WATER CONSERVATION APPROACH FOR BAL GANGA PRAHARIS (SENIOR SCHOOL)

THE WATER WE DRINK
IS OUR MOST DIRECT AND IMMEDIATE
CONNECTION TO THE ENVIRONMENT
AS IT MAKES UP TWO THIRDS OF OUR
BODY WEIGHT

Water covers some 70% of the Earth's surface; approximately 97.5% of it is saline and 2.5% freshwater.

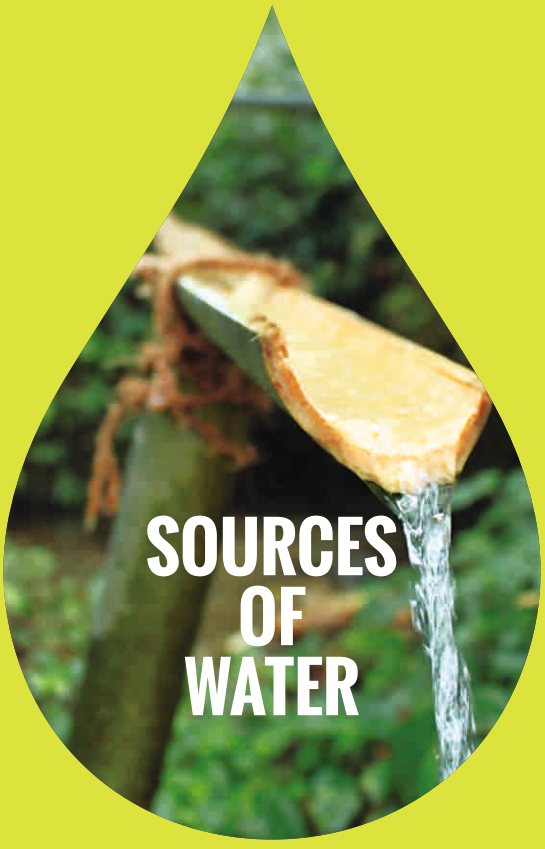
97.5 %

Saltwater
Oceans & seas

2.5%

Freshwater
Lotic (Running water)
Lentic (Stagnant water)

Water is a global renewable resource available in almost all parts of the world that is critical to the survival of all organisms on the planet. It maintains its renewability as it goes through a continuous hydrological cycle. Water exists on earth in 3 forms viz., solid ice, liquid water, and gaseous water vapour.



SOURCES OF WATER

Ground sources

Ground water
Springs
Hyporheic zone
Aquifers

Surface water

River
Tributaries
Streams
Springs
Ponds
Lakes
Wetlands

Precipitation

Rain
Hail
Snow
Fog

Biological source

Plants

Saltwater sources

Ocean
Sea
Delta

Freshwater sources

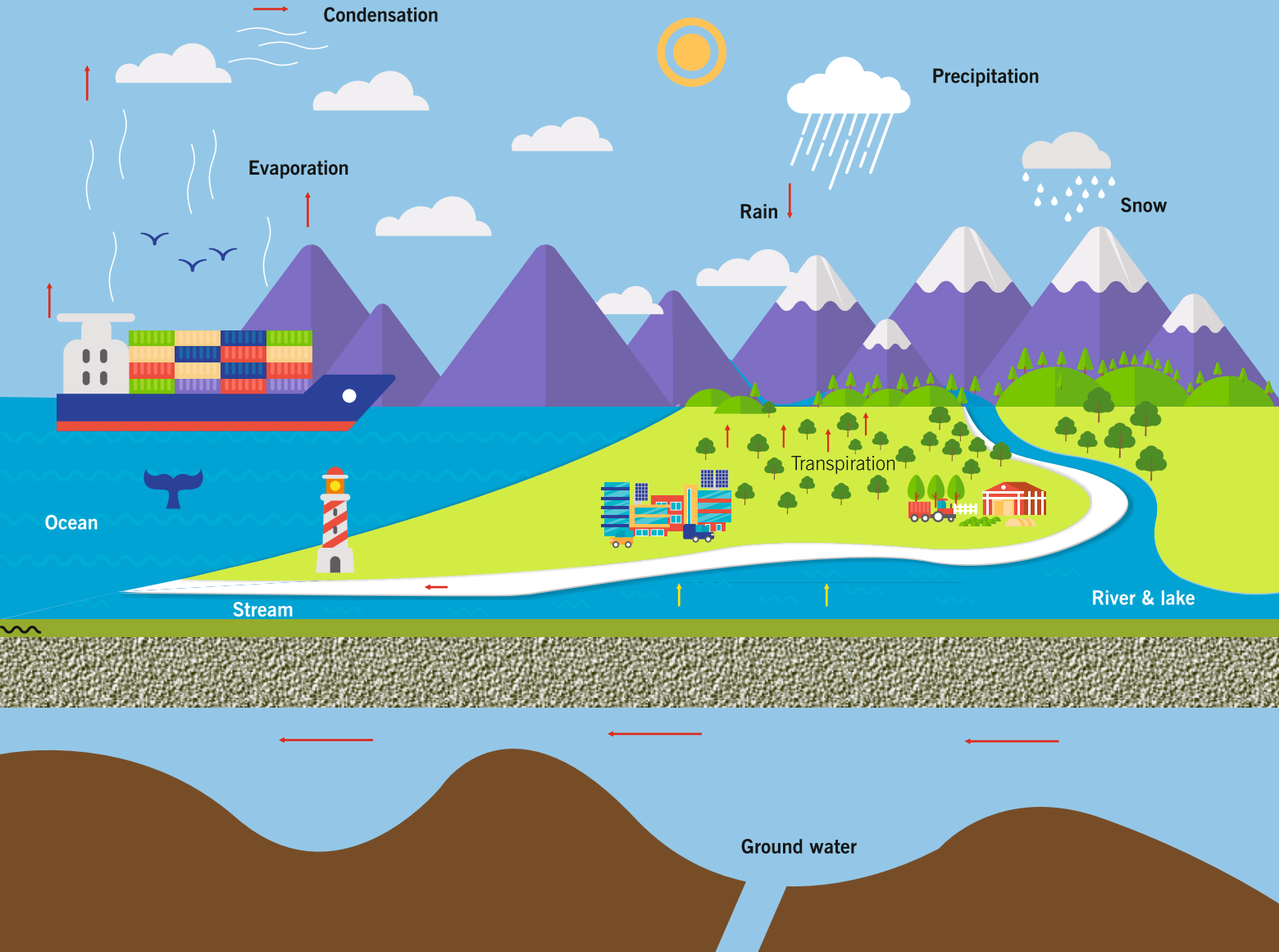
Ice caps
Glaciers
Groundwater

“We forget that the water cycle and the life cycle are one”.

-Jacques Yves Cousteau

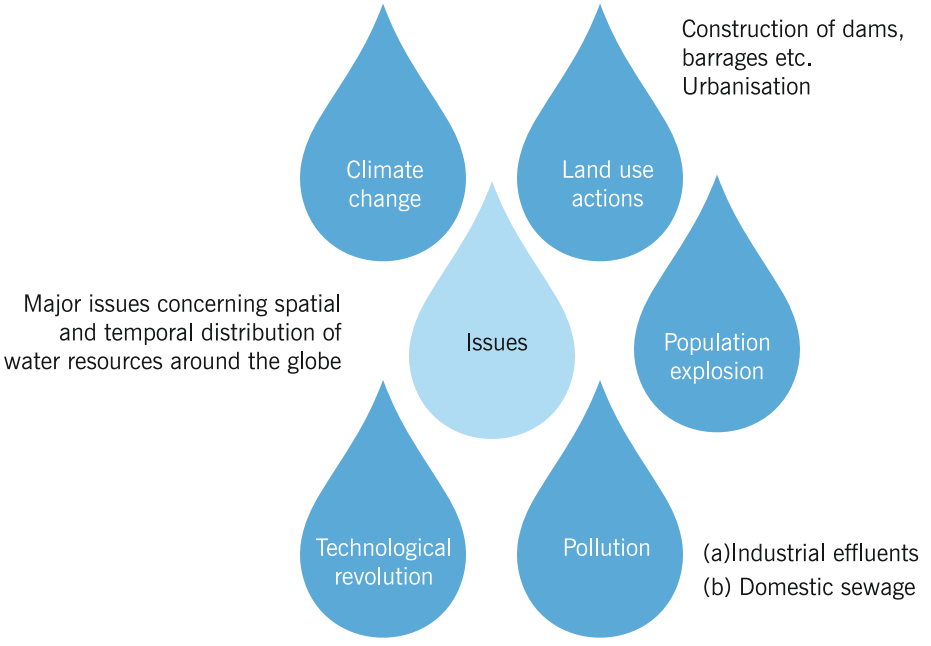
HYDROLOGICAL CYCLE

Water is in a state of constant flux, and the exchange of water from one form to another is known as the turnover rate of water, or the global hydrological cycle.



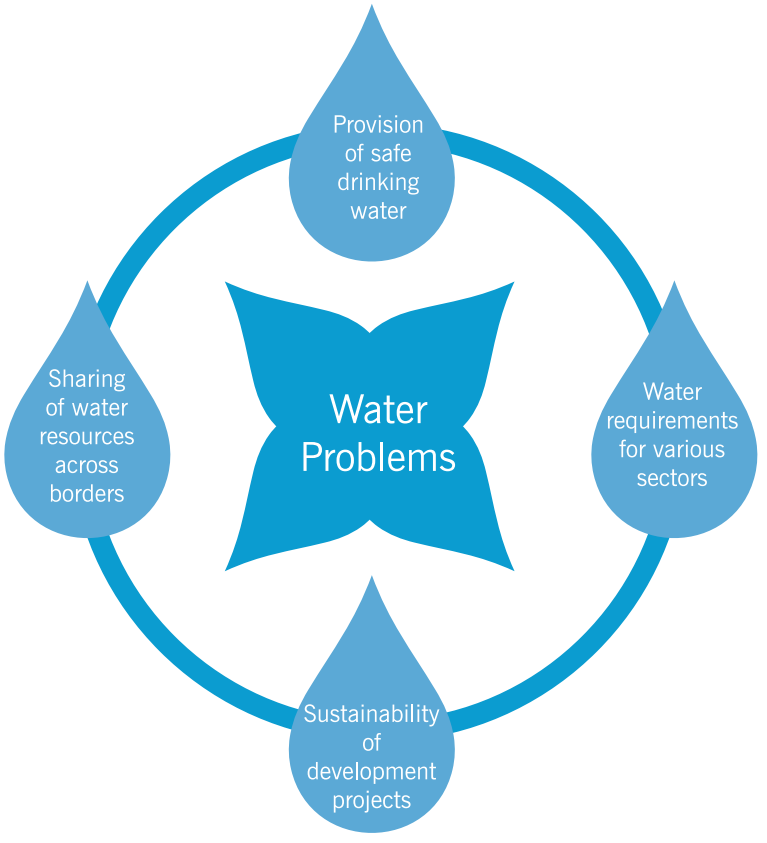
MAJOR WATER ISSUES

Problems pertaining to water can be viewed at multiple levels i.e. at local, regional, national and global levels.



"If we pollute the air, water and soil that keep us alive and well, and destroy the biodiversity that allows natural systems to function, no amount of money will save us."

- David Suzuki



Major water problems in terms of both quality and quantity have recently arisen from the impact of anthropogenic activities.

MAJOR WATER ISSUES IN INDIA

Growing water demand

Population explosion, urbanisation and industrialisation; changes in agricultural practices, and cultural changes have triggered an explosive increase in demand for water.

Dwindling water supplies

Indiscriminate exploitation of existing water supplies.

Increased levels of pollution in water & municipal waste.

Reducing potential for exisiting supplies schemes

Rapid increase in water pollution has dire implications for the health and welfare of human beings.

Presence of industries has a manifold impact on the availability and quality of the existing sources of freshwater.

14 major rivers in India accommodate 82% of the country's total population, leading to major pollutants being released from domestic as well as industrial areas.

Reducing scope for augmenting existing supply of surface water

Utilisation of existing surface water runoff is very low.

Scope for further augmentation of utilisation is low, existing sites are being intensively exploited, and social & environmental cost of further exploitation are very high.

Groundwater depletion

Groundwater is an essential part of livelihoods of many, as well as acting as a drought-buffer.

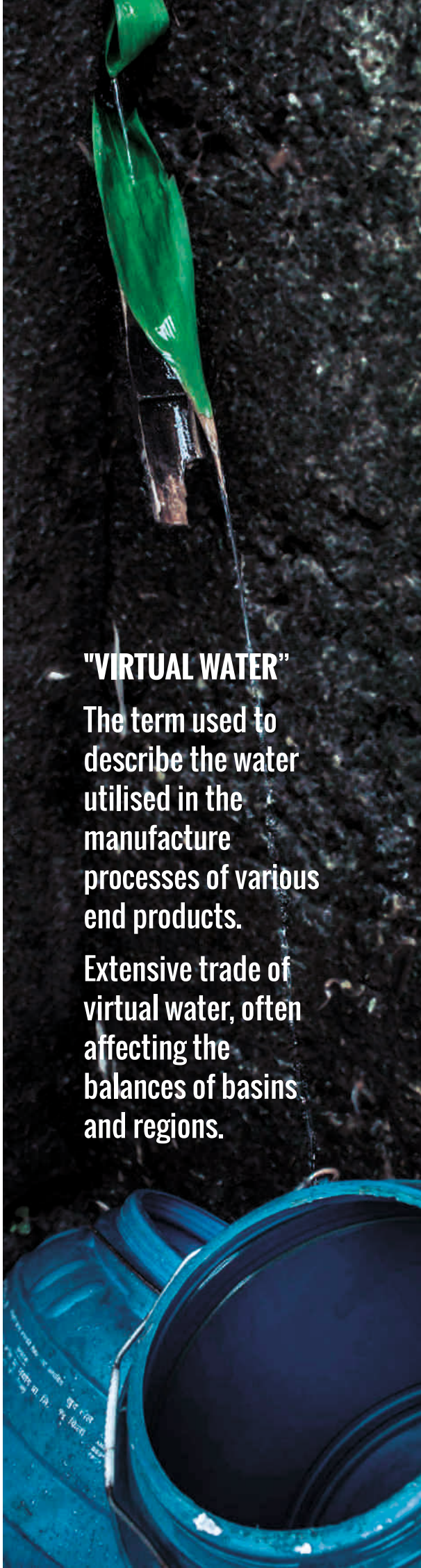
Often polluted due to extensive usage of chemical fertilisers and pesticides in agriculture.

Vulnerable to the pollution caused in aquifers and surface water sources.

Dwindling supplies of natural freshwater

Soil erosion in catchment areas and subsequently accelerated siltation of reservoirs.

Irrigation systems connected to the reservoirs further add to the problems due to their lack of adequate maintenance, poor quality and reliability.



"VIRTUAL WATER"

The term used to describe the water utilised in the manufacture processes of various end products.

Extensive trade of virtual water, often affecting the balances of basins and regions.

NEED FOR WATER CONSERVATION

"Sustainability is not just about adopting the latest energy-efficient technologies or turning to renewable sources of power. Sustainability is the responsibility of every individual every day. It is about changing our behaviour and mindset to reduce power and water consumption, thereby helping to control emissions and pollution levels."

-Joe Kaeser

Anthropogenic activities

Water withdrawal for activities like agriculture and energy production

Water degradation

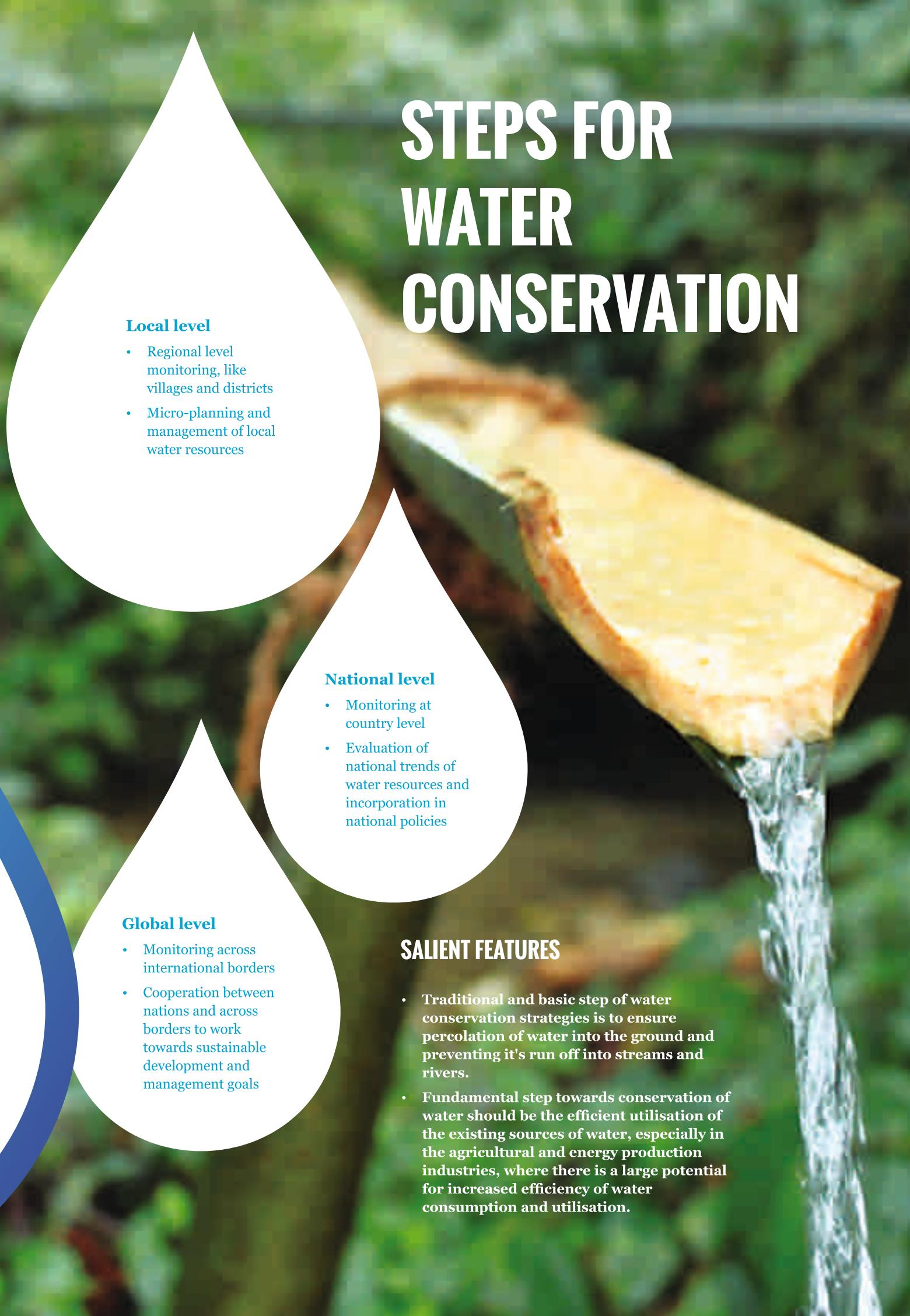
Decline in water quantity and degradation of water quality

Sustainable water management

Need for development of strategies for sustainable water management

SUSTAINABILITY CRITERIA

1. Access to basic amount of water to ensure sustenance of human health and ecosystems
2. Basic protection of renewability of water resources
3. Water resources should maintain a certain minimum standard, which is subjective to the location and objective of use of water.
4. Human activities should not impair the renewability of freshwater stocks and flows
5. Data on water resource availability, use and quality should be collected and made available to all parties
6. Setting up of institutional recommendations for planning, management and conflict resolution
7. Water planning and decision making should be a democratic process, involving all affected parties and fostering direct participation of affected interests.



STEPS FOR WATER CONSERVATION

Local level

- Regional level monitoring, like villages and districts
- Micro-planning and management of local water resources

National level

- Monitoring at country level
- Evaluation of national trends of water resources and incorporation in national policies

Global level

- Monitoring across international borders
- Cooperation between nations and across borders to work towards sustainable development and management goals

SALIENT FEATURES

- **Traditional and basic step of water conservation strategies is to ensure percolation of water into the ground and preventing it's run off into streams and rivers.**
- **Fundamental step towards conservation of water should be the efficient utilisation of the existing sources of water, especially in the agricultural and energy production industries, where there is a large potential for increased efficiency of water consumption and utilisation.**

CLASSICAL METHODS OF WATER MANAGEMENT

Monitoring soil water content

- Maintenance of ground water table
- Prevent soil erosion of dry soil particles

Afforestation

- Slow down runoff with the help of trees and shrubs
- Avoid clear cutting

Crop rotation

- Reduce water runoff
- Prevent exposure of soil to the atmosphere

Organic mulches

- Reduce water runoff improve water percolation
- Improve water percolation

Water needs

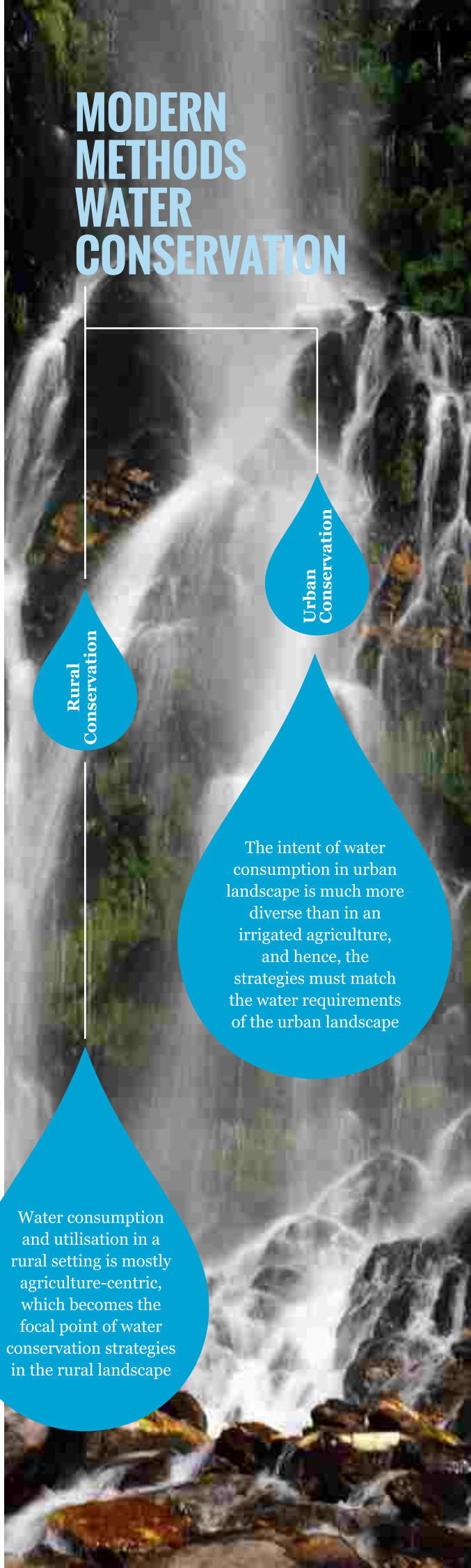
- Adjusting water application according to specific crop needs
- Use of specific water delivery systems

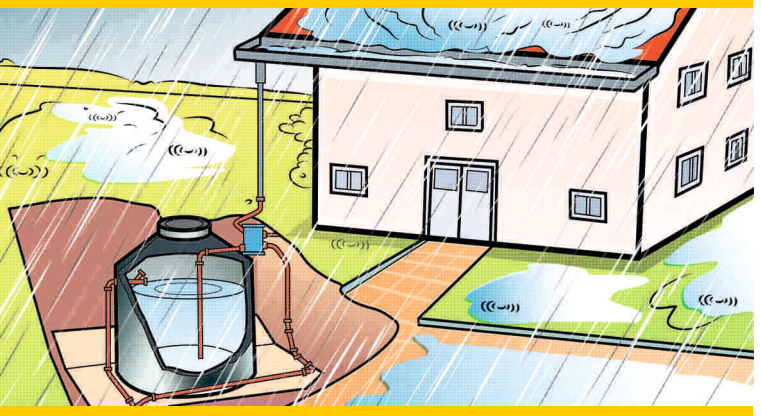
Rainwater harvesting

- Collect runoff from rain water in ponds and tanks
- Improves ground water levels

Prevent biomass removal from land

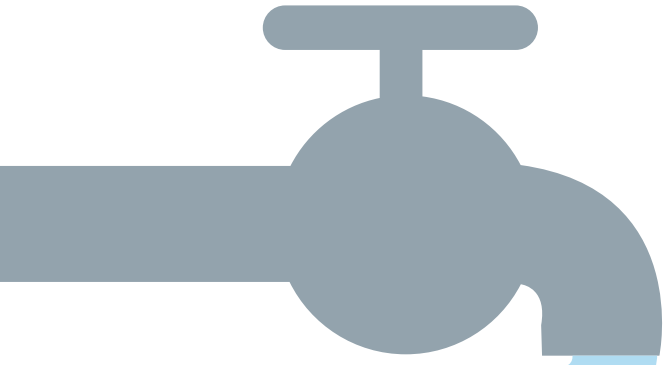
- Improves water retention of soil
- Prevents soil erosion





Rainwater Harvesting

- Storage of rainwater in surface or subsurface aquifers for future use.
- This is done in order to prevent loss of rainwater in the form of surface runoff.
- Often acts to augment the ground water reserves.



Groundwater conservation

Areas with scanty rainfall, the ground water table acts as the main source of water.

Since groundwater occurs in more quantity than surface water, and is more widespread, economically more viable, more sustainable and reliable, and relatively less vulnerable to pollution and drought than any other source of water.

Needs to be replenished and conserved, in order to act as a source of water not just for human civilisations, but also for natural ecosystems.

NOVEL WATER MANAGEMENT STRATEGIES

Science, technology and innovations are integral parts of the sustainable water management strategies. Technological advances and trends are likely to benefit rapid and effective adaptation in the water sector. Many innovations and developments in sustainable water management are high-risk and with uncertain returns. Some of the novel techniques developed for water conservation are enlisted below.

Cybernetics and Artificial Intelligence

Smarter internet and instantaneous information technology

Nanotechnology

Non-traditional Energy Technology

Use of cost-effective, renewable energy sources with a low carbon footprint

Biotechnology

Genetic engineering to help feed the populace and save endangered species

Space-based Environmental Monitoring Systems

Instantaneous feedbacks to predictive models

Geo-engineering to reverse global warming

Giant reflectors in orbit, greening deserts, iron fertilisation of the sea, and aerosols in the stratosphere

Weather and Climate Prediction

Effective and reliable prediction of weather patterns

Desalinization

Cost-effective method to convert sea water into potable water for supply to coastal cities

Sanitation and Wastewater Treatment

Improved wastewater treatment methods, in order to recycle water and decrease consumption

Ecological Engineering

To preserve habitats, reverse species extinctions and combat invasive species

RS & GIS

Mapping of groundwater resources and sustainable extraction levels

WETLAND CONSERVATION

Wetland his any land area that is saturated or flooded with water, either seasonally or permanently, that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.

Marine
Coastal wetlands, lagoons, rocky shores, coral reefs

Lacustrine
Associated with lakes

Riverine
Along rivers and streams

Estuarine
Deltas, tidals marshes, mangrove swamps

Human-made
Farm ponds, irrigated agricultural lands, dam reservoirs

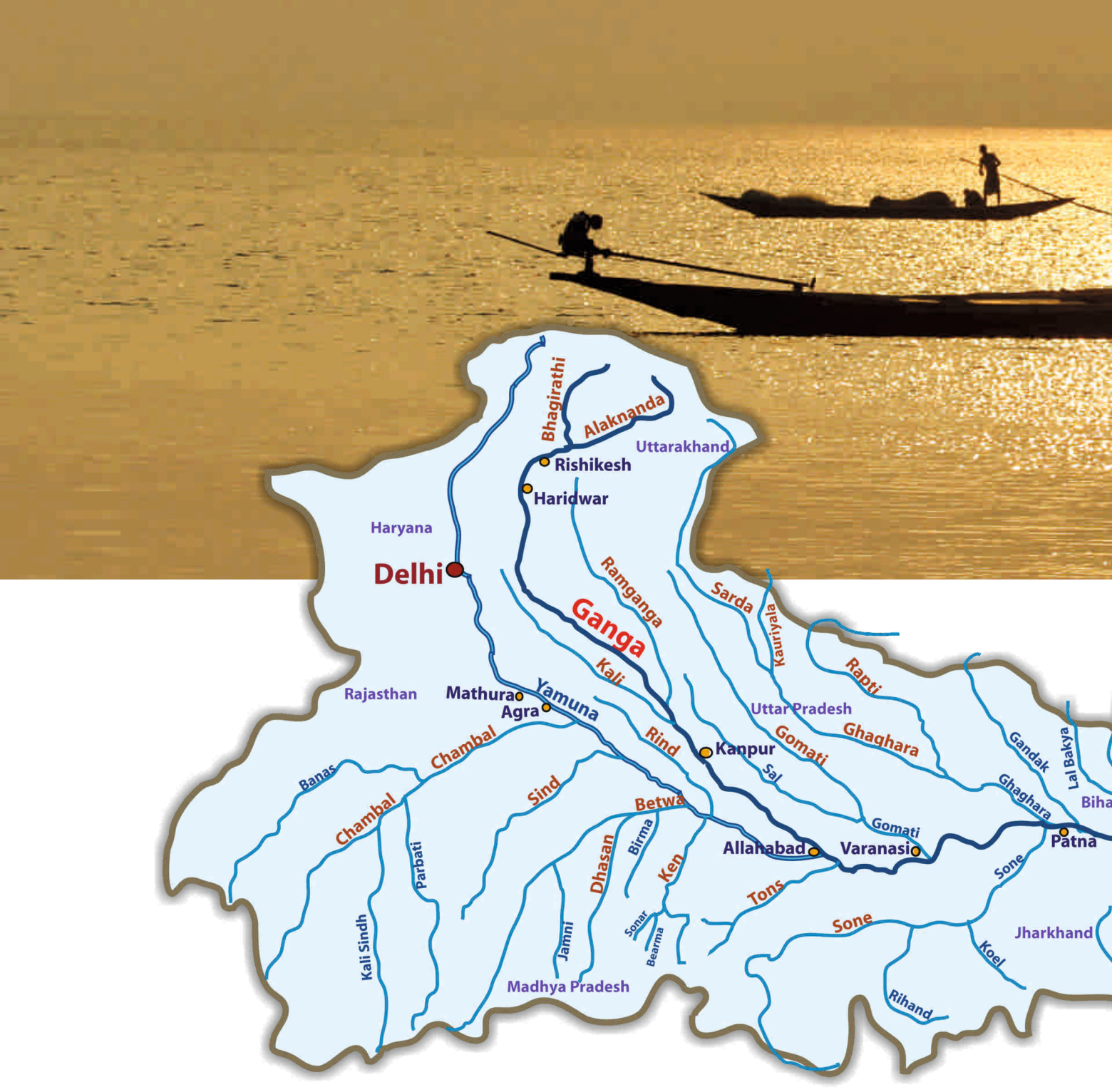
Palustrine
Marshes, swamps, bogs

Functions

- Water storage
- Drought buffering
- Groundwater recharge and discharge
- Storm protection
- Shoreline stabilisation
- Water purification
- Flood mitigation
- Erosion control
- Retention of nutrients, sediments and pollutants

Values

- Water supply
- Timber and other materials
- Range of wetland products
- Fisheries
- Energy sources like peat and plant matter
- Recreation and tourism
- Agriculture
- Wildlife resources
- Cultural importance

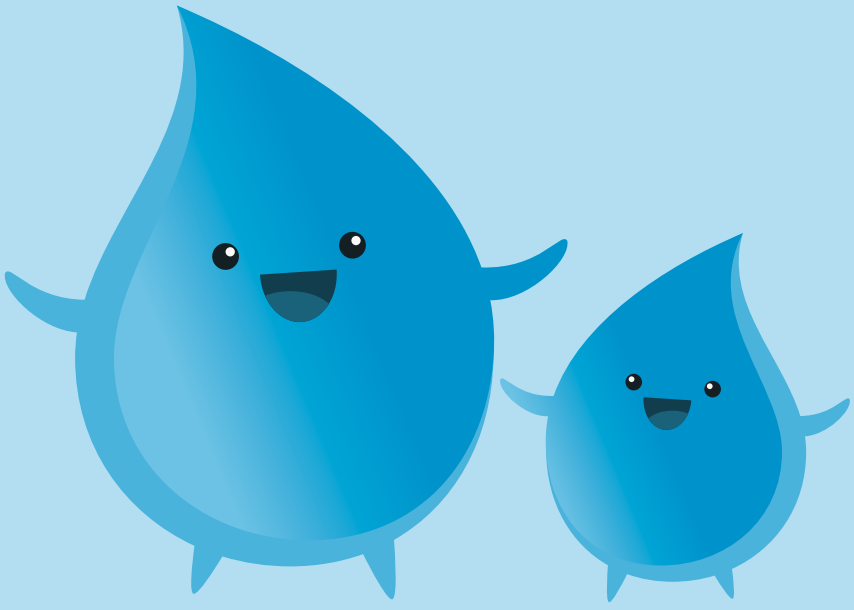


GANGA RIVER BASIN

The Indo-Gangetic flood plain is the largest wetland system in India, extending from the river Indus in the west to Brahmaputra in the east. The Ganga River basin, with an area of 8,61,000 km^2, occupies approximately 26.3% of India's geographical area. The basin is spread across the 11 states viz. Himachal Pradesh, Uttarakhand, Uttar Pradesh, Delhi, Haryana, Rajasthan, Bihar, Jharkhand, Chhattisgarh, Madhya Pradesh, and West Bengal. The waters of the Ganga are extensively used for domestic, industrial and agricultural purposes, and hold high cultural, socio-economic, and ecological value. The basin shows a high degree of heterogeneity in terms of climate, geomorphology, soil, biogeography, culture and socio-economic structure. The Ganga originates as Bhagirathi from the Gangotri glaciers in the Himalaya in the Uttarkashi district of Uttarakhand. The Ganga river is joined by a large number of tributaries on both the banks in the 2,525km long course to the Bay of Bengal.

CONSERVATION METHODS FOR GANGETIC WATER

- Empowerment of appropriate institutions to monitor and implement need-based programs.
- Public and local community participation.
- Plantation campaign & cleanliness drive.
- Awareness workshops and Community outreach programme.
- Workshop and trainings on Ganga and biodiversity conservation.
- Evolution of segmented implementation plan.
- Sewage treatment plants.
- Promotion of forestry programs to prevent erosion problems.
- Regulated withdrawal of water from the river at various major towns and cities.
- River front development activities with garbage management on ghats, removing floatables and maintaining cleanliness & hygienic status.
- Sub-surface flow constructed wetland – Engineered wastewater treatment systems encompassing a variety of treatment modules including biological, chemical & physical processes. Construction of such wetlands along banks of the Ganga may act as a biofilter capable of removing high loads of nutrients & other pollutants from the river.
- Macrophytes are considered to be the main biological component, which play an important role in the treatment process.



Join us for better conservation initiatives for each of us to save water, and better future for the next generation.

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

Information Available link:http://www.wii.gov.in/nmcg/news_events

GACMC
Ganga Aqualife Conservation Monitoring Centre

NMCG
National Mission for Clean Ganga,
Ministry of Jal Shakti
DoWR, RD & GR
Government of India

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