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GENERAL STUDIES (TEST CODE : 1431)

Name of Candidate	ADITYA BANSAL		
Medium Eng./Hindi	ENG	Registration Number	36962
Center	ORN	Date	

INDEX TABLE

Q. No.	Maximum Marks	Marks Obtained
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18	15	
19	15	
20	15	

Total Marks Obtained:

Remarks:

INSTRUCTIONS

1. Do furnish the appropriate details in the answer sheet (viz. Name, Registration Number and Test Code).
उत्तर पुस्तिका में सूचनाएं भरना आवश्यक है (नाम, प्रश्न-पत्र कोड, विद्यार्थी क्रमांक आदि)।
2. There are **TWENTY** questions printed in **ENGLISH & HINDI** इसमें बीस प्रश्न हैं अंग्रेजी और हिन्दी में छपे हैं।
3. **All questions are compulsory.**
सभी प्रश्न अनिवार्य हैं।
4. The number of marks carried by a question/part is indicated against it.
प्रत्येक प्रश्न/भाग के अंक उसके सामने दिए गए हैं।
5. Answers must be written in the medium authorized in the Admission Certificate, which must be stated clearly on the cover of this Question-Cum-Answer (QCA) Booklet in the space provided. No marks will be given for answers written in medium other than the authorized one.
प्रश्नों के उत्तर उसी माध्यम में लिखे जाने चाहिए जिसका उल्लेख आपके प्रवेश पत्र में किया गया है और उस माध्यम का स्पष्ट उल्लेख प्रश्न-सह-उत्तर (क्यूसीए) पुस्तिका के मुख्य पृष्ठ पर अंकित निर्दिष्ट स्थान पर किया जाना चाहिए। उल्लिखित माध्यम के अतिरिक्त अन्य किसी माध्यम में लिए गए उत्तर पर कोई अंक नहीं मिलेंगे।
6. Word limit in questions, if specified, should be adhered to.
प्रश्नों में शब्द सीमा, जहाँ विनिर्दिष्ट है, का अनुसरण किया जाना चाहिए।
7. Any page or portion of the page left blank in the Question-Cum-Answer Booklet must be clearly struck off.
उत्तर पुस्तिका में खाली छोड़ा हुआ पृष्ठ या उसके अंश को स्पष्ट रूप से काटा जाना चाहिए।

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EVALUATION INDICATORS

1. Contextual Competence
2. Content Competence
3. Language Competence
4. Introduction Competence
5. Structure - Presentation Competence
6. Conclusion Competence

Overall Macro Comments / feedback / suggestions on Answer Booklet:

1.

2.

3.

4.

5.

6.

All the Best

1. Giving examples, explain how land topography affects the regional and planetary wind systems. Also, differentiate between the westerlies of the northern and southern hemisphere. (150 words) 10

सोदाहरण व्याख्या कीजिए कि धरातलीय स्थलाकृति क्षेत्रीय और ग्रहीय पवन प्रणालियों को किस प्रकार प्रभावित करती है। साथ ही, उत्तरी और दक्षिणी गोलार्ध की पछुवा पवनों के मध्य अंतर स्पष्ट कीजिए।

Land topography means relief of the land surface—whether it is a plain, plateau or a mountain.

Effect on Regional and Planetary wind Systems

1. Land surface especially if elevated slows down the wind speed and also thus reduces the effect of Coriolis force on it
e.g. → Jet streams - part of upper air circulation high speed and Coriolis force effect due to absence of friction from land surface.

2. Himalayas affect the Indian monsoon system as they bifurcate the Subtropical Westerly Jet stream into two parts flowing north and south of it due to its very high height.

3. Elevation also makes incoming wind rise giving effect to Orographic rain.

Westerlies

Westerlies are winds blowing between $30^\circ - 60^\circ$ in northern and southern hemisphere in a westerly direction. They blow in Ferrel cell ($30^\circ - 60^\circ$)

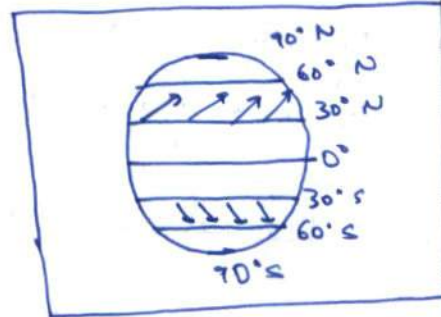


Fig: Westerlies

Northern Westerlies

1. Slow in speed due to higher continental landmass
2. Low Coriolis force effect.

Southern Westerlies

1. Very high speed due to more ocean surface compared to land - thus less friction
2. High Coriolis force effect so much that winds sometimes blow parallel to isobar.

Southern Westerlies are in fact so intense that they are called "Roaring Westlies" and give rise to powerful ocean current — "West Wind Drift" in the Pacific Ocean.

2. What is palaeomagnetism? Explain how it serves as a bridging evidence for Plate Tectonics Theory. (150 words) 10

पुराचुम्बकत्व क्या है? व्याख्या कीजिए कि यह किस प्रकार प्लेट विवर्तनिकी सिद्धांत के प्रमाण हेतु एक सेतु के रूप में कार्य करता है।

Palaeomagnetism is the study of magnetic effects shown by Earth's rocks.

Earth behaves like a geomagnet with its magnetic north and south poles due to electromagnetism of iron and nickel particles in the outer core.

This magnetism of Earth results in alignment of ferrie minerals (Iron, nickel, cobalt) in a rock in alignment with Earth's geomagnet.

The study of this alignment in rocks (palaeomagnetism) serves as a bridging evidence for Plate Tectonic Theory.

Plate Tectonic Theory in geomorphology explains that Earth's lithosphere is composed of numerous plates floating over a plastic asthenosphere.

Due to the movement of plates, lithospheric crust is being continuously consumed at

Convergence zones and new crust created at divergence zone.

Palaeomagnetism serves as bridging evidence for the theory as - ~~it has~~

- It has been seen rocks at same distance from a divergence zone have similar magnetic alignment. This proves that they belong to the same age and were once together
- On the other hand rocks near the divergence zone have similar but different magnetic alignment.

This proves two things

↓
Earth's magnetic field is constantly changing

↓
Sea floor is spreading and new crust is created at divergence zone.

Sea floor spreading is a direct evidence of Plate Tectonic Theory.

3. Mention the conditions responsible for occurrence of Temperature Inversion in atmosphere. Elaborating on its various types, highlight its effects on the biosphere. (150 words) 10

वायुमंडल में तापमान व्युत्क्रमण की घटना हेतु उत्तरदायी परिस्थितियों का उल्लेख कीजिए। इसके विभिन्न प्रकारों का सविस्तर वर्णन करते हुए, इसके द्वारा जैवमंडल पर पड़ने वाले प्रभावों पर प्रकाश डालिए।

Temperature usually decreases with increasing height because air expands and thus adiabatically cools on rising.

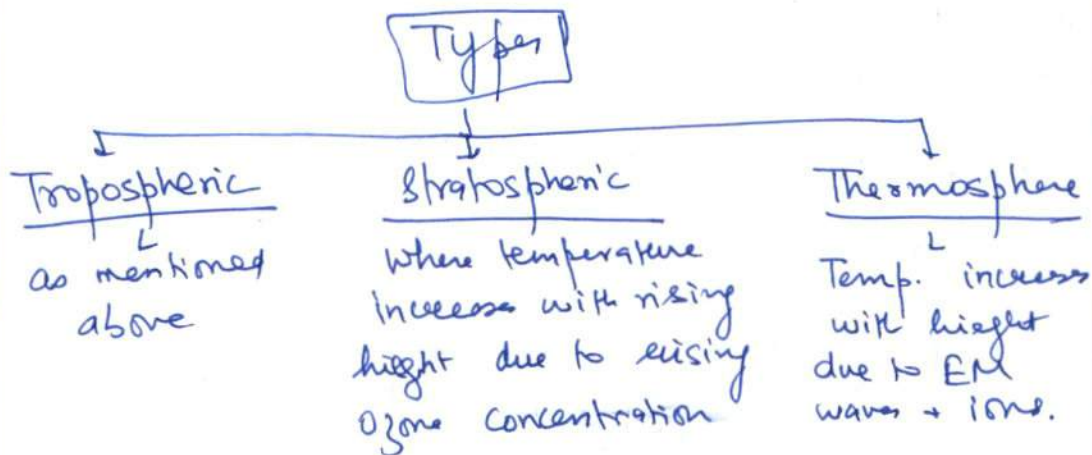
Temperature inversion refers to an anomaly where temperature increases with increasing height.

Conditions Responsible

1. Long, clear winter night — At night, earth loses heat. During winters when nights are long due to prolonged cooling, at early day time, temperature at surface may be less than that at some height - temperature inversion.
2. Mountains — In mountainous topography, due to tall surrounding mountains, the rising air cannot expand and instead rolls down the slope to adiabatically warm. This also produces temperature inversion where valley is cooler than mid slopes where air is trapped.
3. Urban heat island — Similar effect as mentioned

above due to tall buildings in cities.

4. Deserts - In deserts, since land does not have much water, it cools quickly at night leading to very low temperature at surface - lower than air above it - temperature inversion.



Effects on Biosphere

1. Very low temperature may exceed tolerance limit for some organisms
2. Fog - due to low temperature - affecting visibility
3. Pollution - as air is static and air pollutants are stuck near the ground.

That is why air pollution is most troublesome in winters during early morning.

4. Highlight the importance of iron and steel industry as the basic building block of the economy. In this context, discuss the key features of the National Steel Policy, 2017. (150 words) 10

अर्थव्यवस्था के आधारभूत निर्माण खंड के रूप में लौह एवं इस्पात उद्योग के महत्व पर प्रकाश डालिए। इस संदर्भ में, राष्ट्रीय इस्पात नीति, 2017 की प्रमुख विशेषताओं पर चर्चा कीजिए।

Iron and steel industry is the core heavy, capital intensive industry that founded the industrial revolution in 18th century.

Even today, iron and steel industry is the basic building block of economy because -

- 1) All industrial machinery requires iron and steel.
- 2) Construction of houses, offices, other industries necessarily involve iron and steel.
- 3) Infrastructure development in country - be it roads, railways, shipping, navigation depend on iron and steel.
- 4) Iron is a raw material for several other industries like alloy industries etc.
- 5) Iron and steel industry being the mother of industries - as all industries indisputably depend on it for their functioning
- 6) High export potential - as iron and steel are

always in demand.

Its importance can be known by the fact that Trump began his trade war by imposing ~~tariffs~~ tariffs on steel and the development of steel industry is key to develop economy.

India is the third largest steel producing nation ~~among~~ after China and Japan.

National Steel Policy 2017 —

- 1) Aims to increase its contribution in national GDP
- 2) Increase exports of steel industry
- 3) Generate employment
- 4) Focus on developing modern technology for global competitiveness of our steel industry.
- 5) Electric smelting to reduce dependence on imported coking coal and also to reduce Carbon emissions.

India must aim to be the largest and best quality steel producer and exporter in the world.

5. Analyse the phenomenon of 'Resource Curse', by giving adequate examples from around the world as well as India. (150 words) 10

विश्व और भारत से यथोचित उदाहरण प्रस्तुत करते हुए 'संसाधन अभिशाप' की परिघटना का विश्लेषण कीजिए।

Resource curse means where abundant natural resources ~~and~~ ~~to~~ act as dehiment to national well being rather than promoting it.

The phenomenon was highlighted by Economic Survey (2016-17).

~~Natural~~ Natural resources are the bedrock of economic value chain and thus always in high demand. Particularly in present times when demand is rising and supply is limited.

This results in abundant prospects of wealth and development for regions rich in natural resources.

Resource curse refers to the observation that though resource rich regions are rich in wealth they lack development. ~~and~~ ~~because~~

Examples from World

1. Saudi Arabia, Qatar, Iraq are rich in oil and gas resources. These resources are monopolised by state which also monopolises the wealth generated from it. It has led to

a rentier economy and patronage based political system. Since citizens are ~~for~~ not required to pay taxes, they have no democratic rights to seek accountability of state.

2. Rich resources e.g. - Iraq, Syria has led to geopolitical interventions by superpowers resulting in war, instability, misery.

3. Resources in Africa - mineral and energy have led to civil wars and ethnic conflicts.

4. Colonisation of Asia and Africa in 17th and 18th centuries was because of their rich resources.

INDIA

Eastern states Bihar, Jharkhand, Meghalaya, Chhattisgarh, Odisha have rich natural resources but are amongst least developed states because -

1) More revenue from resources means less taxation for people leading to less democratic accountability.

2) Conflict between state, Corporate, tribals over control of natural resources. It has given rise to Left Wing Extremism, which has prevented exploitation of these abundant resources.

6. Growth of natural capital is vital for sustainable economic development in India. In this context, state the concept, strategy and broad policy guidelines for Natural Capital Accounting (NCA) for effective management of natural resources. (150 words) 10

भारत में संधारणीय आर्थिक विकास के लिए प्राकृतिक पूंजी की वृद्धि अपरिहार्य है। इस संदर्भ में, प्राकृतिक संसाधनों के प्रभावी प्रबंधन के लिए प्राकृतिक पूंजी लेखांकन (NCA) की अवधारणा, रणनीति और व्यापक नीतिगत दिशानिर्देशों का वर्णन कीजिए।

Natural capital means the wealth of natural resources that we have that generate significant economic returns.

Growth of natural capital is vital for sustainable economic development because —

- 1) It is natural capital that provides the resource base for all economic processes.
- 2) ~~Absence~~ Loss of natural capital results in catastrophic ~~effects~~ effects like extreme weather events, climate change, climate change induced disasters etc that affects economic growth.
- 3) Livelihood of many tribals, farmers and village communities depend on natural capital.

Natural Capital Accounting

CONCEPT - Economic growth is the result of financial capital, human capital and natural capital.

Formal accounting of national income often takes into account only financial and economic capital—like machinery, capital assets etc.

To get a complete picture of our present wealth and future economic prospects, it is important to also account natural capital.

It will also incentivise policy makers to conserve and augment natural capital.

STRATEGY - Based on ecosystem services valuing—

Various ecosystem services like fruits, nuts (provisioning); regulatory etc are ascribed economic value and then they are accounted.

Thus, it takes into account not just quantity but also quality of ecosystem.

World Bank has launched WAVES to promote Natural Capital Accounting.

7. Discuss the reasons behind increased instances of human-wildlife conflict and suggest some mitigation measures to address them. (150 words) 10

मानव-वन्यजीव संघर्ष के बढ़ते दृष्टांतों के पीछे उत्तरदायी कारणों पर चर्चा कीजिए और इनसे निपटने के लिए कुछ शमनकारी उपायों का सुझाव दीजिए।

Human-wildlife conflict refers to conflicting interests of human and wildlife

Wild animals entering farms & village

Wild animals killed by vehicles on highways

Reasons

- 1) Habitat destruction - Forest cover is reducing forcing wild animals to enter human settlements.
- 2) Habitat Fragmentation - due to construction of infrastructure like roads, highways - this affects large animals like Elephants which have large grazing areas - coming in conflict with humans
- 3) Degrading quality of forests - ^{and} also due to Commercial forestry - forests do not supply enough quality food ~~(for them)~~ etc - forcing animals to move out into human farms
- 4) Development- Environment conflict - while humans see environment as a resource to

be exploited for development, for wildlife it is their source of sustenance.

5) Commercial exploitation of wildlife - for trophy or to make various products from their body parts.

GOVERNMENT Measures

Project Elephant
↓
address human-
elephant conflict

Wildlife Protection
Act, 1972
Protected areas for
wildlife and ban on
hunting

Part IV
of Constitution
↓
directs state
to
Conserve
Wildlife.

Mitigation Measures

1. Improving forest cover and forest quality -
utilising funds from Forest Invest Programme
of World Bank.
2. Animal Corridors - Connecting protected areas
for free movement of wildlife.
3. Eco-sensitive areas - around protected
areas as buffer zones to prevent human-
wildlife conflict.

Above all, it requires eco-friendly development strategies.

8. Montreal Protocol is often considered as the most successful international environmental treaty. Highlighting the achievements of the protocol, discuss the reasons for its success. **(150 words) 10**

मांट्रियल प्रोटोकॉल को प्रायः सर्वाधिक सफल अंतर्राष्ट्रीय पर्यावरण संधि के रूप में माना जाता है। इस प्रोटोकॉल की उपलब्धियों पर प्रकाश डालते हुए, इसकी सफलता के कारणों पर चर्चा कीजिए।

Montreal Protocol, a legally binding Protocol, signed in 1987 is a protocol to Vienna Convention that phases out use of Ozone Depleting Substances (ODS).

The protocol is one of the most successful international environmental treaty because

Near universal
ratification

Compliance with
treaty obligations

This has resulted in significant achievements

1) Ozone hole over Antarctic is contracting and Ozone concentration is again increasing

2) Ozone Depleting substance as decided by Protocol especially Chloro Fluoro Carbons (CFCs) have been phased out almost completely.

Now their substitutes are used in Refrigeration, Air Conditioners etc.

3) Recently, in 2017, Kigali Amendment to Montreal Protocol was signed to phase out

use of HCFCs - which were causing global warming.

Thus Montreal Protocol has achieved not just ozone regeneration but an instrument to arrest Climate Change.

Kigali Amendment has come into force from 2019.

Reasons for Success

1. Seriousness of Problem - Ozone depletion would have increased exposure to harmful UV rays

↓	↓	↓	↓
<u>Diseases</u> skin, eye	<u>low crop</u> <u>productivity</u>	<u>Adverse</u> <u>effect on</u> <u>materials</u>	<u>Ecosystem</u> <u>productivity</u>

2. Political will of developed countries - Lying in temperate zone, they were at greater risk of ozone depletion.

3. Funding and Technological support to developing countries - Multilateral fund (UNEP, UNDP, World Bank, UNIDO) was established to help them phase out ODS.

similar political commitment is required for success of Paris Agreement to mitigate climate change.

9. Identify different factors that trigger Glacial Lake Outburst Floods. Also, suggest certain measures that need to be taken to minimize their impact.

(150 words) 10

उन विभिन्न कारकों की पहचान कीजिए जो हिमनदीय झील प्रस्फोट जनित बाढ़ (ग्लेशियल लेक आउटबर्स्ट फ्लड) को प्रेरित करते हैं। साथ ही, इनके प्रभावों को न्यून करने हेतु किए जाने वाले कुछ आवश्यक उपायों का भी सुझाव दीजिए।

Glacial Lake Outburst Floods are associated with glacial regions.

Factors Triggering them

1. Earthquake - may cause glacial lake to outburst.
2. Volcanism - may also cause tectonic movements
3. Glacier Melting - may increase volume of water in glacial lake causing it to outburst. The risk is even more when global climate is warming
4. Avalanche - That may bring boulders blocking glacial rivers causing outburst upstream.
5. Heavy rainfall / snowfall - may also increase the volume of water in glacial lake beyond its carrying capacity.

Since glacial lake Outburst floods cannot be predicted well in advance, there is a

need to be prepared to minimise their impact

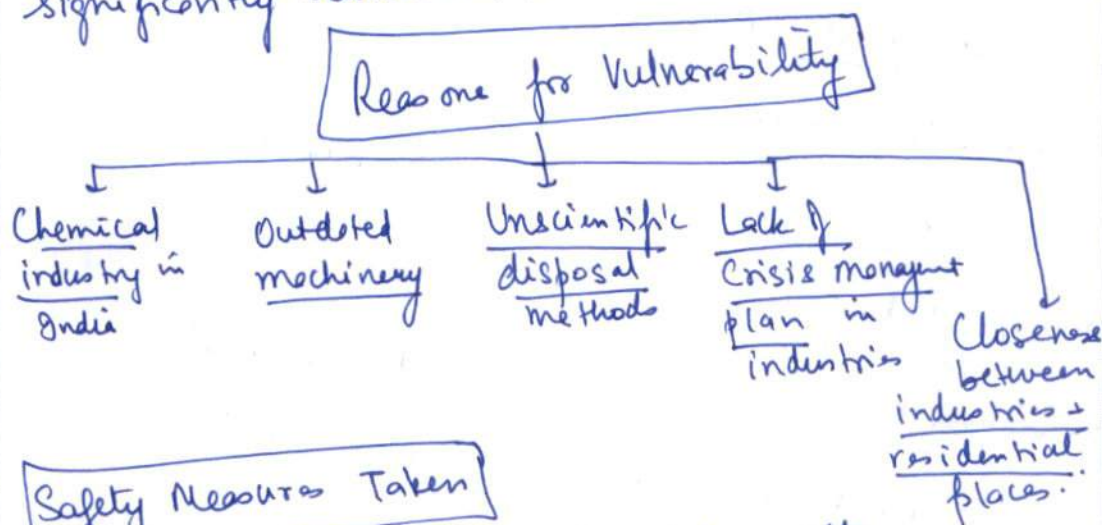
1. Hazard Mapping - Vulnerability to any event of glacial flooding should be mapped for adequate mitigation strategies.
2. Afforestation downstream - to reduce the flow and impact of flood
3. Retentional walls or other such structures may also be constructed
4. Strong engineered structures - to withstand glacial flood - ~~to~~ NOT to be built on loose ground.
5. Contour bunding or building terraces on slope to reduce impact
6. Community Involvement - for better planning, sensitisation and implementation of crisis management plans.

10. Discuss India's vulnerability to chemical disasters. In this context, mention safety initiatives taken to address chemical risk in India. (150 words) 10

रासायनिक आपदाओं के प्रति भारत की सुभेद्यता पर चर्चा कीजिए। इस संदर्भ में, भारत में रासायनिक जोखिम से निपटने हेतु की गई सुरक्षा पहलों का उल्लेख कीजिए।

Chemical disasters are human induced disasters associated with storage, transport, disposal or processing of chemicals.

Being a leader in chemical industry, India is significantly vulnerable to chemical disasters.



Safety Measures Taken

These measures were largely taken after Bhopal Gas Tragedy, 1984 - worst chemical disaster in India till date.

1. Environment Protection Act, 1986 - allows government to regulate industrial processes for safety + risk mitigation.
2. Hazardous Waste Management Rules - by Ministry of Environment mandating procedures

for disposal of hazardous waste including chemicals.

3. Public Liability Insurance Act, 1992 - to fix liability of operator in case of a chemical disaster.

4. NDMA Guidelines → to industries regarding storage, transport, disposal and processing of industrial chemicals

→ also early detection and alarm system to be placed in industries

→ A disaster response plan to be prepared by industry and train its workers

→ Awareness of citizens living around chemical industries about risks and necessary safety measures in case of a disaster.

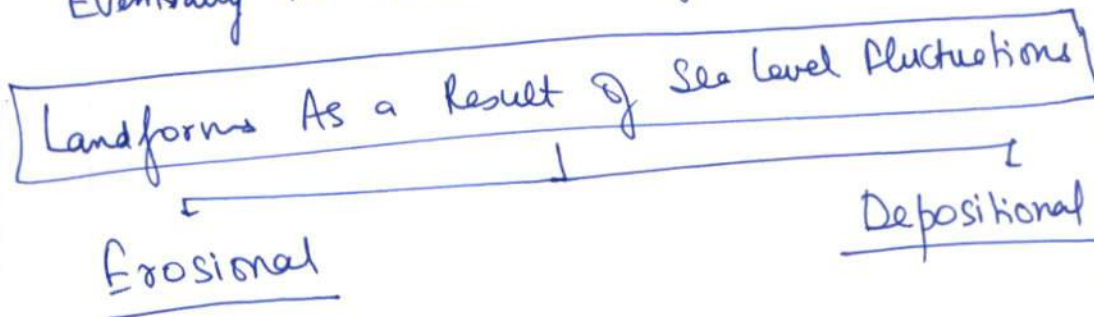
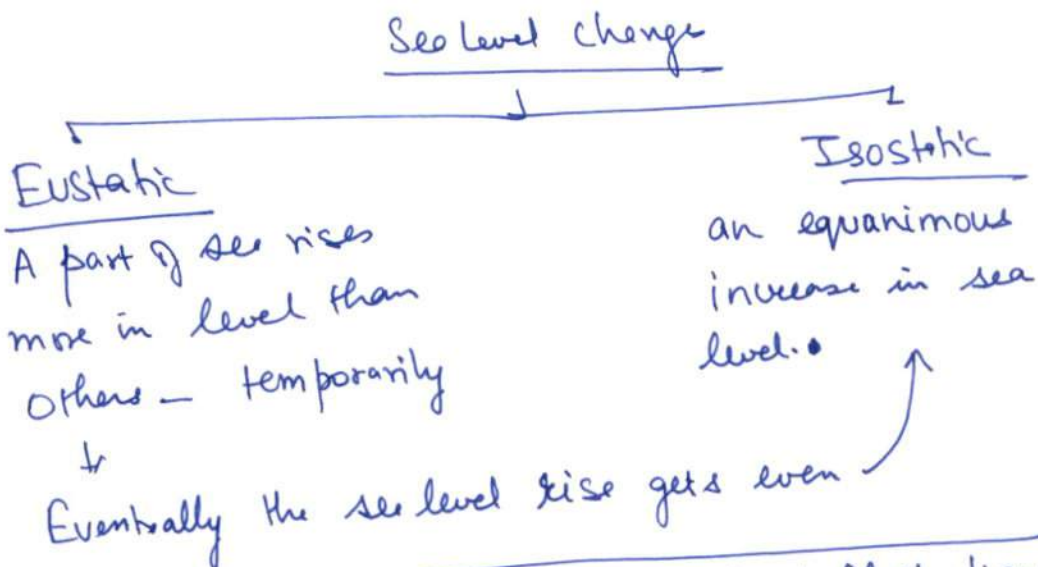
→ Conducting drills - to enhance preparedness.

The key to mitigate chemical risk in India lies in spirited implementation of these safety measures.

11. Differentiate between eustatic and isostatic type of sea-level changes. Also, discuss the resultant landforms which are likely to be formed as a result of sea-level fluctuations. (250 words) 15

सुस्थितिक और समस्थितिक प्रकार के सागर तल परिवर्तनों के मध्य अंतर स्पष्ट कीजिए। साथ ही, सागर-तल के उतार-चढ़ाव के परिणामस्वरूप निर्मित होने वाली संभावित परिणामी भू-आकृतियों की भी चर्चा कीजिए।

Sea level changes are becoming more pronounced due to climate change induced melting of glaciers.

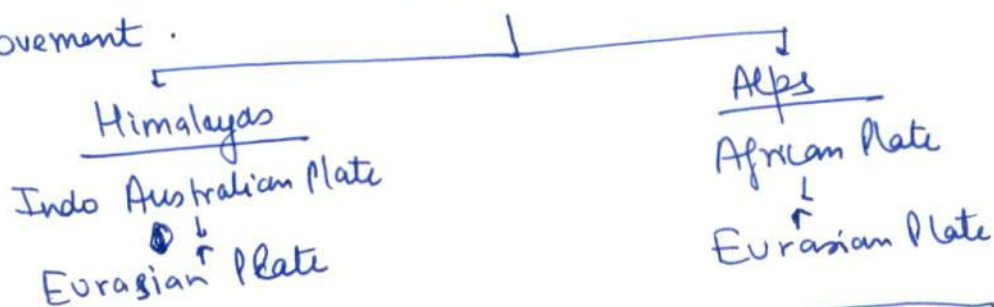


12. Explain the reasons behind earthquakes in Himalayas being more intense and frequent than the ones occurring in Alps region. Why are scientists predicting a largescale earthquake in northern India? Also, elaborate upon some prominent earthquake forecasting techniques. (250 words) 15

आल्प्स क्षेत्र में आने वाले भूकंपों की तुलना में हिमालय में आने वाले भूकंपों के अधिक तीव्र होने और बारंबार आने के पीछे उत्तरदायी कारणों की व्याख्या कीजिए। वैज्ञानिक उत्तर भारत में उच्च तीव्रता वाले भूकंप के आने की भविष्यवाणी क्यों कर रहे हैं? साथ ही, भूकंप पूर्वानुमान संबंधी कुछ प्रमुख तकनीकों का सिवस्तार वर्णन कीजिए।

Earthquake is a sudden movement of Earth's surface due to release of energy caused by movement of tectonic plates.

Himalayas and Alps both witness Earthquakes because of the underlying convergent plate boundary movement.



Earthquakes in Himalayas are **MORE INTENSE** because -

- 1) ~~Earthquake~~ Himalayas are younger than Alps thus tectonically more active.
- 2) While Alps have been formed, Himalayas are still being formed. The height of Himalayas is slowly increasing. Since the

the buckling up of Earth is still in motion, earthquakes are more frequent and more intense.

3) Subduction of Indo-Australian Plate - under the Eurasian plate - leading to thick continental crust under Himalayas - producing frequent and intense Earthquakes.

Earthquakes are difficult to predict. Most common vantage point is that if Earthquake has occurred in a place, it is quite probable to repeat.

Scientists are predicting a large scale Earthquake in Northern India because -

- Earthquakes have occurred frequently in Northern India because of the Himalayas.
- But no major earthquake has happened in recent past.

This has led scientists to believe that a powerful Earthquake is building up under the Himalayas that can anytime occur.

The energy due to plate movements is building up which will suddenly release.

According to 2nd ARC (Crisis Management) there is no credible Earthquake prediction possible.

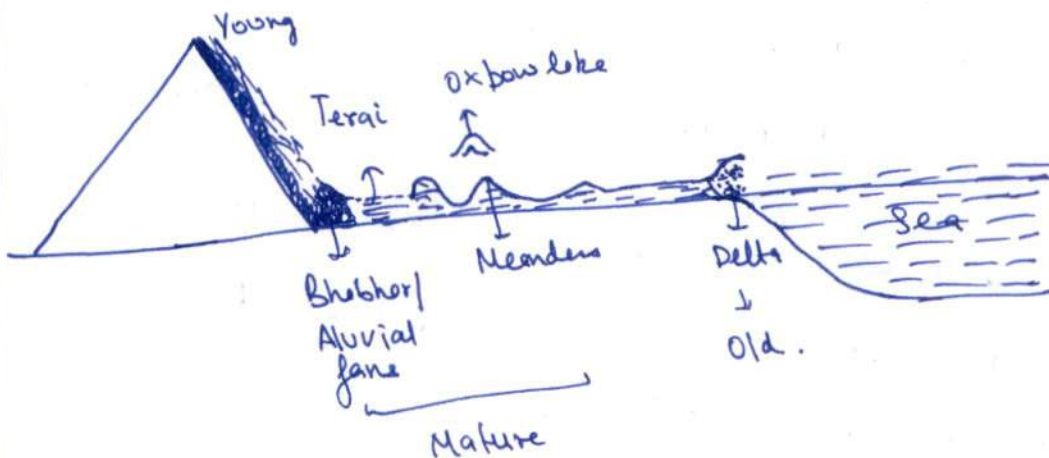
NDMA guidelines also point out the same.

13. Explain the role of river as a geomorphic agent with suitable examples of landforms formed during its course of flow. (250 words) 15

नदी प्रवाह के दौरान निर्मित होने वाले भू-आकृतियों के उपयुक्त उदाहरणों सहित भू-आकृतिक कारक के रूप में नदी की भूमिका की व्याख्या कीजिए।

River is a geomorphic agent responsible for exogenic movements on the Earth's surface. It is a denudational agent that seeks to level down the Earth's surface.

It, during its course forms both erosional and depositional landforms.



Young

In young stage river has high velocity and its erosional activity far exceeds its depositional activity.

1. V-shaped valleys - formed due to vertical

erosion because of high speed.

2. U-shaped Valley - As its speed decreases while arriving at lower slopes, it also starts lateral erosion forming U-shaped valleys.

MATURE STAGE

1. Bhabhar or Alluvial fan - Deposition of big boulders as river arrives at plains from hill slopes.
2. Terai - A marshy area after Bhabhar when river water re-emerges.
3. Bhangar and Khadar - Calcareous deposits.
4. Meanders - The turns of rivers are called meanders due to slowing speed and increasing deposition.

Note - Jhelum River forms meanders in young stage itself because of high sediments in Kashmir valley.

5. Ox Bow lake - When a meander gets cut off from main river course. This is because

of large scale deposition while river crosses the path of least resistance.

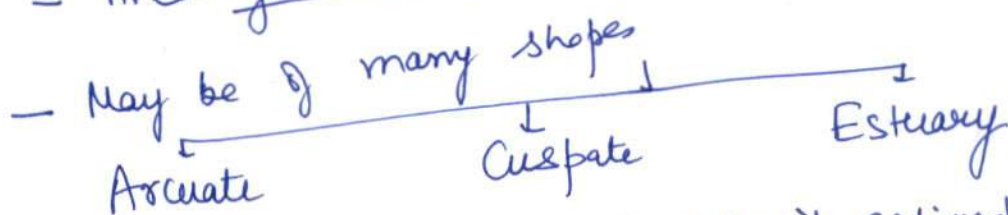
6. Ravines and Gullies - may be formed - leading to badland topography e.g. - in Chambal. This is an erosional feature of river in mature stage.

OLD STAGE - Here river loses speed significantly such that, it only deposits, does not erode.

1. Deltas - Deposition of very fine sediments before river enters sea.

- Areas fertile for cultivation

- May be of many shapes



Arcuate Cuspate Estuary

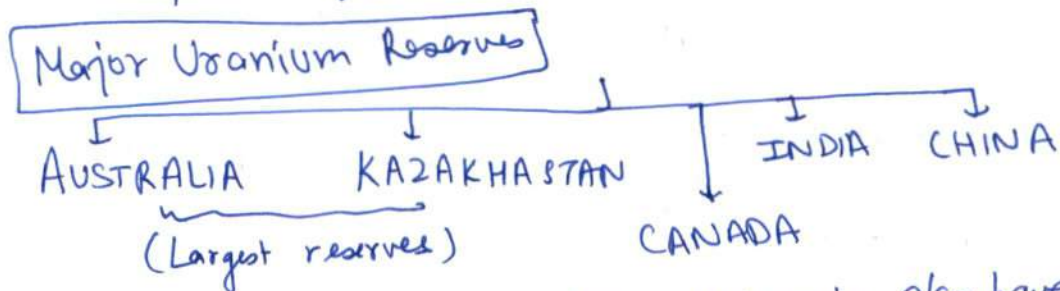
In an estuary, river does not deposit sediments - directly merges in the sea. e.g. - Normande, Tapi etc.

14. Identify the major Uranium reserves in the world and the countries from where India sources it. What measures are required to ensure supply security of fuel for nuclear plants in the country? (250 words) 15

विश्व के प्रमुख यूरेनियम भंडारों और उन देशों की पहचान कीजिए जहाँ से भारत इसका आयात करता है। देश में परमाणु संयंत्रों के लिए ईंधन आपूर्ति की सुरक्षा सुनिश्चित करने के लिए किन उपायों की आवश्यकता है?

Uranium is a rich energy source naturally occurring in two isotopes — U-235 and U-237.

The radio-activity of U-237 makes Uranium an important fuel for nuclear power plants.



Some African countries like Nigeria also have economically viable reserves of Uranium.

India sources Uranium from Australia,

Kazakhstan majority.

India has signed Civil Nuclear Cooperation Agreement with major uranium rich nations including Australia, Kazakhstan, Canada to secure supply of Uranium fuel.

Measures Required to ensure supply security of fuel for nuclear plants in India are -

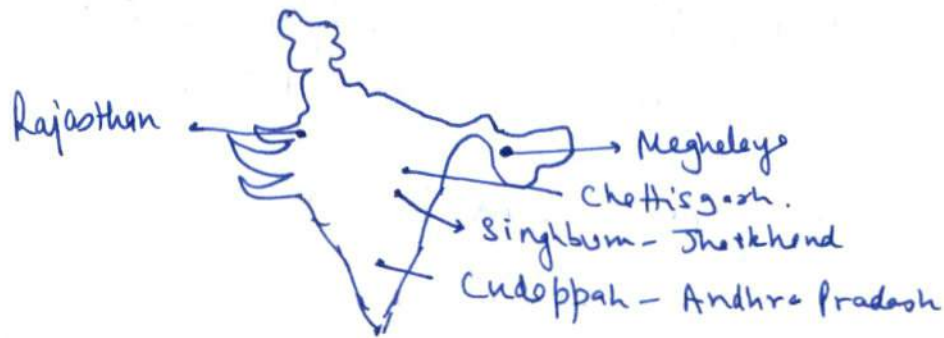
1) Membership of NSG - At present, India has a waiver from ~~NSG~~ NSG as a result of Indo-US Civil Nuclear Cooperation Agreement 2008. This waiver allows us to participate in nuclear trade and buy uranium internationally.

For long term security of uranium supply, it is important to be member of NSG to secure our interests from within.

2) Civil Nuclear Cooperation Agreements - As it is a requirement in domestic laws of most supplier nations.

It ensures uranium fuel is required only for civilian purposes and not for proliferation of nuclear weapons.

3) Exploiting India's own uranium reserves by employing modern technology and inviting ~~more~~ private investment.



Uranium Reserves in India

④ Buying strategic ~~and~~ uranium mines abroad - to secure fuel supply - a strategy followed by China aggressively.

⑤ Advancing Third Stage of India's Nuclear Plan to develop thorium based power plants as we ourselves have one of the largest thorium reserves in the world.

As Dr. APJ Abdul Kalam said nuclear energy is the solution to India's energy needs. Its development requires a steady fuel supply.

15. What is seabed mining and why is it important for India? Highlight the environmental challenges associated with seabed mining and discuss how these can be addressed. (250 words) 15

सीबेड माइनिंग क्या है और यह भारत के लिए क्यों महत्वपूर्ण है? सीबेड माइनिंग से जुड़ी पर्यावरणीय चुनौतियों पर प्रकाश डालिए और चर्चा कीजिए कि इनसे कैसे निपटा जा सकता है।

Seabed mining refers to commercial extraction of resources associated with seabed. These are -

↓
Energy Resources
↓
Hydrocarbons

↓
~~Metals~~ Mineral Resources
e.g. Polymetallic nodules.

IMPORTANCE for INDIA

1. Vast EEZ (Exclusive Economic Zone) and also 1500 km² of area in Central Indian Ocean Basin allotted by International Seabed Authority under UNCLOS — This means India has huge POTENTIAL RESOURCES that by technology and investment need to be harnessed.

2. Economic prosperity — Some reports suggest, these resources may help India's energy needs for next 100 years. Mineral resources will add to economic wealth.

3. Add to technological knowhow - with collateral benefits in other fields.
4. Geo-strategic advantage - Expertise gained by India can help it to be a valuable partner for developing countries in Asia and Africa to help them harness resources within their EEZ.
5. Counter Chinese dominance - which is making intense ~~at~~ efforts in seabed mining in South China Sea and Western Pacific Ocean - increasing its power in Asian geopolitics.

ENVIRONMENTAL CHALLENGES

1. Hydrocarbons especially natural gas may leak during extraction causing significant addition to stock of greenhouse gases - accelerating global warming
2. Mining operations may pollute ocean water, release toxins, and kill marine life.
3. Kill Ocean bed ecology - especially benthic organisms.

Measures to address them

1. Development of better technologies
2. Testing technologies adequately before use
3. International Collaboration

Development of
eco-friendly
technologies

Developing regulations
to prevent
environmental pollution
from sea bed mining

4. Strong domestic laws and regulations

Ministry of Earth Sciences has launched
Deep Sea Mission that will accelerate

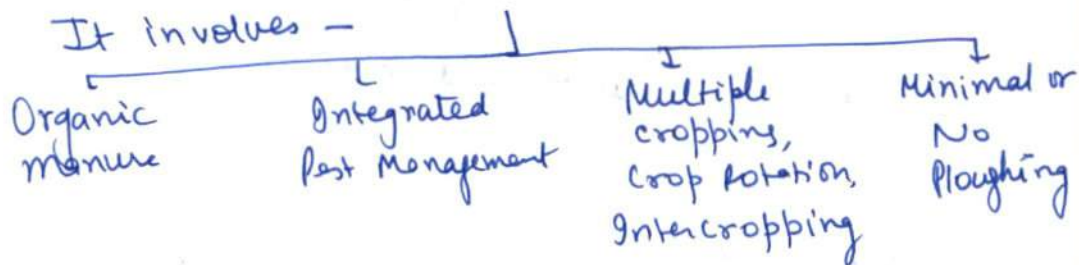
India's progress in sea bed mining.

It aims to develop both scientific knowhow
as well as commercially viable
technologies to exploit rich resources contained
in the sea bed.

16. What is Conservation Agriculture? Highlight the prospects and challenges of adopting Conservation Agriculture in India. Also, mention some important policy considerations for its promotion. (250 words) 15

संरक्षण कृषि क्या है? भारत में संरक्षण कृषि को अपनाने की संभावनाओं और चुनौतियों पर प्रकाश डालिए। साथ ही, इसके प्रोत्साहन के लिए कुछ महत्वपूर्ण नीतिगत उपायों का भी उल्लेख कीजिए।

FAO defines Conservation Agriculture as an environment friendly agriculture system that aids in environmental conservation.



PROSPECTS

- 1) Environment sustainability - especially when Green Revolution involving chemical fertilisers and excessive water have degraded land + depleted ground water.
- 2) Long term food security - which is linked to environment sustainability
- 3) Climate resilience - It will reduce carbon emissions and also better adapt to climate change.
- 4) Increase farmers income - by reducing

dependence on costly inputs - HYV seeds, fertilisers.

5) Better health - because of organic nature of conservation agriculture.

6) Biodiversity Protection - by checking indiscriminate use of pesticides.

7) Save government expenditure - on farm subsidies on inputs like fertilisers (₹10,000 crore)

CHALLENGES

1. Yield - It is argued that conservation agriculture may lead to decline in yield levels - thus not fulfill food demands of our growing population.

Sikkim, after turning organic, now has started to witness fall in yield.

2. Awareness among farmer - about prospects and methods of conservation agriculture.

3. May increase labour cost - for farmers as conservation agriculture requires more labour.

4. Certification - of organic products is not institutionalised and widespread to incentivise farmers for conservation agriculture.

POLICY Considerations

- 1) Paramparagat Krishi Vikas Yojana - aims to promote Organic farming through cluster based approach
- 2) Sub-Mission on Agro Forestry in National Mission on Sustainable Agriculture can also promote Conservation Agriculture.
- 3) Zero Budget Natural Farming - Union Budget (2019-20) has declared to promote this practice. It essentially is an aspect of Conservation agriculture where no purchased external input is required.

ZBNF is widely promoted in states like Andhra Pradesh, Karnataka, Himachal Pradesh.

- A detailed study on yield levels of Conservation Agriculture should be carried out. If found optimal, should be up-scaled throughout the nation.

17. Analyse how far the 'Katowice Climate Package' goes in achieving the objectives of the Paris Climate agreement amid the concerns of developing countries like India. (250 words) 15

विश्लेषण कीजिए कि भारत जैसे विकासशील देशों की चिंताओं के संबंध में पेरिस जलवायु समझौते के उद्देश्यों को प्राप्त करने में 'कैटोवाइस जलवायु पैकेज' कितना कारगर सिद्ध हुआ है।

Katowice Climate Package is the outcome of COP-24 to UNFCCC held in Katowice, Poland. It aims to set implementation rules for Paris Climate Agreement which will come into force from 2020.

Concerns of Developing Countries like India are -

- Following principle of "Common but Differentiated Responsibility" (CBDR) where ~~developed~~ countries should make and implement larger commitments.
- Financial assistance from developed countries - to achieve INDCs in Paris Agreement
- Technological assistance - from developed countries to mitigate climate change.

- Loss and Damage - as agreed in Warsaw COP in 2013 should be activated to compensate developing countries for damages due to climate change
- Assistance for adaptation to climate change as developing countries are most vulnerable especially small island developing countries.
- Green Climate Fund - as agreed in Cancun COP, 2010 should be effectively established to provide climate finance to developing countries.

Katowice Climate Package

- It establish modalities for filing compliance with national INDCs
- It deals with review mechanism to regularly review countries' progress in achieving INDCs and also updating them.
- A Kyoto like market mechanism has been established to trade credits won by exceeding INDC targets.

However it has failed to address the concerns of developing countries as —

- There is no definite roadmap to achieve the target of mobilising 100 billion \$ in Green Climate Fund by 2020.
- The principle of Common but Differentiated Responsibility is also inadequately met.
- USA has pulled out of Paris Climate Deal.
- European nations' commitments under their respective INDCs do not match their expected responsibility.

Achieving the Paris Climate Deal target of preventing global rise of temp beyond 2°C by 2100 can be achieved only by collective cooperation of all nations in spirit of mutualism.

18. Examine the factors responsible for causing soil pollution in India. Discussing its impact on various ecosystem services, suggest some remedial measures to restore polluted soil. (250 words) 15

भारत में मृदा प्रदूषण के लिए उत्तरदायी कारकों का परीक्षण कीजिए। विभिन्न पारिस्थितिकी तंत्र सेवाओं पर इसके प्रभाव की विवेचना करते हुए, प्रदूषित मृदा का जीर्णोद्धार करने के लिए कुछ उपचारात्मक उपायों का सुझाव दीजिए।

Soil ~~for~~ pollution means degradation of soil resources reducing its productive capacity to support vegetation.

Factors Responsible for Soil Pollution

1. Excessive use of chemical fertilisers - have polluted soil with these chemicals
2. Plastic pollution - Excessive use of single use plastic - which is non-biodegradable has resulted in plastic (especially microplastic beads) entering soil
3. Industrial discharge - without treatment into open environment
4. Hospital waste
5. Radioactive waste from nuclear power plant if not well treated may pollute soil.

6. Falling Ground water levels - have accelerated soil pollution as water can dilute pollution.

7. Soil erosion - due to deforestation has also increased concentration of pollutants.

IMPACT on Ecosystem Services

1. Water - soil stores water. Soil pollution pollutes ground water

2. Raising crops

- Polluted soil will have reduced capacity to support plant growth resulting in decreased crop and ecosystem productivity

3. Microbial growth - will also be constrained due to soil pollution which will impede humus formation, nitrogen fixation - key ecosystem services.

4. Food chain - Soil is the fountainhead of all food chain. Soil pollution results in toxic pollutants entering food chain - including in human beings.

Remedial Measures to Restore Polluted Soil

1. Augment groundwater aquifers - through
apostrophisation and rainwater harvesting.
High water level will dilute concentration of
nutrients
2. Bio-remediation - using microbes that can
degrade pollutants and make soil pollution
free.
3. Growing special trees - that can absorb
pollutants naturally freeing soil from them.
4. Investing in research and development -
to develop easy and economical methods
of treating polluted soils.

Soil Health Card is important in knowing
pollution levels in a soil - according to
which relevant solution may be applied.

19. Discuss the vulnerabilities of urban areas to disasters. What measures have been taken to minimise the losses in such areas during disasters? What further improvements would you suggest to make them more resilient? (250 words) 15

आपदाओं के प्रति शहरी क्षेत्रों की सुभेद्यताओं पर चर्चा कीजिए। आपदाओं के दौरान ऐसे क्षेत्रों में होने वाली क्षति को न्यून करने के लिए क्या उपाय किए गए हैं? आप उन्हें और अधिक लचीला (रिजिलियन्ट) बनाने के लिए क्या उपाय सुझाएंगे?

Disasters are large scale crisis involving human and economic losses beyond the coping capacity of a community on its own.

Vulnerabilities of Urban Areas

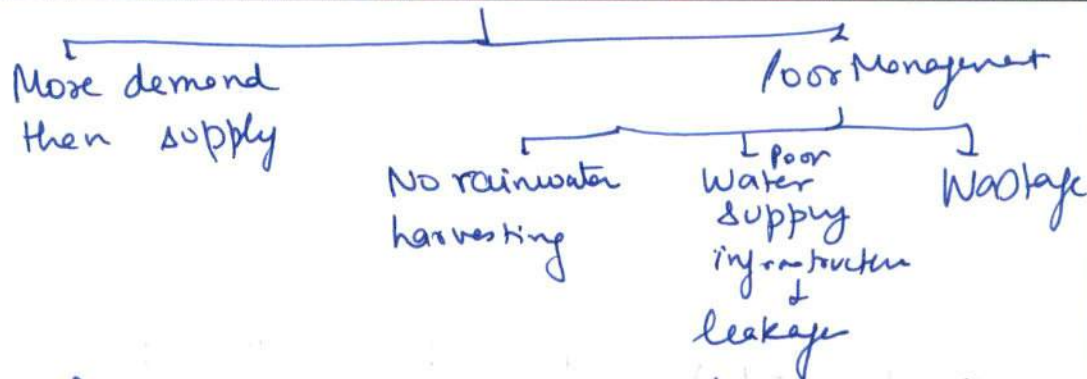
1. Earthquake - as occurred in Bhit in 2001. Delhi lying close to Himalayas is also vulnerable to Earthquake.

2. Urban Floods - As examples in Chennai, Mumbai show, their occurrence is continuously increasing due to

Climate change induced extreme weather events

Poor Urban Planning

3. Water crisis - By 2020, Delhi, Bengaluru, Chennai are expected to go out of groundwater. Modern cities in India are vulnerable to this water scarcity because —



4. Industrial Disasters - since industries are associated with urban areas.

5. Road / highway / Bridge Collapse - like in Mumbai where overbridge in a railway station collapsed.

Measures Taken

1. Hazard Mapping - to indicate vulnerabilities of various cities
2. Including Disaster Management in City Master Plans
3. Construction Norms - include disaster risk reduction measures.
4. ~~India~~ National and State Disaster Response Plans.
5. Constitution of National Disaster Response Force.

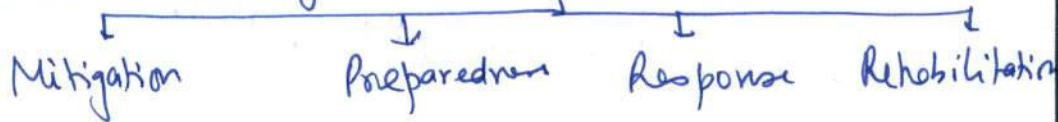
Suggestions

1. Enforcement of construction norms - for disaster resilient buildings; preventing construction on natural streams, lakes etc.
2. Community Involvement - at all stages of disaster management - mitigation, response and rehabilitation.
3. Coordination between central, state agencies and Urban Local bodies
4. Specific structural and non-structural mitigation measures for various disaster risks as outlined in NDMA Guidelines.

20. What is Community Based Disaster Management (CBDM)? Highlight its main principles, features and significance for resilient disaster preparedness in India. (250 words) 15

समुदाय आधारित आपदा प्रबंधन (CBDM) क्या है? भारत में लचीली (रिज़िलियन्ट) आपदा तैयारियों हेतु इसके मुख्य सिद्धांतों, विशेषताओं और महत्व पर प्रकाश डालिए।

Community Based Disaster Management means involvement of community in all stages of disaster management



PRINCIPLES

- Community involvement is key to success of disaster management.

It is recognised as an essential principle in Sendai Framework on Disaster Risk Reduction (2015-30)

FEATURES

- Combining traditional knowledge with modern technology for effective disaster risk reduction. Communities have abundant experience of generations in dealing with disasters.

2. Involving Community in enforcement of various norms/laws pertaining to land use, Construction etc.

3. Preparing local hazard vulnerability map with ~~the~~ participation of local community.

4. Training Community in responding to disaster whenever it occurs

5. Strong Communication links between Community and administration to ~~inform~~ warn local people of an impending disaster timely and secure evacuation.

6. Community support in rehabilitation - in "BUILDING BACK BETTER" - that is more disaster resilient.

SIGNIFICANCE

1. Increases success of disaster management

2. Traditional knowledge is sometimes more valuable. e.g. - During Uttarakashi Earthquake

While modern buildings fell, traditional houses stood firm.

3. It is only with community support that evacuation can be secured timely and search and rescue operations carried out ~~in dist~~ during disaster response.

2nd ARC in Crisis Management Report and NDMA Guidelines stress on adoption of Community Based Disaster Management.