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GENERAL STUDIES (TEST CODE : 1403)

Name of Candidate	GUNJAN SINGH		
Medium Eng./Hindi	ENGLISH	Registration Number	125597
Center	KANPUR	Date	13-05-2020

INDEX TABLE

Q. No.	Maximum Marks	Marks Obtained
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
11	15	
12	15	
13	15	
14	15	
15	15	
16	15	
17	15	
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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MI DUAL CAMERA

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. Explain how the theory of Plate Tectonics helps in understanding the mechanism of volcanism. (150 words) 10

ब्याख्या कीजिए कि प्लेट विवर्तनिकी सिद्धांत ज्वालामुखी की क्रियाविधि को समझने में किस प्रकार सहायता करता है।

Volcanism is the process of eruption of lava or magma from the interiors of earth to the surface of earth. Mechanism and manner of volcanism is best explained by the modern plate tectonics theory.

Volcanism can be in 2 main ways

↓
around a central vent

↓
This is mostly viscous, explosive, has felsic minerals

↓
along plate boundaries

↓
along a fracture or crack

↓
this is mostly quiet, mafic and more fluid
↓
it is mostly along intra-plates

Plate tectonics deals with the interaction of plates (lithospheric plates floating on asthenosphere). The interaction leads to events of volcanism.

Plate Tectonics

1) Divergent boundary →

Volcanism
Plates moving apart & magma comes out.



2) convergent boundary:

a) ocean-ocean plate converges → subducting plate releases magma
eg Andaman & Nicobar, Borneo Island, volcanoes in Japan, Philippines etc, formation of volcanic archipelagoes

b) ocean-continent convergence → andesitic volcanoes
eg Chimborazo, Cotopaxi volcanoes in Rockies & Andes mountains, Pacific Ring of Fire volcanoes.

3) Hot spots → These are intra-plate volcanic fissures
eg Azores Island, Hawaiian Island etc
Thus, plate tectonics explains volcanism clearly.

2. Discuss how technology can help India cope with disasters.

(150 words) 10

बर्चा कीजिए कि प्रौद्योगिकी भारत में आपदाओं से निपटने में कैसे सहायता कर सकती है।

Disaster management and risk reduction are important proactive steps taken up by India. In this, role of technology is manifold.

Role of Technology in coping with disasters

Pre-Disaster ⇒

⇒ Capacity Building & Preparedness

- Technology helps in building resilient infrastructure like buildings, earthquake resistant Dams etc.
- developing state-of-art early warning system using rainfall forecasting systems, GIS, Artificial Intelligence.
- developing critical communication infrastructure.
- Vulnerability mapping using

drones, GIS maps etc.

eg. geological survey of India
has made hazard zone mapping
for landslides using GIS & big
data,

Post-disaster ⇒

⇒ Relief & Rescue:

- Role of social media in helping the government, CSOs & affected people.
- Robots in extracting victims who are strangled.

⇒ Rehabilitation & Reconstruction:

- Using data analytics, helping the people with basic needs.
- Reaching out to people using communication.

But, technology can fail or can be misused, eg. Nepal earthquake & role of social media. Thus judicious use, expertise, & competence of technology is a must in coping with disasters.

3. Bring out the importance of community-based disaster management in India. (150 words) 10

भारत में समुदाय-आधारित आपदा प्रबंधन के महत्व को स्पष्ट कीजिए।

According to UN report, 82% of Indian population is vulnerable to disasters. Thus in managing the disasters & building resilience, community-based disaster management is very important.

Importance :

⇒ Including community has helped India to become more efficient in tackling disasters proactively, rather than just a reactive setup.

⇒ Disaster management being continuous process, thus information, education, communication, ~~some~~ training & capacity building will play a major role.

How disaster-management becomes robust with community participation?

⇒ Pre-Disaster : Preparedness, Risk Reduction, Mitigation ⇒

- Communities have their own indigenous survival mechanisms, through traditional knowledge. It can be used holistically.
- More aware of the rescue routes, thus better planning is possible.

Post - Disaster:

- ⇒ Rescue & Relief ⇒ Locals are the first responders, and with regular drill exercises, they can utilise the 'Golden Hour' properly.
- ⇒ They can help in better vulnerability assessment, thus taking care of women, children & marginalised population.

Involving community makes them aware, confident in coping up with the disaster, & builds their capacity. Thus community is integral part of disaster management.

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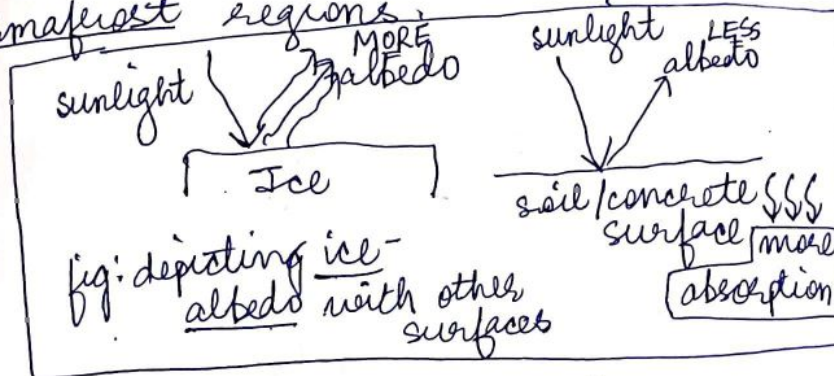
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4. What is ice-albedo feedback and how is it related to climate change?

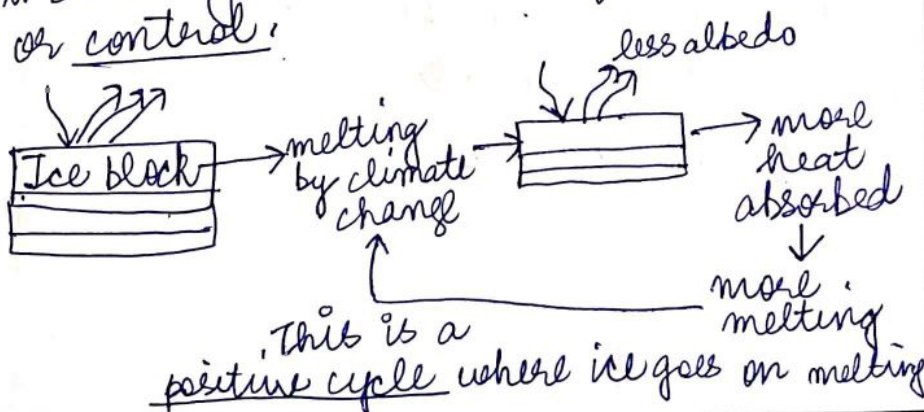
(150 words) 10

आइस-एल्बिडो फीडबैक क्या है और यह जलवायु परिवर्तन से किस प्रकार संबंधित है?

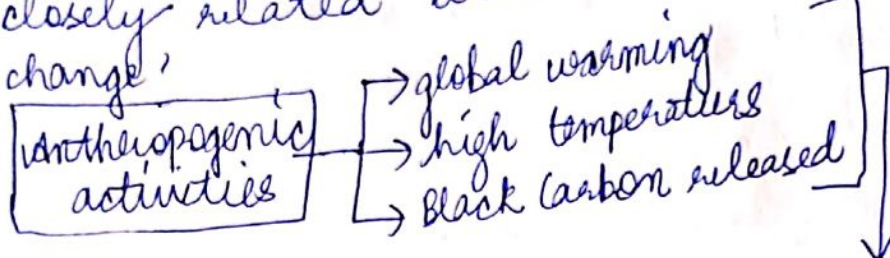
Ice-albedo feedback means the relationship between the insolation, reflection (albedo) and snow cover in cryosphere or permafrost regions.



Ice-albedo feedback is a positive feedback mechanism, where the results or consequences keep on increasing with lack of homeostatis or control.



This ice albedo mechanism is closely related with climate change,



with decreased albedo, heat insolation increases, thus more melting.

← Arctic, Himalayas
Ice cover is reducing

This ice-albedo feedback is affecting the river regimes, monsoonal patterns and thermohaline circulations in Atlantic ocean. Thus, with climate change, this feedback process will further accelerate.

5. Why has there been an increase in the frequency of Glacial Lake Outburst Floods across the world? Highlight the measures, which can be taken to tackle these floods. (150 words) 10

विश्व भर में ग्लेशियल लेक आउटबर्स्ट फ्लड की आवृत्ति में वृद्धि क्यों हुई है? ऐसे बाढ़ से निपटने के लिए अपनाए जा सकने वाले उपायों को रेखांकित कीजिए।

glacial lake outburst floods are a type of floods in the regions of glacial retreat. The lakes formed within the unconsolidated moraines breaks open causing floods. Reason for increasing frequency of GLOF:

Natural

- Glacial lakes in seismic zones.
eg Himalayas are in Earthquake zone IV & V
- unpredictable rainfall patterns

Man-Made

- Due to climate change & ↓ albedo, more ice melting
- slope alterations
- Mass tourism & pressure of population
- Dams diverting water
- Black Carbon induced ice melting

Thus these reasons have led to increased GLOF in Alpine Himalayas and other glacial regions of the world.

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Measures to tackle these floods:

1. Better preparedness with robust early warning systems, capacity building of community by continuous drilling exercises.
2. Using technology to map vulnerability zones, eg as done in Sikkim - Darjeeling region in India.
3. Using structural measures like cementing the moraine embankments etc.
4. Sustainable tourism and long term efforts of reducing the impacts of climate change.

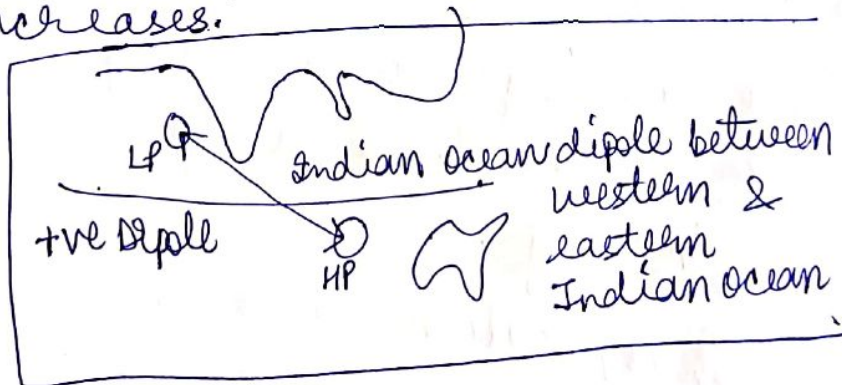
Thus, we need to protect biodiversity, livelihoods & hydrological systems by preventing GLOFs.

6. Give an account of the increasing frequency of cyclonic activity in the Arabian Sea region. (150 words) 10

अरब सागर क्षेत्र में चक्रवाती गतिविधि की बढ़ती आवृत्ति का विवरण प्रस्तुत कीजिए।

Arabian sea which generally ~~sees~~ less cyclonic activity has had suffered with 5 cyclones in 2019. This increased frequency of cyclonic activity can be attributed to various reasons:

↳ Positive Indian-ocean dipole, warms the Arabian sea, thus chances of low pressure cells increases.



↳ Due to less no. of rivers, there is decreased freshwater mixing; this has led to further

- temperature increase.
- ⇒ Some cyclones like Okhi have crossed Bay of Bengal, making it a cyclonic activity for Arabian sea.
 - ⇒ Most of the cyclones like Hikaa, Kyarr and Vayu have remained parallel to coastline leading to heavy rains & winds along coasts.
 - ⇒ Climate change related impacts are causing several low pressure depressions, of which cyclones are originating.

Thus, Arabian sea is the new hotspot of cyclones and early warning system should be made very robust to tackle the unseen danger.

7. Explain the phenomena of Sudden Stratospheric warming witnessed in recent years. How does it affect the ozone hole formation over Antarctica?

(150 words) 10

हाल के वर्षों में देखी गई आकस्मिक समतापमंडलीय तापन की परिघटना की व्याख्या कीजिए। यह अंटार्कटिका के ऊपर ओजोन छिद्र के निर्माण को किस प्रकार प्रभावित करता है?

Sudden stratospheric warming is a phenomena where the upper layers of atmosphere, i.e. from 10 km - 50 km above earth surface, temperature increases suddenly upto 50°C within a span of few days.

This phenomena happens in the polar regions where strong polar vortex forms at the North & South Pole.

Ozone hole over Antarctica has been increasing due to CFCs, HCFCs etc. These long term particles exist on the stratospheric clouds in winters, and during spring when temperature increases, the free radicals of chlorine, Bromine (Cl^+ , Br^+) react with ozone

layer and breaks it into O_2 .
Sudden stratospheric warming
has led to increased temperature
even in winters, thus increasing
the reaction time of radicals
with ozone layer. Hence increasing
the ozone hole formation. The
polar vortex ~~reads~~ meanders
during sudden stratospheric
warming, thus carrying the
reaction to far off places along
the pole.

8. Explain the concept of volcanic winter giving examples. (150 words) 10
उदाहरण प्रस्तुत करते हुए वोल्वैनिक विंटर की अवधारणा की व्याख्या कीजिए।

Volcanic winter is a term associated with temperature decrease during sustained volcanic eruptions.

Volcanic eruptions lead to numerous gases, dust particles and pyroclast in atmosphere. The amount of these outputs depends on the type of eruption of volcanoes.

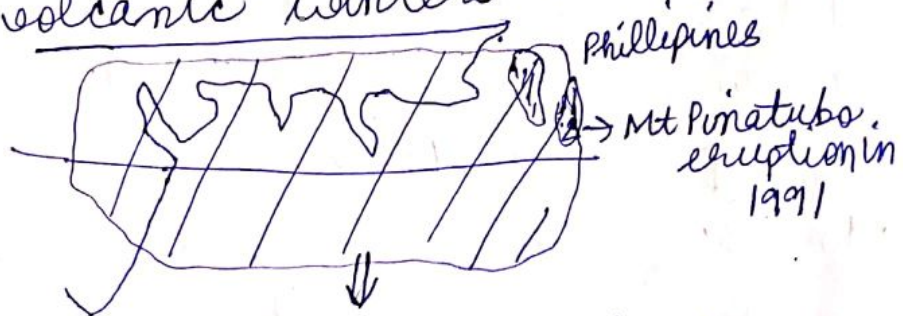
Thus, strong eruptions like

- Volcanian eruption from Mt Etna, Mt Stromboli etc
- Pelean eruption from Mt Karakatdo etc

cause huge amount of gases like SO₂ in air. These gases and dust particles act as aerosols & form a layer above earth's surface.

This further leads to high albedo and prevents sunlight from reaching earth.

Hence the whole phenomena leads to temperature decrease for large periods (1-3 years), leading to volcanic winters.



Aerosols & SO_2 from eruption led to volcanic winters till Eastern Africa and also influenced El-Nino circulations.

Thus such events are a part of climatic history of earth.

9. Bring out the prominent evidences that have been put forward in support of sea-floor spreading. (150 words) 10

सागरीय-अधस्तल विस्तार के समर्थन में प्रस्तुत किए गए प्रमुख साक्ष्यों का उल्लेख कीजिए।

Sea-floor spreading is one of the major findings of glomar expedition in 1950s. It became basis for Plate Tectonics Theory.

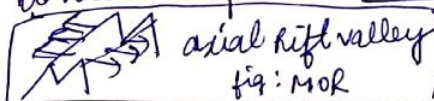
SFS is supported by various evidences put forward by Harry Hess & Dietz ⇒

⇒ SFS is seen clearly by presence of Mid-oceanic Ridges (MORs).
eg 30,000 km long MOR (S-shaped) in Atlantic ocean.

⇒ MORs have transverse faults showing the rate of SFS is uneven.



⇒ Axial rift valley in MORs shows Normal Fault, which explains SFS by tensile forces.



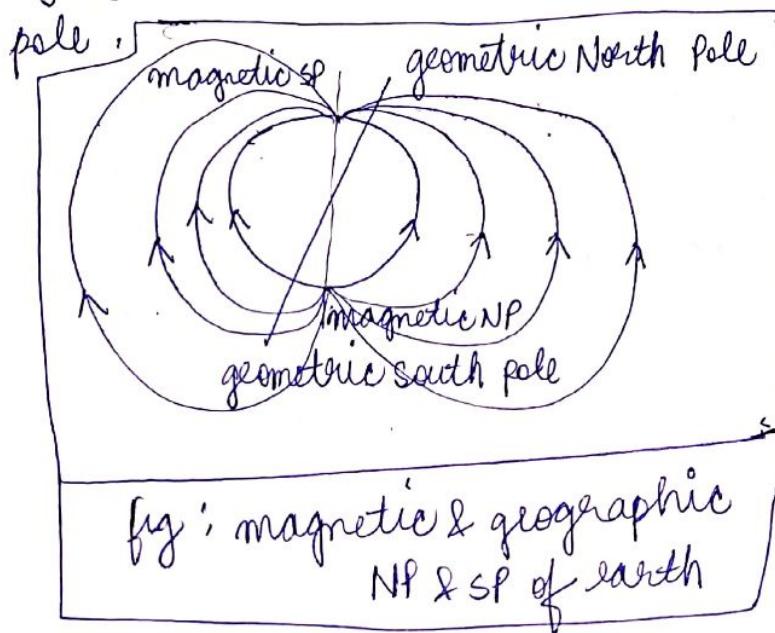
- ⇒ ocean floor is not featureless, presence of sea mounts & guyots shows the outward movement of these features from MORs.
- ⇒ Guyots have aerial erosional features, showing that once they were big in height but eroded while moving outward.
- ⇒ Presence of guyots, mounts & trenches further proves their SFS.
- ⇒ Age of ocean is maximum near trenches and min near MORs, thus validating SFS.
- ⇒ Alternate magnetic fields along MORs with reverse polarity ridges shows SFS happened across ages.

Thus all these evidences proved SFS, which later led to Plate Tectonics Theory.

10. Write a brief note on Earth's magnetism and its role in protecting the Earth from solar winds. (150 words) 10

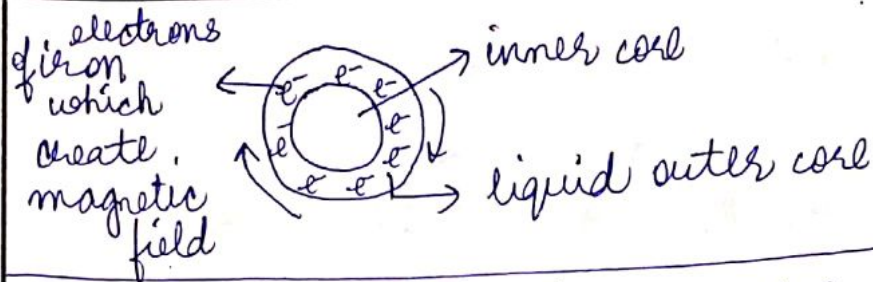
पृथ्वी के चुंबकत्व तथा सौर पवनों से पृथ्वी की रक्षा में इसकी भूमिका पर संक्षिप्त टिप्पणी लिखिए।

Earth is a huge magnet with its magnetic north & south in opposite direction to geographic North and south pole.



This magnetism is considered to be the consequence of inner core which is solidified and surrounded by outer liquid core, which circulates the inner core.





This magnetism is proved by

- various rocks & their orientation
- aurora borealis and australis
- reverse magnetic lines along MORs of Atlantic ocean;

Role in protecting the earth from solar winds;

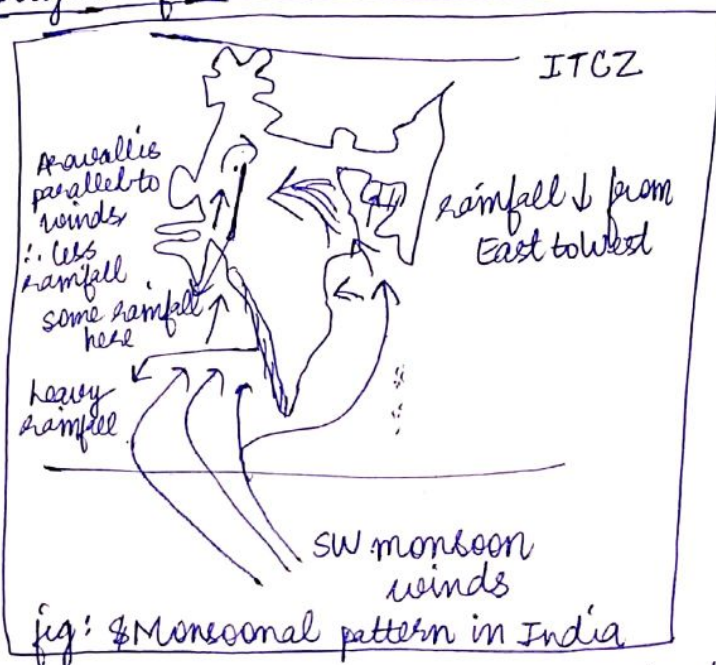
- ↳ This magnetism remains effective upto thousands of km above earth surface.
 - ↳ It is considered life sustaining, as it protects our infrastructure like signals from magnetic interference.
 - ↳ prevents human & life existence from harmful solar winds by repelling them.
- Thus, these are of utmost importance

11. Explaining the origin and mechanism of Indian monsoon account for the uneven distribution of monsoonal rainfall in India. (250 words) 15

भारतीय मानसून की उत्पत्ति और क्रियाविधि की व्याख्या करते हुए, भारत में मानसूनी वर्षा के असमान वितरण का विवरण प्रस्तुत कीजिए।

Monsoons in India are the seasonal reversal of winds which are the consequence of interplay of various oceanic and atmospheric factors.

Origin of Indian Monsoon



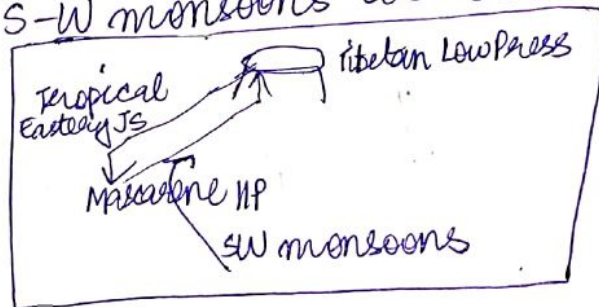
Monsoons in India occur in 4 months $\Rightarrow$ June-September due to the S-W monsoon winds which deflect towards India carrying moisture from Indian Ocean.



Mechanism of Monsoons:

Several factors play role in monsoons, starting from movement of Inter Tropical convergence zone (ITCZ) northwards.

↓
Mascarene High Pressure forms a cell with Tibetan Low Pressure, and helps in diverting S-W monsoons towards India.



↓
The sub tropical westerly jet stream moves northwards, creating low pressure trough over mon plains

↓
This leads to the orientation of winds

↓
The peninsular India, breaks the winds in 2 branches → Easterly Bay of Bengal & Western Arabian Sea branch

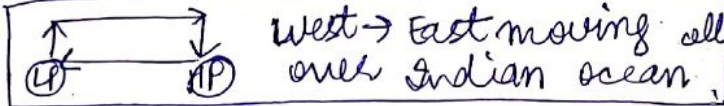
↓
The process reverses in October, when SW monsoon winds retreats, & NE winds which are offshore & dry cover India.

The monsoons are highly uneven
both $\rightarrow$ spatially
 $\rightarrow$ temporally.

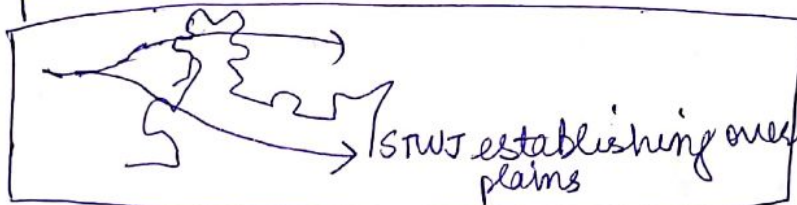
Reasons for uneven & variable nature

Intra-annual variations :

$\Rightarrow$ Moving Madden-Julien oscillations (MJO)



$\Rightarrow$ Break in monsoons due to southward shifting of ITCZ and STWJ forming high pressure over plains.



Inter-Annual variations :

$\Rightarrow$ El-Nino currents causing low rainfall

$\Rightarrow$ Indian ocean dipole $\rightarrow$ +ve : more rainfall
 $\rightarrow$ -ve : low rainfall

$\Rightarrow$ snowfall over Tibet $\Rightarrow$ low pressure weather
low rainfall

Climate Change is further
leading to delayed bursts and more
variations in monsoonal patterns in
India.

12. How does climate change affect the process of desertification?

(250 words) 15

जनवायु परिवर्तन मरुस्थलीकरण की प्रक्रिया को किस प्रकार प्रभावित करता है?

Desertification is a process of land degradation, where it loses its soil capacity and is rendered useless for any kind of agricultural or productive activity.

Desertification is an ever-increasing phenomena in the wake of climate change. The major processes or agents of desertification are : water erosion, devegetation, wind erosion } all these amplified further by climate change

Role of Climate change in Desertification

- Climate change is manifested by
- temperature increase • droughts
 - heat waves & dust storms
 - rainfall variability • ice melting & barren landscapes

• with rising haphazard & unplanned urbanisation, urban heat island effect has occurred, this has led to changing hydrological cycles and temperature rise.

eg. desertification process extending in delhi from Aravallis.

• Dust storms are both cause and consequence of desertification.

• large scale deforestation has led to poor landscape of the forests and with long term climate change affects.

• strong planetary winds are changing orientation & direction, leading to rise of extension of desert regions.

eg. Saudi desert extension.

• climate change has led to water scarcity, thus soils

becoming saline and alkaline
and rendering the land useless.

Desertification is a global
challenge, with 30% of Indian
land facing desertification.

Thus, the promises of Bonn
Challenge Pledge of 150 mha of
forests by 2030 and land
degradation neutrality
must be followed in letter
and spirit. This will be in
consonance with SDG 15.

13. Give an account of landforms that are shaped by running water as it erodes, transports and deposits sediments. (250 words) 15

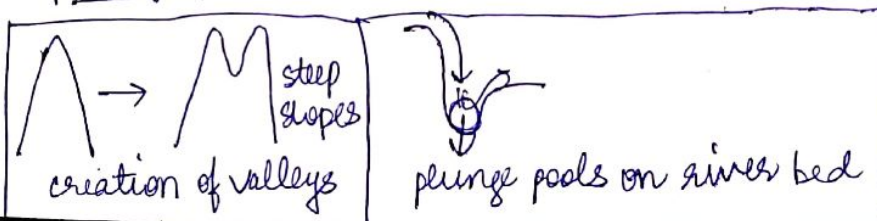
प्रवाहित जल द्वारा अपरदन, परिवहन और तलछटों के निक्षेपण के कारण निर्मित भू-आकृतियों का ब्यौरा प्रस्तुत कीजिए।

Running water is an active agent of denudation. By processes of saltation, hydrolysis, attrition, chemical disintegration; it changes the shapes of landforms.

Landforms of running water as it erodes:

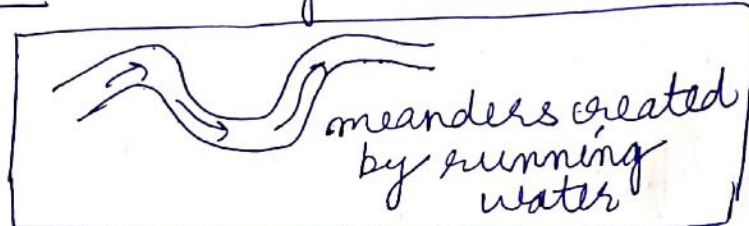
⇒ Rivers in their youthful stage and hilly areas, have high erosive energy.

⇒ They erode the mountain summits by head erosion, and deepen the valleys creating plunge pools, cataracts etc.

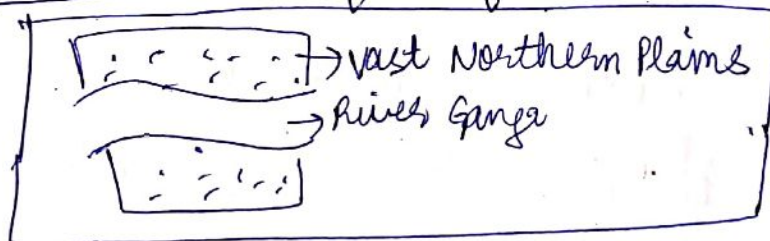


landforms shaped by rivers as
it transports :

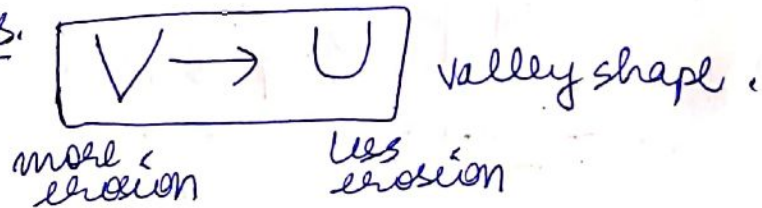
⇒ While transporting sediments,
rivers/moving water often
wavers creating meanders.



⇒ Vast flood plains are created
when some of the sediments get
deposited or after floods.

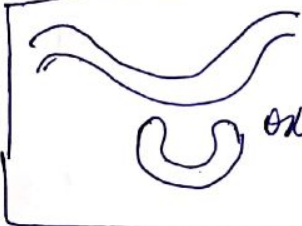


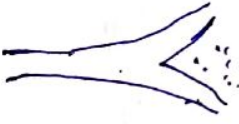
⇒ While transporting, energy is
lowered, thus valley deepening
becomes less, leading to U shaped
valleys.



Landform shaping by running water as it deposits:

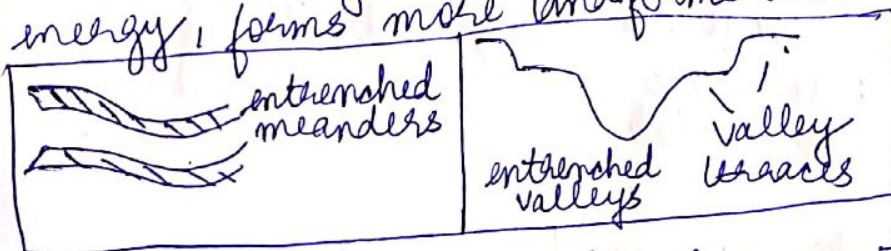
⇒ Deposition starts when running water loses its energy & reaches almost base level.

⇒  or bow lakes are created, as meandering breaks

⇒  creation of riverine islands, deltas by deposition
eg Majuli Island on Brahmaputra, Ganga, Mahanadi delta etc.

⇒ Braiding channels form chars or sandy depositions.

Running water, with change in energy, forms more landforms like:



Thus, running water has great potential in shaping landforms, all of this called as exogenetic process.

14. India is vulnerable to a large number of natural as well as man made disasters on account of its geo-climatic and socio-economic conditions.
Elaborate. (250 words) 15

भारत अपनी भू-जलवायु एवं सामाजिक-आर्थिक परिस्थितियों के कारण वृहद संख्या में प्राकृतिक के साथ-साथ मानव-निर्मित आपदाओं के प्रति सुभेद्य है। सविस्तर व्याख्या कीजिए।

According to UNISDR reports,

India has largest number of population vulnerable to displacements due to disasters

India is 2nd largest country prone to disasters.

This explains the vulnerability of India to a large no. of disasters, both :

Natural

→ Rapid : floods, earthquakes
→ Slow : drought, desertification

Man made

→ slow : pollution
→ rapid & invisible : chemical leaks, industrial disasters

Disaster can be defined as =

$$\frac{\text{Hazard} \times \text{Vulnerability}}{\text{Capacity}}$$

Thus, India is both hazard prone & highly vulnerable too.

Disaster vulnerability on account of geo-climatic conditions:

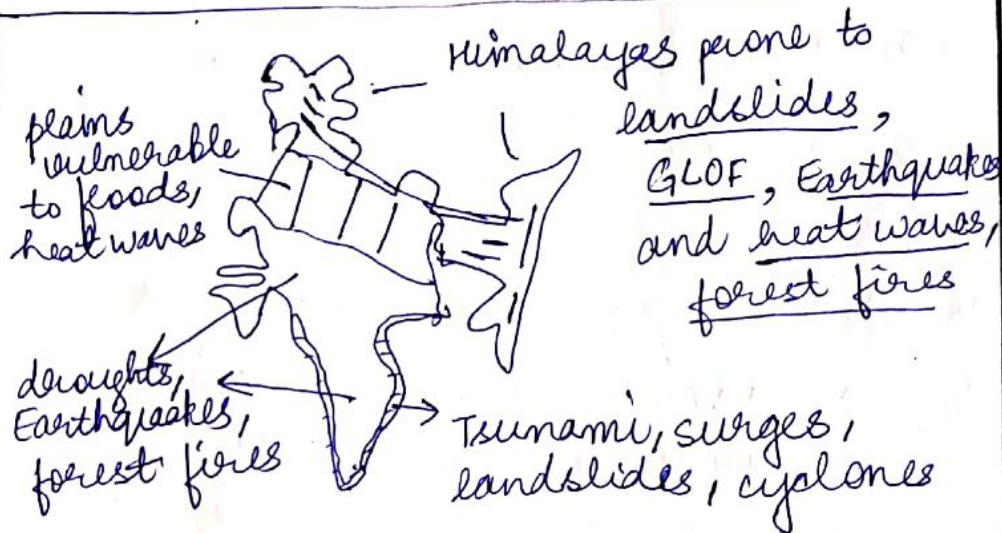


fig: spatial based prone & vulnerable regions

- ⇒ Monsoon variability and climate change impacts have led to increased frequency of floods, droughts.
- ⇒ None of India is in safe seismic Zone I.
- ⇒ India faces all kinds of disasters of mountains, rivers, oceans, deserts and plateaus because of its wide diversity.

Vulnerability because of socio-economic conditions:

- ⇒ Due to population pressure & haphazard urbanisation, our ecological footprint has increased, eg. encroaching Cooum & Adyar rivers in Chennai led to floods.
- ⇒ Due to 25% of world's poor population, we have large economic vulnerability.
- ⇒ Social vulnerability is seen in exploitation of women, children & disabled during disasters.
- ⇒ Lack of capacity building of slum areas, rural areas & tribal areas.

Thus, disaster risk reduction calls for capacity building at all levels to reduce vulnerability.

15. Discuss the need for mainstreaming disability perspective in the efforts towards disaster risk reduction. Also, suggest some measures that can be taken towards Disability-inclusive Disaster Risk Reduction. (250 words) 15

आपदा जोखिम न्यूनीकरण के प्रयासों की दिशा में निःशक्तता संबंधी परिप्रेक्ष्य को मुख्यधारा में समाविष्ट करने की आवश्यकता पर चर्चा कीजिए। साथ ही, निःशक्तता-समावेशी आपदा जोखिम न्यूनीकरण की दिशा में अपनाए जा सकने वाले कुछ उपायों का सुझाव दीजिए।

Disaster risk reduction can be holistic only when the needs and challenges of the most needy are satisfied.

Need for mainstreaming disability perspective in DRR:

⇒ The most affected victims of disasters are the disabled or Divyangjans.

⇒ They face special challenges in form of

- lack of mobility
- generally neglected by society
- lack of financial autonomy
- poor physical robustness
- inability of decision making powers

⇒ In post-disaster scenarios, disabled people are victims of abuse, exploitation and trafficking.

⇒ Disaster risk reduction aims at community involvement, thus perspective of disabled will make the process more foot-proof, robust and successful.

Measures towards disability-
inclusive disaster risk reduction

⇒ To make the process more inclusive, NDMA should frame special policies and provisions for divyangjans.

⇒ Inclusion of divyangjans in the planning committees at district, state and national level.

- ⇒ NDRF be trained to in rescuing the divyangjans.
- ⇒ Developing such technology in communication that helps the people to understand in braille scripts.
- ⇒ Rescue & Relief centres specially for divyangjans.
- ⇒ Special vulnerability mapping keeping them in mind.
- ⇒ Inclusion of divyangjans in regular drills, standard operating procedures.

Thus, it is our duty to take their extra care and empower them for such emergency situations.



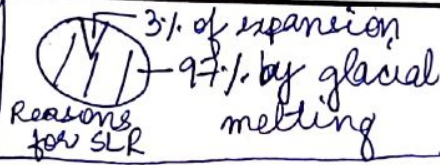
16. Explain the causes and consequences of sea level rise. (250 words) 15
समुद्र के जल स्तर में वृद्धि के कारणों एवं परिणामों की व्याख्या कीजिए।

Sea level rise is one of the phenomena of climate change that has occurred across the climatic history of earth. Current sea level rise is due to anthropogenic reasons, unlike the natural reasons of previous time scales.

Causes of sea level rise:

- Eustatic changes due to subsidence or emergence of land mass.
eg. WG subsidence has led to slight sea level rise.
- Climate change reasons:
 - Expansion of water due to warming of waters
 - addition of freshwater by

glacial melting.



with the current rate of temperature rise, it is estimated that water will rise upto 1 metre by the end of century.

consequences of sea level rise

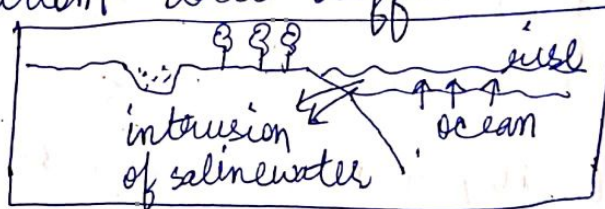
1. Submergence of low lying coastal areas and islands.

eg Vanuatu, Tuvalu, Maldives islands are facing maximum threat

Bangaram Atoll of Lakshadweep subsided recently.

2. Various fringing coral reefs will die due to increased temperature and sea level rise.

3. Temperature induced sea level rise will lead to further degassing of carbon dioxide, affecting flora & fauna.
4. Various livelihoods like fishing, brackish water aquaculture, tourism will suffer.



5. Incidences of cyclones, tsunami and other meteorological disasters will increase.

Formation of climate vulnerability forum during Paris climate deal points to the fact that sea level rise is a potent problem that needs immediate attention.

17. Highlight the factors responsible for occurrence of heat waves and its effects on life and economy. In the light of recent guidelines given by NDMA, describe measures to reduce the negative impact of heat waves.

(250 words) 15

हीट वेव की घटना हेतु उत्तरदायी कारकों तथा जीवन एवं अर्थव्यवस्था पर इसके प्रभावों को रेखांकित कीजिए। NDMA द्वारा हाल ही में जारी किए गए दिशा-निर्देशों के आलोक में, हीट वेव के नकारात्मक प्रभाव को कम करने के उपायों का वर्णन कीजिए।

Heat waves are defined as the high temperatures in different regions. IMD sets the temperature targets for heat waves as :

- on plains → 40°C and above
- on coastal areas → 37°C & above
- on hilly regions → 30°C & above

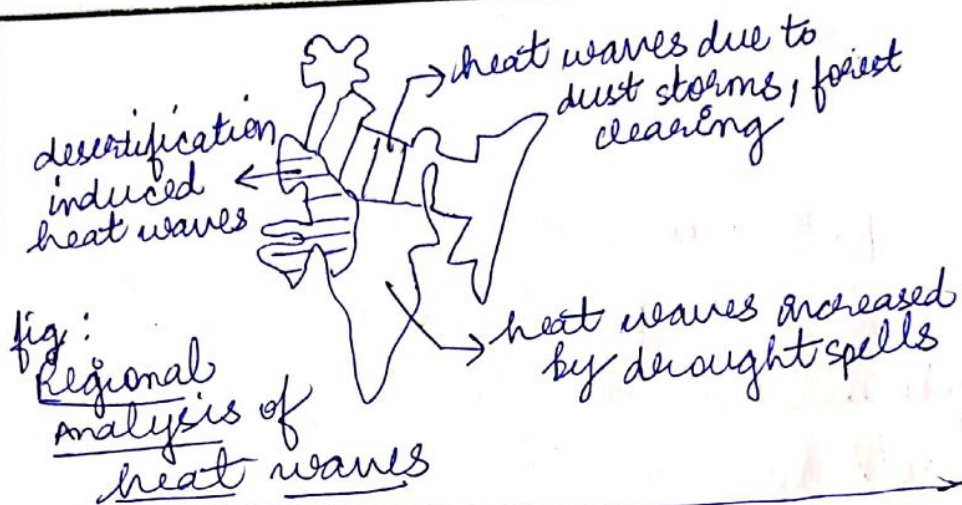
Reasons for heat wave occurrence

Natural

- high convective winds before monsoon onset
- seasonal winds like loo cause heat waves
- delayed monsoons

man-made

- urban heat island effect
- high population density
- deforestation
- encroachment of wetlands
- land use changes



⇒ effect of heat waves on life & economy

- ⇒ sudden increase in temperatures leads to fatal strokes, weaknesses of both humans & animals.
- ⇒ loss of endemic sensitive biodiversity
eg recent heat waves of North East.
- ⇒ heat waves lead to reduced hill tourism, dwindling its economy.
- ⇒ loss of domesticated animals, crops leads to poor agricultural productivity.

Measures to reduce impact of heat waves:

NDMA has come up with several guidelines like

- engagement at national, state & district level
- appointing a nodal officer for table top exercises & drills
- vulnerability mapping & heat action plan
- continuous monitoring, evaluation & updatation of plan.

Along with these steps,
→ heat waves be included in list of disasters.

→ focus be on long term sustainable measures like National Green Mission, planned urbanisation & creation of water sanctuaries.

18. Discuss the increasing need of 'disaster resilient infrastructure' in India. Mention the steps taken in this direction with specific reference to the Global Coalition for Disaster-Resilient Infrastructure. (250 words) 15

भारत में 'आपदा-प्रत्यास्थ अवसंरचना' की बढ़ती आवश्यकता पर चर्चा कीजिए। ग्लोबल कोएलिशन फॉर डिजास्टर-रेजिलिएंट इन्फ्रास्ट्रक्चर के विशेष संदर्भ में इस दिशा में उठाए गए कदमों का उल्लेख कीजिए।

Disaster resilient infrastructure refers to the robust infrastructure, both physical, social & institutional as an integral part of disaster risk reduction.

Need for disaster resilient infrastructure

- ⇒ India has faced economic loss of about \$80bn in last 20 years due to poor infrastructure.
- ⇒ Resilient infrastructure leads to stronger capacity of masses in dealing with disasters.
- ⇒ Increasing impacts of climate change have urged us to be more adaptive & mitigative in our approaches.

⇒ Disaster Resilient Infrastructure will solve manifold problems:

↓ stronger control measures, technical competence and structural solutions	↓ improved planning, robust institutional framework, financing infrastructure & viable hazard mapping
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In this regard, India has created global coalition for Disaster Resilient Infrastructure (CDRI) during Asian Ministerial conference on Disaster Risk Reduction in 2016.

several steps have been taken:

⇒ PM's 10 point agenda in Delhi Declaration of 2016

⇒ focus has already been on sustainable buildings, using ECBC of BEE, GRHA of TERI and Green Building concept,



⇒ climate bonds and green bonds have helped in focusing on building such infrastructure.

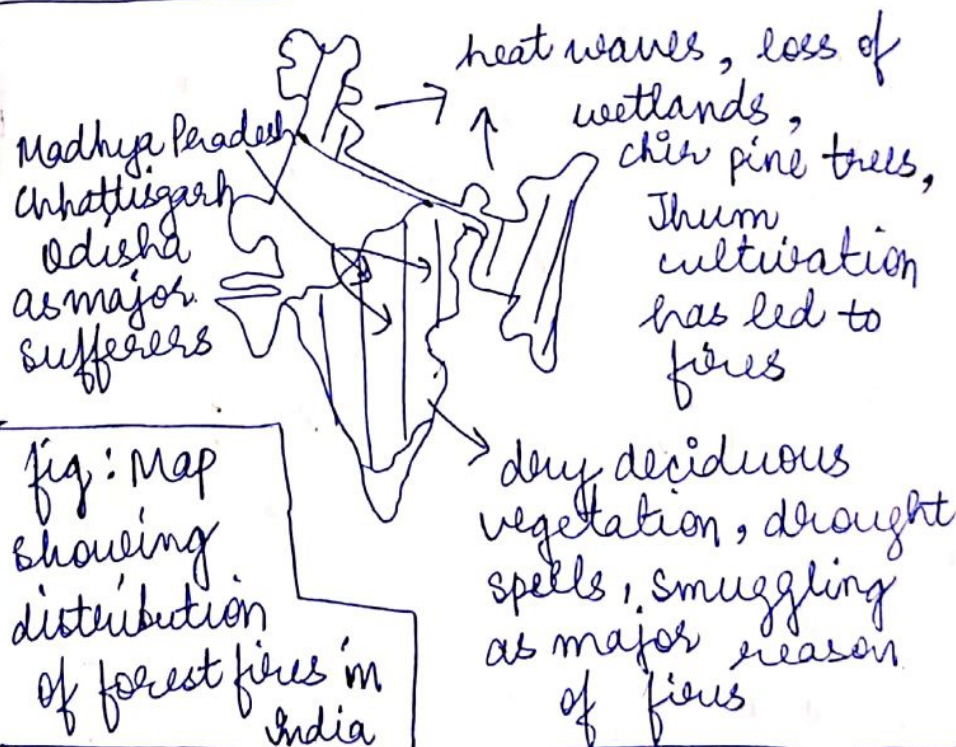
⇒ CDR1 has been developed as a knowledge sharing and capacity building platform and in mobilising funds for catastrophic bonds.

Thus, all these measures are in line with SDG 9 and HABITAT-III agenda. All we need is to implement these design standards & focus on 'Building Back Better' as laid down in Sendai framework, 2015.

19. Give an account of the natural and man-made causes of forest fires. Highlighting the challenges associated with forest fire management in India, mention the different components of the National Action Plan on Forest Fire. (250 words) 15

दावानल के प्राकृतिक एवं मानव जनित कारणों का विवरण प्रस्तुत कीजिए। भारत में दावानल प्रबंधन से संबद्ध चुनौतियों पर प्रकाश डालते हुए, दावानल पर राष्ट्रीय कार्य योजना के विभिन्न घटकों का उल्लेख कीजिए।

Forest fires are an increasing concern for India, as global forest watch has reported an increase of 125% fires in India between 2015 - 2017.



The forest fires can be due to both natural & man made

Reasons :

Natural Reasons

- dry wind speed & direction
- friction between dry twigs
- moisture in soil & air
- lightning
- droughts, delayed monsoon

man made reasons

- replacing broad leaved trees with chir pine
- wetlands covered
- intentional & accidental fires
- Shum cultivation

challenges associated with Management

- ↳ The earlier scheme of Intensification of forest fire Mgmt lacked clarity and people participation.
- ↳ Most of the measures have been ad-hoc and in some response.
- ↳ lack of culture of preparedness & prevention
- ↳ poor technological use.

Recent National Action Plan for Forest Fire and Forest Fire Prevention & Management Scheme

have tried to fill in the lacunae.

→ given a structured organisational framework of involving state forest departments.

→ intensive use of technology like GIS mapping, infrared mapping & other tools required to put off fire and forecast fires.

→ people participation, training of all stakeholders.

The plan is made for short term & long term goals. Thus with sustainable afforestation and

densification of open forests, such

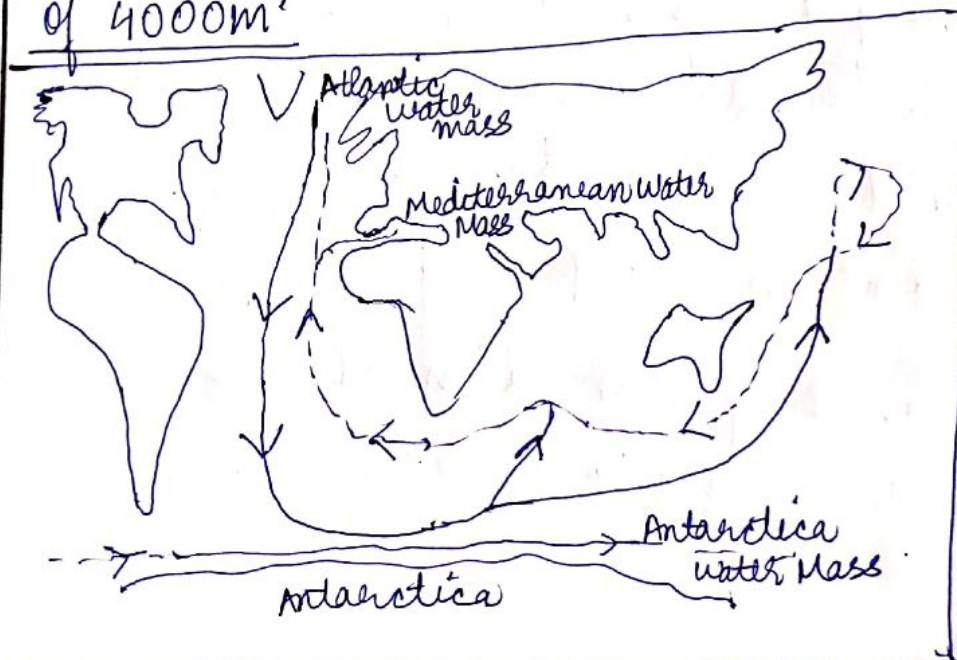
fires can be prevented in wake of climate change.



20. What is the global ocean conveyor belt? Discuss its significance for marine ecosystem. (250 words) 15

वैश्विक महासागर कन्वेयर बेल्ट क्या है? समुद्री पारिस्थितिकी तंत्र के लिए इसके महत्व की विवेचना कीजिए।

global ocean conveyor belt refers to the thermohaline circulations of water masses that cover the globe. This belt moves from surface ocean waters to intermediate (400 m-1000 m) depths and also to deeper depths of 4000 m.



——→ the deep water conveyor belt
-----→ surface waters

This conveyor belt is a result of buoyancy rejection and subsequent densification of water at plac regions. As the water sinks & moves, it comes up as upwelling water in primarily tropical eastern regions and moves back to source regions, thus completing the belt.

Significance for marine ecosystem:

⇒ The upwelling zones of these circulations help in bringing nutrient rich cold water.

These are upwelling regions  eg. Anchovian fishes in Peru fed on these nutrients

⇒ The benthic ecosystem gets desired oxygen & nutrients

due to the mixing of waters.
→ This belt helps in transferring energy, preventing the stratification of water, thus help in blooming marine ecosystem.

Lately, these circulations are weakening on account of climate change and sea level rise. This will have catastrophic impacts and must be prevented at all costs, this will be in consonance with SDG 14 of oceans.