in the endeavor.

In view of all this, the Indian Council For Water And Culture (Bharatiya Jal-Sanskriti Mandal) was established in the year 2002 at Aurangabad - Maharashtra with the objective of systematically compiling a wide range of information on water development, presenting more details and findings to the Indian community, and raising public awareness about water availability and proper use. The council is getting guidance from the noble veteran personalities like Dr. Madhavrao Chitale, Justice Narendra Chapalgaonkar, Dr. R.S. Morvanchikar, Dr. D.M. More and many others. Dr.Datta Deshkar is the current president of the

organization and shri Gajanan Deshpande is its secretary.

The work of the council is mainly carried out keeping in view the five main streams -

1. Water Literacy: To carry out public awareness campaigns regarding judicious water use by explaining the importance and value of water, to try to solve the water issues through public participation.

2. Water Traditions: To bring the historical water management sites to the notice of the people through more and more research and make them available for revival.

3. Public Affairs : To study the rules and regulations regarding various uses and uses of water, to research and suggest necessary corrections, to organize workshops, to carry out public awareness campaigns.

4. Environment: To co-operate with the government and social organizations working in the field with a view to control water pollution and protect the environment.

5. Water Literature : To compile a bibliography of the history of water development in India, to compile books and articles on the subject, to translate the best and scholarly texts on various aspects of Indian water culture for various languages, to organize water literary meets, conventions.

Keeping these main streams in mind, the council has set its objectives as follows -

1) To study the importance of water in India's history, to preserve its glorious heritage and the efforts of its water management since ancient times and also to study the cultural heritage.

2) To study various water issues and suggest solutions, thereby providing a platform to the activists for resolving them.

3) To create awareness about water in the public and thereby changing their attitude towards water issues by making them water literate.

4) To organize meetings, conventions, workshops and conferences for creating positive public opinion regarding resolving of water issue.

5) To produce educative propaganda materials, videos etc. to explain the nature and scope of the water issues to the general public and to promote such activities.

6) Weaving a network of existing social organisations working in this field to resolve the water issues.

7) To promote scientific literature and other mediums to inculcate the importance of water management in the society.

8) To study the ways as to how various water issues are resolved and planned worldwide and to see whether those methods could be adopted in our country as well.

9) To study the current status and suitability of water laws and regulations and suggest reforms to the rulers in this regards.

10) To cooperate with the government and social organizations working in the field, in order to controlling water pollution and protecting the environment.

11) To systematically compile on a large scale, information of the historical water management in Maharashtra and other regions in India.

12) To make efforts for the restoration of the historical water bodies with the peoples participation and making use of the traditional wisdom for its water management.

Council's Network:

The council is a member organization of Global Water Partnership (GWP). To help realize GWP vision, efforts to establish a water and culture network in South Asia Region is underway. The council has, therefore, been named to act as a driver organization for strengthening the network of Water and Culture in South Asia region.

The council carries out its activities in association with number of organizations working in different fields. The council has so far worked in association with 25 different organizations in India. With the assistance of these organizations, it has organized various workshops and seminars on different topics relevant to the council's objectives. Some of the prominent activities are mentioned below -

Workshops & Seminars :

- Traditional Water Management in Medieval (Rashtrakuta) period At Nanded, Maharashtra
- Traditional Water Management in Medieval period (Phad system) at Sakri, Dist, Dhule-Maharashtra
- Water Crisis - at Deccan College, Pune,
- Water Supply issues of Aurangabad City - At Aurangabad,
- A seminar on the topic of "Water & Culture as depicted through the sculptures and paintings in the ancient Indian caves of Ellora".
- Revival of Historical Water Bodies with the help of various Government Schemes
- National Workshop on Traditional Wisdom in Water Management at Nasik
- A workshop on Historical water management practices in Ahmednagar District
- National Workshop on Water and Culture at Hampi, Karnataka in association with Sahayog, Bangoalore.
- National workshop on 'Water as a Human Right-Past and present' in association with Human right Commission of MP, India.

Water Literary Meets : (Water Conventions - Jala-Sahitya Sammelan)

The council arranges water literary meets (Water Conventions - Jala-Sahitya Sammelan) at various places for addressing various water issues. So far 11 such meets at Nagpur, Pune, Malgund, Jalgaon, Aurangabad, Nanded, Ratnagiri, Nashik, Dhule have been organized.

Lecture series, Talks & Symposiums :

Council organizes lecture series, talks on various topics of well known water experts at different places. It also arranges symposiums on various topics related to Water and Culture; historical Water Management Practices as well as on current water crisis at various places.

Talks:

The council and the Aurangabad Municipal Corporation had jointly organised a talk on 28-07-2001 at Aurangabad on 'Aurangabad Area and Water Heritage' by Shri D.M.More, Former Secretary, Water Resourcs Department, GOM. The programme was attended by presidents of Muncipal Councils in Maharathwada Region and the members of the Council, Government and Semi-government officials whose work area is concerned with water as well as the senior citizens of the city.

Symposium :

The People's Education Society's Engineering College, Aurangabad and the Council jointly held one Symposium on 'Water and Culture' on 02-11-2001. The focal speech had been delivered by Dr. M. A. Chitale. Students and staff of Engineering Colleges in city participated.

Water Literacy Campaigns :

The council undertook various water literacy campaigns so far. A special campaign was run for the school students involving more than one lakh students. State-wide women's water awareness programmes were also organized which received a participation of more than thousand women. Also a few Farm Pond Programmes involving more than 1000 farmers were organised at different places. Council's Water Brigade undertook the work of Rainwater Harvesting benefitting to more than 400 households at Aurangabad. The Council has also organised various awareness programmes through Posters and Hand bills

Book Publication / Documentation of Water & Culture Literature :

The Council has assumed a task of bringing out a series of write-ups on historical water management systems in the country. About 10 subjects are enlisted so far.

Dr. R.S. Morwanchikar, a well known historian and former Vice president of the council has written status Book on "Indian Water And Culture" which has been released in June 2006. This is now being translated in different Indian languages. An English version of the book expressing the traditional water management in medieval period has already been published few years back.

In 1995 the Gandhi Peace Foundation, New Delhi has published a book (Aaj Bhi Khare Hai Talab)

by Shri Anupam Mishra. The book is well received in all quarters of the country. Council has brought out its Marathi version.

Another book viz: 'Devagiri Daulatabad an Archeological over view' written by Dr.R.S.Morawanchikar has also been translated in Marathi bearing title "Mdhayugin Jal Sandharan-Jalavyavasthapan - Devagiri Daulatabad". The council has also translated Nepalese Water & Culture country's status book in Marathi.

Jala-Samvad Magazine :

One of the main and prominent activities of the council is its sponsored monthly Marathi magazine viz:"Jala-Samvad" which also acts like its mouthpiece, is being consistently published since 2005 and widely appreciated. It is now also published in English Language as its International publication.

Holding of Separate Session In History Meet :

History council of All Maharashtra has decided to hold a separate session in its Annual meet at the insistence of this council.

The Address of Council's Office is as under :

Bharatiya Jal-Sanskrit Mandal,Old RTC Building, CADA Campus, Behind Gajanan Maharaj Temple, Garkheda, Aurgangabad-431 005. Email : icwcaurangabad@yahoo.com ; deshpandegd@yahoo.com

Membership fee of the Council is as below.

Individual (Life Member)	Rs. 1000/-
Institutional (Life Member)	Rs. 5000/-
Patron	Rs. 10000/- and above

Membership fee is acceptable in terms of cash, DD or Cheque drawn in favour of the Bharatiya Jal-Sanskrit Mandal, Aurangabad.

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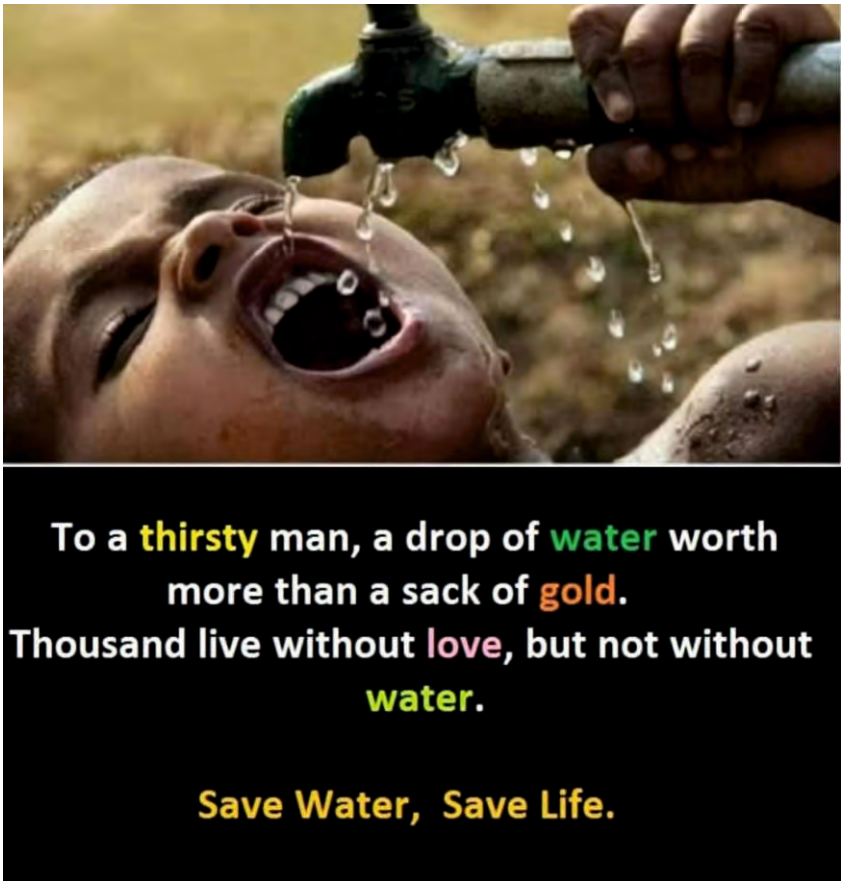


Measuring the Water

Chetan Pandit

(M) : 9423174594

To plan your expenditure you have to know how much money you have. Likewise to plan our water use we have to know how much water we have. In this third article we are going to learn how large quantities of water, as in rain, river, ground water etc. are measured or estimated.

For measurement of anything, you need to use a unit appropriate to the quantity to be measured. Cough syrup is taken in very small quantity and is measured in milliliters (ml). Milk, petrol, cooking oil, etc. are taken in larger quantities and are measured in liter. Asking for 10,000 ml of petrol at a petrol pump is correct but silly. 10 L is more appropriate.

Quantity of water required by a city of the size of Pune for domestic use for one year is about 250,000,000,000 liters. Obviously, a liter is too small a unit to measure the water required for a city, for irrigation, etc. For larger quantities we start with the unit "cubic meter", often written as m^3 or just m^3. One m^3 has 1000 liters. For still larger quantities we use the unit million cubic meters, and then billion cubic meters, abbreviated as mcm and bcm respectively. One bcm has 1000,000,000 m^3. Cube root of this is 1000 meters and that is = 1 KM. Thus 1 bcm = 1 cubic kilometre, and some people use that unit also, CuKM. To understand how much that is, imagine a square plot of land one KM on each side. Now build on it a tank one KM tall, i.e. about 330 story building tall. The volume of water contained in this tank is 1 cubic KM or 1 bcm.

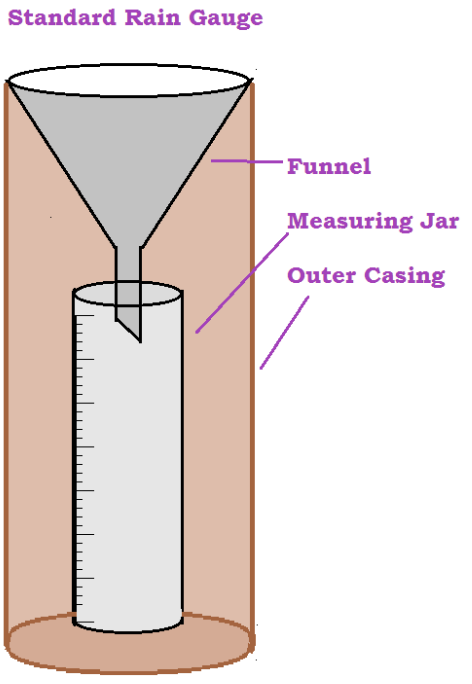
Irrigation engineers often use a unit called Hectare-Meter, abbreviated HaM. This is the volume of water one meter deep over an area of one Hectare. And one hectare = 10,000 SqM, so 1 HaM = 10,000 m^3. The reason for this unit is, agronomists express the water requirement of various crops as depth, e.g. wheat requires 0.7 M of water. Means, whatever be your farm area, volume of water required for wheat crop = your farm area X 0.7 M. The unit HaM enables the engineers to quickly assess how much area can be irrigated with a given quantity of water. viz. suppose we have 1000 HaM of water then we can provide irrigation to 1000/0.7 = 1428 Ha of wheat crop.

Before the advent of metric system, the units used were TMC, which expands to Thousand Million Cubic Feet. For reasons that are not clear, this unit continues to be in use in most of Southern India. But the northern India has adopted the metric units mcm and bcm. The FPS (English) equivalent of HaM is Acre Feet and Million Acre Feet, abbreviated as AF and MAF respectively. One acre is = 43,560 square feet and one AF = 43,560 cubic feet = 1233.5 m^3. One m^3 = 35.3147 CuF.

Measurement of Rainfall :

Rainfall is an accumulative parameter. One may ask what is the air temperature or pressure at this moment. But it is incorrect to ask what is the rainfall at this moment. Rainfall is measured as accumulated over a period of time, and is expressed as depth of rainfall on a given area, in mm. Yesterday Pune received 25 mm of rainfall, means, if the rain water was not allowed to flow away or percolate, evaporate etc. then the depth of accumulated water would have been 25 mm. To get the volume of water multiply the depth by the area over which the rainfall took place.

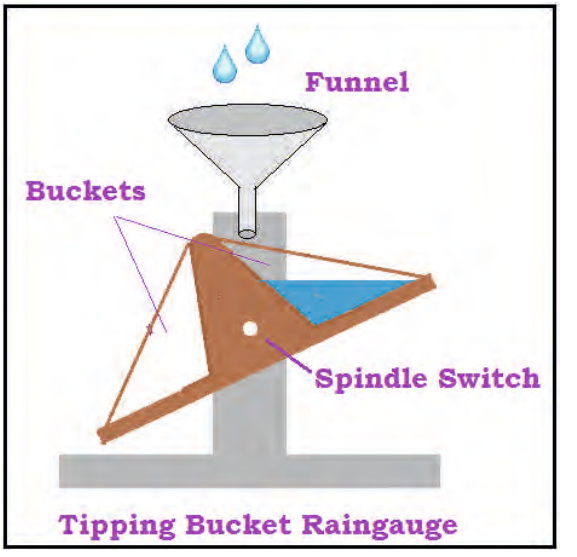
A rain gauge is perhaps the simplest of all instruments. It comprises of a funnel that collects rain water and stores it in a glass jar. Volume of water collected in the jar over a period of time,



divided by the area of the collection funnel gives the depth of rainfall. Traditionally, rain gauges in India are read at 8:30 AM in the morning. Which means the rainfall we record every day is the rainfall accumulated over the past 24 hours, from yesterday 8:30 AM to today 8:30 AM.

The standard rain gauge described above collects the rainfall and gives measurement during the period after the previous measurement, usually 24 hours. Such measurement is good enough for estimation of water availability from a catchment. However, for flood studies we also need the rate of rainfall per hour. 100 mm of rainfall evenly distributed over 24 hours may only slightly increase the flow in a river. But the same 100 mm rainfall if it occurs in just 1 hour, it can trigger a small flood. To get a continuous record of rainfall, we use a device called "tipping bucket rain gauge".

This looks somewhat like a see-saw. As in simple rain gauge, a funnel collects the rainfall. Two small receptacles, misleadingly called 'buckets', are balanced on two ends of a beam. At any time one bucket is under the funnel. As it fills, the weight of the water tips the beam, the filled bucket empties and the other bucket starts filling. This continues indefinitely. Every time the beam tips over, a switch



connected to it sends out an electric pulse. By counting the number of pulses per unit time, and volume of the buckets, we get not only the total rainfall but also its rate of occurrence. Another advantage of this type is, the pulses it sends out can be connected to a recorder, or to a transmitter for remote reading.

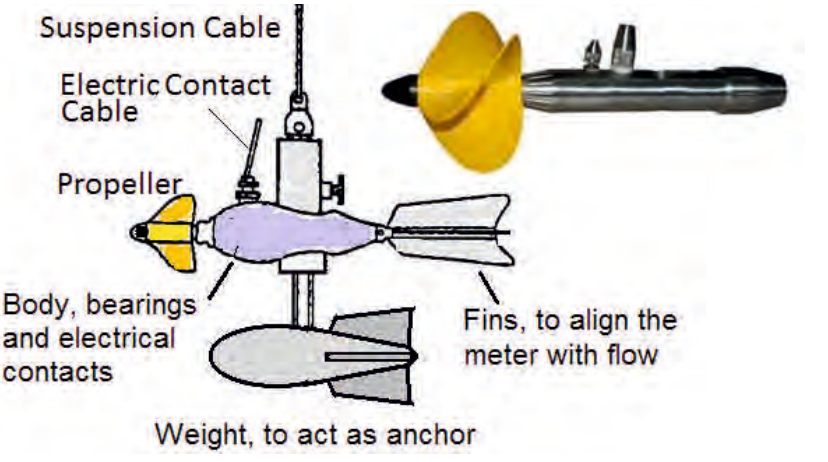
Rainfall can also be estimated – not measured but estimated – with a special kind of radar called S-band radar. This works on the principle of reflection of radio waves by a body of falling rain. However, these devices are rather expensive and the standard manually read rain gauge continues to be the backbone of rainfall measurement.

Measurement of River Flow :

Flow in the river is more difficult to measure. Rate of flow is expressed as cubic meters of water flowing in one second, abbreviated as cumecs. The old English unit was cubic foot per second, abbreviated as cusecs. If there is a weir or similar structure in the river, then the depth of flow of water over the weir or the dam spillway can be related to the flow rate by a formula. If there is no such structure then the measurement of flow rate requires measurement of the velocity of water in the river, and cross section of the river.

Cross sectional area of the river multiplied by the velocity is the flow rate in m3/second. Can you see how so? Suppose the cross sectional area

of the river at a certain location is A, and the flow velocity at that location is V m/sec. Then the length of a body of water that flows past that point in one second is V meters. And the cross sectional area of that body is A SqM. So the volume of this water body is A x V. This is the volume of water flowing in one second. Cross section is measured by surveying instruments, during summer when the flow is low. And how is velocity measured?



Till about late 80s, in India the velocity of flow in rivers was measured by a simple technique called "float method". Two points were marked on the river bank say 100 M apart. A piece of wood that would float on the surface was thrown in the river upstream of upper marker, and the time taken by this piece to travel from the upper marker to the lower marker was observed with a stopwatch. Velocity of flow = distance between two markers divided by the time taken for travel.

This method was inexpensive, and did not require any special equipment. However, the accuracy of this method is not satisfactory. Now we have discontinued this method and use an instrument called "current meter". This looks like a propeller of a boat. It is suspended in the river by a rod or a cable. A weight below the propeller acts like a ship's anchor and holds it in position. Fins at the back end of the meter align the meter axis with flow. The flow of water rotates the propeller. The RPM (revolutions per minute) of the propeller is proportional to the flow velocity. An electrical switch connected to the shaft of the propeller sends out an electrical signal in each revolution. These signals are recorded, and from this the RPM and hence the velocity, is worked out.

The velocity is not same at all places in the river. It varies with depth and also with distance from the banks. Therefore, the velocity has to be measured at many different places across the river, and also at many different depths and average is taken. If there is a bridge across the river then standing on the bridge one can suspend the meter in the river below from different places. If there is no such convenient bridge, then we either erect a cable way across the river and suspend the meter from it, or enter the river in a boat. In large rivers, particularly when they are in flood, such measurement of velocity is difficult, and even risky. Central water Commission has lost gauge readers in such operations.

Measurements of velocity and then discharge, by whatever method, is called "discharge measurement". As explained above, this is not easy and actually we don't measure the discharge every day.

At a given point in a river, the water level in the river, or the depth of flow, is related to the flow rate in cumecs. Over a few days, or months, we take discharge measurements at many different water levels, and then prepare a graph with discharge on the Y-axis and water level on X-axis. This graph is called rating curve. Once the rating curve is prepared, thereafter every day we only read the water level and read the discharge from rating curve. But the rating curve has to be updated periodically.

The flow rate in cumecs is an instantaneous measurement, cubic meters per second. Total volume of flow in a day is = flow rate in cumec x 3600 x 24. The sum of flow volume for all the 365 days is the flow volume in one year.

The manual water level observations are now being replaced by Telemetry. Tele means from a distance, and metry means measurement. So,

telemetry means measurement from a distance. Instruments called "water level sensors" are installed at a suitable place in the river, and they give out an electrical signal proportional to the depth of flow over the sensor. There are many different types of sensors, and a detailed discussion of these is beyond the scope of this article. The output from the sensor is input to an electronic device called data-logger that records the measurement in a micro SD card like memory. The data stored in the data-logger can be downloaded in a laptop by connecting to a USB or similar port, or the logger can send the data over a wireless communication system, and is received and recorded at the control station.

Estimation of ground water :

Measurement of Ground Water (abbreviated GW hereafter) poses a different kind of challenge. In second article in this series I have explained that the GW is held in the spaces between solid particles in layers of gravel etc. or in the cracks and fissures in rock mass. Since the velocity of flow in the aquifer is very slow, therefore we treat the aquifer like a storage and try to estimate the volume of water therein. The quantity of water thus held underground depends on the volume of the aquifer, and its porosity. But what is porosity?

Imagine two identical glasses, one filled with some coarse material, say Sabudana and the other filled with a mix of coarse and fine material, say Sabudana and mustard (Mohari in Marathi). Now pour water in each. The glass with Sabudana can take much more water than the glass with Sabudana and mustard mix. Because there are more empty spaces between only Sabudana grains than are between Sabudana and mustard grains mix. You can even perform this experiment. Separating the Sabudana and Mustard grains after the experiment, will be a good time pass during lockdown. :-) The ratio of the volume of empty spaces to the total volume of grains, is called porosity. For the same depth of water, alluvium stores more water compared to hard rock because alluvium has higher porosity. Conversely, it will take more quantity of water to raise the water level by 1 M in alluvium, than in hard rock.

Returning to measurement, the quantity of water held underground depends on the volume of the aquifer, and its porosity. Neither is easy to measure. GW recharge is mostly a natural phenomenon, and artificial recharge can increase it, but doesn't make a big difference to total recharge in a year. The total annual recharge can not be measured. It is estimated by indirect means and a further discussion of these is beyond the scope of this article. But an understanding of geology is essential for estimating the ground water.

I will end this section with "pumping test". The water level in a well is first observed. Then the water is pumped out by a powerful pump, and the rate of pumping is recorded. As water is pumped out from the well the water level in the well will drop and water at higher level from surrounding aquifer will rush in to the well. However, if the rate of pumping exceeds the rate at which water gets back in to the well, then the water level in the well will get lower and lower. The rate at which the level gets lowered is recorded. After the pumping stops, the water level starts rising again and after a certain time will get back to its original level. The rate of rise is also recorded. From all this data we can estimate several parameters of the aquifer.

In this article we have learnt how the rainfall, river flow, and ground water quantities are estimated. This data is necessary to prepare our water budget, how much water we have and how much we need. This is what scientific water management is all about. Our water budget is the topic for the next, i.e. 4th article. Till then, take care and stay safe.

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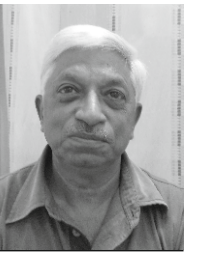
Organization – International Water Management Institute (IWMI)

Shri Vinod Hande - (M) : 9423677795

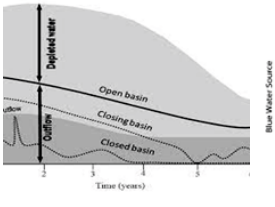


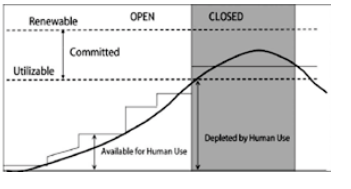
The "International Water Management Institute" (IWMI) is a non-profit, scientific research organization focusing on the sustainable use of water and land resources in developing countries. IWMI is a member of the CGIAR (Consultative Group on International Agriculture Research). CGIAR is a global partnership that unites organizations engaged in research for a food secure future. IWMI leads the CGIAR's research program on Water, land and ecosystems. This research program is for intensifying agriculture program for lifting millions of farm families out of poverty and still protecting environment.

IWMI was established in the year 1985. IWMI works in partnership with governments, civil society and private sector to develop agricultural water management solutions that have a impact on poverty reduction, food security and ecosystem's health. IWMI's headquarter is in Colombo, Sri Lanka with regional office across Asia and Africa. IWMI's mission is to provide evidence-based solutions to sustainably manage water and land resources for food security, people's livelihoods and environment. The institute undertakes research projects with this aim in mind. As water becomes scarcer there is growing need to find ways to produce sufficient food to feed the world's expanding population, by using less water.

The Institute was founded under the name 'International Irrigation Management Institute' (IIMI) in 1985 by Ford foundation and the Govt. of Sri Lanka. It had support from International Agriculture Research and World Bank. During the Green Revolution of 1940-70, billions of dollars had been spent building large-scale irrigation systems. This contributed use of new fertilizer, pesticides and high yield varieties of seeds, to help many countries produce more quantities of food crops.

By the mid of 1980 it was observed that these irrigation systems were no longer performing efficiently so it was the job of IIMI to find out reason. IIMI concluded that problem was not technical but more institutional. IIMI recommended PIM (Participatory Irrigation Management) as a solution which involves farmers in water management decision. Initially there was resistance to accept but later PIM become the status quo for government and major agencies. IIMI became a member of the CGIAR in 1991. Due to increasing larger global population, expansion of cities and increasing industries there was competition for water resources. A new approach was needed. IIMI began developing new field of approach on open and close basin, water accounting, multiple use system, remote sensing analysis and environmental flow. Taking this wider approach in consideration IIMI's name changed to IWMI (International Water Management Institute) in 1998.





In 1950's water was considered as a finite source of water as there were fewer people on the planet but the situation is changed after. In IWMI's research publication Water for Food, Water for Life showed that a third of world's population already

suffered from water scarcity. The report also defined physical water scarcity where there are insufficient water resources to meet the demand of the population. In 2009 World Economic Forum and UNESCO concluded that water scarcity is bigger problem than global financial. They also confirmed that If current trend continues, global annual water use is set to increase by more than two trillion cubic meters by 2030 which will rise to 6.9 trillion cubic meters. That is equal to 40 per cent more that can be provided by available water sources. In 2010 IWMI highlighted six point plan for averting water crises at Stockholm World Water Week. They are,

- Gather high quality data about water resources.
- Take better care of the environment.
- Reform how water resources are governed.
- Revive how water is used for farming.
- Better management of urban and municipal demand for water.
- Involve marginalized people in water management.

In the year 2010 IWMI celebrated its 25th anniversary by commissioning a series of essays on agricultural and development themes.

IWMI research works in the fields of ,

- River systems
- Water and cities
- Climate change
- Water-food- Energy nexus.

River systems :

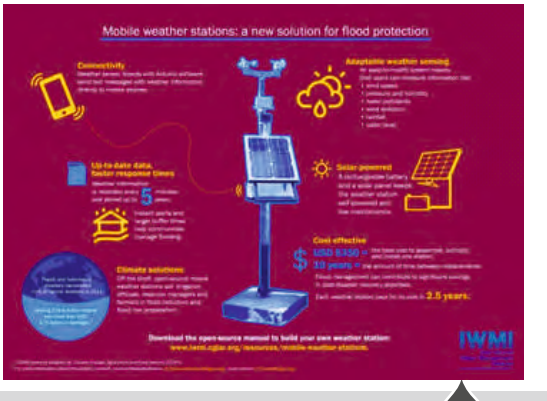
Rivers in India hold a special significance for its people. Even though health of many rivers of country is rapidly deteriorating including Ganga due to high level of water extraction and increased population. This issue was accepted by IWMI as challenge and started studies across Ganga river basin. These include work on pollution abatement, environmental health and how economic growth is affecting the nature of riverside agriculture and natural resources. Many rivers of India including Ganga, cross international boundaries. This creates challenges in how they can be best managed to ensure sustainable and equitable growth. On the Indus river also IWMI is studying for data sharing between institutions to enhance transboundary water management because millions of farmers of India and Pakistan depend on water resource of this river. River systems in India have the potential to irrigate nearly 140 million hectares of farms. IWMI's research is looking for automated canal data collection, their performance and cost recovery of canal irrigation systems. This information can be used to develop new and more effective management models.

Water and cities :

India is urbanizing rapidly. This expansion has been branded as "over loaded and under planned" by some cities. Urban development is also bringing new opportunities for resource recycling. IWMI with its partners explores how waste and wastewater can be recycled and put to profitable use. This approach has a potential to create jobs and contribute to improvements in urban sanitation. Such studies have been carried out in fast growing cities like Hyderabad and Bangalore.

Climate change :

Climate change is likely to have a major impact on India's food security. IWMI aims to improve the capacity of the agriculture and water sectors by studying how climate change will directly affect farmers. Institute is developing strategies for policy makers. Climate change is also likely to increase the incidence of natural disasters such as floods and draught. IWMI is conducting studies for better management of these risks. The effect of increased flooding could be mitigated by funneling more surface water into ground aquifers as per IWMI study and pilot project is also running in Indian environment.



To protect farmers from shock of floods, IWMI and its partners are developing hi-tech satellite sensing to identify damaged crops and swiftly award of compensation

Water-food- Energy nexus :

Water, food and energy are interlinked and depend on each other also. IWMI seeks to better understand the interconnection between these sectors. Take a example of South Asia. Here, energy pumps are required for irrigation. A lack of reliable power coupled with unsustainable groundwater management which led to increased energy cost as water tables fall, hampered agricultural development.

Irrigation boosting in the East :

In West Bengal, groundwater legislation compelled farmers to apply for permits to use tube wells. This was costly and time consuming. In addition power-grid connections were costly. Poor farmers were forced to hire expensive diesel pumps if they wanted to irrigate. Growth of irrigation stagnated. A research team of IWMI was asked for help. The research team recommended two policy changes : one scrapping of pump licenses in areas with plenty groundwater and second providing a subsidy towards the cost of new electricity connection. This increased the number of connections by over 90%, thus increasing farmer's income by giving them affordable access to irrigation.

New Policies for solar pumps :

For Solar powered pumps subsidies are currently being promoted by several Indian states. They, not only give reliable power supply to farmers but also run without emitting greenhouse gases that cause climate change. However if farmers have access to 'free' power, there is serious risk of over pumping of aquifers. To deal with this issue, IWMI and its partners have recommended incentives for farmers to sell back surplus solar power to the grid. This will also encourage efficient and sustainable water use. The Government of Gujarat has adopted this approach for their recent solar policy.

Increasing Land Productivity in Tamil Nadu through drip irrigation :

In Coimbatore District of Tamil Nadu, over 90% of the farmers who had been encouraged to invest in drip irrigation systems, did not know how to use them properly. Farmers were disappointed as there was no increase in crop productivity. Capacity building led by IWMI, Tata water Policy Research Program and local partners to train farmers in all aspects of drip irrigation. This led to reduction in water abstraction and yield increased of up to 40% for some crop.

Sustainable Groundwater Use And Improved Access to Electricity in Gujarat :

Twenty years back, Gujarat's aquifers were severely depleted. Reason for this was subsidies for farm electricity, which made pumping water cheap. This made electricity board bankrupt and led to erratic water supply. IWMI researchers recommended separate cable for agriculture and domestic electricity feeder line. Rationing power to match the seasonal crop was also recommended by IWMI. This concept was known as 'Jyotigram Yojana' and was so successful that it is now adopted by other states.

Poverty reduction by using water management :

IWMI worked in Gujarat, India, for improving water management that could have influenced people's livelihood. By introducing subsidies to farmers on electricity in 1970, the state faced dual problem of bankrupt electricity Dept. and depleted ground water storage. The situation arose because the subsidies enabled farmers to easily pump ground water from yet increasing depth. The Asian Development Bank and World Bank directed Gujarat govt. to cut the electricity subsidies and charge farmers, based on metered consumption of power but there was objection from the farming comminity.

IWMI scientists suggested govt. to introduce 'intelligent rationing' of farm power supply by separating the power cables carrying electricity to farms from those supplying to rural use such as households and industries. This way farmers were provided high quality power supply with affordable price. Gujarat govt. decided to include these recommendations to reform electricity utility. A study conducted to found out its impact. Results were much greater than anticipated.

IWMI is doing researches in India in the field of Water, Climate Change and agriculture, Water policies, Water future of India 2025-50, for the vision of water secure world. To help IWMI in their research they are having Indian partners too, and they are,

- CGIAR Research Program on Climate Change,
- Indian Council of Agricultural Research (ICAR)
- Indian Institutes of Technology (IITs)
- Institute of Rural Management Anand (IRMA)
- The Energy and Resources Institute (TERI), and others

The new IWMI strategy 2019-23 is focused on water solutions for sustainable, climate resilient development. IWMI looks at water as a system because it interconnects people, nature and economy. IWMI works in Central Asia, East Africa, India, Middle east, Nepal, Pakistan, Southeast Asia, Southern Africa, Sri Lanka and West Africa. IWMI also is having many awards at its credit.

With headquarter at Colombo, Sri Lanka IWMI is having three offices in India at New Delhi, Hyderabad and Anand. Roberto Lentan is a chairman of IWMI.

Further needed information if any about institution's research and strategies can be had from following contact details.

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World water Day - Caring for our Water

Resources is Everybody's Business

Gajanan Deshpande, Pune - (M) : 9822754768

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

The main theme for World Water Day-1994 was "Caring for our Water Resources is Everybody's Business". Various events and activities were organized in that year.

All of us use water. We use water for hundreds of things - for drinking, for cooking, for processing food, for making various products etc. Water also plays an important role in protecting nature. Our ecosystem depends on the flow of water. The availability and quality of such vital thing i.e. water is becoming a matter of concern for each and every one of us day by day. The increasing use of water and the priorities we have adapted to the situation, have led to major water shortages around the world. Global freshwater resources are, therefore, in trouble.

Since 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 that place. If there is social inaction in this regard, its cost would be very high. Keeping this in mind, various events were planned around the world on the occasion of the 1994 World Water Day.

Every sensible citizen can easily contribute to the improvement of the situation by ensuring his participation in the following four matters in this social issue.

1. Discretionary use of water :

Household water is commonly used for drinking, cooking, washing vehicles, bathing, washing clothes, rinsing, flushing toilets, gardening and other minor activities - such as hand-foot-mouth washing as well as fruit-vegetable-grain washing. Care should be taken to ensure that only as minimum water as required is used.

Good cleaning can be done without using excessive water. Many times it is found while washing clothes or washing utensils that the tap is kept on till the end of the work and it consumes three times more water. This should be avoided by carefully controlling our wrong habits.

- Avoid resorting to showers or tubs in the name of cleanliness.
- Do not keep the basin tap running continuously while shaving, washing mouth, use it finely.
- Repair leaking taps.
- Offer only as much water as needed to the guests and that too in a small glass.
- Do not use pure drinking water for toilet.
- As soon as the building tank gets full, turn off the motor immediately, do not allow any wastage there.

▪ Do not throw away stored water in the house as it never gets spoiled if properly preserved.

▪ Water the garden only as much water as it needs, remember that excess water does not mean rapid growth.

2. Maintaining water quality :

Using unclean water for drinking causes many disorders. For this, everyone needs to take care of how to keep their water sources clean and pure. Care must be taken that no waste is dumped in those resources and no domestic or industrial effluent is discharged into it.

More attention should be paid to water purity in rural areas. Water should always be used after purification, first by adding alum to it and then straining it, boiling it and adding chlorine to it, so that it becomes drinkable. If possible, water purification devices should be used.

3. Water recharge :

The ground water level is going deeper day by day due to various reasons like population growth, urbanization, industrialization, mismanagement of land and water, neglect of soil and water conservation measures, lack of literacy in water use, increase in area under high irrigated crops, and inadequate efforts for groundwater recharge. As a result, the wells and bore wells are drying up and they do not meet water even if the bore wells gets 300 feet deep. Therefore, in order to increase the ground water level, it is necessary to recharge rainwater wherever possible. Besides taking appropriate measures; the available ground water should be used sparingly and scientifically.

Groundwater can be recharged by letting rainwater in to it through a well or if the roof water is released into a drainage ditch or a bore well. Recharging water scientifically lets us avoid severe drought conditions and it also helps create water storages for future. With proper and effective planning of groundwater management and recharge through public participation in villages, we can overcome the drought situation to some extent.

4. Water recycling :

Water recycling is just like producing additional water. For this, more and more water should be recycled and reused. Reuse of water helps in reducing the demand for water. There are several possible home remedies for this. For example - bathwater should be collected separately and used for gardening. In the kitchen, water used for cleaning of dal, rice or vegetables can be given to the home plants to save water. Similarly, water used for washing of cloths can be used to clean the bathroom / toilet or basin.

All in all, a great deal of social awareness is needed to remind us that we have to take care of our own water resources.

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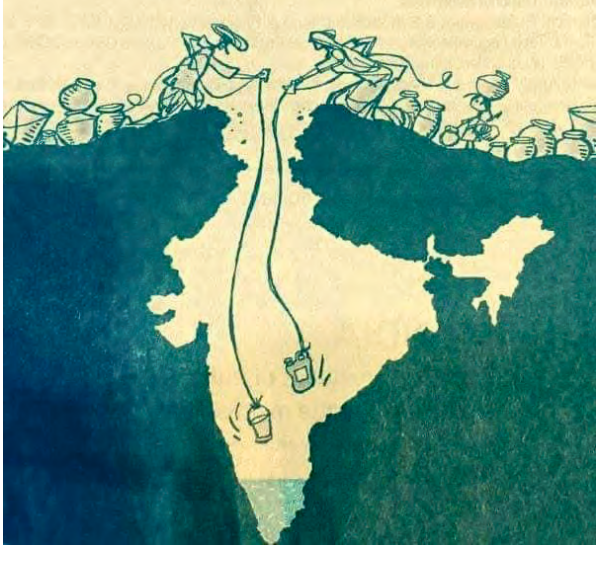

Stockholm Water Prize 1992

Gajanan Deshpande, Pune

(M) : 9822754768

Department of Environmental Engineering, Technical University of Denmark

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

The 1992 Stockholm Water Award went to the "Department of Environmental Engineering, Technical University of Denmark". The award ceremony was attended by a large number of researchers. Prof. Dr. Paul Harremoes, who has been the head of that department since 1969, received the award on behalf of the department.

The success of the department was due to the research work stemmed from a collective effort carried out by the various branches of the University in a conducive environment required for the creation. In 1969 the department had only one member. By 1992, that number had risen to 50. The award recognizes that the department's success is the result of the coordination of a group working together for the common cause under the energetic and influential leadership of the department head Dr. Paul Harremoes.

The distinctive feature of the Department of Environmental Engineering is the in-depth research work it has carried out in these various fields. Based on this research, mathematical replicas were developed and implemented worldwide. In addition, great efforts were made to educate and train a new generation of experts on this research.

He also developed technologies to protect these vital water resources while imparting knowledge of many factors that pollute groundwater. This is considered to be the most important contribution of this department. Research by the organization on how to minimize groundwater pollution caused by urban sewage and sewage overflows was a top priority. They developed the basic science for the process of eliminating nitrogen from sewage and sludge.

Speaking on the occasion of award ceremony, Dr. Paul Harremoes said "When we started the nitrogen research project in the early 1970's, many people didn't believe it would be technically successful. But being a leader in this work, we did not give up. As a result, it proved successful throughout Scandinavia and later throughout Europe. We've been able to do this with a lot of important personal contributions and that's why we've had this success."

Developed to meet the expected results, the technology is now being used in wastewater treatment plants around the world. By the time the department received the Stockholm Water Award, it was planned to set up 500 such plants in Scandinavia by the year 2000, which would combine the process of removing Potassium and Nitrogen from wastewater.

The research carried out on metals in

wastewater sludge showed sludge to be a minor contributor of metals to agricultural land, compared with the much larger inputs from fertilisers and the atmosphere.

The department was at the forefront in enhancing our understanding of the need for an integrated approach to the total system: sewerage, wastewater treatment and receiving waters.

To summarize the citation for the award, the department received the Prize for its research and development programme, its scientific approach, its international collaboration with the water industry in search of practical applications, and its contributions to water pollution abatement, in Scandinavia and worldwide.

The Institute of Environment & Resources, as it is called today, headed by Professor Mogens Henze, is one of the leading and largest environmental engineering university institutes in Europe, with a staff of 90 scientists and 40 technicians. Twenty-five per cent of the staff is international researchers. New significant activities at the Institute since 1992 are in solid waste management, groundwater geochemistry, eco-toxicology and remediation of contaminated sites. The Institute has a unique flat research and teaching structure where the faculty can float freely between research areas. This allows it to develop new cross disciplinary activities on the boundaries between single specialisation. Since 1995, teaching at the master level has been in English, and 80 master students graduate each year.

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A river runs dry: farms and ranches along Colorado River in jeopardy

Willy Lowry

A two decade-long drought fuelled by climate change has farmers and ranchers worried about their future

Frank Nieslanik's calloused hand pulls hard on the gear shift of his 1951 Jeep Willys as he navigates the bumpy roads of the land he has farmed for the last 30 years.

On one side of the road, the fields are verdant, filled with rows and rows of young sweetcorn. On the other side, the fields lie fallow. It is one of the many efforts that Mr Nieslanik has made in recent years to conserve water at his farm in Grand Junction, Colorado.

"We're using less," he said. "We're trying to leave one piece fallow off of each headgate just to give more water to the others in case they cut us back — or when they cut us back, which they will. We'll have some vacant ground we don't have to water."

The Colorado River, which runs adjacent to his farm, has been in a drought for 22 years.

The waterway and its tributaries snake through seven US states and Mexico. Along the way, the river provides drinking water for about 40 million people and nourishes the farmland that helps feed families across the country.

But exceptionally hot weather this year coupled with an increase in water demand downriver means there is mounting pressure on farmers in the area to use less water.

"Seems like we're shorter every year," Mr Nieslanik told The National. "We're in an extended drought and we keep hoping that they're going to get a big snowpack to alleviate part of that, but we just haven't had it."

The source of the Colorado River lies high in the Rocky Mountains, which serve as the continental divide that separates the water basins of the Pacific and Atlantic Oceans.

The region's heavy snowfall fuels the river, but several years of low snow levels have left the river a shadow of its former self.

Scientists say climate change is exacerbating the problem.

A study by the US Geological Survey published in February found that global warming is causing the Rocky Mountain snowpack to shrink at a rate of about 9.3 per cent per degree Celsius increase in temperature.

"Climate change is having a pretty profound impact on snow in the west and our water supply," said Keith Musselman, a scientist at the University of Colorado's Institute of Arctic and Alpine Research.

The Rockies' snowpack is like a water tower

for the Colorado River: snow accumulates in the winter and melts in the spring, filling the river when demand is at its highest.

"Climate change is affecting that in a couple of different ways," Mr Musselman said, standing on a rocky outcrop overlooking the continental divide.

"It's changing the type of precipitation that we get; instead of getting snowfall in the winter, we're frequently seeing rain and that rain doesn't persist into the dry seasons as readily, so that leaves our soils dryer, vegetation thirstier and more stressed."

Janie VanWinkle has been working the land near Grand Junction her entire life. The fourth-generation cattle rancher has seen good, bad and even really bad years. This year is shaping up to be the latter.

"We've been through dry spells before and we've been through droughts," she told The National.

"The hard part is the cumulative effect. We saw 2018 was dry, 2019 was an average year, 2020 was dry and here we are again, so the soil moisture is just gone. There's just nothing left in the soil."
This means there is very little food for her cattle.

"They're just not happy," she lamented, looking at her cows. "It's not because they don't have food and not because they don't have water, because they do have feed, but they have to walk a lot farther and they have to work a lot harder."

Clad in a cowboy hat and sunglasses, Ms VanWinkle treks along the rocky banks of a reservoir high above the land she ranches. Her loyal and capable border collie, T-Bone, bounces along the shore next to her. Beneath her work boots, the dry soil crunches where it would normally be soft and spongy.

"I'm appalled at how low it is," she said, inspecting one of her reservoirs for the first time this season. "This is the level I would expect it to be for September."

Dry cracked earth where water would normally pool in the Bodaway area of the Navajo Nation reserve.
The reservoir is Ms VanWinkle's primary source of water for two of the tracts of land she grazes her cattle on.

She estimates it is only about 40 per cent full, leaving her unsure of how her cows will manage in the autumn and winter months.

"If we're lucky, we'll be able to irrigate until the first of August." In a good year, she would irrigate the ranch until the first of October.

Ms VanWinkle, 60, runs VanWinkle Ranch with her husband, Howard, and their son, Dean, who has just returned home from university.

The family has already had to sell 70 heads of cattle in an attempt to preserve the health of the herd and the land.

The drought has taken an emotional and psychological toll on Ms VanWinkle as well.

"The drought is just right here in front of our face in everything that we do," she said. "It's just hard to stay positive and stay looking forward and do the hard work that we do."

Every meal as a family is spent talking about the drought, strategising ways to try to mitigate its devastating toll on the land and animals.

"We can't keep doing the same thing and expect different results," she said.

But without a good snowpack, there is little the VanWinkles can do but sell more cattle and try to find alternative sources of food for the cows.

They're discussing hauling in hay from Kansas to offset their own hay production issues.

But the family is unbowed by the drought and Ms VanWinkle is determined to see the ranch

she has worked her entire life building succeed into another generation as her son Dean learns the ropes.

Mr Nieslanik is less optimistic. With no children to pass the farm to, he doesn't believe the land he has tilled for three decades will survive into the future.

"It's sad and it's discouraging," said Mr Nieslanik as he gazed out over a bend in the Colorado River. "The water is really concerning. In my opinion, we won't be farming here in 30 years."
It's a stark outlook, but one shared by many climate scientists.

"Life in the west is going to be different," Mr Musselman said. "And life globally is going to be different going forward until we mitigate the changes that are occurring."

Agriculture is a major component of Colorado's economy, contributing $47 billion and employing more than 195,000 people. The success of farmers like Mr Nieslanik and ranchers like Ms VanWinkle are critical to the state's well-being.

The state is working hard to protect farmers and ranchers from the effects of the drought.

On July 1, Governor Jared Polis declared a drought emergency for the western slope of Colorado where Mr Nieslanik and Ms VanWinkle live and work.

At the federal level, Michael Bennet, a Colorado senator, introduced the Outdoor Restoration Partnership Act, which would invest $60bn in local forests and watershed restoration. The bill, which was included in President Joe Biden's American Jobs infrastructure package, aims to help prevent wildfires in the West and to preserve the region's fragile watersheds.

Mr Nieslanik doesn't blame anybody but the weather for the current drought. But he said he is concerned by the growing populations downriver in Arizona, Nevada and Colorado that he said are using more water than ever before.

While some accuse farmers and ranchers of abusing their water rights, both Mr Nieslanik and Ms VanWinkle bristle at the idea.
Ms VanWinkle sees herself as a steward of the land.

"We look at ourselves as a part of the solution to food security, part of the solution to climate change, with the carbon sequestration that we can do on range land — part of the solution to ensuring these open lands and these big expanses of lands continue. I think livestock production is the most efficient way we can utilise these lands to meet all of these other goals."

This story is part of a series on the Colorado River drought in the American West.

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Bihar: Centre approves Rs 4,900-crore project to link Kosi, Mechi rivers

PATNA: The Centre has approved a project worth Rs 4,900-crore Kosi-Mechi river interlining project, providing a major lease of life to Bihar's Seemanchal region.

The ambitious Kosi-Mechi project, which is the country's second major river interlinking project after Ken-Betwa of Madhya Pradesh, secured the last remaining mandatory technical-cum-administrative approval from the Union ministry of environment, forest and climate change (MoEFCC) two days back.

The mega project is unique in many ways. It will not only relieve large swathes of north Bihar from the menace of recurring floods but also provide irrigation for a whooping over 2.14 lakh hectares of command areas spread across the districts of Araria, Kishanganj, Purnia and Katihar in north Bihar.

"This project is aimed at alleviating flood and resultant hardships in the entire region, and has the potential to usher in the next green revolution in Seemanchal region," Bihar's water resources department (WRD) minister Sanjay Kumar Jha told TOI.

Having assumed office only in the month of June this year, Jha has been particularly keen on securing the Centre's nod for this model project, and ensured close follow up with Central Water Development Authority and MoEFCC in Delhi.

In his maiden meeting with the Union minister of Jal Shakti Gajendra Singh Shekhawat on June 17 this year, Jha had flagged securing necessary approval for this project as the state's top priority.

"This interlinking project envisages diversion of part of surplus water of Kosi river through existing Hanuman Nagar barrage to the Mahananda basin," explained Jha, elaborating on the flood management component of this ambitious project. Mechi is an important tributary of Mahananda river. Its basin however remains mostly deficient in providing adequate water for irrigation. "Channeling Kosi water into the Mahananda will optimize redistribution of the surplus waters which will take irrigation potential in the region into a different league, often cited by Bihar CM Nitish Kumar, as the potential harbinger of a Green Revolution in this important region," Jha said

On the lines of India's first Interlinking of rivers project, the Ken-Betwa project in MP, Bihar's Kosi-Mechi Interlinking project is believed by experts to have all necessary ingredients to qualify for a 'National Project' status.

"The Kosi-Mechi project fulfils all mandatory provisions and parameters such as ensuring an irrigation command area of two lakh hectares or more," Jha said.

The state WRD minister further said he would now focus on working closely with the state leadership to strongly pitch the case for a national project

status for this flagship intervention of Nitish Kumar.

"Besides the huge flood management and irrigation potential enshrined in this initiative, the fact that the entire command area is contiguous to an international boundary (India-Nepal) is a critical aspect that the Centre would likely take special note of in our quest for getting it declared a national project," Jha pointed out.

A National Project status for this venture will mean that the majority of funding support gets borne by the Centre instead of putting strain on the State resources, he said.

The Bihar WRD minister further revealed that the Kosi-Mechi interlinking project is a green project. "Its environmental approval note clearly states that 'the project involves no displacement of population and there is no acquisition of any forest land. The total land requirement is about 1,396.81 hectares. No National Park, Wildlife Sanctuary, Eco-sensitive areas, etc. are present within 10 km radius of the project'," Jha said.

Bottled Water

Bottled water has a 3,500 times higher impact on the natural resources of the Earth when compared to normal tap water, recent research has concluded.

In a first of its kind research, scientists studied the impact of bottled water on the Earth's ecosystem in comparison to tap water. Experts found out that the bottled water can result in a 3,500 times higher cost of resource extraction than tap water consumption.

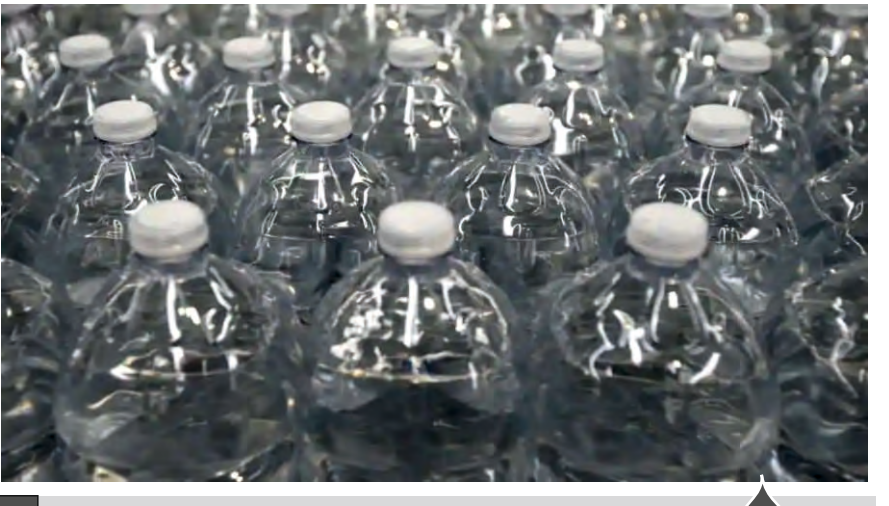
This research, conducted by the Barcelona Institute for Global Health (ISGlobal), has come at a time when the consumption of bottled water is becoming increasingly popular in Barcelona. Experts have also claimed that the impact of bottled water is 1,400 times higher on the ecosystem than tap water.

"I think this study can help to reduce bottled water consumption, but we need more active policies to change that," lead author of the study and ISGlobal researcher Cristina Villanueva said. "For example, in Barcelona, we could have more education campaigns to make the public aware that the health gains from drinking bottled water are minor compared to the environmental impacts. We need to improve access to public water, to public fountains, to public buildings where you can bring your own bottle and don't need to buy one. We need to facilitate access to public water in public streets."

"People trust bottled water because advertisers have done a good job of convincing people it's a good option, so we need the effort on the other side," she added.

Researchers also pointed out that the process of treating drinking water generates low levels of trihalomethanes (THM), which are often associated with a high risk of bladder cancer.

However, the experts feel that "health reasons don't justify the wide use of bottled water. Yes, strictly speaking, drinking tap water is worse for local health, but when you weigh both, what you gain from drinking bottled water is minimal. It's quite obvious that the environmental impacts of bottled water are higher compared to tap water," Villanueva explained.



Different approach to solve water problem

Shri Ulhas M. Paranjpe

M : 9820788061

I had been to Ambajogai and Beed from 9th to 14th July 2021, to conduct training to Mason, Farmers . Training was to train Mason in "Water conservation with Natural Fibre Cement Technology " , during training they learned and constructed 2 types of tanks. One below ground and other above ground During discussion everyone was mentioning about water shortage and depleting ground water table or level. I told them ,let us calculate potential of your Beed District and we will see how much rain water is available every year of our use.

Beed District Rainfall Potential

Area of Beed – 10693 km

1 sq.km = 100 Hector = 100 X 10000 =10,00,000 sq.m

Annual average Rainfall is 666 mm

Potential of o 1,000 sq.m = 666 cu,m

At 135 LPCD ,YEARLY QUANTITY PER PERSON = 135 x 365 – 49,275 LITRE SAY 50 CU.M so 666 will be sufficient for 666 / 50 =13.32 person say 13 person Hence per hector 130 person , hence per sq.km 130 X 100 = 13,000 Population as per 2011 is 25.85 lac. We assume in 2021 it is 30 lac= 30,00,000 /13000 =230.76 sq.km . In short say Potential of 230 sq.km is sufficient to solve Water Problem of 30 lac population, I know this is theoretical , I know this calculation is as per average annual Rainfall and if we could store entire Rainfall , then we need to store Rainfall potential from 230 sq.km.

If we can collect 50% of annual average Rainfall then area required will be 460 sq.km . say 500 sq.km . Again if Rainfall does not occur as per annual average then say we will have collect Rain fall from 1000 sq.km . This is hardly 9.35 % of entire land that is 10693 sq.km [1000 /10693 =9.35 %]

This means we could store 25 % of annual average rainfall over 1000 sq km of land then it is sufficient for 30 lac population , we have taught 2 different Innovative Technology to Mason Farmer, Students and other , One is free to use other Methods to store Rain Water also.

Rest of the water will be used for agriculture and Industry /commentarial activity For agriculture they can use 10 % model .

WE ALWAYS SAY MONEY AND WATER CAN BE BEST USED IF THEY ARE STORED .MONEY EVERYONE COLLECTS BUT VERY FEW ARE COLLECTING / STORING RAIN WATER

Training of Mason , farmer at KVK – Amajogai

We were holding workshop at KVK –Ambajogai on 10th and 11th . It rained in the evening of 11th July . and water gets collected in Tank constructed by Participants. If there existed sufficient storage arrangement or capacity , the Rainfall which occurs will get stored and problem will be solved or eased

Following photo shows that water gets collected even from direct Rainfall. If we can store surface

runoff then water collected will be much more
Photo of stored water after rains on 11and 12th

Ferro –Coconut coir Cement Tank above Ground at JSS –Beed to store Water

July 2021 in a Tank of 12,000 Liter capacity
Ferro –Coconut coir Cement Tank above Ground at KVK , Ambajogai to store Water
Training of Mason at "Jan Shikshan S anstha" -Beed on 12th and 13th July 2021
Similarly we held workshop at JSS at Beed and there also it rained on 13th .photo shows water gets collected if there is arrangement to store .

Cost of Natural Fibre Cement Tank or Ferrocement Tank below ground is between Rs. 2 to 3 for small storages and cost of ferro-Natural Fiber Cement Tank or Ferrocement Tank above Ground is between Rs. 4 to 5 .cost will go on reducing as Tank storage capacity increases. Workshop are supported by RuTAG –IITB. Study on use of Natural Fibre in Water retaining structure has been completed by Dr. Eldho T.I Civil Dept IITB
Both these Technologies are our Innovation . In 1st we are using Natural fibres such as coconut coir, Banana Fibre and Ambadi Fibre [Flax Fibre] I 2nd one we have replaced chicken mesh by Natural Fiber in " Ferroceent Technology "

Conclusion

Sufficient storage capacity to collect Rainfall at individual , Institute level and at Village level does not exist . Hence people feel that they have water shortage.

If we could Manage Rain Water properly then water problem can be solved or eased . We will not have to use Bore well water.
From above TWO training programs it is clear that water can be collected with "simple appropriate rural technology "

Photo of Pond / Tank at JSS Beed as on 17 th Morning

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New-age check dams built under MGNREGA cost less, give more (Vijaypura, Bagalkot & Bengaluru Districts Karnataka)

The project is unique because the design consumes less concrete and the dams last longer than traditional stone masonry ones. The State government is promoting construction of new generation check dams across natural streams, rivulets and other waterbodies under the MGNREGA programme. Over 5,000 multiple arch buttress check dams (MACD) have come up under MGNREGA, 1,820 in the last two years.

The project is unique because the design consumes less concrete and lasts longer than traditional stone masonry check dams. The cost of MACD is around 25% less than Reinforced Cement Concrete check dams. They harvest rain water, act as temporary impounding structures, and recharge the aquifer. Apart from providing water to farmers in drier months, they act as water holes for wildlife too.

Aniruddha Shravan, commissioner, MGNREGA, said MACDs ensure better utilisation of funds, scientific construction, and increased efficiency in water harvesting. "We use the services of Karnataka State Remote Sensing Application Centre to map probable locations for check dams to prevent unscientific construction. We have been using an app designed by the Foundation for Ecological Security called CLART to locate dams near appropriate strata. We choose a site where the stream is at its narrowest width, as it reduces costs and to see that the stream should not be meandering as it can cause flooding and shifting of the river's course," he said. He added that gram panchayats are creating boulder checks with recharge pits in large numbers. "To avoid slush getting collected in downstream check dams, several water harvesting structures are built upstream," added Mr. Shravan. They hold back silt, improve soul moisture, support vegetative growth, and harvest the rain more effectively.

"MACDs have brought long-lasting change in districts like Vijayapura, Bagalkot and the drier taluks of Belagavi," said Mahantesh Biradar, Vijayapura-based environmentalist. In several villages in Vijayapura district, ground water levels have increased and women are relieved of the burden of walking for miles to fetch drinking water, he added.

The MACD model was introduced by the Bidar Zilla panchayat in 2004. Naveen Raj Singh, a civil engineer by training, was the ZP CEO then. He introduced the design and led the construction of around 100 such structures in two years. Now, Bidar has over 700 MACDs. The design was approved for MNREGA in 2015, Mr. Singh recalled.

Demand of Water :

- Human being settled on the banks of rivers and lakes because he found water to be very useful. He found out that if water is used for irrigation, agricultural yield increases many fold. Not only that, he found out that wood floats on water and by using wood transportation is also possible in water.
- In course of time, he found various other uses of water also. He found out that with the help of compressed vapor he can make a wheel move. That gave rise to industrial revolution. Because of that, large scale production became possible.
- With the help of compressed vapor buses started moving on the roads. Railway owes its origin to this compressed vapor. Because of this, bulk goods transport became possible. That gave a big boost to trade and commerce.
- Previously international trade was conducted with the help of road transportation. That was a very tedious process. In course of time, large ships were built which started carrying hundreds of containers from one country to another. That gave a big filip to international trade. It was realized that this mode of transportation was the cheapest one as compared to other modes of transportation.
- In course of time big lakes and rivers were joined with canals and a grid was created for internal transportation. Such system is very much popular in European countries and internal trade also got a big push because of this cheap mode of transportation.
- You may ask a simple question why thermal power stations are located near rivers. When the thermal power station works, huge heat is created and lot of water is needed for cooling the system. Such a huge quantity of water is available only where rivers are there. If you look at the locations of almost all the thermal power stations are located on the banks or rivers.
- When it was found out that force of water can move the wheels, turbines were invented and thereby electricity generation became possible. It was proved that electricity generated was the cheapest power. Generally dams are constructed for irrigation purposes. But there are some dams which are constructed exclusively for generation of power. This hydro-power again gave a big push to the economic development.
- Water is being used for recreation purpose also. Big gardens are developed near the rivers. Best examples of such gardens are Brindawan Gardens near Mysore and Dnyaneshwar Udyan near Paithan (Aurangabad District). Water sports like boating, canoeing, kayaking, swimming, water polo, scuba diving have become very popular all over the world. Many tourist centers have come up near the dams constructed in many countries.
- Demand of water for sanitation has also gone up quite sizably. The underground drainage system entirely works on water supply. For toilets cleaning huge quantity of water is required. Water is needed for bath, cooking, washing utensils, cleaning the floor and for many other domestic purposes.

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