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GENERAL STUDIES (TEST CODE : 1404)

Name of Candidate	GUNJAN SINGH		
Medium Eng./Hindi	ENGLISH	Registration Number	125597
Center		Date	10/7/2020

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	
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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 that 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।

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

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1. Biosphere reserves promote solutions reconciling the conservation of biodiversity and its sustainable use. Discuss. **(150 words) 10**

जीव मंडल निचय, जैव विविधता संरक्षण और इसके संधारणीय उपयोग के मध्य सामंजस्य स्थापित करने वाले समाधानों को बढ़ावा देते हैं। चर्चा कीजिए।

Biosphere reserves are one of the approaches of 'in situ conservation' of specific keystone and endangered species, as well as focuses on holistic habitat based conservation approach.

Importance of Biosphere Reserve is manifold. Biosphere reserves, by their ~~var~~ very structure strike balance between conservation & sustainable use of biodiversity.

Biosphere Reserves as

↓ Biodiversity conservation

- The advanced version of National parks & wildlife sanctuaries.
- Huge size gives a larger habitat region.

eg Nilgiri Biosphere Reserve has Nagarhole Wildlife sanctuary, Bandipur National Park, silent Valley National Parks combined

↓ sustainable use

- Participation of people with restricted activities clearly defines the importance of each stakeholder.
- Tourism in the buffer zone.

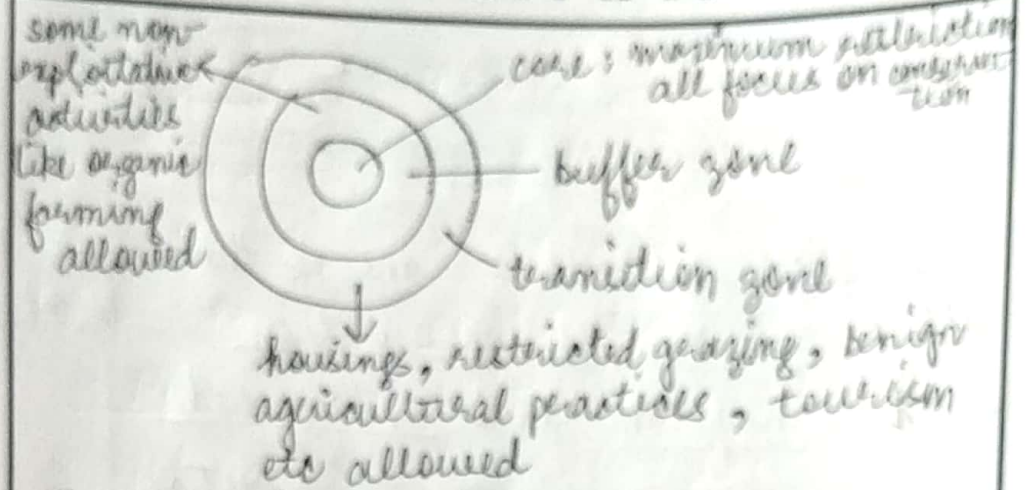

fig: structure of biosphere reserves.

constant monitoring and involvement of local people, & thus symbiotic living

Biosphere Reserves

→ coarse and filter approach helps in conserving keystone species.
eg Snow leopard in cold desert reserve of Himachal Pradesh

large size and shape reduces edge effect

fig: various features of biosphere reserves

Wildlife conservation program (2017-2031) has acknowledged the landscape based approach of biosphere reserves. We have currently 18 such reserves and there is need to further emulate such co-habitations for our sustainable development.

X ——— X

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2. Fertilizers have been one of the key inputs in the agricultural sector since Green Revolution in India. In this context, give an account of distribution of fertilizer industry in India. **(150 words) 10**

भारत में हरित क्रांति के बाद से, उर्वरक कृषि क्षेत्रक का एक प्रमुख आदान (इनपुट) रहे हैं। इस संदर्भ में, भारत में उर्वरक उद्योग के वितरण का विवरण प्रस्तुत कीजिए।

Fertiliser industry forms one of the 8 core industries of India, because about 50% of population is involved in agriculture in India.

The distribution of fertiliser industry depends mainly on the source of raw material for the fertilisers.

Distribution of fertiliser industry across time & space:

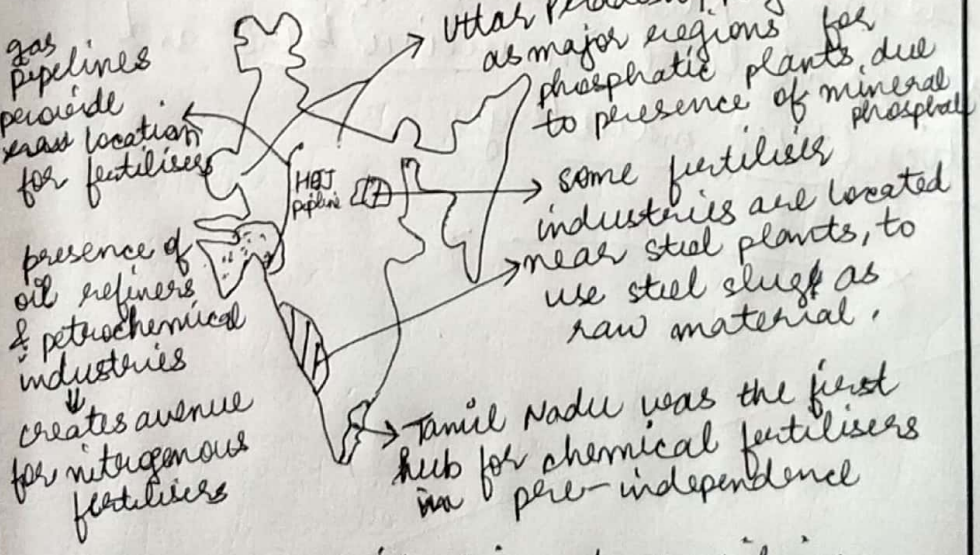

fig: distribution of fertiliser industries

Reasons for distribution:

⇒ Natural gas sources provide feedstock for fertiliser plants.

⇒ Fertiliser plants in the coastal states like Andhra Pradesh, Karnataka, Tamil Nadu also provides for port facilities

⇒ 70% of nitrogeneous plants are near the oil refineries and pipline infrastructure.

With green Revolution, demand for fertilisers has increased manifold and India is still largely dependent on imports. with more PSUs, joint ventures, and private participation, we can achieve self sufficiency, and also with a suitable mix of organic fertilisers, we can further reduce dependence on imports.

× ——— ×

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3. Given the adverse effects of light pollution, urgent steps are required to tackle it. Analyse. **(150 words) 10**

प्रकाश प्रदूषण के प्रतिकूल प्रभावों को देखते हुए, इससे निपटने हेतु तत्काल कदम उठाए जाने की आवश्यकता है। विश्लेषण कीजिए।

Increasing urbanisation and industrialisation has given rise to a new form of pollution – light pollution. It is the excessive, inappropriate and wasteful use of light which starts altering with natural ecological and human processes.

Adverse effects of light pollution

↳ The greatest impact is on fauna – birds and animals.

Impacts on fauna:
- Impacting on breeding patterns
- nocturnal species worse affected.
- altered migration patterns affecting their diurnal & hibernation cycles.

↳ Light pollution is also causing energy crisis and even greater pressure on fossil fuels

↳ Impacting astronomical research activities due to interference with night starry lights.

↳ Also has affected sleep patterns & cycles of humans, a major reason for stress.

In such devastating impacts, we urgently need to tackle the issue.

↳ Focusing on daylight saving techniques which is practised in temperate regions.

↳ Demarcating sensitive areas like National parks etc, where no light emitting infrastructure upto a certain range.

↳ Minimising & regulating 'night-life' tourism & adventures in such areas.

↳ Moving towards greener forms of energy, like solar steet lights.

↳ Using sensors, where light intensity adjusts according to the movement of people.

Thus adequate & urgent steps like switching off lights of major industrial & software parks in megacities at nights can be powerful solutions towards tackling light pollution.

4. Temperate regions are more favorable for fishing in comparison to tropical regions. Explain. **(150 words) 10**

उष्णकटिबंधीय क्षेत्रों की तुलना में शीतोष्ण कटिबंधीय क्षेत्र मत्स्य-ग्रहण हेतु अधिक उपयुक्त हैं। व्याख्या कीजिए।

Temperate regions to have well suited conditions for fishing as compared to tropical regions, these conditions can be divided into 2 broad categories:

Natural Reasons:

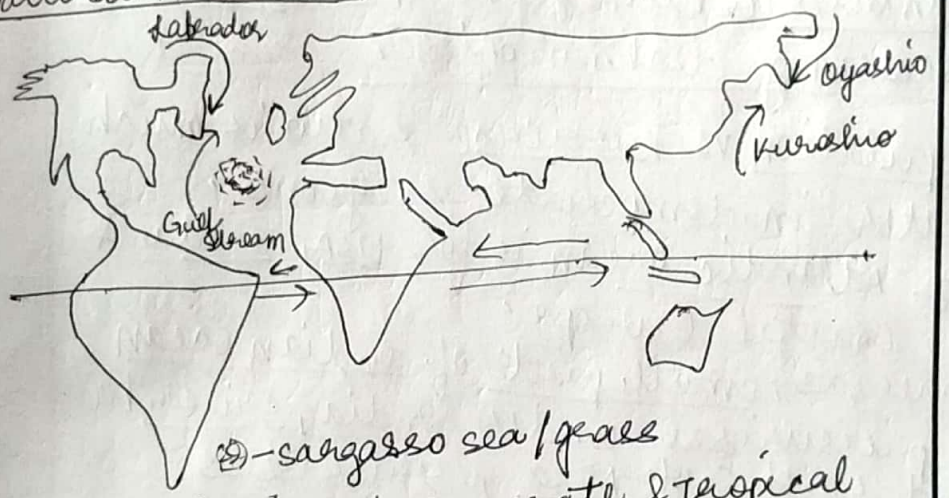

fig: conditions of Temperate & Tropical regions

↳ Temperate regions have mixing of currents (cold & warm), thus better fishing grounds. eg Newfoundland, Japan etc.

↳ Broader continental shelf of Atlantic Ocean and various archipelagos of Pacific season, give enough breeding grounds for fishes & plankton growth.

↳ Formation of gyres in temperate regions which accumulate planktons. eg Sargasso sea in Atlantic ocean.

↳ Moderate temperature conditions gives impetus to variety of marine life.

Anthropogenic Reasons:

↳ Temperate regions has developed countries which have better storage, processing technologies.

↳ Population vs resource ratio is much better in temperate regions. eg Atlantic ocean is for USA, Canada & coastal Europe, whereas, small part of Indian ocean is pressurised under India, Sri Lanka and South East Asia, thus less recuperation time for fish.

↳ Lack of agriculture & overdependence on fish for protein in temperate regions is another reason for its development.

Yet, tropical regions like India, China are developing their fishing potential & are greatest production countries at present. All we need is to focus towards sustainable fishing.

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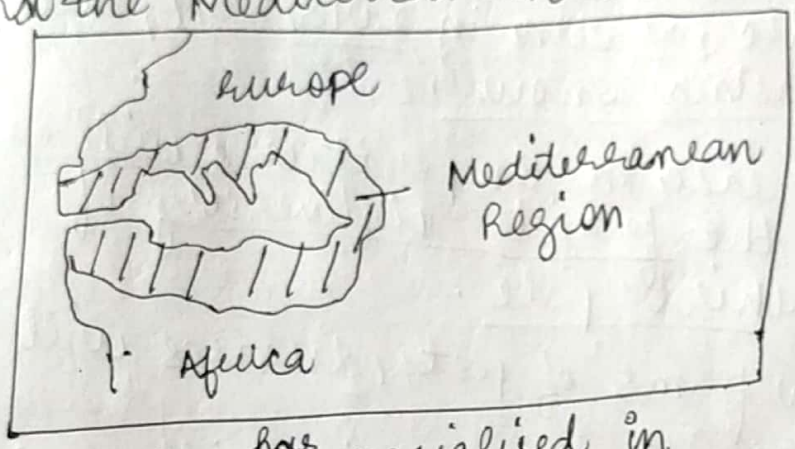
5. Explain the reasons behind development of horticulture and wine industry in the Mediterranean region. (150 words) 10

भूमध्यसागरीय क्षेत्र में उद्यान कृषि और मदिरा उद्योग के विकास हेतु उत्तरदायी कारकों को स्पष्ट कीजिए।

Mediterranean region includes the parts of Europe and North Africa around the Mediterranean Sea.



This regions has specialised in horticulture & wine industry because of several reasons:

↳ Specific climatic conditions of Mediterranean → winter rainfall, long dry summers and moderate temperature conditions have led to suitable growing conditions for grapes, olives, figs and vit-C rich fruits.

↳ Developed nature of european countries led to early establishment of organised

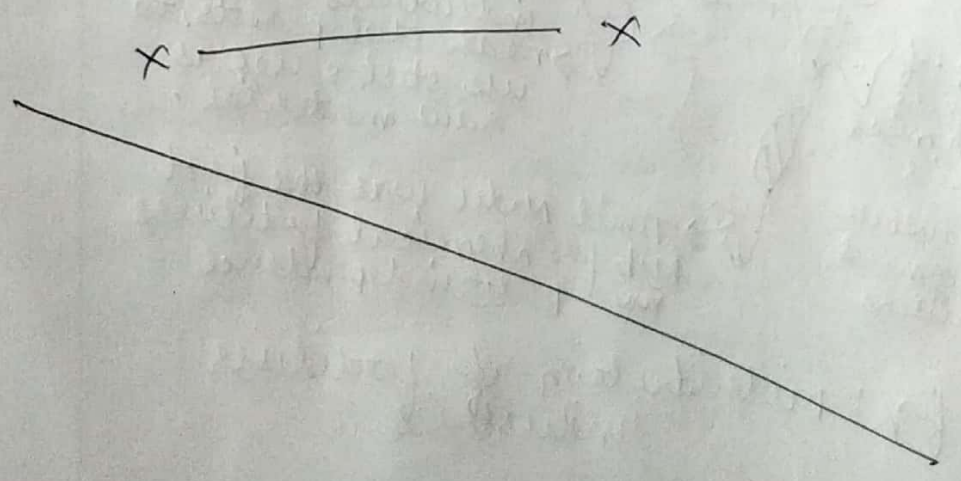
industries of wine.

↳ Demand for market gardening in Europe due to lack of fertile lands.

↳ Presence of longitudinal valleys of Alps give suitable conditions for grapes and fruits orchards.

↳ Improved connectivity and inter-linkages within the European region keeps up demand for perishable goods.

Thus with these specific natural, climatic and socio-economic reasons, Mediterranean region has specialised in viticulture and horticulture industry.



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6. Analyze the impact of climate change on the third pole of the world.

(150 words) 10

विश्व के थर्ड पोल (तृतीय ध्रुव) पर जलवायु परिवर्तन के प्रभाव का विश्लेषण कीजिए।

climate change has started to grave impacts on all fragile ecosystems including the third pole of the world, i.e. the Himalayan glaciers and snow peaks systems.

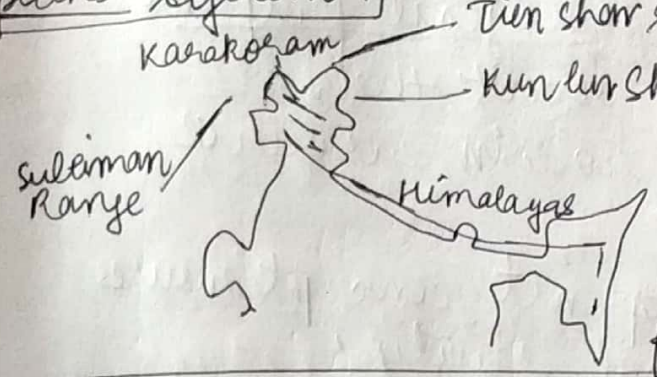


fig: 3rd pole of the world from the Pamir Knot.

Impacts are manifold;

↳ Rapid melting of glaciers is responsible for catastrophes like glacial lake outburst floods, floods in the major rivers - Ganga, Indus, Brahmaputra etc.

Between 2003-09, 175 giga tons of himalayan glaciers have melted, the highest in history.

↳ Increasing temperatures will cause positive feedback on albedo & melting, thus even more glacier loss.

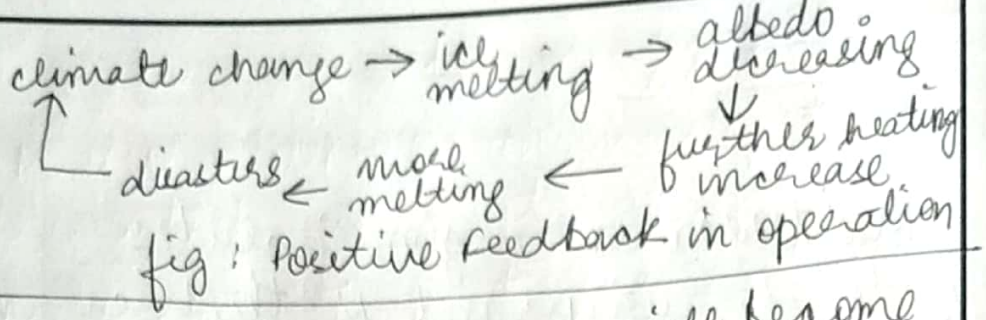


fig: Positive feedback in operation

↳ Western disturbances will become erratic, as seen in 2018, 2019, thus decreasing snowline.

↳ Increase in temperatures will affect the fragile biodiversity of the third pole.

↳ New forms of pests/diseases will occur.

↳ Hydropower generation will slow down by 3% for every 1% decrease in stream flow.

↳ Long term scarcity of water & emergence of water crisis in the Indian subcontinent.

↳ sea level rise will amplify.

↳ socio-economic impacts like decreased tourism will impact livelihood on large scale.

Thus, Paris Deal, National Mission for Himalayas under NAPCC are all the much needed steps of the present.

7. The concept of ecological footprint is a useful indicator for assessing progress on the sustainable use of resources in a country. Explain.

(150 words) 10

किसी देश में संसाधनों के संधारणीय उपयोग पर हो रही प्रगति का आकलन करने के लिए इकोलॉजिकल फुटप्रिंट की अवधारणा एक उपयोगी संकेतक है। व्याख्या कीजिए।

From exploitative economic growth we are shifting towards overall development, intra- and inter-generational equity with sustainable use of limited resources.

One of the useful indicators for assessing progress on sustainable use is — ecological footprint. It is the human interference with the nature for economic growth.

How ecological footprint is a useful indicator?

↳ It gives information about human activities that alter natural environment.

eg Amazon fires, dead zones in oceans all are manifestations of very high ecological footprint.

↳ It gives impetus towards shifting

to green renewable energy sources.

↳ Measures like Earth overshoot day or country overshoot day gives an assessment about the rate of exploitation of natural resources.

↳ For countries like Annexe I of Kyoto Protocol, ecological footprint gives a clear idea about their disproportionate role in resource exploitation.

↳ Ecological footprint concept ensures inter-generational equity.

Thus, incorporating this concept in carbon credits, carbon emissions, green GDP and CDM measures will help us mitigate the challenges of climate change in a holistic manner.

This is the need of hour.

×——×

8. Explaining what peats are, examine why emphasis is being given to sustainable management of peatlands worldwide. **(150 words) 10**

यह स्पष्ट करते हुए कि पीट क्या हैं, परीक्षण कीजिए कि विश्व भर में पीट-भूमियों के संधारणीय प्रबंधन पर क्यों बल दिया जा रहा है।

Peats are the partially decomposed plant matter in a water-saturated region. It is also considered as ~~the~~ a cheap quality of coal fuel.

Brazzaville declaration, Peatlands Initiative etc have emphasised on sustainable management of peatlands worldwide. These are present in ~~peat~~ permafrost as well as tropical rainforest regions, hence their conservation becomes utmost necessary.

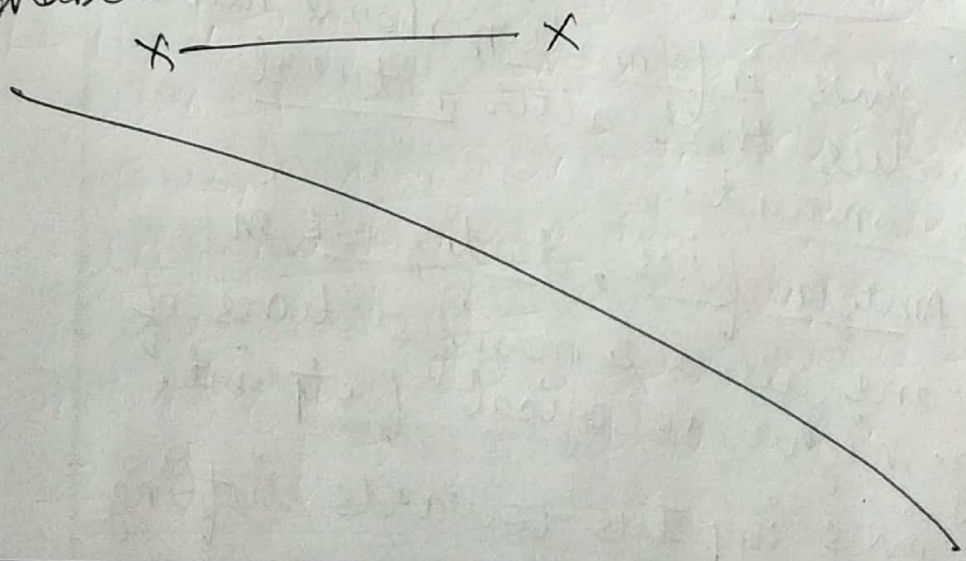
↳ Peatlands store the maximum amount of carbon as compared to forests.

↳ They regulate hydrological cycle, and are sinking grounds for lots of minerals & nutrients.

↳ They are house for distinct flora and fauna, as well as many migratory species.
eg tigers, elephants, huge mammals of Africa, all have habitats around peatlands.

↳ They provide livelihood support to local population, through cultivation of specific vegetables and fruits. eg berries, mushrooms etc.

Thus for these reasons and their vast areal extent, it is important to manage these 'keystone ecosystems' which have developed specific habitat around them.



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9. The CRZ Notification, 2018 aims to maintain a balance between economic growth and conservation principles of coastal regions. Discuss.
(150 words) 10

CRZ अधिसूचना, 2018 का उद्देश्य आर्थिक संवृद्धि और तटीय क्षेत्रों के संरक्षण सिद्धांतों के मध्य संतुलन बनाए रखना है। चर्चा कीजिए।

CRZ notification 2018 has been drafted by taking many inputs including Sailesh Nayak committee recommendations. The notification has several modifications which try to strike balance for sustainable development.

CRZ notification 2018 changes for;

economic growth

↳ promoted tourism by allowing Temporary infrastructure.

↳ No development zone decreased for heavily populated areas.

↳ Floor Space Index (FSI) restrictions defreezed.

conservation principle

↳ The zones divided in 4 parts, with maximum focus on zone 1 & 4. ~~zones~~ conservation

↳ Zone 1 and 4 projects would require clearances

↳ Ecological sensitive Areas taken special care of.

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Thus with these modifications, CRZ notification tried to:

↳ diversify coastal livelihood besides fishing.

↳ focus on pollution abatement projects

↳ clear demarcation of zones according to vulnerability has eased policy making.

But certain issues remain

↳ Hazard line mapping data has been delinked with the zone planning.

↳ Tourism if not monitored can create ecological disaster in future.

↳ Treatment plants may rupture fragility.

↳ Need to monitor that tourism etc doesn't pose challenge for fishing.

Thus, Sagarmala and Integrated coastal zone Management are our saviours and CRZ should be constantly monitored & reviewed & altered if the need arises.

10. Highlight the need to integrate informal and formal sectors for improved waste management. **(150 words) 10**

उन्नत अपशिष्ट प्रबंधन हेतु अनौपचारिक एवं औपचारिक क्षेत्रकों को एकीकृत करने की आवश्यकता पर प्रकाश डालिए।

Waste management has become an integrated part of circular economy and sustainable development today. It is estimated that 165mn tons waste will be produced by 2031, and currently:

- 75% waste is collected ⇒ only 22% is processed & treated.

Hence the need for integrating formal & informal sectors has risen.

↳ Informal sector constitutes 90% of waste management stakeholders, thus their formalisation will lead to better collection & processing of waste.

↳ This will end not only child labour & poor working conditions, it will also lead to trained workforce for better waste management

↳ This will ease the burden of Extended Producer responsibility, and by creating a large third party it will utilise economies of scale.

↳ This will give impetus to waste-to-energy plants, better innovation in waste management.

↳ A separate and integrated workforce for waste management will lead to entrepreneurial skills, increased capacity of municipal bodies and creation of a specialised collection and recycle economy.

Thus the guidelines of Waste Management Rules, 2016 of integrating the informal labourforce must be done quickly and in organised manner.

× ——— ×

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11. Identify the important mineral belts of India. Highlighting some of the issues plaguing the mining sector in India, discuss how the National Mineral Policy 2019 aims to address these issues. **(250 words) 15**

भारत की महत्वपूर्ण खनिज पट्टियों की पहचान कीजिए। भारत में खनन क्षेत्रक को समस्याग्रस्त करने वाले कुछ मुद्दों को रेखांकित करते हुए, चर्चा कीजिए कि राष्ट्रीय खनिज नीति-2019 इन मुद्दों को किस प्रकार संबोधित करने का लक्ष्य रखती है।

India is rich in various types of metallic and non metallic minerals. eg 5th largest reserves of coal are in India. Also it has rich amounts of rare-earth minerals. The major mineral belts of India are

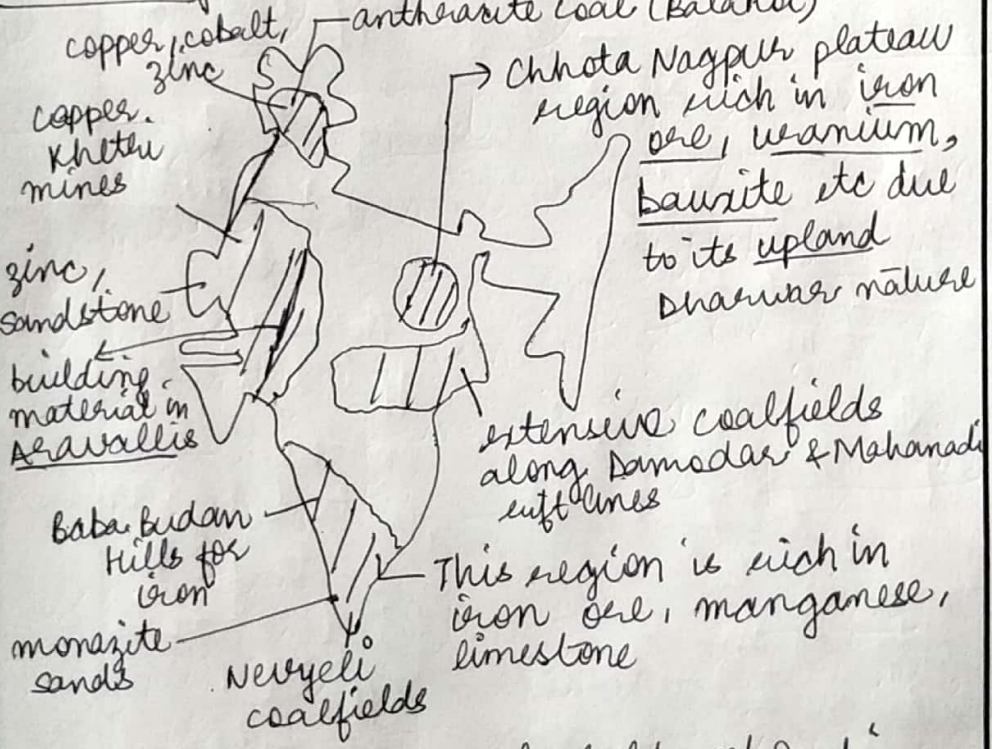

fig: major mineral belts of India

But mining sector in India is plagued with various challenges.

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↳ ① Technological Issues

Use of obsolete machinery and poor methods of mining.

eg rat hole mining for coal in Meghalaya

open shaft mining with poor productivity.

↳ ② Human rights issue

The mining areas co-incide with forests & tribal belts. Thus large scale displacement has led to deterioration of the living conditions of poor.

eg Niyamgiri revolts of odisha were against blantant displacment.

↳ ③ Environmental issues

Poor methods of mining have led to large scale deterioration of Western Ghats, Bastar Highlands.

Deforestation, changing rivers course due to sand mining are some of the emerging challenges.

↳ ④ Illegal mining, corruption and weak administrative machinery

Thus, National Mineral Policy, 2019 is an attempt to solve some of these problems.

↳ Utilisation of district mineral fund for equitable development of displaced people.

↳ Focus on sustainable mining with intergenerational equity concept.

↳ Checking corruption through e-governance, drone surveillance etc.

↳ To foster healthy competition, encouraging private sector through revenue sharing model and creation of dedicated mineral corridors.

↳ Harmonising taxes, levies to boost up the mining sector and make it more vibrant.

Thus, mining can help India not only have surplus raw materials, but also it can boost employment and manufacturing. Thus, the challenges must be taken care of systematically to make the best use of this sector.

X ——— X

12. What is carbon pricing? Mention some of the different types of carbon pricing mechanisms. Examine how it can help India in achieving its climate commitments under the Paris Agreement. **(250 words) 15**

कार्बन मूल्य निर्धारण क्या है? विभिन्न प्रकार की कार्बन मूल्य निर्धारण क्रियाविधियों का उल्लेख कीजिए। परीक्षण कीजिए कि यह पेरिस समझौते के अंतर्गत अपनी जलवायु प्रतिबद्धताओं को प्राप्त करने में भारत की किस प्रकार सहायता कर सकता है।

carbon pricing is a method of controlling carbon emissions. It is a method that gained traction after Kyoto Protocol, and helped put a cost on carbon pollution.

There are 2 major approaches of carbon pricing:

- emission trading system / cap & trade system
  - less polluting industries can monetarily benefit by selling the carbon credits to more polluting industries to fulfil their quota.
- carbon taxes
  - These are applied directly on the carbon emitted by an industry. A fixed rate is applied, eg Rs400/ton of carbon in India

India has taken ambitious targets of 175 GW of Renewable energy and reducing carbon emissions to 25%-35% of its GDP taking 2005 as base level.

Thus, carbon pricing will be a major step towards India's fulfillment of its commitments in the Paris deal.

How will it help?

⇒ It will discourage polluting industries & production processes.

⇒ Using cap and trade system, India can benefit from using eco-friendly methods.

⇒ Working on the 'polluter pays principle', it will help reduce negative externalities on environment.

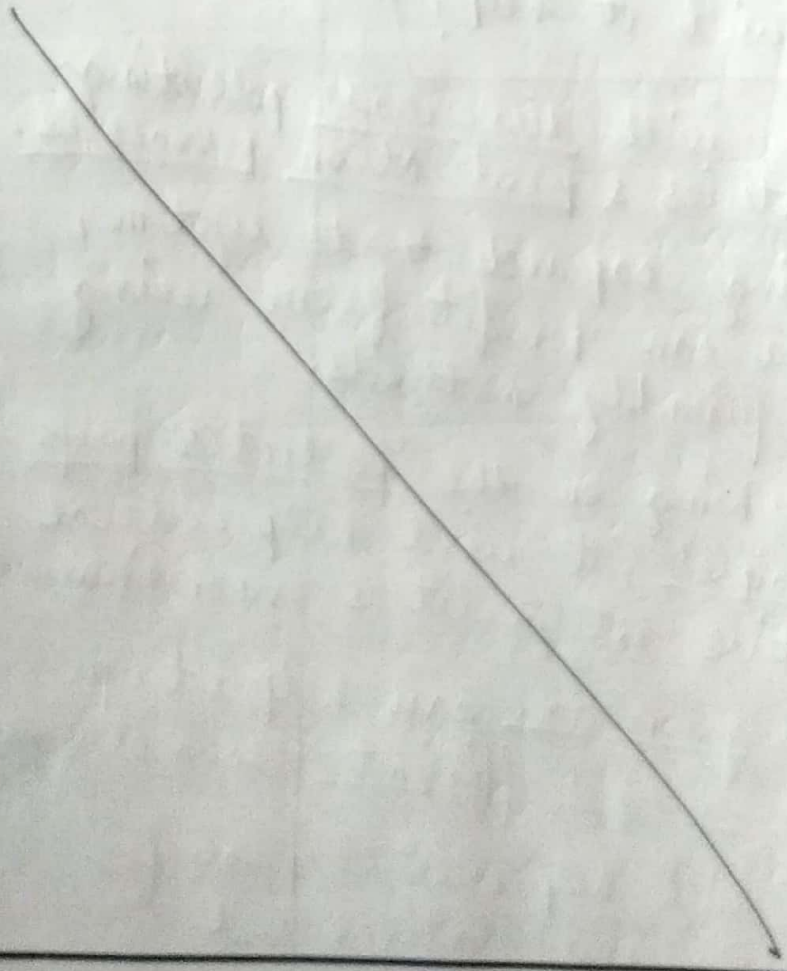
⇒ This green tax can help set up more energy efficient technologies.

⇒ It will help create space for more innovations and

disruptive technologies.

⇒ This pricing can also be used to subsidise renewable energy processes

For all of these it is necessary that India institutionalises the carbon pricing mechanism along with its INDCs, so that it gets implemented in letter & spirit.



13. Not only is the spatial and temporal distribution of freshwater in India very skewed, but also its usage inefficient and wasteful. Discuss in context of the current water crisis. **(250 words) 15**

भारत में ताजे जल का स्थानिक और सामयिक वितरण न केवल अत्यधिक विषम है, अपितु इसका उपयोग भी अकुशल एवं अपव्ययी है। वर्तमान जल संकट के संदर्भ में चर्चा कीजिए।

India has monsoon type of climate and receives 4000 BCM water annually. Yet India is on the verge of water scarcity today. current water crisis can be studied from the context of natural & anthropogenic phenomena.

Spatial and Temporal variations in freshwater distribution

↳ India receives 118-120 cm/yr water by rainfall, but that is only limited in few regions & months of the year.

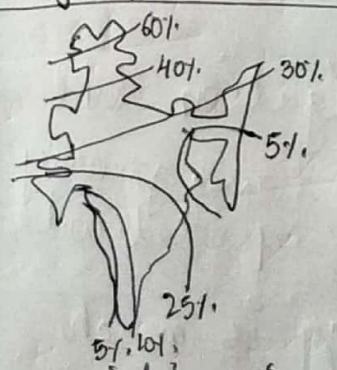


fig: variations in rainfall

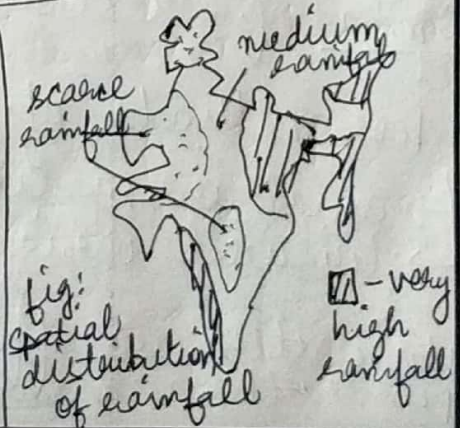


fig: spatial distribution of rainfall

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↳ Also, 60% of freshwater is contained in Ganga, Brahmaputra only, thus creating a huge spatial divide in freshwater. Godavari, Krishna, Kaveri account for only 15% of freshwater.

↳ with climate change, rainfall variations are further increasing, thus putting a huge challenge on water sources.

water crisis due to inefficient and wasteful use

↳ India being agrarian economy, has huge dependence on irrigation. Yet only 90 mn hectares of irrigation potential is utilised for 190mha of net sown area.

↳ Poor methods of irrigation like
- ↳ canal irrigation.
- ↳ tubewell irrigation

] have grossly exploited water.

Our water use efficiency is much poorer than many developing countries

eg for every 1 ha of irrigated cropped area, India uses 1.5 m depth of water as compared to 87 cm depth water by USA.

↳ Events like shimla water crisis have shown that soon glaciers which are major source of freshwater will extinguish soon.

↳ There is lack of tapwater connection on one hand, on the other hand huge amounts of untreated waste wastes gets added to freshwater sources (rivers, lakes etc)

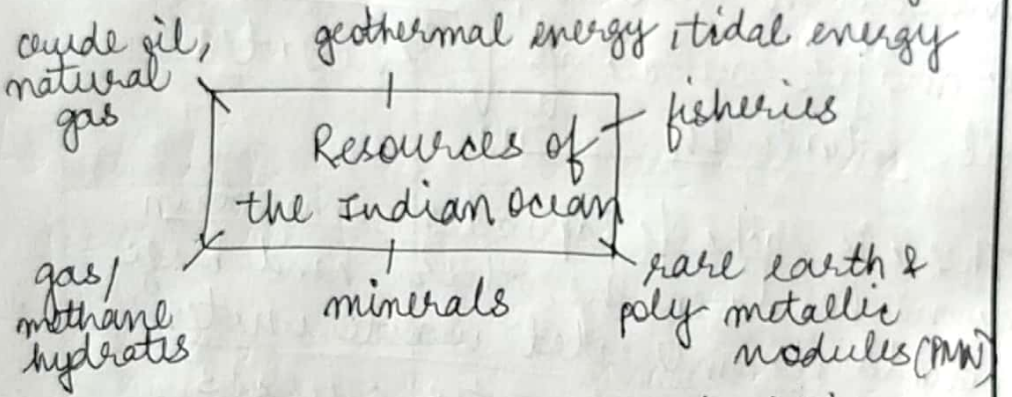
industries, domestic exploiting freshwaters → create lot of wastewater → no treatment facility → directly drain in lakes, rivers, ponds → pollute the remaining freshwater

↳ Bellandur lake tragedy of Bangalore or Chennai floods due to freshwater exploitation are all signals towards impending doom that will amplify with climate change. Thus, rainwater harvesting, sponge city concept & micro-irrigation as solutions must be followed.

14. Discuss the opportunities and challenges for India in harnessing the resources of the Indian Ocean Region. (250 words) 15

हिंद महासागर क्षेत्र के संसाधनों का दोहन करने में भारत के लिए अवसरों एवं चुनौतियों की विवेचना कीजिए।

with about 7500 km of wide coastline, India has a strategic location & importance in the Indian Ocean Region.



India has huge opportunities in harnessing these resources:

↳ India holds 2nd place in fisheries production due to vast indented coastline.

↳ India was the ~~goo~~ first country to get permission for extracting PMN from International seabed Authority.

↳ good relations with Japan, Germany, France has provided technical aid in extracting various minerals.

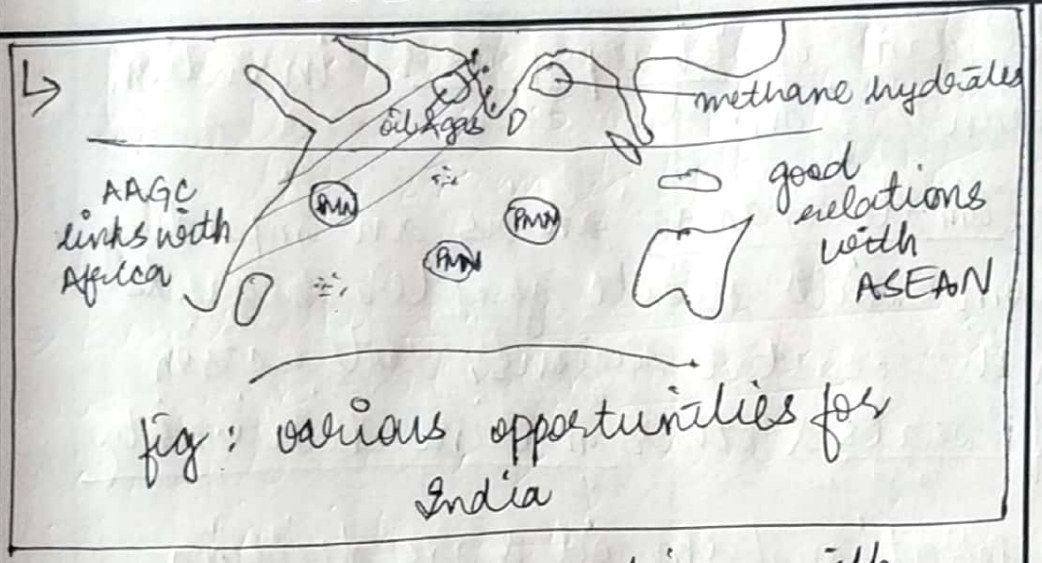


fig: various opportunities for India

↳ India holds good relations with Africa & ASEAN, thus there are opportunities for amicable sharing of benefits.

But, despite these opportunities, India faces few challenges too.

↳ In fisheries, India is at constant loggerheads with Sri Lanka in the Gulf of Mannar and Palk St region.

↳ Problems of trawling and lack of technology for deep sea fishing.

↳ China with its technological prowess is doing better than India in extracting PMN and other minerals, thus a constant challenge besides

its usage of 'sharp powers' in Indian ocean region.

↳ Climate change ~~an~~ as an impending doom will create greater hazards in the coastal regions, destruction of corals & other marine biodiversity

↳ Pollution from oil & gas drilling poses risks for future.

↳ Methane hydrates are still inaccessible due to technological limitations.

Thus, India has to pace up its technology and use its diplomatic capital more efficiently to not just keep Indian ocean safe, but also as a rich storehouse of resources useful for future generations. This will help us move towards our SDG 14.

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15. Examine how resource efficiency can bring about multiple benefits along the three dimensions of sustainable development - economic, social and environmental - in India. (250 words) 15

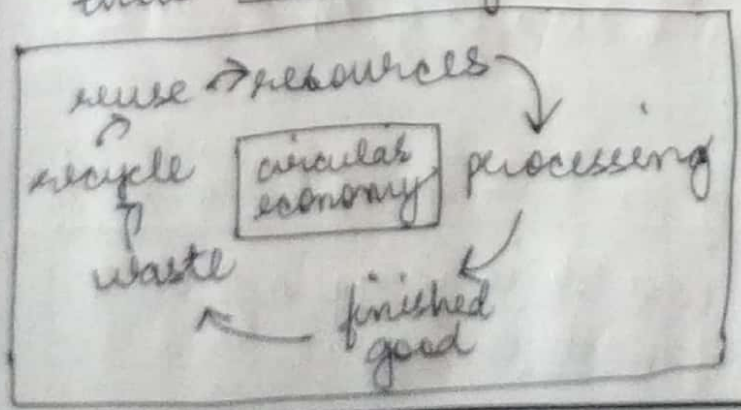
परीक्षण कीजिए कि संसाधन दक्षता, भारत में संधारणीय विकास के तीन आयामों-आर्थिक, सामाजिक और पर्यावरणीय - के साथ-साथ किस प्रकार विविध लाभ प्रदान कर सकती है।

Resource efficiency means utilising the resources in a prudent manner and focusing on reusing, recycling and reducing their use.

eg blending of ethanol in petrol is a move towards resource efficiency.
focusing towards drip irigation etc.

Benefits along economic dimensions:

↳ It creates a circular economy, where the waste can be reused thus reducing cost of production



↳ This also creates new forms of employment

↳ It will help integrate the informal sector, formalise them and create economies of scale.

eg reusing plastic, paper waste will create new waste to energy plants, new industries and cheaper raw materials

Benefits along social dimensions:

↳ with cheaper goods, it will be accessible to all.

↳ By reducing unemployment and diversified economy, people would come out of poverty.

↳ Much benefit to rag pickers, will help reduce child labour.

↳ Exploitation of labour, long working hours, unhygienic work conditions would be done away with organised functioning.

Benefits along environmental dimension:

↳ Today the world is grappling with waste management issues.

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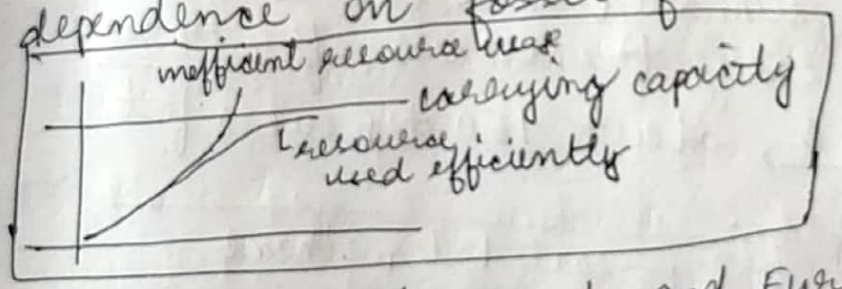
↳ India faces huge amount of liquid, solid, plastic, e-waste issues.

several problems:
- air pollution
- deforestation
- improper mining and extraction
- leaching in groundwater
- fires on landfills (eg Ghazipur landfill fire)

⇓

all these problems will be resolved through efficiently managing the resources.

eg moving towards solar and biomass energy will reduce dependence on fossil fuels.



Thus, Niti Aayog's and European Union's move towards resource efficiency is a welcome steps towards sustainable development.

16. Highlighting the significance of unconventional hydrocarbons for India, discuss the issues faced in their exploration and extraction. **(250 words) 15**

भारत के लिए अपरंपरागत हाइड्रोकार्बनों के महत्व पर प्रकाश डालते हुए, उनके अन्वेषण एवं निष्कर्षण में आने वाली समस्याओं की विवेचना कीजिए।

Unconventional hydrocarbons are those hydrocarbons which cannot be extracted like crude oil and natural gas. These include: coal bed methane (CBM), shale oil, shale gas, methane hydrates etc.

Significance of unconventional hydrocarbons

↳ It is estimated that India has second largest reserves of methane hydrates, about 130 tcm cubic feet of shale gas.

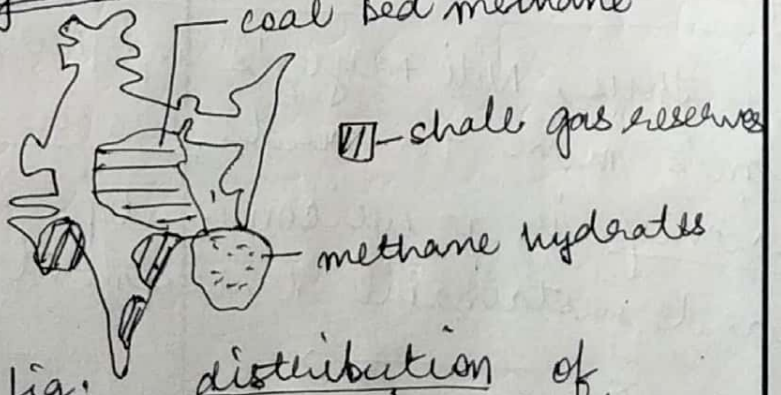


fig: distribution of unconventional hydrocarbons in India

↳ It will reduce dependence on imports. Currently 80% crude oil is imported.

↳ It will lead to our energy security.

↳ Coal bed methane, shale gas are closely associated with coalfields, thus with improvement in extraction, we can increase our production of energy resources.

But despite this abundance, certain issues still remain.

Issues in Exploration:

↳ The data about these hydrocarbon gives an estimate and not the actual figures.

↳ Due to separate policies and lack of private players, not much effort taken in their exploration.

↳ It requires new investment in exploration & production (E&P), lack of cutting edge technology creates problems.

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Issues in Extraction:

↳ Complex methods like 'pressurised water, chemicals and sand' create issues in exploration.

↳ Requirement of water (5-9mn ltrs) is another challenge, also chances of polluting aquifers.

↳ Fracking and other technologies are not yet formalised.

Thus, to address these issues, India has moved towards HELP, where these hydrocarbons will also be covered under uniform licensing policy. With improved EIA process, involvement of private players and technology upgradation we can utilise these unconventional hydrocarbons in near future.

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17. Programmes for cleaning polluted rivers in India have been implemented for a long time, however, the results of these programmes are not very encouraging. Identify the reasons for the same and possible steps to rectify the situation. **(250 words) 15**

भारत में प्रदूषित नदियों की सफाई के कार्यक्रम लंबे समय से कार्यान्वित किए जाते रहे हैं, हालाँकि, इन कार्यक्रमों के परिणाम बहुत उत्साहजनक नहीं हैं। इसके कारणों और इस स्थिति में सुधार लाने के संभावित उपायों की पहचान कीजिए।

From River Ganga and Brahmaputra to small rivers like River Mithi, river pollution is one of the most daunting challenges for all of these rivers.

several programs like Ganga Action Plan, Namami Gange, Central Monitoring Committee, National River conservation Plan etc have been formulated but still more than 350 polluted stretches exist (2018) in India.

Reasons for the programs not working

↳ There is flaw in formulating the policies, in terms of identifying the source areas.

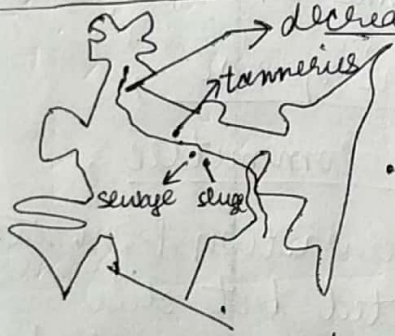
- point source
  - ↳ factories effluents etc
- non point source
  - ↳ agriculture etc

↳ lack of co-ordination at all levels - central, state, municipality.

↳ The policies have been largely top-down, not involving the local population. This has been tried to done away with Namame Gange program.

↳ lack of treatment infrastructure, poor monitoring, budgetary constraints are other issues

eg.



- Kanpur, Allahabad, Varanasi as high polluting areas

River Ganga gets polluted across the upper & lower reaches

Possible steps to rectify the situation:

↳ identify the source areas and take required action:

↳ point sources: common effluent treatment plants, sludge treatment plants with anticipated capacity.

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↳ non-point sources → stop open defecation projects like Ganga Gramas be implemented in India, creating no-development zone just like CRZ rules.

→ using bioremediation techniques, aquatic plants which absorb heavy metals and facilitate river cleaning

⇒ Maintaining the ecological flow of rivers all across, thus going for 'river of the rivers' projects to prevent water shortage.

⇒ opting for watershed approach where local people are actively involved & incentivised.

⇒ use of technology like drones, sensors to map the worst polluted stretches and pinpointed actions be taken

Rivers are the core of our survival & civilisation. Their protection is our utmost requirement

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18. Ecosystem services are the direct and indirect contributions of ecosystems to human well-being. In this context, distinguish between supporting, provisioning, regulating and cultural services provided by ecosystems.

(250 words) 15

पारिस्थितिकी तंत्र सेवाएँ मानव कल्याण हेतु पारिस्थितिकी तंत्र के प्रत्यक्ष एवं अप्रत्यक्ष योगदान हैं। इस संदर्भ में, पारिस्थितिकी तंत्र द्वारा प्रदान की जाने वाली सहायक (supporting), प्रावधानन (provisioning), विनियामक (regulating) और सांस्कृतिक (cultural) सेवाओं के मध्य अंतर स्पष्ट कीजिए।

Ecosystem services are the services provided by the biosphere and its components. These services are a part of the 'natural capital'. Their direct and indirect contributions can be studied in 4 types of services provided.

Supporting services

↳ These form the base of all services, and provide habitat for all life forms.

↳ Major services include

- soil recycling
- nutrient recycling
- retaining etc. biodiversity

↳ These form part of indirect contribution of ecosystem to human beings.

Provisioning services

↳ These are the direct benefits provided to the human beings.

↳ Here ecosystem provides food, wood, fiber, fuel, medicines, water to the humans.

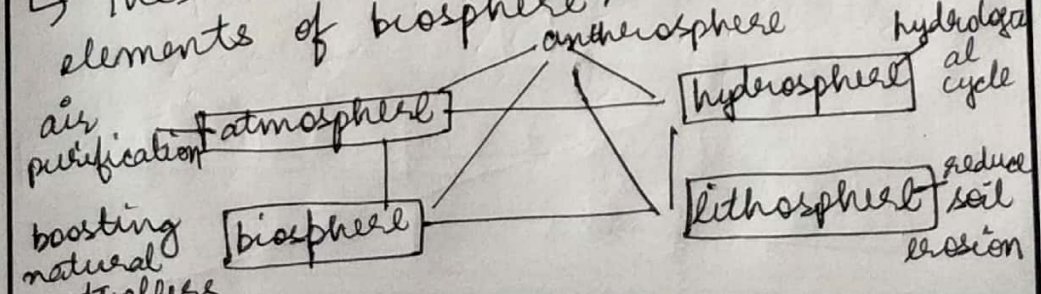
↳ These services provide immediate benefits & fulfill the basic needs of human beings.

Regulating services

↳ These are those services which create facilities for the functioning of ecosystem and maintaining balance.

↳ These services create a functional envelope for human beings' survivals.

↳ These include controlling all the elements of biosphere.



Cultural services

↳ These are the services exclusively for human beings.

↳ Just by the virtue of its existence, ecosystem improves the aesthetics of a region, boosts tourism and provides direct economical benefits.

↳ sacred Groves are also providing spiritual services to human beings

Thus, 'payment for ecosystem services' and 'natural capital' helps us realise the varied potential and benefits that ecosystem has for us, we all need to strike a balance between use and conservation for our own harmonious existence.

19. What are various phases of Environmental Impact Assessment (EIA) studies? Comment on the need for institutionalising public participation in EIA. **(250 words) 15**

पर्यावरणीय प्रभाव आकलन (EIA) अध्ययन के विभिन्न चरण क्या हैं? EIA में जन भागीदारी को संस्थागत बनाने की आवश्यकता पर टिप्पणी कीजिए।

Environmental Impact Assessment (EIA) is a process of evaluating the consequences of a project that it would have on environment and people residing in that region. EIA in India is part of Environment Protection Act, 1986.

Various phases of EIA studies:

- **Screening** → The size of the project is evaluated and decided if it requires clearance.
- **Scoping** → Project's impacts are studied, its influence area is noted
- **Impact & Data collection** → For creating EIA reports, all the possible data & affected domains are considered.
- **Mitigation measures** → For all the possible impacts noted, mitigation steps for prevention and control are evaluated.

Public hearing → once the report is created, it is put out before the public, so that it can be debated by CSOs, people interested & affected.

↓

Decision making → Keeping above all the points, final decision about the project is taken.

↓

Evaluation, monitoring → continuous risk assessment is done to check whether the project is in accordance to the report created.

In all these phases, the most effective phase is of public participation which decides the credibility of reports & projects.

several issues in the EIA have called for institutionalisation of public participation.

Why is the need?

↳ This will improve the applicability & credibility of the report.

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↳ By institutionalisation, several experts & CSOs will become part of public hearing, which will ensure all possible dimensions are covered.

↳ Mandatory public hearing will strengthen social audit process, make people more aware of their rights & responsibilities.

↳ Data collection will become more accurate & transparent; will get verified.

↳ Fraudulent EIAs will be recognised and appropriate actions can be taken on them.

Thus, public participation forms the core of a working democracy where people don't get displaced without their will and ample remuneration is provided to them.

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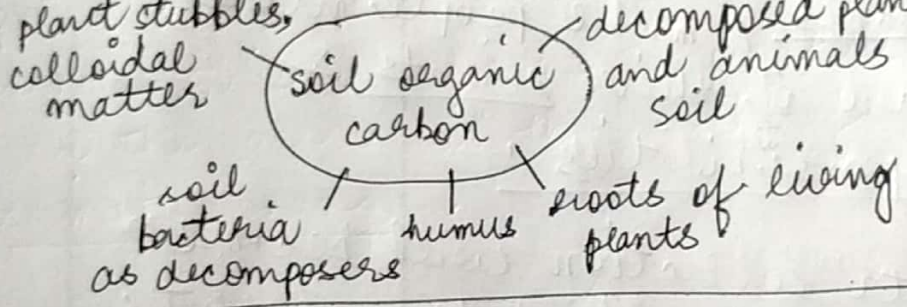
20. What is Soil Organic Carbon (SOC)? Identify various factors affecting SOC levels. Also, highlight the beneficial impacts of SOC on soil health and functionality. **(250 words) 15**

मृदा जैविक कार्बन (SOC) क्या है? SOC के स्तर को प्रभावित करने वाले विभिन्न कारकों की पहचान कीजिए। साथ ही, मृदा स्वास्थ्य और कार्यात्मकता पर SOC के लाभकारी प्रभावों पर प्रकाश डालिए।

Soil organic carbon refers to the organic part of soil which is formed by the interaction of microbes, plants and animals.



Various factors that affect SOC levels

↳ climatic conditions: Acid regions have low carbon content: Moist, humid, warm conditions create more soil organic carbon.
eg Boreal forests, tropical rainforests have high SOC.

↳ Presence of micro-organisms, earthworms etc also control the amount of SOC.

↳ colloidal state and soil particles size & texture also determine the amount of SOC. eg clayey soil has less SOC than peaty soil.

↳ Human activities like monoculture, deforestation, deposition of non-biodegradable waste etc reduce SOC.

Benefits of SOC on soil health & functionality:

↳ Improves the fertility of soil by increasing the required micro-nutrients.

↳ Improves soil structure, porosity and water retention capacity of soil.

↳ By storing carbon, soil improves the crop & vegetation yield also.

↳ High SOC regions like peatlands, forest soils, permafrost also are huge reservoirs of GHGs.

↳ They help in recharging aquifers.

Thus, with these importance, there is a wide requirement for protecting & preserving soil organic carbon. This has become imperative all the more in the wake of climate change.