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VIDUSHI SINGH

AIR - 13

(CSE 2022)

GEOGRAPHY OPTIONAL

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(443)

TEST - 19

GS SCORE

GS MAINS TEST SERIES 2022

PHYSICAL GEOGRAPHY INDIA

Time Allowed: 90 min. *Max. Marks: 150*

Q.	Marks
1.	
2.	
3.	
4.	
5.	
6.	
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8.	
9.	
10.	

Instructions to Candidate

- There are **10 questions.**
- **All questions are compulsory.**
- The number of marks carried by a question is indicated against it.
- Answer the questions in 250 words each. All questions carry equal marks. 15 x 10 = 150 Marks
- Keep the word limit indicated in the questions in mind.
- Answers must be written within the space provided.
- Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

71

Name Vidushi Singh

Roll No. 40666

Mobile No. _____

Date _____

Signature Vidushi

1. *Invigilator Signature* _____

2. *Invigilator Signature* _____

→ You seem to have been consistent with the concept throughout.

→ Try to focus on pin-pointed answer writing only. Q.4 lacks this feature.

Roll No. 40666

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Q1. Different physiographic divisions of India are complementary to each other and lead to socio-economic development of the nation. Explain. (15 Marks) (250 Words)

The INDIAN PHYSIOGRAPHY is characterised by 'Great Diversity' in its features. India can be divided into the following Physiographic Divisions:

Satisfactory intro

1. North & North-East Mountains: consist of Himalayas and Northeastern Hills.

i) Significance: Act as Physical Barrier and contribute to Monsoon genesis by obstructing winds. Provide weathered material for deposition by rivers. Also act as sources of Rivers which provide water for drinking and irrigation.

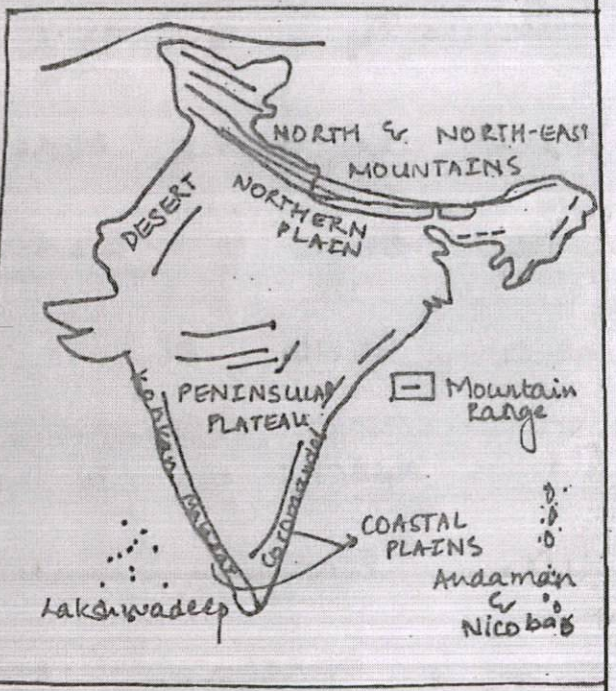


Fig: Physiographic Divisions of India

2. Northern Plains: formed by alluvial deposits

Remarks

of rivers - Indus, Ganga and Brahmaputra

•) Significance: Provide close Network of Roads and Railways. 43% of total Land is Plain. Major Foodcrops produced here.

3. Peninsular Plateau: are very rich geologically. eg: 98% of coal Reserves of India are found here. They provide wide range of Biodiversity, especially in Western Ghats Biodiversity Hotspots.

4. Indian Desert: lie to Northwest of Aravali Hills. Features include longitudnal Dunes & Barchans. Arid climate with ephemeral rivers provide low scope of primary activities.

5. Islands: Lakshwadeep and Andaman and Nicobar Islands provide diversity to marine ecology.

Good analysis of Physical features

Remarks

6. Coastal Plains: Western coastal plains are submerged hence act as ports, Eastern coastal Plains are Broader are Fertile.

Complementarities to Socio-Economic Development

1. Northern Mountains are sources of perennial rivers which make Northern Plains fertile.
2. Primary Produce of Northern Plains is processed in Industrial Hubs of Peninsular Plateau.
3. Mineral Resources of Peninsular Plateau account for huge Energy Generation, distributed throughout the country.
4. Himalayas prevent N-winds from escaping and provide monsoon-climate in India.

Hence, it can be said that the Physiographic Divisions are complementary to each other, with their own significance.

7½

Good analysis of socio-economic development

Q2. Give an account of the distribution of flood-prone areas of India. Why does flood control and management remain a problem in India despite a plethora of agencies?
(15 Marks) (250 Words)

FLOOD is a general term for a state of high-water level along a river channel or coast that leads to inundation of land.

Sound intro

Rashtriya Bark Aayog has identified 40 million hectares of land as flood-prone.

Various states face heavy losses in terms of life and property due to Recurrent floods.

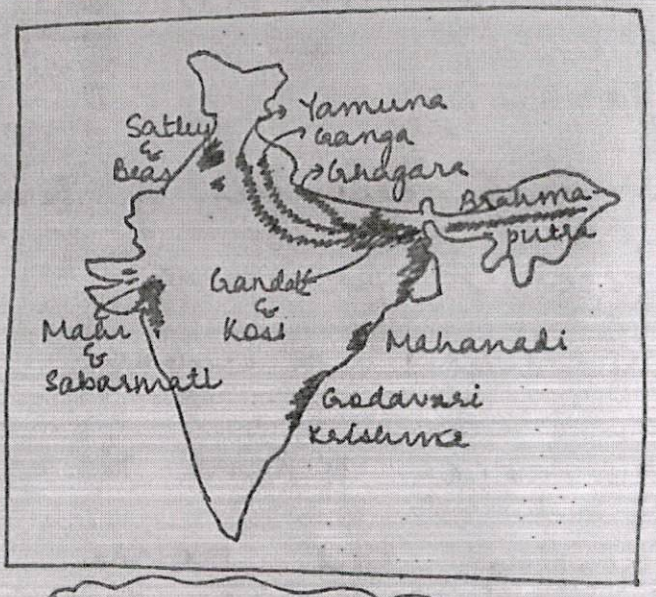


Fig: Flood-Prone Zones

These are:

•) Assam, Bihar, West Bengal: are among the high flood-prone states of India.

Also mention reason for flood

Remarks

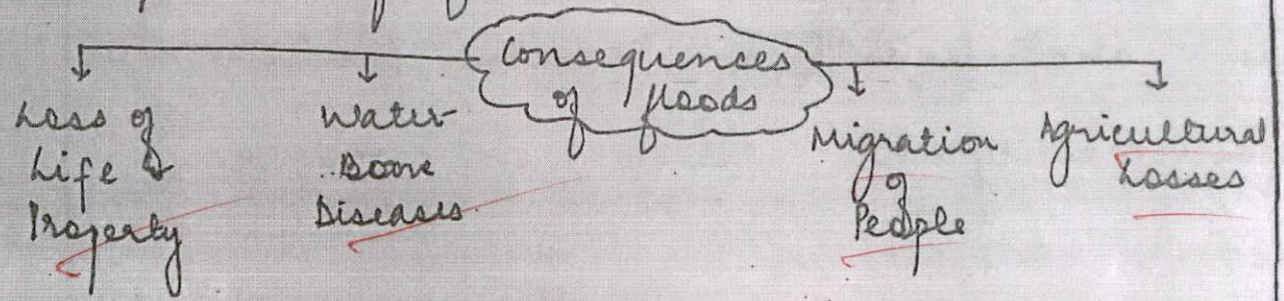
•) Punjab and Uttar Pradesh : are also vulnerable to occasional floods.

•) Flash floods in Rajasthan, Gujarat, Haryana and Punjab → due to monsoon pattern and anthropogenic causes.

•) Tamil Nadu sometimes gets flooded in season of Retreating monsoon.

Sound analysis distribution of flood prone area

Consequences of floods :



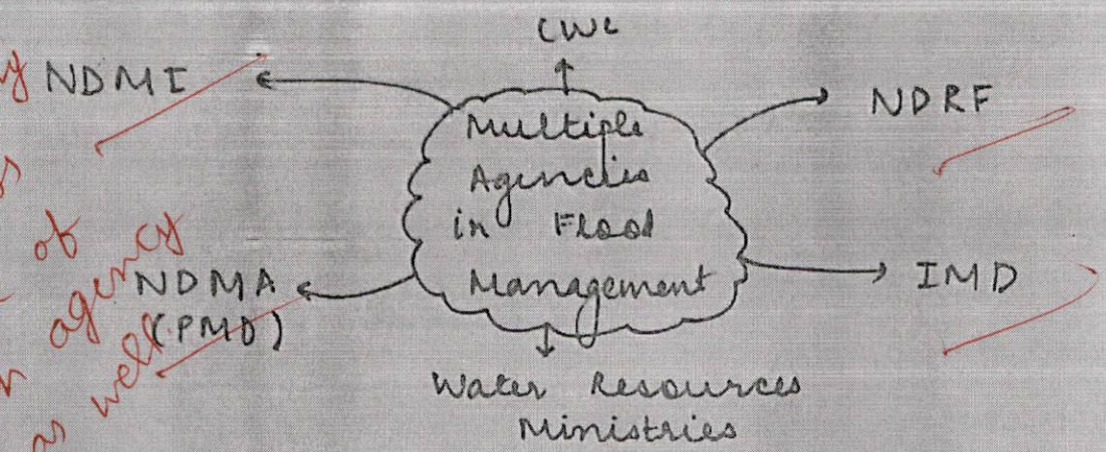
Flood Control and Management in India :

Central Water Commission (CWC) oversees the flood control and advises Water Resources Ministries of each State.

- However, multiple agencies are involved if a flood-induced disaster takes place:

Remarks

Briefly discuss role of each agency as well



- This leads to administrative problems due to inter-departmental silos and non-coordinating actions of several bodies.
- This also leads to evasion from accountability and delays in providing adequate support.

Sound analysis

What Needs to be done?

7

There is an urgent need to solidify efforts in terms of making the already established bodies work in an efficient manner. A National-level Flood Prevention/Control Council can be set-up with all these bodies as its members to coordinate relief actions

Remarks

Q3. "The folds of the Greater Himalayas are asymmetrical in nature". Explain the formation of asymmetrical ranges in Himalayas. How does it play an important role in shaping the biodiversity and culture of the region? (15 Marks) (250 Words)

HIMALAYAS are an example of Young fold mountains which started forming 20-30 million years ago (mya)

Satisfactory intro

Formation of asymmetrical ranges in Himalayas :

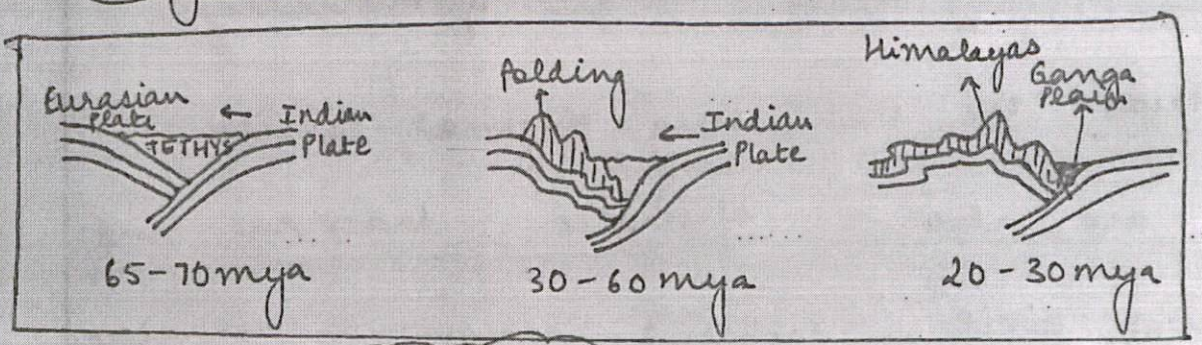


Fig: Formation of Himalayas

- About 120 mya, Pangaea broke into Angaraland & Gondwanaland, separated by TETHYS SEA.
- As per Plate Tectonics theory, Indian Plate Broke away from Gondwanaland and

Better focus on collision between Eurasia & Indian plate

Remarks

started moving Northward.

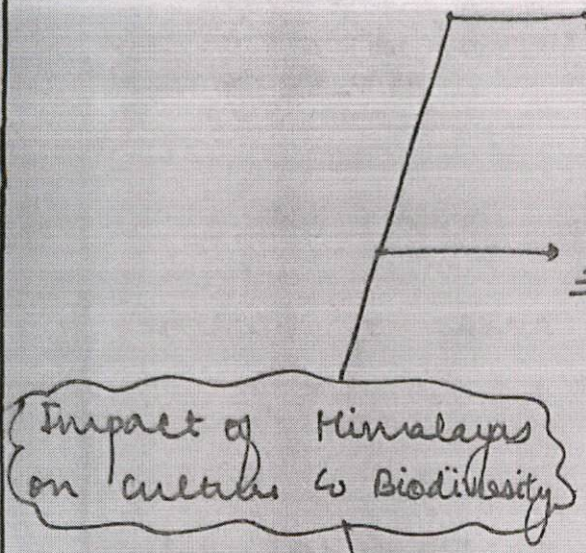
•) 50 mya: formation of Himalayas started.

•) 20-30 mya: sediments accumulated in Tethys sea were compressed, squeezed and uplifted as a series of folds one behind the other, giving birth to ASYMMETRICAL RANGES of Himalayas.

Himalayas are not only a physical barrier, they are also a climatic, drainage and cultural Divide. Different ranges of Himalayas provide different services to the adjoining areas, enriching its culture and biodiversity.

Impact of Himalayas on Culture and Biodiversity of the region:

Remarks



1. Physical Divide between different cultures of China, Nepal and India

2. Different Languages: Mandarin in China while, Hindi, Urdu, Tamil, etc. in India.

3. Different Vegetation in India and China and accordingly different species etc.

4. Different Drainage in India and China & Nepal.

Sound analysis of Impacts on biodiversity & Culture

7

Hence, Asymmetric Nature of Himalayas has truly changed the cultural evolution of adjoining areas by acting not only as a physical divide, but also as a climatic, Drainage and cultural divide.

Remarks

Q4. "Differential heating of the Tibetan plateau and pressure gradient between it and Mascarene high plays an important role in pulling Monsoon winds towards the Indian Sub-continent". Discuss. (15 Marks) (250 Words)

Better discuss differential heating of the Tibetan plateau in intro, etc.

INDIAN MONSOON is a complex phenomena because it is a result of interplay of various factors involving interactions between atmosphere, oceans, topographical features, etc.

Major factors influencing Monsoon are:

- Shifting of ITCZ
- IOD,
- Himalayas
- Rotation of Earth & Coriolis force
- Easterly Jet Stream.

→ PULLING MONSOON WINDS towards Indian Subcontinent.

Focus on core aspect of the given question

Role of differential Heating of Tibetan Plateau and Mascarene High:

During Peak Summer months (JUNE), due to increased solar heating of TIBETAN

Remarks

PLATEAU, a low pressure area is formed. This intensifies the flow of Tropical Easterly Jet Stream (TEJ).

It is generated there too

Fig: Role of Tibetan Plateau & TEJ & Mascarene High

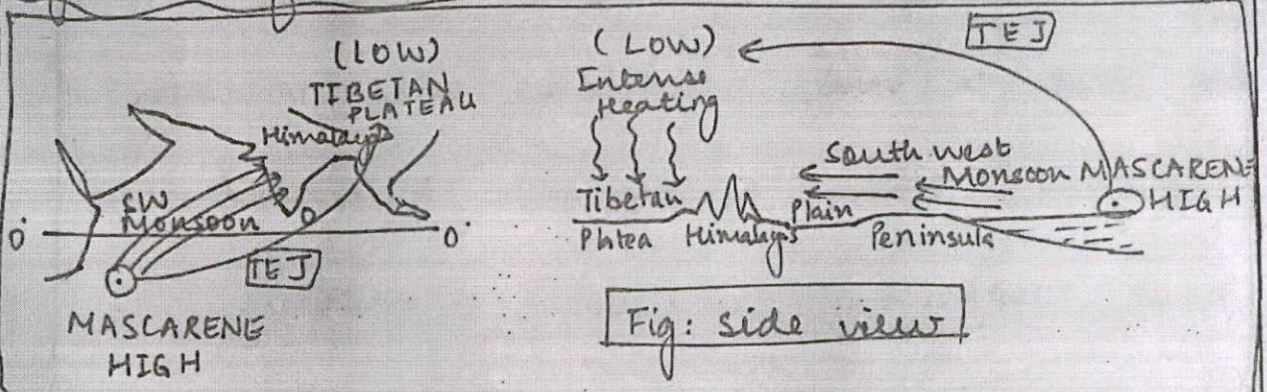


Fig: Side view

This phenomenon to be elaborated comprehensively

Thus, tropical easterly jet stream flows from Mascarene high to Tibetan Plateau, pulling monsoon winds towards the Indian subcontinent. This happens because of Intense heating of Tibetan Plateau which induces Pressure Gradient between Mascarene High and Tibetan Plateau.

→ However, this phenomenon works only when there is (+) POSITIVE Indian Ocean

Remarks

Dipole (IOD), where winds over Indian ocean flow from East to West.

→ Incase of (-) NEGATIVE IOD, there will be a reversal in wind's direction from West to East, which will weaken Mascarene High, affecting TEJ and thus weakening Indian monsoon.

→ The phenomenon will also not work in an EL-NINO YEAR. El-Nino induces warmer current in place of cold Peruvian current, rendering Australian low pressure ~~as~~ ineffective. With lesser temperature over Australia, IOD weakens and thus TEJ weakens, weakening the Indian Monsoon Cycle.

→ Hence -Ve IOD & El-Nino affect Indian Monsoon negatively.

Need to focus on positive here but negative

5

Remarks

Q5. Discuss the nature and magnitude of the drinking water problem in India. Also, explain the impact of El Nino on India's water security. (15 Marks) (250 Words)

As per Water - Related Statistics published by CWC, per capita annual water availability in India has decreased from 1816 m^3 in 2001 to 1544 m^3 in 2011 leading to a situation of WATER STRESS.

Sound intro

Nature and Magnitude of Drinking water Problem in India:

As per Census 2011, only 30.8% of total Rural households and 70.6% of total Urban Households get piped water supply.

- More than 50% population has no access to safe drinking water and >200000 people die every year due to lack of access to safe drinking water.

Remarks

Sound analysis of nature & magnitude of the problem

i) 256 of 700 districts have reported over-exploited groundwater levels, according to latest report by CGWB.

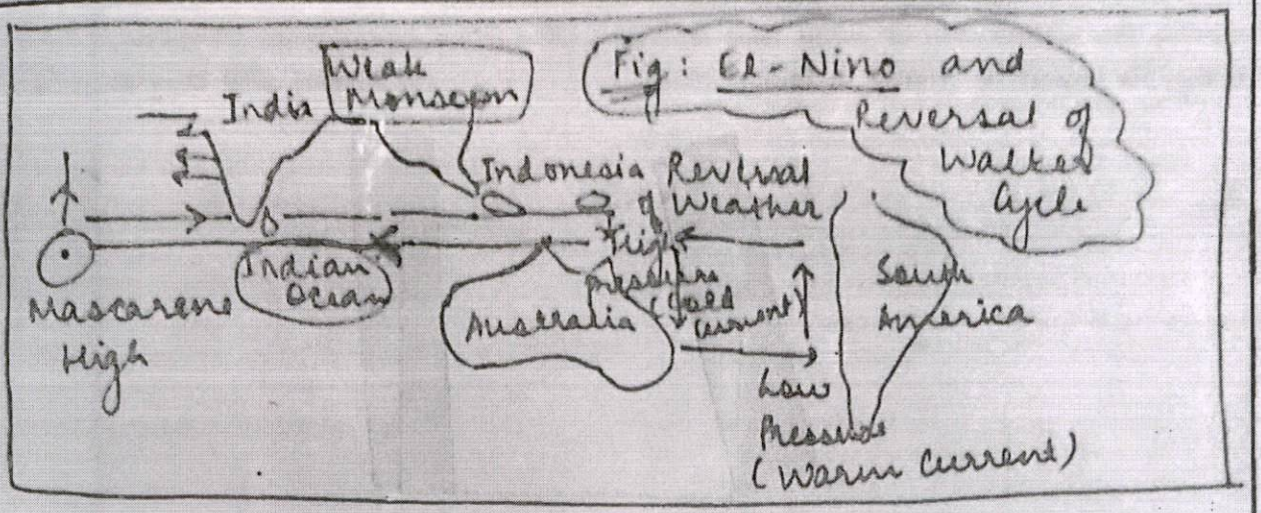
ii) Drinking water crisis have been frequent in the past few years, affecting metropolitan cities of Chennai, Mumbai, Bangalore, Delhi.

Hence, Drinking water situation in India currently is grim and requires utmost efforts towards improved Water-Use efficiency and Conservation strategies.

Impact of El-Nino over India's Water Security

El-Nino: is a phenomenon which replaces cold Peruvian current with warm current through reversal of trade winds to westerly directions.

Remarks



El-Nino leads to reversal of Walker cycle which reduces intensity of Mascarene high, directly affecting intensity of Tropical Easterly Jet stream and thus weakening Indian Monsoon.

Sound analysis of effect of El-Nino

- Weakened Monsoon leads to drying up of rivers which are important source of drinking water.
- It also reduces ground water as only 22% of rainwater percolates to the ground and lower overall precipitation will lower Groundwater Table.

7

Thus, El-Nino intensifies Water-Scarcity in India, reducing its Water-Security.

Discuss some ways to overcome aforesaid issue as well

Remarks

Q6. Describe the relationship of urban heat islands with surface temperature inversion. Discuss its impact on climate in Indian cities. **(15 Marks) (250 Words)**

Sound intro

An URBAN HEAT ISLAND (UHI), is a metropolitan area which is relatively warmer than the rural areas surrounding it due to human activities. Thus, Urban areas become 'islands' of higher Temperature relative to outlying areas.

Relationship of UHI & Surface Temperature Inversion:

Night time temperatures in UHIs remain high due to Surface ~~air~~ Temperature Inversion. Due to absence of solar radiation heating, decrease in atmospheric current occurs leading to Stabilization of Urban Boundary layer. This 'traps' warm air near the surface, resulting in higher temperatures with the UHI.

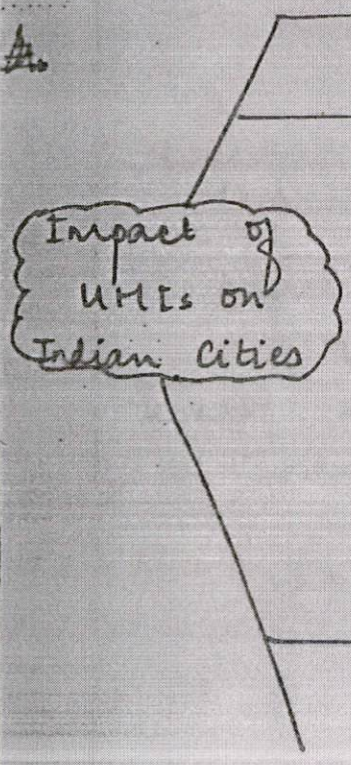
Sound explanation of relationship

Remarks

Surface normally loses heat in the nighttime, however huge buildings in Urban area block the residual heat leading to warmer Temperature at night.

Impact of UHI on climate in Indian cities:

A recent study of IIT Kharagpur stated that 'Anthropogenic forces' have exacerbated UHIs in India. This has led to:



1. High Temperature at Night
2. Decrease Air Quality in Cities: With AQI ranging between 500-1000 in Delhi due to Particulate Matter and Industrial Exhaust.
3. Water Quality adversely affected due to warmer Temperatures - affecting marine ecology.

Sound analysis of impact

Remarks

Impact of UHIs on Indian cities

4. Health Impact: UHI affects human and animal health adversely in cities.

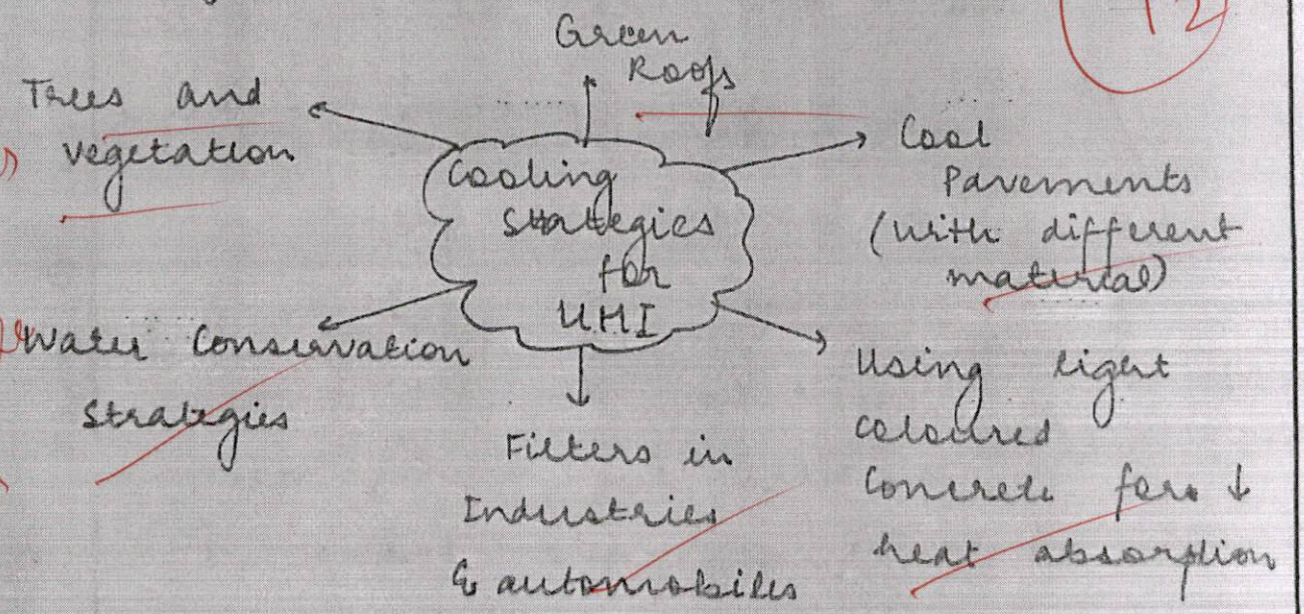
5. High Energy consumption in Indian cities due to higher Temperature.

UHI : Cooling strategies :

In order to reduce the impact of UHI, following can be done :

7½

Sound strategies to tackle UHIs



Industrialisation and Urbanisation are vital to the country, but control of UHIs are equally vital. This can be done by adopting most Sustainable Strategies.

Remarks

Q7. Briefly explain the importance of Inter-linking of Rivers in India. Also, examine the problems and prospects of the Ken-Betwa river link project.

(15 Marks) (250 Words)

INTER-LINKING of Rivers in India aims to link Indian rivers by a network of reservoirs and canals that will allow river water to be shared and distributed.

Sound intro

Importance of Interlinking of Rivers

1. Availability of Water throughout the year through reservoirs
2. Sustainable Agriculture: water can be transferred from water surplus area to water-deficit area.
3. Flood Control: Interlinking will act as a hedge against floods and infact increase water in reservoir
4. Inland Waterways: will provide cheaper alternative to costly road transport.

well analysed importance

Remarks

In addition to these, Interlinking of Rivers will also provide employment and food-security to the people.

KEN-BETWA RIVER LINK PROJECT: aims to transfer surplus water from Ken River to Betwa Basin to help irrigate drought-prone Bundelkhand Region.

- 230 km concrete canal will pass through 2 states of UP and MP and benefit the 2 states in terms of meeting their irrigation and drinking water requirement.

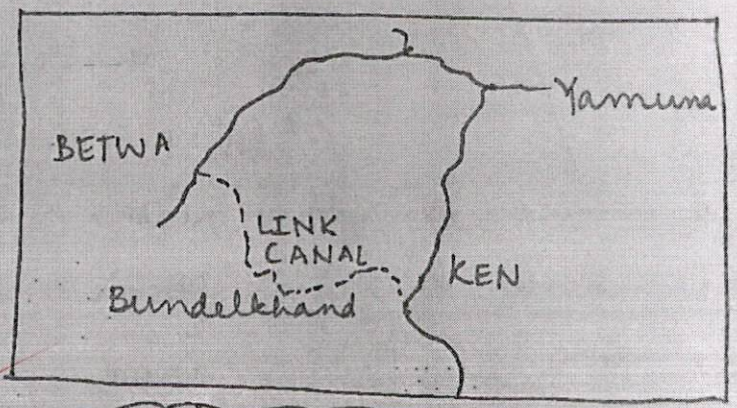


Fig: Ken-Betwa link Project

- Prospects of the Project:

(i) Reducing Drought in Bundelkhand Region.

Good analysis of benefits & prospects of the project

Remarks

(ii) Farmers' Benefit : with adequate supply of water for irrigation.

(iii) Increased Electricity Production.

•) Problems associated with the Project :

Problems

1. ENVIRONMENTAL : The canal will pass through Critical Tiger Habitat of Panna Tiger Reserve.

2. ECONOMIC : Huge economic cost with project implementation and maintenance.

3. SOCIAL : Reconstruction and Rehabilitation due to displacement will involve substantial social cost.

Good analysis of problems

7 1/2

What Needs to be Done?

The need of the hour is to consult all stakeholders - Farmers, local People, and NGT and formulate the most effective and efficient plans in order to reap the envisioned benefits.

Remarks

Q8. Examine the availability and extent of ground water resources in India. What are the reasons for the declining groundwater? Suggest measures for its effective management.
(15 Marks) (250 Words)

Only 22% of the total annual rainfall of 118 cm percolates under the ground and forms GROUNWATER RESOURCE of India. India has total Replenishable Groundwater Resource of 443 BCM / year, of which 80% is used for Irrigation & 20% for domestic purposes.

Good intro

Availability and Extent of Ground Water Resources in India :

The Ground Water Distribution in India is highly complicated due to varied geological features in India.

- 40% of total ground water is available in Alluvial areas of Northern India.
- Parts of Punjab, Haryana, Delhi, Western

Sound analysis of this aspect

Remarks

UP, Rajasthan, Gujarat and south Indian States (except Kerala) have inherent Crystalline aquifers, making groundwater availability low in these regions.

Reasons for declining Groundwater:

Reasons for ↓ Groundwater

1. Overexploitation: Haryana, Punjab, Rajasthan receive less than 40 mm annual rainfall. Therefore these areas exploit > 85% of available groundwater for Irrigation.
2. Groundwater Pollution with Fluoride, Arsenic, Nitrates.
3. De-saturation of Aquifer zones.
4. Saline water intrusion in Coastal areas.
5. Natural and Anthropogenic overuse and pollution.

Good analysis of reasons for declining groundwater

Remarks

Measures for effective Groundwater Management

Measures for effective Management

1. Groundwater Reservoirs and Aquifers with Integrated Rainwater Harvesting.
2. Reduced Surface Runoff from farms and Industries to lower Groundwater Pollution
3. Drip / Micro Irrigation Strategies
4. Traditional Water Conservation promotion, eg: Johads in Rajasthan, Bandharas in Maharashtra.
5. Adequate pipelines & to reduce direct extraction through Jal Jeevan Mission

Sound measures for effective management

7 1/2

Groundwater is a quintessential resource for human survival and it is imperative to start conserving this resource at both micro & macro-levels.

Remarks

Q9. Illustrate the significance of estuaries and delta. Explain the factors responsible for sinking of deltas in India, and strategies to tackle the same.

(15 Marks) (250 Words)

Sound intro

ESTUARIES: are partially enclosed coastal body of brackish water with one or more rivers or streams flowing into it.

•) Estuaries form a transition zone between river and marine ecosystems (ECOTONE)

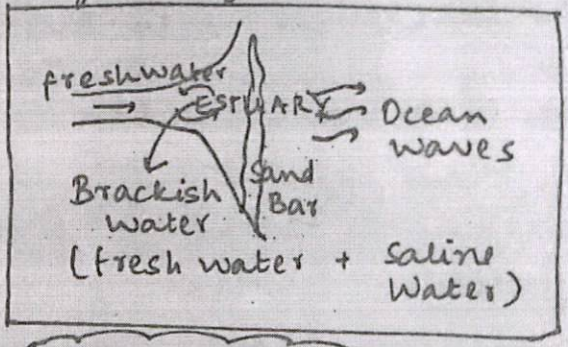


Fig: Estuary

•) Significance:

Significance of ESTUARIES

1. Most Paoductive Water Bodies (more than Wetlands)
2. Very little wave action, ∴ provides refuge to numerous aquatic species.
3. Vast Mangrove forests act as a barrier for coastal habitat to act as check on Cyclones
4. Estuaries Store & Recycle Nutrients
5. High clay and alluvium concentration.

Good analysis of significance

Remarks

DELTA : is a depositional feature of a river, formed at mouth of the river. These are wetlands with high productivity

- Importance / Significance :

(i) Agricultural Activities

eg : Cauvery Delta in India is very fertile.

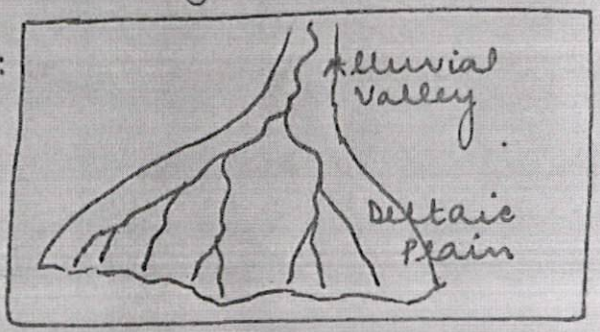


Fig : Delta

Well Analysed significance of delta

(ii) Economic Activities : Deltas are source of sand and gravel used in several economic activities.

(iii) Biodiversity Hotspots : eg : Sundarbans → one of richest biodiversity hotspots in India

(iv) Buffer Region : and act as a check on cyclones and storms.

Sinking of Deltas

Loss of Deltaic Plain due to Coastal

Erosion and other factors is termed as Sinking of Deltas.

•) Factors responsible for Sinking of Deltas:

Factors for Sinking of Deltas

1. Large Dams: which restrict sediment deposition in Deltas.
2. Groundwater Mining: which causes land compaction leads to sinking of Deltas.
3. Artificial levees: which affect natural course of Rivers.
4. Coastal Erosion: with overexploitation of Deltas.
5. Seawater Intrusion

Good analysis of factors

Also mention natural factors

What can be done?

•) Comprehensive Environmental Impact Assessments for Dam Construction.

•) Restricting Coastal Mining to conserve Deltaic Plains.

•) Better River Management by allowing its natural course.

Deltas are one of the most productive tracts of Lands in India. It is essential to conserve them.

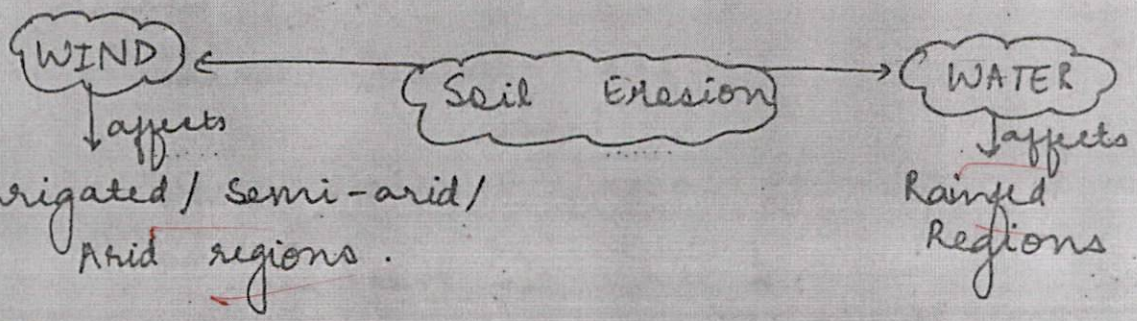
7 1/2

Remarks

Q10. Soil erosion in our country is a serious threat to both the irrigated and rainfed areas. Discuss. Suggest some concrete measures to tackle this problem.
(15 Marks) (250 Words)

SOIL EROSION is described simply as destruction of soil cover. More broadly, Soil Erosion is loosening and displacement of topsoil particles from the land. Good intro

WIND and WATER are powerful agents of Soil Erosion.



Soil Erosion as a threat to Irrigated Regions: (WIND)

Loose soil particles are blown and transported from wind by:

(i) SILTATION: blown by wind in series of short bounces.

Remarks

(ii) Suspension: transported over long distances in suspended particle form.

(iii) Surface Creep: Transported by high-velocity winds at ground level.

•) Consequences of Wind Erosion: (Serious Threat)

Sound analysis of this effect

Consequences of Wind Erosion
1. Removes finer soil material and leaves behind coarser, less fertile material.
2. Productive capacity of soil is lost
3. Damages roads & fertile agricultural fields.

Soil Erosion as a threat to Rained Areas: (WATER)

Soil Erosion by water occurs by raindrops, waves or ice.

Soil Erosion by Water
- Sheet Erosion
- Rill Erosion
- Steam Bank Erosion
- Land-slides
- Coastal Erosion

•) Consequences of Water Erosion:

Remarks

Good analysis of this aspect

Consequences of Water Erosion

1. Removes most fertile part of soil.
2. Causes Siltation of Rivers, Streams and fields.
3. Deteriorate water quality.
4. Coastal Erosion affects marine ecosystem.
5. Landslides cause huge loss of life & Property.

Concrete Measures to tackle Soil Erosion

Measures to tackle Soil Erosion

1. Crop Rotation
2. Strip Cropping
3. Contour Ploughing
4. Check on Shifting Agriculture
5. Mulching
6. Contour Barriers
7. Rock Dam.

Briefly explain each of these

7½

Soil conservation is the need of the hour, in order to reduce huge economic & social losses incurred through Soil Erosion.

Remarks