Open Text-Based Assessment

2015-16

Science

Class-IX

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OPEN TEXT BASED ASSESSMENT

SCIENCE CLASS-IX

Theme–1: Handling Drought in our Country

Abstract

After exploring the content, learning of the students will be enhanced as they will develop the concept of drought as a disastrous climatic anomaly. They will be able to identify the causes and assess the impact of drought. It will trigger their creativity to devise ways to reduce the impact of drought. It is designed with a view to create awareness through two successful case studies where in constant efforts and determination of people transformed the dry and shattered drought affected areas and brought them back to life.

Waiting for the rain

The farmers' eyes

With shattered hopes

And intense cries

Waiting for the rain

The farmers' plights

With cracked dreams

And weary nights

Waiting for the rain

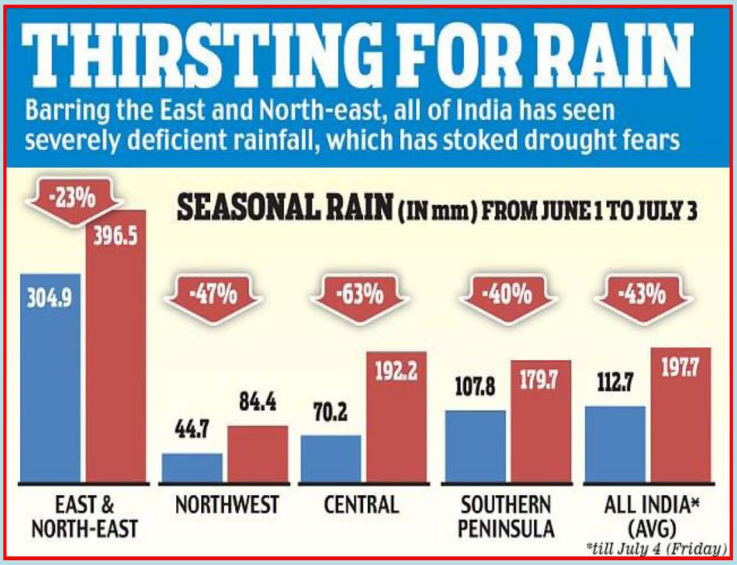
When the clouds pass dry

Still they wait

The farmers 'eyes.....

How difficult it is even to imagine the problems faced by drought victims: Isn't it?

Drought is an insidious hazard of nature, characterized by deficient moisture supply resulting either from sub-normal rainfall, variable rainfall distribution, higher water requirement or a combination of all these factors. It is an issue of serious concern because of its damaging consequences



Report: 'Thirsting for rain: Parched India braces for the El Nino effect as forecaster calculates 60 per cent chance of drought'

The India Meteorological Department (IMD) said that cumulative rainfall across the country during the current monsoon was 43 per cent below the long period average and the worst impact of a sub-normal monsoon was felt in central India leading to strong drought probabilities.

Report: 'Drought worsens in Maharashtra; 7,075 villages hit across the state'

Mumbai: A recent survey showed that the drought situation in Maharashtra has worsened with more villages being supplied water through water tankers.

A total of 11,801 villages across the state - barring coastal regions - are in the grip of the severest drought in the past four decades.

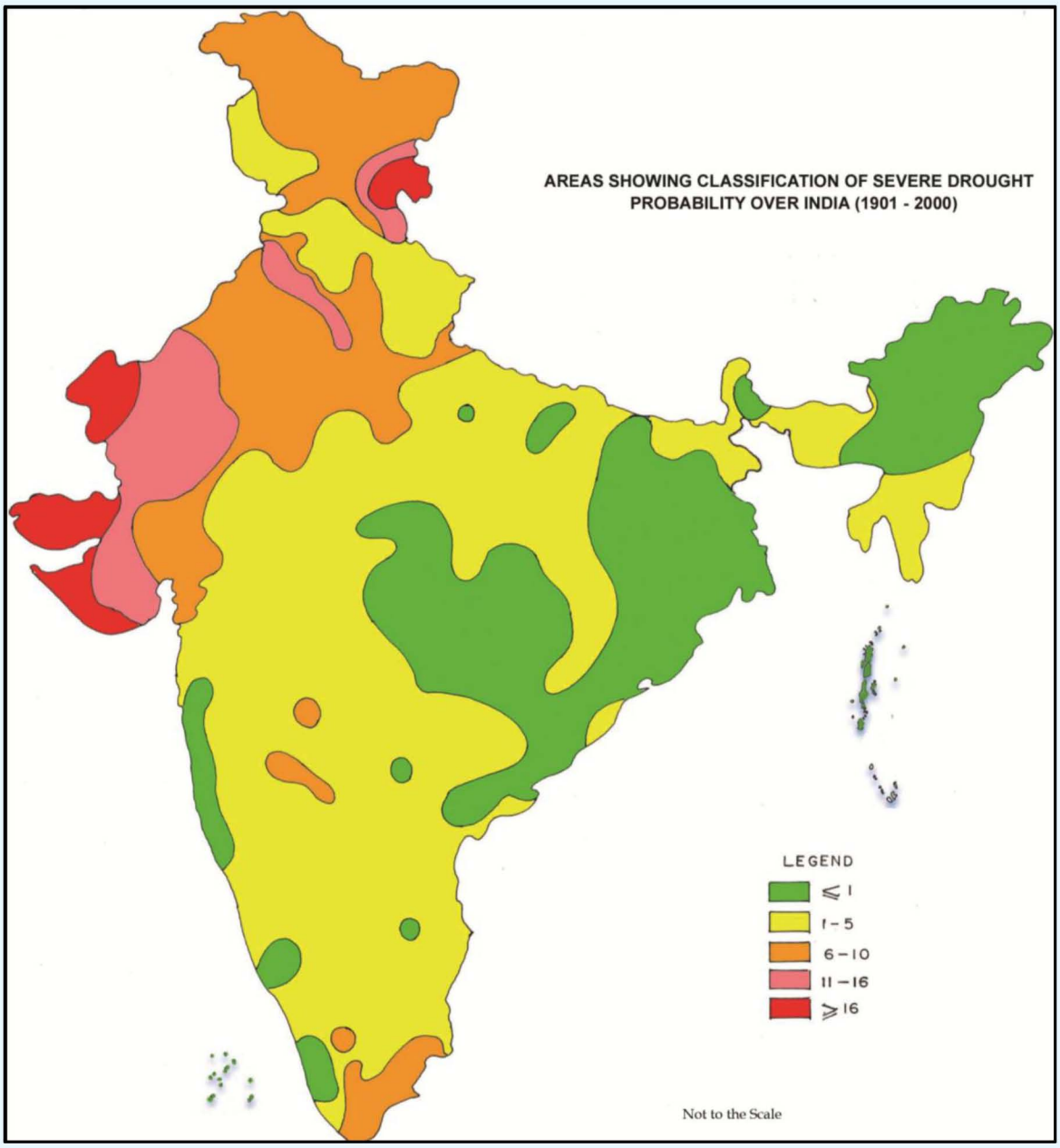
Addressing a joint session of the Maharashtra assembly on the first day of the budget session, the Governor said that the failure of the monsoon for the second consecutive year in the state was a matter of deep concern.

"In February 2012, only 230 tankers were supplying drinking water while in 2013 the number in

February -end was nearly 10-fold at 2,136 tankers," the governor said.

Of the total 34 districts in Maharashtra, the worst-affected are Solapur, Ahmednagar, Sangli, Pune, Satara, Beed and Nashik.The situation is also serious in Buldhana, Latur, Osmanabad, Nanded, Aurangabad, Jalna, Jalgaon and Dhule districts.

As depicted in the map, the probabilities of drought are higher in the arid zone (western India) compared with other sub-divisions.



The most severe consequence of drought is famine. In India, major droughts in 1918, 1957-58, and 1965 resulted in famines during the 20th century. The Sahelian drought and famine of 1968 to 1974 is a horrific reminder of the combined effects and impacts of desertification and drought

Planning and Implementation:

A drought risk management program with different levels has been developed in our country. The governments of the state assess the drought situation and activate drought response systems under

this programme. The state will provide financial support through loans and grants, food, water, fodder supply, seeds, and fertilizers. Local populations lend a supporting hand by deepening village ponds, repairing dams and roads, and establishing cattle camps for livestock. Local governments provide weekly and bi-weekly *"agromet advisories"* to farmers so that they can use appropriate agricultural practices.

A project proposed on river-linking involves a large-scale engineering intervention to shift water from the Brahmaputra and lower Ganga basins in eastern India to water scarce regions of western and central India, through the construction of reservoirs, dams and over 14,000 kilometres of canals. The project is aimed at balancing the uneven water flow in different river basins. However, environmentalists and water experts are of the opinion that, going against nature would lead to an irreversible ecological disaster.

Challenges remain, so let us look into the causes-

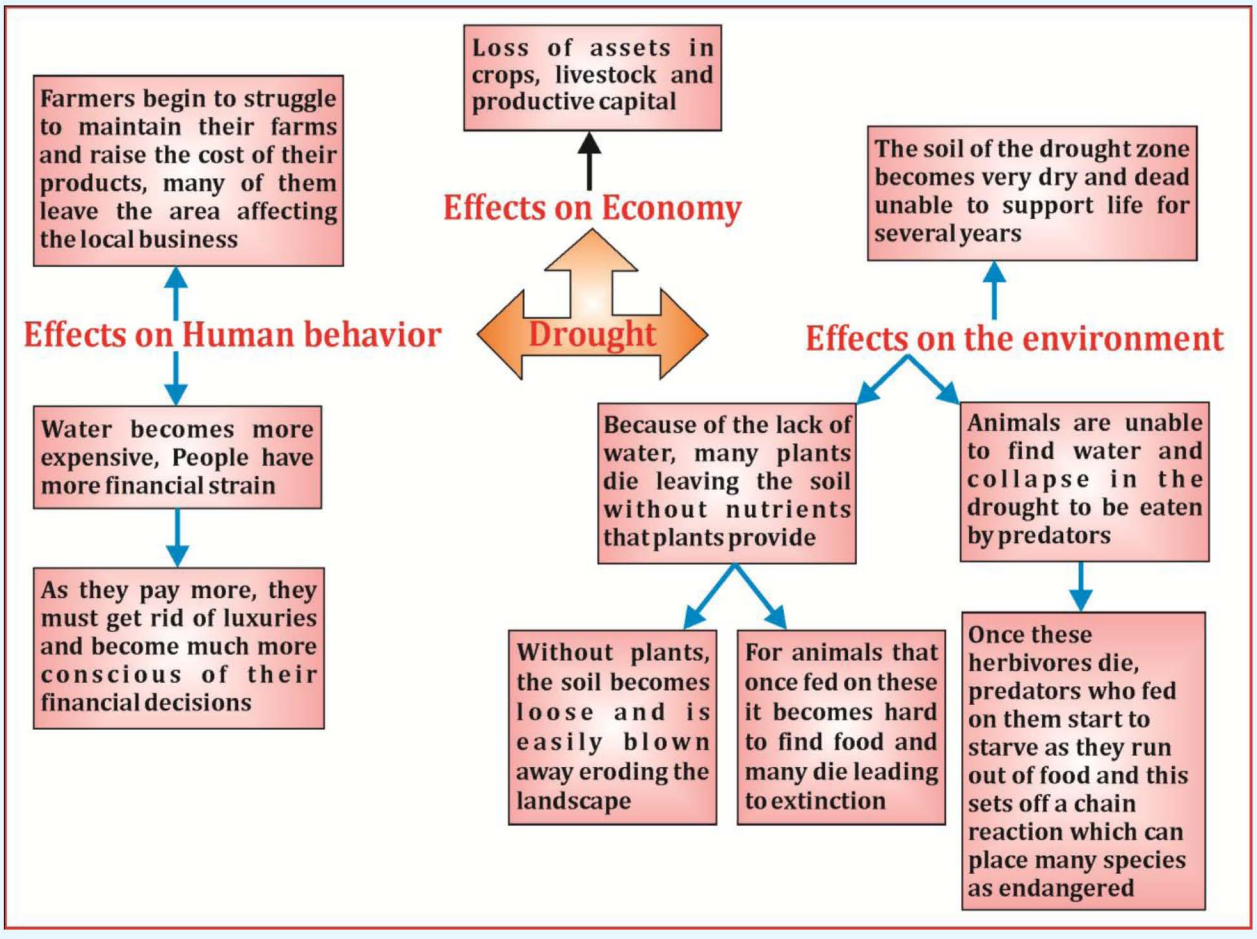
- **Meteorological:** They are related to climatic conditions and lack of rain. The deficiency may be for specific areas and not for the entire country. The deficiency is measured as a deviation from the mean rainfall over a particular region.
- **Hydrological:** Surface and ground water depletion and drying up of fresh water bodies such as rivers, lakes and ponds.
- **Agricultural:** Reduction in the moisture content of the soil leads to great stress to the crops and eventual crop failure results in lowering of agricultural productivity.

Condition of Soil in drought

☆ **Human factors-**

- Over farming: This leads to reduced soil fertility and nutrients do not get replenished leading to drought like conditions
- Excessive irrigation: This can cause loss of water and a declining water table. Constructing a dam on a large river may help provide electricity and water to irrigate farmland near the reservoir. However, it may also cause drought downstream by severely reducing the flow of water.
- Deforestration and Erosion: Forest stops wind from blowing too fast. Without forest, wind blows fast, evaporating water from soil, bringing dirt and sand, causing soil erosion. Eventually, deforestation and soil erosion would dry up the place. If the soil is dry, then there is little or no water available to evaporate. Consequently, the incoming sunlight can only continue to warm the surface, thereby making conditions hotter and drier, thus beginning the chain of events leading toward drought.

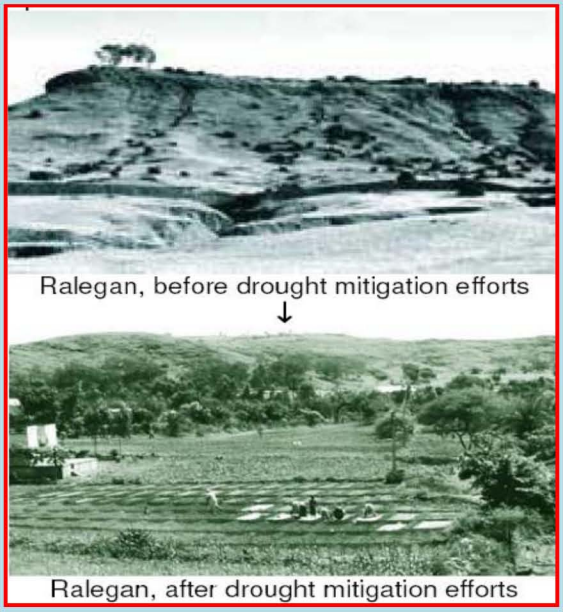
We know that the consequences of drought are alarming. A drought affects all aspects of our society, be it economic, political or social.



Case Studies

Let us know the determined people of Ralegan Siddhi and Alwar .

The people of Ralegan Siddhi in Maharashtra transformed the dreadful straits to prosperity. Twenty years ago the village showed all traits of miserable poverty. It had almost no trees, no agriculture, top soil eroded and people were jobless. Anna Hazare, one of the India's noted social activists, started his movement concentrating on trapping every drop of rain, which is basically a drought mitigation practice.



So, the villagers planted trees and built check dams and tanks. They could achieve the big goal and now Ralegan Siddhi has a massive area of 1300 acres under irrigation from 80 acres of irrigated area two decades ago. The migration for jobs has stopped and the per capita income has increased ten times from Rs 225 to 2250 in this span of time. No World Bank funding, no-government grants - only people's enterprise.

Do you know?

An award known as "the Nobel Prize for water" has been given to an Indian campaigner who has brought water to 1,000 villages. The Stockholm Water Prize winner, Rajendra Singh is known as 'The Water Man of India.'

Restored slopes after five years!

The work of Tarun Bharat Sangh (TBS) and its founder, Rajendra Singh, in the districts of Rajasthan is a revolution in regenerating life and society in denuded and deserted lands. The villagers followed a two-step programme. First, rejuvenated barren hill slopes by plantation and second, build small water catchments in the valleys and the plains. They identified water and fodder as the key to revival of rural life in the ravaged lands of Alwar. To ensure their availability throughout the

A Johad (water Pond) constructed by the Villagers

year, micro-structures to trap water had to be built . TBS discovered that it is only peoples' fullest cooperation, that can achieve these ends. The water harvesting structures called, 'Johad' were constructed with the consensus of Gram Sabha. Every member contributed either labour or money towards this cause. A social fencing was framed by the villagers' agreement to not let browsing by cows for 3 years, goats for 5 years and camel for 7 years to restore the denuded slopes in their village. People solved all the serious issues through mutual understanding. Well, it has happened in the space of 15 years in Rajasthan. Beginning from the small village of Bhikampura in Alwar district, the people-centred development model is spreading all over the state. Today we can see the river Arvari, dead for 40 years, flow again and also the rivers Ruparel, Jahjajwali and numerous other rivulets.

As drought is a complex, natural as well as a man-made phenomenon, its management requires specialized support to address different levels of complexities. At the national level, droughts are monitored by various agencies such as rainfall and aridity anomaly by the India Meteorological Department and reservoir storage position by the Central Water Commission (CWC). At the State-level Agriculture, Irrigation, Economics and Statistics Departments monitor crop and seasonal conditions.

Drought preparedness, coupled with appropriate mitigation actions and programs, can reduce and, in some cases, eliminate many of the impacts associated with drought. Drought planning process has three components: *monitoring and early warning; risk assessment and mitigation*.

Monitoring and early warning:

Real-time monitoring of Rainfall is done on daily and weekly basis by the Meteorological subdivisions in the country. The Department of Space has established a Decision Support Centre (DSC) at the National Remote Sensing Centre (NRSC) under the Indian Space Research Organisation's (ISRO) Disaster management support (DMS) programme. Remote sensing includes constant monitoring of the various environmental components potentially affected by droughts (soil, vegetation, etc.) in order to obtain a comprehensive and updated picture of the situations

Risk assessment

According to Kates and Kaspersons (1983) , it comprises of three steps;

- Identification of hazards which may cause disasters
- Estimation of risks arising out of such events
- Estimation of losses

This would help people adopt corrective measures in time to rule out any social and economic disruption caused by such calamities.

Mitigation and response

Mitigation actions, programs, and policies are implemented during and before drought to reduce the magnitude of risk to human life, property, and productive capacity.

- A large scale research will be conducted through the university system to evolve drought resistant crop varieties.
- The judicious use of surface and ground water

Water management issues of current concern, therefore, are:

a) less exploitation of groundwater for irrigation,

b) increased concentration of salts in the soil profile and groundwater,

c) increased concentration of specific ions like fluorides and nitrates in water and

Immediate steps are needed to make efficient use of available surface and groundwater in drought prone areas - resorting to drip and sprinkler practices wherever possible, particularly for commercial crops including fruit orchards. Construction of water shed structures at the right place where water recharge can be enhanced will be used for life saving irrigation at critical stages of crop growth.

Cloud seeding in Drought Prone regions of India

Cloud seeding does not produce rain. It enhances rainfall which otherwise would have fallen in area. Claims concerning the efficacy of cloud seeding as a positive intervention need to be validated through more studies However the fulfilment of experimental requirements involves not only higher cost but high scientific skills. IITM, and CSIR (CMMACS) have taken up experiments to assess the efficacy of cloud seeding

Pioneering Efforts

In India, attempts in the field of rain making were made in 1951 over Western Ghats using ground based silver iodide generators. Cloud seeding was attempted in 1952 with salt and silver iodide by means of hydrogen filled balloons released from the ground. The committee on the Atmospheric Research of the Council for Scientific and Industrial Research (CSIR) recommended in 1953 that a Rain and Cloud Physics Research (RCPR) Unit be set up for undertaking extensive scientific studies on cloud physics and rainmaking. RCPR conducted long term cloud seeding programme over north India using ground based salt generators during the period 1957-1966. The results showed an increase in rainfall by 20%. RCPR later became part of IITM. IITM conducted similar experiments over Tiruvallur (state of Tamilnadu), during 1973, 1975-1977. The seeding experiments were also done over Mumbai in the monsoon seasons 1973 and 1974. In the same years IITM carried out cloud

seeding operations over Rihand 4 catchments in the state of Uttar Pradesh. In 1975, operational programme of cloud seeding was conducted over Linganamakki catchment area in the state of Karnataka. IITM carried out cloud seeding experiment over Baramati region of the Maharashtra state during the period 1973-74, 1976, and 1979-86.

☆ Post Harvest Management

To avoid the post-harvest losses a chain of cold storages, need to be created along with Post Harvest Management practices like pre cooling, cold storages and refrigerated transport.

☆ Afforestation with Bio-diesel species

Through afforestation with bio-diesel species the land goes into forestation which would act as sink to the CO_2 emitted by the use of bio-diesel reducing the actual CO_2 emission. The term bio-fuels describe fuel components produced from biomass, such as plants, straw or waste paper. Afforestation with subabul, seemaruba, casurina, eucalyptus and bio diesel plantation like jetropha and pongomia will be encouraged.

☆ Public Distribution System

The Public Distribution System (PDS) is a scheme under which essential requirements i.e., food grains and certain other non-food products are supplied to persons at subsidized costs through fair price shops (FPSs)

The TPDS(Targeted Public Distribution System) has the main object of ensuring that essential commodities are accessible to households which are below poverty line and to the 'poorest of poor' sections thus promoting household food security amongst economically poor sections

☆ Crop Insurance

An All-India Comprehensive Crop Insurance Scheme (CCIS) for major crops was introduced in 1985. It was subsequently replaced by the National Agricultural Insurance Scheme (NAIS) in 1999. There is a need to promote agricultural insurance programmes and ensure that farmers are informed about the availability of insurance products and educate them about the need for managing their yield and income risks through insurance coverage.

As the Earth continues to warm, India becomes more prone to droughts, floods, heat waves, and cyclones. Therefore, it is extremely important that we seriously address drought risk management to avoid millions and millions of deaths in the next century as a result of drought and lack of food.

We have to think on these lines- How do we manage our water supply for future generations? It is definitely through water conservation measures that we can reduce demand and preserve existing supplies to ensure that adequate water is available through the full course of a drought.

ABBREVIATIONS

- MoEF – Ministry of Environment and Forests
- CRIDA – Central Research Institute for Dry land Agriculture
- IITM – Indian Institute of Tropical Meteorology
- NRAA – National Rainfed Area Authority
- SAUs – State Agricultural Universities

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SAMPLE QUESTIONS

1. Identify from the map given in the text, the region in our country mostly affected by drought. What steps can be taken by the authorities and communities to curb the menace of the same? 5 Marks
2. Design a drought preparedness plan for any given area. 3 Marks
3. Cite examples of mitigation actions as practiced in Ralegan Siddhi in Maharashtra. 2 Marks

MARKING SCHEME

1. The probabilities are high in the arid zone (Western India) compared with other sub-divisions. 5

   - Can plant trees for soil conservation.
   - Can collectively contribute in terms of labour and money towards constructing water harvesting structures.
   - Drought monitoring and early warning system.
   - A chain of cold storages can be created along with Post Harvest Management practices.
   - Authorities can ensure that essential commodities are accessible to households which are BPL.
   - Can promote agricultural insurance programmes and ensure that farmers are informed about the availability of insurance products.

2. Drought planning process has three components: monitoring and early warning; risk assessment; and mitigation and response 3

   - Real-time monitoring of Rainfall on daily and weekly basis for the Meteorological subdivisions in the country.
   - Identification of hazards and estimation of losses
   - Judicious use of surface and ground water
   - Cloud seeding in drought –prone regions of India
   - Rain water harvesting
   - Afforestation with Bio-diesel species

3. Around twenty years ago, Ralegan siddhi practically had no trees, the topsoil had blown off, there was no agriculture and people were jobless. Anna Hazare, one of the India's most noted social activists, started his movement concentrating on trapping every drop of rain, which is basically a drought mitigation practice. So the villagers built check dams and tanks. 2

   To conserve soil they planted trees. From 80 acres of irrigated area two decades ago, Ralegan Siddhi has a massive area of 1300 acres under irrigation.

OPEN TEXT BASED ASSESSMENT

SCIENCE CLASS-IX

Theme–2: Conservation of Water Bodies

Abstract

Mindless extraction and over exploitation of very small quantity of fresh water resource has caused a rapid depletion and deterioration both in its quantity and quality. As per the latest assessment of ground water resources, carried out jointly by the Central Ground Water Board (CGWB) and the States, the assessment units are categorized as 'overexploited' or 'critical' and 'semi-critical' based on the stage of ground water development and the long-term water level declining trend during the past decade. This calls for initiative to conserve water bodies. The initiative gains immense importance in the sense that urban lakes or water bodies are first victims of urbanization and their conservation or restoration is sign of healthy and sustainable urban development. Urbanization and/or industrialization of the lake catchments in particular have had its extreme adverse impact.

After exploring the content, the learner will be able to explain importance of conservation of water bodies. This will help him/her to develop a positive attitude towards conservation through case studies. The student shall be able appreciate the interdependence of different natural resources and their management as a whole.

Until the last drop dries
And the Mother Nature cries
I think we won't realize
Our precious water bodies price

The cries grow shrill
A glassful to drink will be a frill.
You say it's polluted
You say it's scarce
But have we done for its care?

It will be the reason for fights and battles
It will be the reason for end of humans and cattle

That day is not far
When we are going to be on the brink
What will remain is just
The formula "H_2O" and the water bodies converted to a stink.

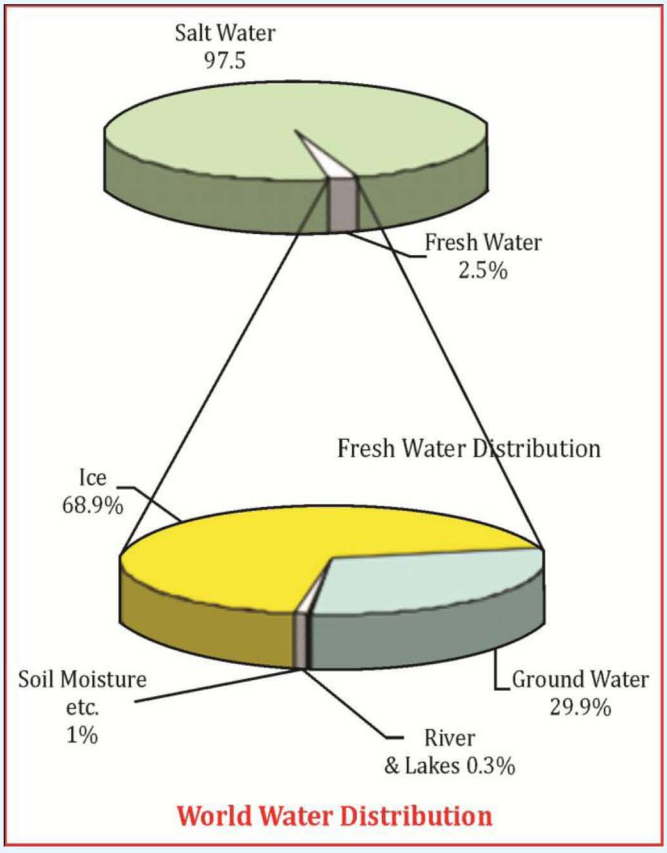
It's never too late
And it's not the matter of our fate
It's high time now
It's the right time now
Let's save them, let's save them let's save them……..

A young girl of 8th standard was curious about going to her new class, the senior class -9. While going through her text book of science she was surprised to see a topic "Water-a wonder liquid" Out of curiosity she asked her science teacher why is it so that there is a need to study such a common and easy topic even in the senior class when they have already studied about it in the lower classes. Her curiosity actually encouraged her teacher to discuss at length the most debated topic all over the world and plethora of tactics and conventions being adopted for the sustainable use of water.

There started a class room discussion on need and importance of WATER, WATER BODIES and their CONSERVATION……..

Water is an abstract concept for some and a stark reality for others. It is a topic of environmental, political, social, economical and cultural importance and relevance. ***Ismail Serageldin*** - the Vice President of the World Bank in 1995, rightly predicted that in the next century wars would be over water.

While nearly 70% of the world is covered by water and nearly 60% of the human body is made of water, ironically, merely 0.0007% of planet's water is available for its 6.8 billion people!!



World Water Distribution

In a developing country like India, which no doubt is blessed with many beautiful and pious water bodies like rivers, streams, lakes and ponds---- CLEAN and POTABLE WATER is either hard to come

by or a commodity that requires laborious work and significant investment. It is projected that, the population under water stress will rise from 450 million at present to 2.7 billion by 2025 and Indian subcontinent is already being classified as water stressed i.e. our water needs will far exceed its availability.

Inland Water Resource of India

(1)	(2)
Rivers and Canals (length in km)	195095
Other Water Bodies (area in Mha)	
Reservoirs	2.93
Tanks and Ponds	2.43
Food Plain Lakes & Derelict Water bodies	0.80
Brackish Water	1.15
Total	7.31

Source: Handbook on Fisheries Statistics: 2014, Department of Animal Husbandry, Dairying & Fisheries, M/o Agriculture

Water bodies: Inland Water resources of the country are classified as: rivers and canals; reservoirs; tanks, lakes & ponds; lakes and derelict water bodies; and brackish water. The area of water bodies at all-India level has been presented in the table. Total water bodies other than rivers and canals cover an area of about 7.3 Mha. Among these water bodies, 'reservoirs' have maximum area (2.93 Mha) followed by 'tanks, lakes and ponds' (2.43 Mha). The total area of inland water resources (other than rivers and canals) is unevenly distributed over the States.

WHY DO WE FORGET THIS? – ALL LIVING BEINGS NEED CLEAN WATER……..

Hence a CHALLENGE: How can we effectively conserve, manage, distribute and sustainably use the various water resources available to us?

Water bodies have served various functions to meet the water requirements of the people for drinking, household, irrigation, fishing, religious, cultural and even recreational purposes. They are the host to a variety of flora and fauna and are an important feature of the landscape. In hydrological conditions like droughts and floods they influence the micro climate of the region.

Since water bodies are the life lines for all the living beings, it becomes our social and moral duty to conserve them and contain further

on. The present day environmental conditions like pollution, drying up of water bodies, reduced water level, eutrophication, silting and flooding of water bodies are the results of various anthropogenic activities like urbanization, sewage, agriculture and industrial run off, to name a few. These factors are leading to the death of our life lines.

Some Facts and Figures on Water

Food and Agriculture Organization of the United Nations (FAO)

- The daily drinking water requirement per person is 2-4 litres, but it takes 2000 to 5000 litres of water to produce one person's daily food.
- It takes 1000-3000 litres of water to produce just one kilo of rice.
- In 2010, the estimated number of undernourished people worldwide was 925 million.
- Over the period to 2050 the world's water will have to support the agricultural systems that will feed and create livelihoods for an additional 2.7 billion people.
- The extent of land under irrigation in the world is 277 million hectares, about 20 percent of all cropland. Rainfed agriculture is practiced on the remaining 80 percent of the arable land.
- The Intergovernmental Panel on Climate Change predicts that yields from rain-dependent agriculture could be down by 50 percent by 2020.
- Due to climate change, Himalayan snow and ice, which provide vast amounts of water for agriculture in Asia, are expected to decline by 20 percent by 2030.
- Irrigation increases yields of most crops by 100 to 400 percent, and irrigated agriculture currently contributes to 40 percent of the world's food production.
- Water use has been growing at more than the rate twice of population increase in the last century.
- By 2025, 1800 million people will be living in countries or regions with absolute water scarcity, and two-thirds of the world population could be under stress conditions.

World Water Assessment Programme (WWAP)

- Poor drainage and irrigation practices have led to water logging and salinization of approximately 10 percent of the world's irrigated lands.
- How the world uses freshwater: Irrigation- about 70%, Industry - about 22%, Domestic use - about 8%

Seeing the present state of our water bodies, we have to conserve and restore the water bodies and recycle waste water. Many programmes have been launched by State and Central Governments. The programme for Repair, Renovation and Restoration (RRR) of water bodies with domestic and

external assistance have been set up with the main objective to increase the availability of drinking water. The adoption of stringent steps will initiate the restoration of these water bodies. These steps will help to alleviate the suffering of all living beings from this crisis.

Role of Government and other authorities: The major role of the Government at local level is to identify the local water bodies and notify them in their records. The water bodies like step wells (Baolis), trenches around old forts, wells as well as man made water bodies like ponds within temples, gurudwaras, mosques, parks, residential areas and other such public places should be declared as part of the "green architecture" of a city. Committees at all levels should be set up, drawing members from all the concerned departments and the local residents for maintaining the balanced conservation of water bodies. All stakeholders should allocate an adequate budget for water utilisation for various purposes such as, for drinking, domestic and industrial uses besides other uses like gardening. A Storm Water Management Plan of each city should be prepared and water bodies around should be prepared to receive storm water after it is appropriately treated through various feasible techniques such as in a sedimentation basin and/or constructed wetland (bio-treatment) approach etc. Awareness programmes should be initiated at all the levels of society, through various campaigns, hoardings involving famous personalities. The land around the water bodies should be declared as eco- sensitive areas and dumping of any waste should be a punishable offence. Only treated effluent, as per effluent standard should be allowed to be disposed into the water bodies.

Conservation of Water bodies- Important Schemes

National River Conservation Plan (NRCP): The objective of NRCP is to improve the water quality of the rivers, which are the major water sources in the country, through implementation of pollution abatement works, to the level of designated best use. The river conservation programme in the country initiated with the launching of the Ganga Action Plazn (GAP) in 1985. The Ganga Action Plan was expanded to cover other rivers under National River Conservation Plan (NRCP) in the year 1995.

National Plan for Conservation of Aquatic Eco-Systems (NPCA): The 'National Wetlands Conservation Programme' (NWCP) and the 'National Lake Conservation Plan' (NLCP) has been merged into one integrated scheme of National Plan for Conservation of Aquatic Eco-systems (NPCA). NPCA aims at conserving aquatic ecosystems (lakes and wetlands) through implementation of sustainable conservation plans, and governed with application of uniform policy and guidelines. The scheme would contribute to reduction of pollution loads in lakes and wise use of wetland resources and their services including biodiversity of these water bodies to the stakeholders.

Source: Annual Report 2014-15 Ministry of Environment, Forests and Climate Change, Govt. of India

A Case Study

The news about India's first River Lake Link project in Tikamgargh to save the water bodies of the Chandelaera, drew everybody's attention. The project aims to create additional irrigation potential for 1990 hectares of land.

Tikamgarh district is situated in the northern part of Madhya Pradesh. It is bound in the north and west by Jhansi and Lalitpur of Uttar Pradesh, in the east by the Chhatarpur district. River Dhasan passes through it.

Tikamgargh is blessed with a large number of water bodies like wells, tube wells, tanks, lakes, dams which are used for irrigation, fisheries, industrial and domestic purposes. The river network of the region comprises of big and small rivers like Yamuna, Chambal, Betwa, Dhasna, Sindh and Ken... Canals have been culled out from most of these reservoirs for water supply. Two minor dams are constructed on river Jamni and Dhasan .

More than 86% of net ground water availability has been utilized placing the district in a critical condition.

Irrigation by Different Sources	Area (Km^2)
Dug wells	762151235.74
Tube wells/ Bore wells	1955 88.73
Tank/Ponds	276 105.13
Canals	175 134.80
Other sources	65.86

The above data indicates that the most of the agricultural land depends on wells for irrigation.

The average annual rainfall of the Tikamgargh district is about 1000mm which is certainly far below the national average.

A large number of water bodies are still serving the purpose, but they are in various stages of degradation due to human intervention. According to recent surveys, the quality of water is deteriorating in rural and urban areas due to poor sanitation, run off fertilizer and improper disposal of solid and liquid waste.

In ancient times also, people had realized the importance of managing water resources. Several water harvesting structures had been constructed in the past to ease the water situation. These include Bundela tanks, step wells, village ponds, *hawelibandies* etc,. Many of these structures are

currently in a state of neglect and are no longer able to harvest water. Moreover, the water quality is deteriorating day by day. The presence of nitrates, fluorides and cholera causing micro-organisms are confirmed by the concerned department .It has repeatedly been found that not just physical infrastructure, but behavioural issues also need to be addressed for solving the water issues. There is no practice of reuse of water for domestic purposes although some coping mechanisms have emerged in the last few years like reduced cropping of water-intensive crops, creation of farm bunds and mixed cropping.

A few suggestions made are maintenance and modernization of water bodies, ground water development, quality control of drinking water, participation in water management, research in science and technology.

The district administration then decided to initiate programmes with government departments, NGOs Wuas (Water User Association) and fishermen cooperative societies. The programme involved public awareness activities in villages such as celebration of World Wet lands day, desalting, removal of water weeds, preventing soil run off, and preparation of compost pits.

There was an overwhelming response from the community in all the awareness and conservation project works. Students from schools located in all rural areas and NGOs rejuvenated the village tanks by desiltation and deepening of the water bodies.

Our water resources, irregularly distributed in space and time, are under pressure due to major population change and increased demand. Access to reliable data on the availability, quality and quantity of water, and its variability, forms the necessary foundation for the management of water resources. The different alternatives that we are looking at are very small steps to match the demand and supply. All components of the hydrological cycle, and the influence of human activities on it, need to be understood and quantified in order to efficiently and *sustainably* develop and protect our water resources.

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SAMPLE QUESTIONS

1. How can lakes be socially beneficial? Explain with examples. 2 Marks
2. What lessons are learned from the project carried out in Tikamgarh district of Madhya Pradesh in order to conserve water and the water bodies? 3 Marks
3. Give some suggestions to revive the water body in your area as the leader of a campaign at local level. 5 Marks

MARKING SCHEME

1.
- Help in maintaining ecological balance 2
- Provide us with food products (fishing), eco tourism, sites of artistic, recreational, religious and social pursuits.

2.
- Local people can be involved for saving water bodies of a region as they are the best stakeholders of that area. 3
- Role of government or government bodies was also specified in saving water bodies.
- It also empowered the community based institutions and strengthened the dialogue between community and government.

3.
- Storm drains can be directed to the water body. 5
- Storm drains should not be left blocked.
- Separate outlet in each home for water from toilets and kitchen.
- The area around the water body to be declared as Eco sensitive
- Dumping of any waste to be prohibited and should be made a punishable offence.

(Any other relevant points)

CENTRAL BOARD OF SECONDARY EDUCATION

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