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YK GIST - JUNE 2023

- GIFTING HOLISTIC WELL-BEING TO THE WORLD
- WATER CONSERVATION

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GIFTING HOLISTIC WELL-BEING TO THE WORLD

A. AYUSH

ॐ सर्वे भवन्तु सुखिनः ।
सर्वे सन्तु निरामयाः ।
सर्वे भद्राणि पश्यन्तु ।
मा कश्चित् दुःख भाग्भवेत् ॥
ॐ शान्तिः शान्तिः शान्तिः॥

हिन्दी भावार्थ: सभी सुखी होवें, सभी रोगमुक्त रहें, सभी का जीवन मंगलमय बनें और कोई भी दुःख का भागी न बने। हे भगवन हमें ऐसा वर दो!

About AYUSH

India, known for its rich traditional heritage, has bestowed upon the world a precious treasure in the form of AYUSH system of healthcare that has stood the test of time. Encompassing ancient wisdom and holistic healthcare practices, Ayush emphasizes on a personalized approach to health and well-being, balancing the body, mind, and spirit through a combination of exercise, diet, lifestyle modifications, therapeutic drugs, and treatment practices.

- Ministry of Ayush has a mandate to develop Ayush systems viz. Ayurveda, Yoga & Naturopathy, Unani, Siddha, Sowa-Rigpa and Homoeopathy.
- The National Health Policy (NHP) 2017 has strongly advocated mainstreaming the potential of Ayush within a pluralistic system of Integrative healthcare.
- The Ministry works with the vision to position Ayush systems as the preferred systems of living and practice for attaining a healthy India. Such a vision has gradually emerged through the thought processes of experts concerned with health care provisioning in the country.
- The Ministry has identified its Mission in terms of seven broad thematic areas of Ayush activities.
    i. Effective Human Resource Development
    ii. Provision of Quality Ayush Services
    iii. Information, Education and Communication
    iv. Quality Research in Ayush Sector: Collaborates with various research institutes, universities, and international organizations like CSIR, CIMR, etc.
    v. Growth of the Medicinal Plants Sector
    vi. Drug Administration:
        - Launched to recognize traditional medicine products to give authenticity to quality Ayush products of the country.
        - The Ministry is also working in close coordination with the Bureau of Indian Standards to develop standards for Medical Value Travel.
        - So far 17 Indian standards have been formulated for Herbal materials, *Panchkarma* equipment, and yoga accessories.
    vii. International Exchange Programme/ Seminars/Workshops in the Ayush sector
- **The WHO-Global Centre for Traditional Medicine (GCTM)**, the first and the only global Centre for traditional medicine is being established in Jamnagar, India.

- It aims to strengthen the scientific foundation of traditional medicine.
- It will provide leadership on global health matters pertaining to traditional medicine and help position Ayush system across the globe.
- One of its major responsibilities is to ensure the quality, safety, efficacy, accessibility, and rational use of traditional medicines.
- It will involve developing norms, standards, and guidelines in various technical areas, as well as tools and methodologies for data collection, analytics, and impact assessment.

Pragmatic Model of Research in Ayush

Ayush approaches the grey areas of research and tackles healthcare challenges through:

- **Exploring Traditional Challenges:** The research aims to explore and validate traditional knowledge and tap wisdom accumulated over centuries to find innovative approaches to health and well-being.
- **Integration of Modern Scientific Methods:** An Interdisciplinary Ayush Research and Development Task Force in collaboration with national organizations of repute to formulate and develop strategies for the management of Covid.
- **Addressing Unmet Healthcare needs:** It addresses unmet healthcare needs, especially in areas where modern medicines have limitations. For example, *Brahmi Ghrita* and *Jyotishmati Taila* in the management of Cognitive Deficit.
- **Promoting Lifestyle Modification:** Ayush promotes a healthy lifestyle including Yoga, meditation, dietary guidelines, and natural remedies.
- **Predictive, Preventive, and Personalized Medicine:** Ayush recognizes that health is influenced by multiple factors like physical, mental, spiritual, and emotional aspects. It thus fosters a comprehensive and personalized approach to healthcare.

Ayush and SDGs

- Good health and Well-being (SDG 3)
- Works towards Reduced inequalities (SDG 10) through National Ayush Mission (NAM) and integrated health programs.
- With herbal medicines Ayush supports SDG 11 'Sustainable Cities and Communuties'.
- Promotes Partnership for the Goals (SDG 17)as it promotes partnership and exchange of Knowledge and expertise.

Portals under AYUSH

- **E-Medha (electronic Medical Heritage Accession) Portal:** Online public access catalog for more than 12000 Indian medical heritage books through NIC's e-granthalaya platform.
- **AMAR (Ayush Manuscripts Advanced Repository) Portal:** It has digitized information on rare and hard to find Manuscripts and catalogues of Ayurveda, Yoga, Unani, Siddha, Sowa Rigpa in libraries or in individual collections across India or in other parts of the world.
- **SHAI (Showcase of Ayurveda Historical Imprints) Portals**
    - This portal showcases inscriptions, Archeo-botanical Information, Sculptures, Philological sources and advanced Archeo Genetic studies.
    - This portal will be of tremendous use in understanding of Indian Knowledge system with a focus on indigenous health care practices.
- **CCRAS-Research Management Information System (RMIS):** A collaborative effort of Indian Council of Medical Research (ICMR) and Central Council for Research in Ayurvedic

Sciences(CCRAS), this portal will be a one stop solution for Research and Development in Ayurveda based studies.

AYUSH systems of health care can play an important role in realizing the dream of India as a global health-care destination through Heal in India and Heal by India. At present, we are witnessing a highly receptive environment where the value of Ayush systems in health care is widely recognized and globally acclaimed for its holistic health-care approach.

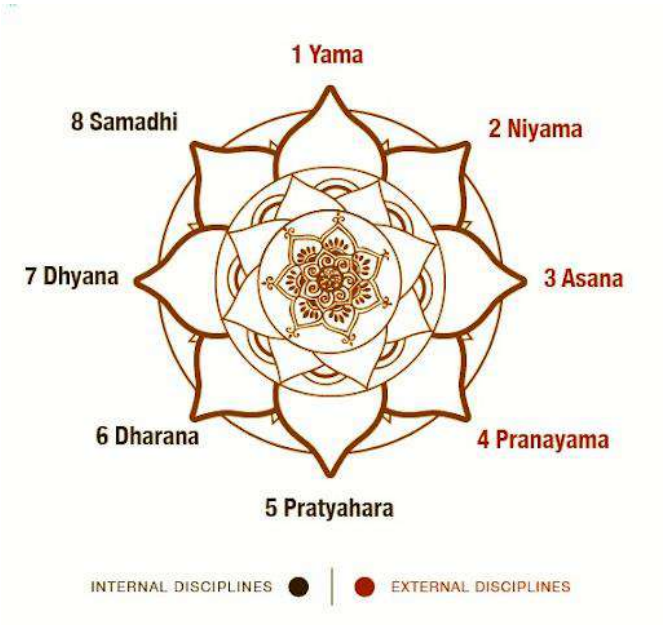
Various promotional and propagation activities are being underway at the MoA both at the national and international levels. Ministry is also working on MoUs with other countries to ease up the regulatory framework around manufacturing and export, reducing import duties and taxes, and further enhancing bilateral collaboration.

AYUSH is in a position to make India, a global health-care leader through its unique holistic health-care approach. The coming decade will also put an ever-increasing emphasis on the AYUSH system of health care both nationally and internationally.

B. Yoga for Global Well-being

Yoga is one of the treasures that has been given to the world by this ancient land called Bharat — India. As early as the Upanishadic times — at least a thousand years ago — the science of yoga was taught and practised by the sages.

- The word "Yoga" comes from the Sanskrit word "***yuj***" which means "*to unite or integrate*".
- Yoga is about the union of a person's own consciousness and the universal consciousness.
- It is primarily a way of life, first propounded by **Maharishi Patanjali** in systematic form **Yogsutra**.
- UNESCO put it on the Representative List of the Intangible Cultural Heritage of Humanity in 2016.
    - UNESCO List of the Intangible Cultural Heritage of Humanity: includes forms of expression that demonstrate the diversity of intangible heritage and raises awareness of its importance.
    - India has 13 intangible heritage including Yoga as a part of this list.
- The discipline of Yoga consists of eight components namely,
    1. **Restraint (Yama),**
    2. **Observance of austerity (Niyama)**
    3. **Physical postures (Asana)**
    4. **Breathing control (Pranayam)**
    5. **Restraining of sense organs (Pratyahar)**
    6. **Contemplation (Dharna)**
    7. **Meditation (Dhyan)**
    8. **Deep meditation (Samadhi)**



Source: The Yoga Institute

- These steps in the practice of Yoga have the potential to elevate social and personal behaviour and to promote physical health by better circulation of oxygenated blood in the body, restraining the sense organs and there by inducing tranquillity and serenity of mind and spirit.
- The practice of Yoga has also been found to the useful in the prevention of certain psychosomatic diseases and improves individual resistance and ability to endure stressful situations.
- Yoga is a promotive, preventive rehabilitative and curative intervention for overall enhancement of health status.
- A number of postures are described in Yoga literature to improve health, to prevent diseases and to cure illness.
- The physical postures are required to be chosen judiciously and have to be practiced in the correct way so that the benefits of prevention of disease, promotion of health and therapeutic use can be derived from them.

International Yoga Day

- The science of yoga joins different facets of human existence. The Indian seers have unequivocally emphasised physical fitness as the first and the crucial first step towards human progress.
- "*Shareeramadyam khalu dharma saadhanam*"(a healthy body is the prerequisite for achieving higher goals).
- Recognising that "yoga provides a holistic approach to health and well-being" and also that wider dissemination of information about the benefits of practicing yoga would be beneficial for the health of people all over the world, the UN proclaimed **June 21** as the International Day of Yoga via Resolution 69/131.

IMAGE SOURCE: WordPress.com

While addressing the event at Mysuru, Hon'ble Prime Minister said, "Yoga brings peace to our society, Nations, World and Yoga brings peace to our universe. Today, Yoga is being practiced in all parts of the world. The peace from Yoga is not only for individuals, it brings peace to our nations and the world." He further added that, "This whole universe starts from our own body and soul. The universe starts from us. And, Yoga makes us conscious of everything within us and builds a sense of awareness."

'The Guardian Ring'

- The Guardian Ring of Yoga celebrates the movement of the Sun, underlining the concept of 'One Sun, One Earth'.
- 'The Guardian Ring' was a collaborative exercise between 79 countries and UnitedNations organisations along with Indian Missions abroad to illustrate Yoga's unifying power that surpasses national boundaries.

In the second chapter of the Bhagwat Gita, Lord Krishna asks Arjuna to perform his duties without flinching as if he was in a state of yoga. Krishna seems to see yoga as a state of mindfulness under all circumstances. Yoga fundamentally means letting the virtues of godliness and spirituality permeate one's mind — it's about self-realisation and the ability to merge one's mind with the soul. Buddhist Dhamma also talks about qualities such as patience, self-control, tolerance, and understanding — these, according to Dhamma, are qualities that make virtuous rulers.

Ocean Ring of Yoga

- Ocean Ring of Yoga symbolizes unity and solidarity.
- Organized by: Ministry of Defence and other ministries.
- The Indian Navy has been an ambassador for Yoga across the seas for several years.

C. Mental Well-Being

What is mental health and why it is important?

- Mental health includes our emotional, psychological, and social well-being. It affects how we think, feel, and act. It has intrinsic and instrumental value and is integral to our well-being.

- Mental also helps determine how we handle stress, relate to others, and make healthy choices. It underpins our individual and collective abilities to make decisions, build relationships and shape the world we live in.
- Mental health is important at every stage of life, from childhood and adolescence through adulthood.
- Mental and physical health are equally important components of overall health. For example, depression increases the risk for many types of physical health problems, particularly long-lasting conditions like diabetes, heart disease, and stroke. Similarly, the presence of chronic conditions can increase the risk for mental illness.
- Mental health is determined by a complex interplay of individual, social and structural stresses and vulnerabilities.
- Positive mental health allows people to:
    - Realize their full potential
    - Cope with the stresses of life
    - Work productively
    - Make meaningful contributions to their communities
- Mental illnesses are among the most common health conditions across world. There is no single cause for mental illness. A number of factors can contribute to risk for mental illness, such as
    - Early adverse life experiences, such as trauma or a history of abuse (for example, child abuse, sexual assault, witnessing violence, etc.)
    - Experiences related to other ongoing (chronic) medical conditions, such as cancer or diabetes
    - Biological factors or chemical imbalances in the brain
    - Use of alcohol or drugs
    - Having feelings of loneliness or isolation

Importance of Taking Care of Mental Health

- **Neglected Area**: Mental health which forms the core of our personhood is often neglected which impeded the development of an individual to full potential.
- **Stigmatised**: Mental health illness is often considered as Taboo that leads to reluctance on part of family members to seek diagnosis & treatment for the patient
- **Burden of Demography:** According to WHO, the burden of mental disorders is maximal in young adults. India being a young country (nearly 50% of its population below the age of 25) will face increased burden of mental illness in short term
- **Major contributor to the burden of illness:** An estimated 150 million people across India are in need of mental health care interventions, according to India's latest National Mental Health Survey 2015-16.
- **Disproportionate impact:** It is the poor, dispossessed and marginalised who bear the greatest burden of mental health problems, but historically their sufferings are dismissed as a natural extension of their social and economic conditions
- **Post-Treatment gap:** There is need for proper rehabilitation of the mentally ill persons post his/her treatment which is currently not present.
- **Lack of Specialists:** Low proportion of mental health workforce in India (per 100,000 population) include psychiatrists (0.3), nurses (0.12), psychologists (0.07) and social workers (0.07).

- **Dangers of increase in post-COVID order:** Mental health problems, tend to increase during economic distress leading to reduction in life-expectancy. This has been described by Nobel prize winning economist, Angus Deaton, as "Deaths of Despair"
- **Prone to abuse:** Mentally ill patients are vulnerable to and usually suffer from drug abuse, wrongful confinement, even at homes and mental healthcare facilities which is a cause of concern and a gross human right violation.
- **Affordability issues:** Due to inadequate number of mental health caretakers, such service if often concentrated in Urban areas and are also expensive
- **Needs Unique approach:** There is no one-size-fits-all prescription for mental health issues as they are intimately intertwined with unique, personal life stories

What measures does WHO recommend to tackle mental health?

- WHO's "World mental health report: transforming mental health for all" calls on all countries to accelerate implementation of the action plan.
- WHO argues that all countries can achieve meaningful progress towards better mental health for their populations by focusing on three "paths to transformation":
    - **Deepen the value given to mental health** by individuals, communities and governments; and matching that value with commitment, engagement and investment by all stakeholders, across all sectors;
    - **Reshape the physical, social and economic characteristics** of environments – in homes, schools, workplaces and the wider community – to better protect mental health and prevent mental health conditions; and
    - **Strengthen mental health care** so that the full spectrum of mental health needs is met through a community-based network of accessible, affordable and quality services and supports.
- WHO gives particular emphasis to protecting and promoting human rights, empowering people with lived experience and ensuring a multisectoral and multistakeholder approach.

What is the status of Mental Health in India?

- In India, according to National Institute of Mental Health and Neuro-Sciences data, more than 80% of people do not have access to mental healthcare services for a multitude of reasons.
- As per the National Mental Health Survey conducted by the National Institute of Mental Health and Neurosciences (NIMHANS):
- The prevalence of mental morbidity is high in urban metropolitan areas.
- Mental disorders are closely linked to both causation and consequences of several non-communicable disorders (NCD).
- Nearly 1 in 40 and 1 in 20 persons suffer from past and current depression, respectively.
- Neurosis and stress related disorders affect 3.5% of the population and was reported to be higher among females (nearly twice as much in males).
- Data indicate that 0.9 % of the survey population were at high risk of suicide.
- Nearly 50% of persons with major depressive disorders reported difficulties in carrying out their daily activities.

What are the initiatives taken by India to deal with mental health?

- **Constitution and Legal Provisions:**
    - **Article 21:** The right to a dignified life extends to the right to seek Mental Health care.
    - **Article 47:** Duty of the state to raise the level of nutrition and the standard of living and to improve public health.
- **National Mental Health Program (NMHP):** The National Mental Health Program (NMHP) was adopted by the government in 1982 in response to the large number of mental disorders and shortage of mental health professionals
    - To generate awareness among masses about mental illnesses Information, Education and Communication (IEC) activities are an integral part of the NMHP.
    - **District Mental Health Programme (DMHP),** 1996 was also launched to provide community mental health services at the primary health care level.
    - Facilities made available under DMHP at the Community Health Centre (CHC) and Primary Health Centre (PHC) levels, include outpatient services, assessment, counselling/ psycho-social interventions, continuing care and support to persons with severe mental disorders, drugs, outreach services, ambulance services etc.
- **Mental Health Care Act 2017:** Under this legislation, every affected person has access to mental healthcare and treatment from government institutions. It has significantly reduced the significance of Section 309 IPC and attempts to commit suicide are punishable only as exceptions.
- **Kiran Helpline**: In 2020, the Ministry of Social Justice and Empowerment launched a 24/7 toll-free helpline 'Kiran' to provide mental health support.
- **Manodarpan Initiative**: It aimed at providing psychosocial support to students, teachers, and family members during the Covid-19 pandemic.
- **MANAS Mobile App:** To promote mental wellbeing across age groups, the Government of India launched MANAS (Mental Health and Normalcy Augmentation System) in 2021.
- **National Tele Mental Health Programme**: This programme was announced in the Budget of 2022-23, to further improve access to quality mental health counselling and care services in the country.

The Way Forward

- **Awareness**: People should be made aware of significance of mental health, as much as that of physical health.
- **Destigmatising the issue:** Sharing one's story about mental health (through media campaigns) is the most effective strategy to reduce stigma attached with mental illness
- **Community Approach**: There is need to deploy community health workers who, with appropriate training and supervision, effectively deliver psychosocial interventions for the needy
- **Increase Funding**: State governments need to scale up its psychosocial interventions through community health workers
- **Broadening the scope**: Mental health care must embrace the diversity of experiences and strategies which work, well beyond the narrow confines of traditional biomedicine with its emphasis on "doctors, diagnoses and drugs"
- **Digital initiatives**: To help improve rural India's mental health through telemedicine, initiatives like Schizophrenia Research India's (SCARF) mobile bus clinic is being run by an

NGO. There is need for scaling up such initiatives through public-private collaboration to bridge the rural-urban divide

- **Measures that can be taken at individual level** by people who are suffering from mental illness
    - Reminding oneself that all of humanity is goes through tough times
    - Doing something for others, for science has shown that care-giving and community service makes life more meaningful & rewarding
    - Discussing with friends & families about the issues being faced

D. Role of Meditational Approaches in Mental Well-Being

In today's time, stress has become a part of most people's lives with many of them not even realising. This, coupled with an erratic sleep cycle, sedentary lifestyle, and unhealthy eating habits only makes things worse and may also lead to certain health conditions, including fatal ones such as heart disease, obesity, high blood pressure, stress, and depression. In such a case, meditation comes into the picture.

What is Meditation?

Each person identifies with their own interests and with their own groups, but meditation is pure science. Science does not belong to any particular division or department of life, it is an honest way of exploring life.

Meditation is the foundation of what we call human intellect: our self-awareness and ability to introspect and know what we are comes from meditation, from the teachings of meditation.

- Meditation is a systematic way of using our consciousness, our awareness, to understand the phenomenon of life that is happening right here and right now.
- The science of meditation is so pure that it does not use any external instruments, no external objects.

It is not about going somewhere, it is not about external reality at all. As far as meditation is concerned, the universe is the individual.

If there is space somewhere in the universe, that space is within the individual.

If there is air in the universe, it is within the individual.

If there is matter, it is in the individual. If there is gravity, it is felt by the individual.

Meditation is one of the most effective ways to develop a better understanding of yourself.

- In meditation, you passively observe your thoughts without any struggle to suppress them or force them to vanish.
- The benefits of this age-old practice are manifold – focussed attention, a calm mind, clarity of feelings and thoughts, relaxation, rejuvenation, better inner strength, and the ability to keep emotions balanced even in stressful situations.
- Studies have shown that meditation "can reduce depression and anxiety disorder and improve stress-related conditions like PTSD, fibromyalgia and irritable bowel syndrome.

Active Meditation

This is about being mindful of everything that you do, switching off the familiar and switching on your responses to newer experiences, even something as simple as walking. You become so involved in the activity and are so absorbed in it that you automatically cut yourself from disruptive thoughts and anxieties.

The ways to do this would be something simple, like sitting in the train and watching everybody around you, noticing the countryside rush by and being attentive in the moment. Or just sitting under a tree, feeling the breeze and taking in all that is around you, even focussing on other people milling around. Anything that takes you away from your own preoccupations.

E. Basics of Healthy Lifestyle

- A healthy diet during all stages of life is crucial to prevent several non-communicable chronic diseases (NCDs), such as obesity and diabetes.
- Together with physical activity, a healthy diet is essential to achieve a "sustainable health", which is defined as "a healthy and active ageing avoiding the risk of diseases".

Both the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) agree with the key principles of a healthy diet, which are as follows:

- Eat a variety of foods to ensure adequate intake of nutrients.
- Eat plenty of fruits and vegetables. At least 400 g (i.e. five portions) of fruit and vegetables per day.
- Consume whole grains, nuts and healthy fats rich in unsaturated fatty acids.
- Reduce the intake of saturated fats. To prevent unhealthy weight gain in the adult population, saturated fats should be reduced to less than 10% of total energy intake.
- Limit sugar intake. Free sugars intake should be reduced to less than 10% or to less than 5% of total energy for additional health benefits. This would be equivalent to 50 g or 25 g of free sugars per day, respectively.
- Cut back on salt. Less than 5 g of salt (equivalent to one teaspoon) per day.
- Drink water regularly. Good hydration is crucial for an optimal health.
- Consumption of alcohol. There is no safe level of alcohol consumption; therefore, alcohol is not a part of a healthy diet.

The Healthy Eating Plate proposed by Harvard University divides a plate in 4 parts:

- half of the plate for vegetables and fruits,
- a quarter for whole grains:
- and the other quarter for healthy proteins.

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WATER CONSERVATION

F. Water Stress & Scarcity

Growing water stress – various reports:

- In 2007, 'Coping with water scarcity' was the theme of World Water Day (observed on March 22).
- The new Water Report of the Food and Agriculture Organization of the United Nations (FAO) sounded a note of caution about this silent crisis of a global dimension, with millions of people being deprived of water to live and to sustain their livelihood.
- A NITI Aayog report, 'Composite Water Management Index' (2018) has sounded a note of caution about the worst water crisis in the country, with more than 600 million people facing acute water shortages.

Water stress and water scarcity

- Water scarcity is a physical, objective reality that can be measured consistently across regions and over time.
- "Water stress" refers to the ability, or lack thereof, to meet human and ecological demand for water.
- Compared to scarcity, "water stress" is a more inclusive and broader concept.
- India is experiencing a very significant water challenge, approximately 820 million people of India – living in twelve river basins across the country have per capita water availability close to or lower than 1000m3 – the official threshold for water scarcity as per the Falkenmark Index.
- Falkenmark Indicator or Water Stress Index:
    - It defines water scarcity in terms of the total water resources that are available to the population of a region; measuring scarcity as the amount of renewable freshwater that is available for each person each year.

Types of water scarcity

Water scarcity is the lack of fresh water resources to meet the standard water demand. There are two types of water scarcity

- **Physical water scarcity** is where there is not enough water to meet all demands, including that needed for ecosystems to function effectively.
    - Arid areas for example Central and West Asia, and North Africa often suffer from physical water scarcity.
- **Economic water scarcity** is caused by a lack of investment in infrastructure or technology to draw water from rivers, aquifers, or other water sources, or insufficient human capacity to satisfy the demand for water.
    - Much of Sub-Saharan Africa has economic water scarcity.

Causes of water scarcity

- **Unequal water distribution** as most of the rainfall that is received in India is distributed over a specific time and area. The level of water table rises during rainfall months but then decreases when there is no rainfall.
- **Overpopulated cities**, which create pressure on natural resources add to the problem of water scarcity.

- **Due to inefficient irrigation techniques and small land holdings for agriculture**, over-exploitation of groundwater is in practice. This has lowered the water table, leading to conflict between the demands from industry, agriculture and domestic sector.
- **Lack of recycling capacity for used water and low emphasis on water treatment** and reuse along with dumping of municipal and industrial waste in water bodies has led to reduction in input to water sources.
- **Low awareness about rain water harvesting, water usage efficiency** coupled with increasing purchasing power of people has increased demand leading to magnification of the problem.
- **Increasing Geogenic groundwater pollution** as well as increasing river pollution limits utilizable water in the country.
- **The concretization in urban areas and encroachment of water bodies** in both urban and rural areas not only prevent surface storage and groundwater recharge but also causes disasters like floods. Guwahati's Deepor Beel, for example, is used by the municipal corporation to dump solid waste.
- **Climate change** increases incidences of droughts and reduce annual precipitation in drought prone central and North West India.
- **The water harvesting and reuse technology** is still a luxury in India, the people in rural and small towns face hardship for purchase, use, and repair because of less motivation among both public officials and general public for use of these equipment.

Other issues of water scarcity:

- The typical response of the areas where water shortage or scarcity is high includes transfer of water from the hinterlands/upper catchments or drawing it from stored surface water bodies or aquifers.
    - This triggers sectoral and regional competition; rural-urban transfer of water is one such issue of global concern.
- Increasing trans-boundary transfer of water between rural and urban areas has been noted in many countries since the early 20th
    - A review paper published in 2019 reported that, globally, urban water infrastructure imports an estimated 500 billion liters of water per day across a combined distance of 27,000km. At least 12% of large cities in the world rely on inter-basin transfers.
- A UN report on 'Transboundary Waters Systems – Status and Trend' (2016) linked this issue of water transfer with various Sustainable Development Goals proposed to be achieved during 2015 to 2030.
    - The report identified risks associated with water transfer in three categories of biophysical, socio-economic and governance. South Asia, including India, falls in the category of high biophysical and the highest socio-economic risks.
- **Urban water use:**
- According to Census 2011, the urban population in India accounted for 34% of total population.
    - It is estimated that the urban population component in India will cross the 40% mark by 2030 and the 50% mark by 2050 (World Urbanization Prospects, 2018).
- Dependence on groundwater continues particularly in the peri-urban areas in almost all large cities that have switched to surface water sources.
    - While surface water transfer from rural to urban areas is visible and can be computed, the recharge areas of groundwater aquifers are spread over well beyond the city boundary or its periphery.

- At present, the rural-urban transfer of water is a lose-lose situation in India as water is transported at the expense of rural areas and the agricultural sector; in cities, most of this water is in the form of grey water with little recovery or reuse, eventually contributing to water pollution.
- Rural and urban areas use water from the same stock, i.e., the water resources of the country. Therefore, it is important to strive for a win-win situation.

G. Groundwater in India

India is the world's largest user of groundwater. The country's economy is tagged to groundwater development in many ways and its inadequacy will jeopardise progress.

- Tube wells, bore wells, springs and open-dug wells remain the primary source of groundwater production and abuse in India. Currently, there is a complete mismatch between available resources and the volumes of water withdrawn.
- Figures show that the extraction of groundwater in India, now a full-fledged industry in its own right, has shown an increase.
    - Drilling rigs and pumps registered an annual growth of 10-12 per cent.
    - An additional 10 million wells were energised with submersible pumps in the last two decades.
    - Centrifugal pumps in domestic, institutional, commercial and entertainment sectors remain unaccounted for.
- *Some learnings:*
    - Groundwater extraction has to be decoupled from wealth-generation if the excessive demand for groundwater has to be moderated.
    - Groundwater use need not be made 'evil'. However, failing to distinguish 'need' from 'greed' is criminal.

Causes for groundwater contamination

- **Industries-** Manufacturing and other chemical industries require water for processing and cleaning purposes. This used water is recycled back to water sources without proper treatment. Also industrial waste is dumped in certain areas, the seepage of which results in groundwater contamination.
- **Agriculture-** the fertilizers, pesticide and other chemicals used in growing plants contaminate groundwater.
- **Residential areas-** These generate pollutants (microorganisms and organic compounds) for groundwater contamination
- **Mining-** Mine drain discharge, oilfield spillage, sludge and process water also contaminate groundwater.
- **Coastal areas-** Saltwater intrusion increases the salinity of groundwater in nearby areas.
- **Excessive extraction-** It increases the concentration of minerals in the extracted areas, thus making it contaminated.

How technology can help save India's groundwater?

Integration of technology, ecology and livelihood is critical to the overall sustainability of groundwater. Technology can help in 'decision-making' on economic and social priorities related to groundwater use. Technology-guided decision-making would help distinguish groundwater abuse and promote efficient use.

Automated decision-making is one aspect that needs to be adopted as an integral part of groundwater extraction. We need to enable technologies to simulate appropriate human responses.

- Smart pumps should form part of automation at the basic well level. Sensors and decision-making tools must be integrated with the pump design to make them intelligent.
- Analysis of millions of wells' data in real-time needs to be supported by big-data analytics, cloud computing and real-time modelling with forecasting tools.
- Technology to automate water extraction systems should be adopted at the earliest and be completely automated five years after notification.
    - All existing tube well owners should be required to upgrade to the new technology. All new wells should integrate automation during construction.
    - Industries, farms, residential complexes, commercial establishments with multiple wells with bulk extraction should implement automation within six months of notification.
    - Individual households, small farms, schools, public institutions need to be incentivised to adopt automation and conform to water extraction norms.
    - The cost of automation to the well owners should not pinch the pocket, ideally matching the basic smartphone price.

Automation advantages

- Adopting artificial intelligence (AI) will help make decisions and visualise emerging scenarios for pro-active governance. For instance, smart sensors in different appliances and Internet of Things (the interconnection via the internet of computing devices embedded in everyday objects, enabling them to send and receive data) shall enable visibility of data of consequence.
- Data from millions of nodes (wells) can be analysed simultaneously in a decentralised fashion. Owners can be notified and decisions implemented simultaneously across India.
- Data from all nodes shall aggregate at the cloud servers for advanced regional analysis.
- Groundwater use through automation, be it for agriculture, industry, commerce, sports, entertainment and domestic use, will be forced to adhere to water footprint norms on daily and annual consumption.
- Zettabytes of data traffic flow shall enable daily audit of water balance at the well, watershed, aquifer and river basin scale.
- Big data analytics, combined with AI, shall transform governance into a practice of national behaviour for protecting the common property resource under threat.

Technology-guided decision-making would help distinguish groundwater abuse and promote efficient use. Additionally, this would ensure the safekeeping of groundwater within aquifers for posterity.

The Way Forward

- Make it mandatory for all energised pumping wells to integrate sensors and decision-making tools to help curb wastage and contamination.
- Privately financed wells, pumps, conveyance pipes, storage reservoirs, drips, sprinklers as well as treatment plants installed by millions of ordinary citizens and institutions have already built an efficient decentralised supply chain.
- Attaching additional technology to the existing investment is the first step in reducing wastage, improving efficiency and self-governance.

- Appropriate policy interventions in regulating further constructions and ensuring retention of 50 per cent of the resource within the aquifers can only help in its sustenance.

Groundwater remains the only natural resource that offers free access to all. For the poor, this has ensured economic growth, combined with social mobility. Groundwater cannot be allowed to fail.

NOTE: Groundwater Mapping

- Latest state-of-the-art technology is being employed by Council of Scientific & Industrial Research (CSIR) for mapping ground water sources in arid regions and thus help utilize ground water for drinking to supplement "Har Ghar Nal Se Jal" scheme.
- The entire work will be completed by 2025 with more than 1.5 lakh square kilometers of area with an estimated cost of Rs. 141 Crores.

Some of the most important initiatives taken by the Ministry of Water Resources to conserve and augment India's water bodies:

The Government of India has created the Ministry of Jal Shakti by integrating the Department of Drinking Water and Sanitation and the Department of Water Resources River Development and Ganga Rejuvenation, with a goal of integrated water resources management under one umbrella, so that all the issues relating to water are dealt with in a holistic manner.

Some of the most important initiatives taken by the Ministry of Water Resources to conserve and augment India's water bodies includes:

- The Ministry of Jal Shakti under the Indian government launched the **Jal Shakti Abhiyan** in 2019. It is a nation-wide water conservation campaign that aims at encouraging citizen participation to promote water conservation at the grassroot level.
    - Jal Shakti is monitoring Interlinking of River (ILR) programme with the mission of ensuring greater equity in the distribution of water by enhancing the availability of water in drought prone and rain-fed area.
    - On the World Water Day, March 22nd 2021, the government launched the 'Jal Shakti Abhiyan: Catch the Rain' with the theme 'Catch the rain, where it Falls When it Falls' under which, the government focuses on creation/ maintenance of water conservation and rainwater harvesting structures, renovation of various traditional water bodies tanks, reuse and recharge of bore wells, watershed development and intensive afforestation.
    - Jal Shakti Abhiyan – Har Ghar Jal Scheme (National Water Conservation Scheme 2019-20) was launched to ensure water security and providing safe water to all Indians with the aim to provide drinking water supply for all rural households in the country by 2024.
- **The Jal Jeevan Mission** is set to stress on local infrastructure for rainwater harvesting, management of waste water for sustainability of source as well.
    - Focus is on various water conservation efforts like point recharge, desilting of minor irrigation tanks, use of grey water for agriculture and source sustainability.
    - The Jal Jeevan Mission will connect with other Central and State Government Schemes to achieve its objectives of sustainable water supply management across the country.
- **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)**
    - The scheme offers an end-to-end solution for irrigation through source creation, distribution, management, field application and extension activities.

  - It was formulated by amalgamating the following schemes-
    - Accelerated Irrigation Benefit Programme (AIBP) – Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation.
    - Integrated Watershed Management Programme (IWMP) – Department of Land Resources (DoLR), Ministry of Rural Development.
    - On Farm Water Management (OFWM) – Department of Agriculture and Cooperation (DAC).
- **Per Drop More Crop (PDMC)**
  - PDMC focuses on micro-irrigation technologies like drip and sprinkler irrigation systems.
  - GoI provides subsidies to small and marginal farmers @ 55% of the indicative unit cost and @ 45% to other farmers.
- **Sahi Fasal Campaign**
  - A component of the National Water Mission, launched in 2019 by the Ministry of Jal Shakti.
  - The "Sahi Fasal" campaign was launched to nudge farmers in the water-stressed areas to grow crops which are not water intensive, but use water very efficiently, and are economically remunerative; are healthy and nutritious; suited to the agro-climatic-hydro characteristics of the area; and are environmentally friendly.
- **Bhartiya Prakratik Krishi Padhati (BPKP)**
  - A sub-mission under the Paramparagat Krishi Vikas Yojana (PKVY), which falls within the umbrella of the National Mission on Sustainable Agriculture (NMSA).
  - BPKP promotes natural farming – a chemical-free, traditional farming-based diversified farming system that integrates crops, trees and livestock with functional biodiversity.
  - The scheme aims at minimising the cost of cultivation, recreation of soil ecosystem and ensuring environmental sustainability.

Jal Jeevan Mission: Access to piped water to every household

The government of India has restructured and subsumed the ongoing National Rural Drinking Water Programme (NRDWP) into Jal Jeevan Mission (JJM) to provide Functional Household Tap Connection (FHTC) to every rural household i.e., *Har Ghar Nal Se Jal* (HGNSJ) by 2024.
Proposed Jal Jeevan Mission will be a decentralised, community-managed and sustainable water management scheme –

- Out of 17.87 crore rural households in the country about 14.6 crore which accounts for 81.67 percent are yet to have household tap connections for water.
- JJM envisages a structural change in the provision of drinking water supply services. The service provision should change to 'utility based approach' centered on 'service delivery'
- The government had also integrated different ministries and departments dealing with water into one ministry — the Ministry of Jal Shakti.
- JJM aims at providing potable water at service level of 55 litre per capita per day (lpcd) to every rural household through Functional Household Tap Connection (FHTC) by 2024.

- The fund sharing pattern between the Centre and states is 90:10 for Himalayan and North-Eastern States, 50:50 for other states, and 100% for Union Territories.
- Jal Jeevan Mission adopts a bottom to top approach, where the users and Paani Samitis (Water Committees) in the villages envision the whole project from its implementation to maintenance and operation.
- The mission has also ensured that at least 50% of the members of the water committee would be women.

Work to be taken up under JJM:

- In-village water supply (PWS) infrastructure for tap water connection to every household
- Reliable drinking water source development/ augmentation of existing sources
- Transfer of water (multi-village scheme; where quantity & quality issues are there in the local water sources)
- Technological intervention for treatment to make water potable (where water quality is an issue, but quantity is sufficient)
- Retrofitting of completed and ongoing piped water supply schemes to provide FHTC and raise the service level
- Grey water management
- Capacity building of various stakeholders and support activities to facilitate the implementation

73rd Amendment of Constitution of India

Gram Panchayats or its sub-committees will play a crucial role in planning, designing, execution, operations and maintenance of the in-village infrastructure under the Jal Jeevan Mission – Every village is to prepare a village action plan (VAP) which will be essentially having three components namely;

1. Water source & its maintenance
2. Water supply and
3. Grey water management.

Every village will prepare a Village Action Plan (VAP) which will have three components:

- Water source and its maintenance
- Water supply and
- Grey-water (domestic wastewater) management.

'Margadarshika for Gram Panchayats and Paani Samitis under Jal Jeevan Mission' (Guidelines for the Village Panchayats and Water Committees)

- The Mardarshika Guidelines will guide the members of the Water Committee and Gram Panchayats in taking the right decisions.
- A special 100-day campaign is being launched on 2nd Oct this year under Jal Jeevan Mission to ensure drinking water connection to every school and Anganwadi in the country.

Unburdening lives of women

- According to a report by the National Commission for Women, on an average, a rural woman in Rajasthan walks over 2.5 km to reach a water source. This is probably an underestimate, but the bottomline is that our women and girls spend a significant proportion of their time on fetching water.

- With women playing a leadership role in managing their community's water resources, minus the drudgery of walking for miles to fetch water for their families, the Jal Jeevan Mission will provide a massive fillip to the ease of living for women, and they will no longer be beasts of burden.

The Way Forward

- Need to relook at water-guzzling sugarcane —with a value chain that sucks is terrible in terms of subsidies at various stages
- Need to reimagine the public health engineering department (PHED) as not just a technical body but also as a public utility that oversees water entitlements as well as pricing of such entitlements is a goal. Digital sensors could facilitate remote monitoring of household water supply and quality, and eliminate tedious meter readings.
- This devolution can be incentivised by GoI, linked to milestones state governments and gram panchayats must reach, and hand-held by NGOs. For instance, JJM could tie up with the skill development ministry to train village women to measure turbidity and quality.
- On the lines of the Swachh Bharat Mission, extensive information, education and communication will be needed to create a jan andolan for water management. The ongoing Jal Shakti Abhiyan will help in creating awareness about the importance of integrating source sustainability and water reuse with the provision of household water supply.

H. Water Insecurity As A Real Challenge To Human And Environmental Security

- Although access to clean water is one of the largest hurdles, insecurity also stems from a range of issues, including dwindling groundwater, stress on water bodies, unsustainable development and theft, amongst others.
- Changes in the climate and ecosystems are added causes and effects of water insecurity.
- About a third of the global population lives without access to clean water and the United Nations' Sustainable Development Goals for 2030 set a high bar to ensure safe and affordable drinking water for all by the end of the decade.
- It will not be easy, especially in Asia, where approximately 300 million people in the region do not have access to safe drinking water, and close to 80 percent of wastewater generated by cities is discharged untreated into water bodies.
- These goals can be met through a better understanding of how water plays a pivotal role not only in human, food, and health security, but also in protecting ecosystems, growth ambitions, energy needs, and mitigating climate change.

Technology in the aid of growing water insecurity

- The emerging technology and the evolution of the **fourth industrial revolution** can aid the growing water insecurity if the world is cognizant of following two key aspects:
    - **Overdependence on technology** cannot and should not replace human responsibility on how water is seen, understood and used as there is no substitute for education to ensure that the world is no longer wasteful.
    - **Ensuring any emerging technology**, **innovation, and science** is used mindfully with smart policies and global governance systems in place that provides security as well as safeguarding the water itself.

- Emerging technology can be effectively utilised and optimised to make access to water and managing water systems more efficiently while aiding in smarter predictions and forecasting.
- There are numerous ways to **harness technology, innovation, and the drive to create and aid water solutions** that can ultimately also prevent conflict over shared resources.
- From space to smart infra, science has proven that efficiency is possible.
- From low-cost desalination to hand-held purifying filters, technology has revolutionised access to clean drinking water and improved livelihoods across the globe.
- Technology has also aided in **enabling better infrastructure, reducing loss, and creating a more secure environment.**
- AI and machine learning can map and predict potential risks, and early warning tools can aid in tracking water supplies, the effects of changes in the weather patterns, and potential disruptions that can occur.

Industrial Revolution 4.0 and management of water resources

- The emerging fourth industrial revolution offers untapped possibilities on understanding water.
- In 2021, a joint satellite mission between **NASA and France, the Surface Ocean Topography Mission,** was launched to use radar technology to provide a global survey of Earth's water.
- The satellite will study lakes, rivers, reservoirs, and the oceans, potentially adding a wealth of knowledge to previously unknown data to understand, measure, and manage our water resources.
- Such knowledge is not only about understanding the waters better, but it is also incredibly useful in understanding the effects of development on resources and the more nuanced effects of changes in weather and climate, ultimately feeding into better policy making.

Case Study of Smart Metering:

- It uses **IoT sensors** installed at critical junctures along infrastructure to alert users on water levels, quality, theft, and leakages.
- Primarily used in large scale systems, these can be introduced at the household and community level, including new housing complexes that are being built in growing cities across India.
- Not only can such a system create better awareness and understanding on domestic use patterns to allow for better policy making, it also ensures that the citizen has a role and responsibility in the sustainability of water cycles.

Management of water resources with cutting edge innovations

- Innovation in this space is countless, from **water ATMs to fit-for-purpose wastewater solutions to underwater drones with sensors for pipes and drains.**
- **In Bhubaneshwar, researchers at the Council of Scientific and Industrial Research** are using burnt red clay to treat raw water and make it potable; and in central India, low cost fit-for-purpose wastewater solutions developed by **ECOSOFTT** are being used to treat pollution in the Narmada River.

Challenges

- There are limitations and challenges to the extensive use of technology including:
    - Regulatory frameworks
    - Lack of skill

  - The inability of existing infrastructure to support such innovation
  - Financial obstacles
  - High energy consumption
- New environmental and water-related technology and the use of AI or machines are met with suspicion and are seen as a challenge to cultural traditions, especially if local communities are not suitably sensitised.
- There are added risks that come with the use of technology, such **as cyberattacks that are used as threats on critical infrastructure, utilities and businesses, affecting consumers and causing significant financial loss.**
- **'Hacktivism'** is a growing concern and interconnected grids, dams, treatment plants, and other infrastructures all become vulnerable.

Way Forward:

- As the dangerous trio of climate change, unsustainable development, and dwindling water resources hinder human and environmental security, the trio of science, emerging technology, and innovation need to be brought closer together in the water sector.
- Better public-private partnerships with substantial investment allows for targeted forecasting and tools that can predict potential conflict zones.
- A transformation in thought, analysis, and implementation is necessary to be able to counter known and, more importantly, some of the unknown risks and effects of a warming planet.
- A wider approach is needed with upgraded infrastructure, a range of new technical skills, new governance frameworks, education, and effective management.
- These are not insurmountable challenges and can be overcome through political will, forward-looking institutions and policies, and significant public-private partnerships.

Working with companies and people that bring **the best of innovation in technology, artificial intelligence (AI), the internet of things (IoT), robotics, and new frontiers in computing can help in better management of the growing water insecurity.** However, with the merging and blurring of these two spaces, the extent of the world's dependency on technology should not distract from behaviour and patterns of use.

Water Conservation Initiatives by the States

1. **Neeru-Chettu**
   - Implementing State – Andhra Pradesh.
   - It is aimed at collective participation and the spread of awareness to make the state 'drought proof' through better water conservation.
   - The activity involves rejuvenating and re-vitalising water resources through the desilting of tanks and feeder channels, etc.

2. Jal Jeevan Hariyali

   - Implementing State – Bihar.
   - It is aimed at encouraging farmers to participate in water conservation efforts of the government and to sensitise them on the use of alternative crops, organic farming, drip irrigation and other technologies with less dependence on irrigation.
   - It involves the identification, restoration and renovation of all public storage structures- canals, ponds, etc.

3. Sujalam Sufalam Jal Sanchay Abhiyan

- Implementing State – Gujarat.
- It is a Public Private Partnership (PPP) programme and the government's contribution is 60% of the work expenditure.
- The project involves deepening of the water bodies before the arrival of the monsoon to enhance storage.

4. Jal Hi Jeevan Hai

- Implementing State – Haryana.
- It encourages farmers to adopt crop diversification and sow crops which need less water like maize, arhar, etc.

5. Pani Panchayat

- Implementing State – Odisha
- It aims to ensure optimum utilisation of water as well as improving agriculture production.

6. Jalyukht Shivar Abhiyan

- Implementing State – Maharashtra.
- The aim is to make Maharashtra drought-free by making 5000 villages free of water scarcity every year.
- It involves the deepening and widening of water streams, the construction of cement and earthen stop dams, etc.

7. Mukhya Mantri Jal Swawalamban Abhiyan

- Implementing State – Rajasthan.
- Through the convergence of schemes of various departments, works are executed through people's participation by motivating villagers and beneficiaries.
- The conservation efforts include managing rainfall, run-off, groundwater and in-situ soil moisture.

8. Mission Kakatiya

- Implementing State – Telangana.
- The initiative aims at spreading minor irrigation **in the state with community participation for sustainable water security.**

I. Water Credit – Innovative way solution Climate Change

- **According to the World Bank**, India bears losses worth $9.8 billion each year as a result of extreme events, with floods alone accounting for 50 per cent of the damages.
- In 2020, floods led to damages equivalent to 0.15 percent of the country's GDP in addition to thousands of lives being lost or impacted.

About Water Credit:

- Water credits are one of the financing mechanisms to drive collective action toward common climate adaptation goals.
- Water credits represent a fixed quantum of water that is conserved or generated and can be transacted between water deficit and water surplus entities within a sub-basin.
- The concept of water credits is similar to carbon credits; however, unlike the atmosphere, the spatial limit for the transaction should remain within the same hydrological unit — that is, a river basin or watershed.

- g., multiple industries can offset their impact by buying water credits from municipalities that are fund-crunched to finance large-scale floodwater harvesting or wastewater treatment projects that conserve freshwater resources at a city level and promote wastewater reuse.

Usage of Water Credit:

- The **UN GEMS/ Water Program** uses a similar concept called the **'Green Water Credits'. It is implementing this in countries like China, Kenya and Morocco.**
- This project incentivizes upstream farmers to undertake green water management practices to reduce runoffs, boost groundwater recharge and curb sedimentation in reservoirs.
- Downstream, the public and private beneficiaries have created an investment fund to address the gap between the farmers' initial investment and the realization of benefits by the end-users downstream.
- The UN is expected to expand this model to other countries as well, with the aid of **IFAD/ International Fund for Agricultural Development and other institutions**.

Benefits of Water Credit

- The concept could help **boost the 'value' of water in the public eyes**. By attaching a monetary value to the resource, people could be encouraged to use it in a more economical manner.
- It is considered as an effective way to discourage water pollution on one hand and encourage maximum sustainable utilization of water on the other hand.
- Such a model could expand the existing recycling system. The discarded metals, plastics, phosphates and other materials would be diverted into recycling units instead of water bodies.

Challenges of Water Credit

- Commodification of water is a controversial issue. If water is turned into a tradable commodity, dilemma would arise about pricing in relation to quality.
- Richer entities would simply buy the water credits and continue to pollute, while claiming to be environmentally responsible. This preference for the status quo to maintain productivity, rather than go for sustainability, is a phenomenon being seen in the carbon credit system too.
- **Any credit system faces the risk of oligopoly**e., the market falls under the control of a few institutions, leading to limited competition. If such a situation arises, the rich players could buy up the credits from the economically weaker entities and start to control the market.

J. Water Use Efficiency Ensuring Water Sustainability in Agriculture

Ensuring physical access to water on farm, enhancing on farm water use efficiency and adopting water conservation practices are the most important focus areas for agricultural water management.

Water Use Efficiency: The ratio between effective water use and actual water withdrawal. Enhancing water use efficiency in every sector of water use (agriculture, drinking, domestic etc) is very important for sustaining life faced with the challenges posed by climate change in the water sector.

Water Use Efficiency in Agriculture

- Water Use Efficiency (WUE) in irrigation is the percentage of the irrigation water consumed by the crop of an irrigated farm, field and project to the water delivered from the source. Some water is lost due to conveyance, distribution and application in the field.
- In India, the agriculture sector is the largest consumer of water resources, therefore even a small percentage saving of water in this sector will have a large impact on the availability of water for drinking and domestic purposes.

Methods for Improving Water Use Efficiency in Agriculture –

1. **Micro Irrigation –**
   - The WUE in micro-irrigation including drip irrigation is as high as 80-95% in comparison to only 30-50% in conventional flood irrigation.
   - The micro-irrigation techniques also help in reducing water logging, fertiliser usage, labour expenses and other input costs and in enhancing agricultural productivity and farmers' income besides sustaining soil health.

2. Mulching –

- Mulching helps in increasing WUE by controlling water losses by evaporation from the plant root zone.
- A mulch is a material spread on the top of the soil – plastic sheets, organic material.
- There is about 10% water saving from the use of mulch materials in agriculture.

3. Drought- Tolerant Crops –

- Growing crops that are appropriate to the climate of the region also helps in getting more crops per drop.
- The ICAR has developed several drought-tolerant short-duration crop varieties that suit different agro-climatic regions of the country for judicious use of water.

4. Decentralised water storage and irrigation:

- Decentralised storage systems offer the possibility to provide safe drinking water where centralised supply systems are not feasible due to technical, economical or institutional reasons. Ex: In rural communities or informal settlements.
- Small water bodies (mainly tanks) are less capital-intensive, user-friendly with fewer environmental problems and augment groundwater resources through sub-surface recharge. Ex: Existence of decentralised water storage systems in (Hebbal) Bengaluru, etc.
- Decentralised supply offers the possibility to provide clean, reliable drinking water to rural or informal settlements where centralised systems are not economically or technically possible.
- Wide range of simple, relatively inexpensive and cost effective options are available so people can choose the technologies most appropriate for them. Ex: Drip irrigation, Sprinkler technique, etc.,
- In cities with grave water crisis decentralised water storage is the only solution and the society as a whole should a make an effort in this regard. For Ex: Individuals and communities in Chennai have created a simple rainwater harvesting apparatus which can successfully collect 225 litres in just 10 minutes.
- Traditional irrigation techniques such as tankas, khadins, vav, ahar pynes are significant in areas such as arid and semi-arid regions. Ex: Bikaner, Jaisalmer, South Bihar.
- They are independent from an institutional set-up or centralised systems.

- Government initiatives to promote decentralised irrigation:
    - Mission Kakatiya is a flagship program under Telangana government aimed at restoring minor irrigation sources of water like ponds and tanks.
    - Jalyukt Shivar yojan in Maharshtra has played a prominent role in providing farm ponds to every farmer in her/his agriculture field.
    - In Gujarat 'Bhungroo' a water management system that injects and stores excess rainfall water underground. This water is then used for irrigation during summers .

Other measures to increase water use efficiency include –

- Reduce conveyance losses by lining channels or preferably, by using closed conduits.
- Avoiding mid-day sprinkling reduces evaporation.
- Reduce run-off and percolation losses due to over-irrigation.
- Select the most suitable and marketable crops for the region.
- Use appropriate insect, disease and parasite control.
- Apply manures and green manures where possible and fertilise effectively.
- Apply weed control measures.
- Practice soil conservation for long-term sustainability.
- Irrigate in the exact amounts to prevent water deficits, taking into account weather conditions and crop growth stages.

All the best,
Team IASbaba 😊

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