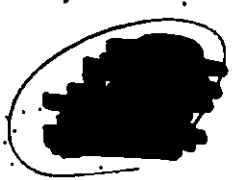


**GEOGRAPHY, ENVIRONMENT, SCIENCE
TECH. & DISASTER MANAGEMENT**

Time Allowed: 3 hrs.

Max. Marks: 250

Q.	Marks	Instructions to Candidate
1.		<ul style="list-style-type: none">• There are 20 questions.• All questions are compulsory• The number of marks carried by a question is indicated against it.• Answer the questions in NOT MORE THAN 200 words each. Contents of the answer is more important than its length.• Answers must be written within the space provided.• Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off. 
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1. Invigilator Signature _____

2. Invigilator Signature _____

Name Pawas Swapnil

Roll No. _____

Mobile No. Date 02/04/2017Signature 

REMARKS

- You must try to write, within the space provided. You shall be penalised for not conforming with the instruction!

Q1. There have been increasing incidences of antimicrobial resistance, which could be more disastrous than fighting a war. Discuss various reasons of antimicrobial resistance, how human activities are supporting the superbugs to thrive? What could be the way to handle this problem? (12.5 Marks)

Anti-microbial resistance (AMR) is when the disease causing pathogens become resistant to anti-microbial drugs. Such instances are increasing world over and the recent example of MCR-1 gene in a woman which was resistant to all available line of drugs is the warning signal.

Such superbugs and AMR instances can spread, without any method to control them and thus becoming a larger than war threat.

Reasons for AMR:

- Misuse of anti-biotics → self-medication without prescription.
- Overuse → due to lack of awareness, medicines taken even without need.
- Doctor behaviour → Prescribing anti-biotics even for small causes to earn commission from chemists.

Remarks

→ Use in animals → these medicines are used to prevent infections in as well as fattening of poultry. These then travel up the foodchain, inducing AMR in humans.

4

Handling the problem:

→ Making prescriptions mandatory for certain drugs especially antibiotics. This is all the more important when epidemics are emerging.

Please refer to model answer

→ Penal provisions for fraudulent prescriptions by doctors; training and behaviour change; Awareness generation in people. Ex - India's

Red Line Campaign

→ Disallowing use in poultry. Also proper cooking of meat at high temperatures to kill any superbugs.

These steps are necessary to protect the population from superbugs and the consequent biological disasters.

Remarks

Q2. What is hyper-loop technology? What are its advantages as compared to high speed railway like Bullet trains? Does India need investments in such technologies?

(12.5 Marks)

The new hyper-loop technology is proposed for transport - which would be superfast. Define hyper-loop technology.

Advantages vis-a-vis bullet trains:

- High speed
- Require less space in terms of area around tracks
- Reduced energy requirements.

Should India invest?

The technology is still not well-established and at experimental stages. We have national priorities in terms of poverty, agriculture etc. Thus the technology can be welcomed after it is well established. This should be done without jeopardising focus on the priority areas.

25

Remarks

Your answer is not complete

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Remarks

Q3. Indian government announced Digi-Gaon initiative in 2017-18 budget. What are the important components of this initiative? How does it try to achieve the objective of 'inclusive growth'? (12.5 Marks)

The newly proposed digi-gaon aims to embed villages with technology to make them smart and inclusive.

Components: Discuss main objective of this initiative.

- Use of technology - like e-governance
- Provision of internet in villages and panchayats.
- Digital literacy under Digital India.
- Less-cash - Pos machines, net-banking, mobile payments.
- Digitisation of land records.

Inclusive growth through Digi-Gaon:

- Access to technology to all would reduce inequality in technology use.
- Digital literacy initiative would empower the illiterate.
- Bringing all into the formal financial system of banking → boost to entrepreneurship in rural areas.
- support to M.M.E sector.

Remarks

→ help small farmers.
 Who are all going to be the beneficiaries?

However, the funding and clear implementation roadmap with objective targets are missing.

3 Addressing these challenges and implementing the initiative along with Bharat-Net, Digital India would boost rural growth and the areas where $\frac{2}{3}$ of India lives.

Remarks

Q4. What is Aquaponics? Analyze how it is better as compared to conventional agriculture practices? How it can help in tackling climate change in agriculture? (12.5 Marks)

The new technology of aquaponics is the combination of agriculture and aquaculture at the same place.

It has to be precise.

In it, special pads are kept along the surface of a pond or small water tank. Make it clear the pad is used for growing crops and pond for fishing - simultaneously.

Advantages over conventional agriculture:

- Reduced need of fertilisers as the waste of mass aquaculture - fish etc. would serve the purpose.
- It requires less water than conventional agriculture.
- Requires less space and this help increase agricultural production without pressure on land.
- Can be taken up on smaller scale than agriculture this would help livelihoods of poor small scale farmers, women.

Remarks

Issues with aquaponics:

- 4
- The initial investment cost is high.
 - Tuberos and root plants like potato etc. cannot be grown.

Help in tackling climate change:

Discuss more ways how it helps

Reduced pollution due to release of CH_4 , NH_3 from agricultural land would be reduced. It does not make proper sense.

→ The present trend of cutting forests for agriculture and industrial activities would stop as pressure on land would be reduced.

in tackling climate change. The technology is new and promising. Thus it needs policy and investment support as well as promotion by government. It would go a long way in mitigation at least a part of agriculture's distress.

Remarks

Q5. India is going global through its collaborations in various megaprojects in research and development. Discuss India's efforts in this direction and the significance of these projects. (12.5 Marks)

India has boosted its R&D collaboration in global and mega projects in recent past.

The efforts and their significance:

2 1/2

→ CEFN (European Nuclear Research Organisation)

India became associate member at CERN. This would enable Indian scientists to access the vast knowledge, the positions in CERN; also Indian industries would participate in project bits → thus boosting R&D and innovation in India.

→ IGAD and IRO - also try to boost research

In origin of gravitational waves and use of neutrinos for various purposes like:
 - detection of nuclear proliferation activities
 - detecting black matter in universe.

→ Defense - India has signed major deals in this sector for defense technology transfer and joint research eg - with US - major defense partner would boost joint development

Remarks

- With Russia for Kamov helicopters.
 You must refer to model answer as your answer seems partly differently from it

It would enhance our defence preparedness, reduce dependence on exports and boost Make in India.

→ Nuclear: Russia has invited India for research in third generation nuclear technologies. It would boost our energy sector and help achieve clean energy targets - helping environment.

→ Agriculture: India has taken up major research projects in this sector including GM crops, DMH (Dhara Mustard Hybrid) etc. It would help agricultural productivity, food security and livelihoods of farmers.

However, where we lack is funding for these projects and clearance obstacles (eg. ICHD and IVO stalled for years). Removing the hurdles would help India for multidimensional development.

Remarks

Q6. Net Metering is an encouraging mechanism to promote the generation of renewable power on small scale. In this reference discuss net metering mechanism. Also discuss its advantage as India is facing huge challenge to provide affordable and easily accessible energy to all its residents. (12.5 Marks)

In Net Metering (NM), the ~~total~~^{energy} is calculated by considering the energy fed into the grid by the household along with its consumption. This energy can be generated via rooftop solar instruments. If thus incentivises the ~~past~~ households and industries to generate their own energy and reduce energy bill.

In India, the power shortage, load shedding, inability to handle peak loads, inefficient utilisation of generation capability are the looming problems. In this context, NM provides following advantages:

- Incentivises off-grid production by households.
- This further helps reduce peak load on

Remarks

transmission system

- Incentivises use of rooftop solar → green energy
- Makes power affordable for poor by reduction of electricity bill.
- Help reduce power deficit in India and better load management; Thus ensuring better supply to industries and boost to economic activity and initiatives like Make in India, 24x7 power for All.

- Help offgrid production in rural areas where infrastructure for electricity is not available.

However, the technology is not taken up due to high initial cost and lack of awareness.

This is sought to be addressed by National Solar Mission by subsidising rooftop solar. It should also incentivise WtG. It would go a long way in ensuring clean energy and power for all.

Remarks

51
2
Good approach

Q7. What is the importance of Kigali Agreement and how it is different from Paris Climate Deal? What is Indian commitment under the deal and what are the likely challenges to be faced by India in this? (12.5 Marks)

The Kigali Agreement amends the Montreal Protocol and the Vienna Convention on Ozone Depleting substances (ODS).

Importance:

- It includes a very potent green house gas ~~hydro fluoro carbon~~ Hydro fluoro carbon (HFC) into the list of ODS. Don't use such abbreviated words.
- As the agreement is legally binding and one of the most successful in the world, it would go a long way in phasing out HFCs and help reduce effect of climate change.
- It also outlines the commitments by developed countries towards finance and technology to help developing nation - which would be finalised in 2018 ministerial.
- It clearly divides countries into 3 groups and assigns target for phasing out according to national capabilities.

Remarks

- It is expected to supplement Paris Deal by limiting GHG emission and reducing warming by 0.5°C by 2100.

Don't do extra things.

4

Paris deal	Kigali Agreement
<ul style="list-style-type: none"> • Not legally binding 	<ul style="list-style-type: none"> • legally binding ✓
<ul style="list-style-type: none"> • Principle of Common but Differential Responsibilities (CBDR) included ✓ 	<ul style="list-style-type: none"> • No CBDR available
<ul style="list-style-type: none"> • Burden more on developed nations. 	<ul style="list-style-type: none"> • Equitable sharing of burden by developed and developing ✓
<ul style="list-style-type: none"> • Relates to green house gases (GHGs). 	<ul style="list-style-type: none"> • Relates to Ozone Depleting Substances (ODS) [except HFC].

Although you have written well but you seem to have not complied with

Challenges ahead:

- India is highly dependent on HFC-23 for Refrigeration, AC, foaming technologies.
- It would ~~cost~~ India heavily in new technology adoption.
- Proper storage of HFC and not allowing its release into environment is challenging.
- The commitment shown by India is laudable and states the position

Remarks instruction

on climate change and environment protection. The implementation and innovative finance would go a long way in this direction.

Q8. The union Environment Ministry recently notified a 'Graded Response Action Plan' against air pollution for Delhi and the National Capital Region. How does it tries to control pollution level and what are the likely challenges to be faced?

(12.5 Marks)

Remarks

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Remarks

- Q9. Discuss the major provisions of Regional Centre for Biotechnology Bill, 2016. How it would provide a skill base for wider adoption of Biotechnology in every walk of life in future? (12.5 Marks)

Remarks

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Remarks

Q10. India's sugar industry is the second largest agro-based industry in India; however, the production of sugar is skewed towards the states like Maharashtra, Tamilnadu, and Karnataka, which are not very suitable for sugarcane cultivation and have been suffering from water shortages. Analyse the reasons behind this trend? What are the problems faced by the sugar industry in India and the possible measures to overcome the crisis?

(12.5 Marks)

In last decade, a trend of shifting sugarcane production and industries towards central-southern India from Gangetic plains was witnessed. This is despite the contradiction that these areas have water shortage and sugarcane is a water intensive crop.

The reasons behind this trend

are:

→ Sugarcane is a tropical crop and central-southern India yields high quality cane and greater yield of sugar from cane (≈ 12% against 8-10%).

→ In these areas, the sugarcane is produced in both Rabi and Kharif as against only in Kharif season in North.

→ This allows sugar factories to run for substantial part of year.

You must comply with the instructions

4 1/2

Remarks

- This in turn reduces the seasonal unemployment.
- Co-operative culture is better developed in central-southern India - conducive for sugar factories.

Problems of sugar industry:

- Write its expanded form
- High input cost - due to the FRP by centre and additional support price by States for political motives, mostly.
 - Cane Reservation Area - restricts the farmers from approaching industries outside the prescribed area.
 - Tute packaging - 20% compulsory packaging further erodes profits.
 - Input costs and packaging costs erode profits of industries.
 - Most industries are co-operative and mostly controlled by politicians and are inefficient.

Way forward:

- Rangarajan committee had suggested doing away with cane Reservation Area and Tute packaging.
- Upgradation of technology.
- Rationalisation of FRP and support-prices.
- Utilizing byproducts - mollases and bagasse.

Remarks

for biofuels, fertilizers to increase profitability.

These steps are necessary to boost the industry as well as drive exports and agricultural livelihoods.

Q11: Analyze whether the monsoon rains play a role in reducing air pollution in Indian cities. State the reasons why air pollution has increased in Indian cities post monsoon and winter. (12,5 Marks)

The increasing pollution ~~problem~~ is highlighted by the fact that less than 10% of Indian people live in places with prescribed air quality standards of WHO.

India largely has tropical summer monsoon climate. The monsoon rains are said to reduce pollution as due to summer, the particulates and pollutants are propelled higher up in atmosphere, ^{due to convection} cleaning the air at bottom of atmosphere. Also, the rains ~~take~~ take away the pollutants by dissolving them.

However, it just shifts the problem of pollution to upper layers. In first case, in second case, the pollutants may cause acid rain or the polluted rain water may affect water bodies. Thus, it may reduce air pollution but not completely and shifts the

Come to the point directly.

Remarks

problem to other places. You should write point wise how monsoon reduces air pollution.

The reasons of air pollution post-monsoon & winter:

- 4
- Heavy traffic and increased construction activity in and around cities leads to pollution.
 - In North India, the stubble burning in states like Haryana, Rajasthan, Punjab, Ganga plains, affect cities from Delhi to West-Bengal.
 - Firecrackers during Diwali (October-November).
 - Seasonal factor - The subsidizing cold winter air due to high pressure over N. India and absence of convection lead to concentration of pollutants in lower atmosphere.

To tackle this issue, vehicular

Don't write unnecessary if not required hazards. pollution needs to be controlled through BS-VI, odd-even like policies. Also the commercialization of paddy straw as suggested by M. S. Swaminathan would go a long way in reducing pollution hazards.

Remarks

Q12. Why are North Eastern states preferred for palm cultivation in India? Discuss the government's measures to support this. (12.5 Marks)

The North-Eastern states are preferred for palm cultivation for following reasons:

- Availability of Red-Yellow soil
 - Moamy soil
 - Abundant rainfall ; All these factors are favourable for palm cultivation.
 - Also the pressure on agricultural land would be relatively lesser due to palm cultivation in NE states.
- what is the significance?

Govt's measures:

- National Mission on Oil Palm → to boost production and exports of palm and palm oil and provide employment.
- 100% FDI allowed in oil palm plantations.

Challenges: Has it been asked?

- Despite liberalisation FDI has not taken up

Remarks

as the palm plantations are not viable.
→ The inviability is due to land ceiling laws
→ also, palm is not given plantation agriculture
status.

• Providing plantation status and support for palm plantation would go a long way in ensuring edible oil security; reduce imports and increase exports and provide employment to people.

Remarks

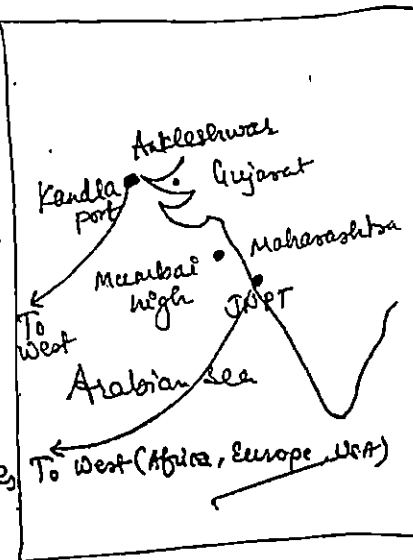
Q13. The contribution of Gujarat to India's pharmaceutical and health sectors can be gauged by the fact that this Western State, having only 4 per cent of the country's population, accounts for more than 40 per cent of medicines manufactured in India. Why is the pharmaceutical industry concentrated in the western region? (12.5 Marks)

The Western states, especially Gujarat are major producers of pharmaceuticals. This is because of these states have the conducive factors for Pharma Industry:

→ Raw material :: needed for pharmaceutical industries is the chemicals derived from hydrocarbon industries and by products of oil refineries.

These are available from areas like Amleshwar in Gujarat, Mumbai high etc.

→ Ports and transport for exports : The region has major ports like Kandla (Gujarat), Mumbai and Jawaharlal Nehru Port Trust → for exports to high value markets like Africa, Europe, USA.



Remarks

Also the area has well developed road and rail transport to bring in other supplies.

→ Capital: The western states are industrially developed and capital rich areas traditionally; Mumbai is financial capital of India; this capital for investment is available.

⑤ → The western coastal regions are densely populated thus labour too is available.

→ Also skilled labour is available due to educational clusters in these areas like Mumbai, Pune, Ahmedabad.

→ Availability of electricity as areas are well developed. The pharmaceutical industry is

poised for great development through new proposals of Pharma Production Policy, pharma clusters. It would bring India the tag of pharmacy of the world and boost exports.

For this the major issue of import of 280% APIs should be addressed by developing self dependence.

Remarks

Also discuss the supportive role of government.

Q14. Lack of professionalism and autonomy of the major port boards led to the dismal performance to the ports in India. Critically comment in the light of Major ports authorities act, 2016. (12.5 Marks)

The reasons for dismal performance of major ports are:

→ The hybrid or Service Port model in it; the govt does both tasks of owning the port and operating the port. Its disadvantages are:

- burden on limited manpower.
- lack of professional management.
- strict government controls and lack of autonomy for decisions.
- the monopoly reduces competition and induces inefficiencies.

→ High turn over time and complex documentation

→ This model is obsolete and world over landlord

Tenant model is being used for professional management. One of India's major port has adopted this model and it is a step in right direction.

You should have better focused on the said act only.

Remarks

Also the Major Ports Authorities (Bill) has provisions to boost the economic productivity of ports:

- It replaces earlier laws and simplifies it by reducing the provisions in numbers.
- The TAMP's (Tariff Authority) functions are devolved to the Port Board.
- Port Board composition is simplified and reduced in number.

Discuss

various

other

provision

of

act

→ Allows leasing of land for economic activities.

However, the issue of finances is not being dealt clearly in the bill and needs to be addressed.

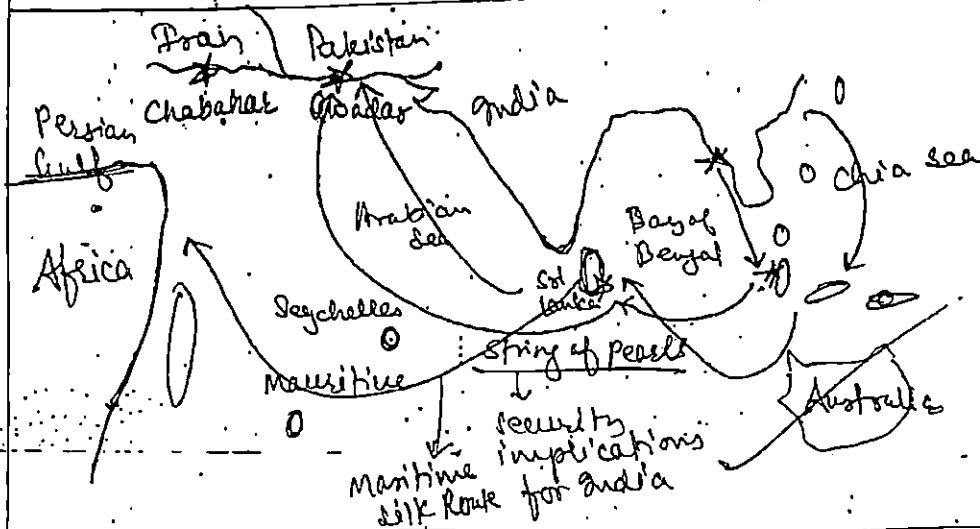
It would help revive India's port and thus exports.

Remarks

Q15. While India has retained a near monopoly regarding naval presence in Indian Ocean; it has recently been challenged aggressively by China. Examine the geopolitical significance of the Indian Ocean region in context of the above statement.

(12.5 Marks)

India is a major South-Asian country and has dominated Indian Ocean affairs. However, recent acts by China to increase its presence in the area has challenged India.



What is the geopolitical significance of the Indian Ocean region?

Chinese actions and the geopolitical significance

→ Chinese project of CPEC starts at Gwadar (Pakistan) close to India and this can become reason for Chinese Naval Presence affecting Freedom of Navigation - in name of boosting the Maritime Silk Route.

Remarks

→ The string of pearls - establishment of naval & military bases - threatens India's defence & security relations in the region.

3½

→ Chinese support to Sri Lanka in building Hambantota Port - increase Chinese presence and give it a strategic presence.

→ Recently Chinese ships traversed a new route to Europe and Africa through Indian Ocean - this increased ~~approachment~~ approachment by China may affect Indian interests in the region.

You have not written answer.

However, to counter Chinese presence, India has initiated Project Mausam, the Spice Route, increased aid and approachment with Sri Lanka, South East Asian Nations, Seychelles and Mauritius.

Remarks

Q16. A mass bleaching event on the Great Barrier Reef this year killed more corals than ever before sounding the alarm over the delicate ecosystems. What is coral bleaching? Discuss the conditions favourable for coral formation. What are the recent environmental conditions that are leading to mass bleaching events? (12.5 Marks)

Coral reefs are symbiotic association of coral polyps and algae / zooxanthellae. Algae provide food and colour while polyps provide platform for growth.

However, a recent study found that more than 20% of Great Barrier Reef has bleached beyond recovery. The reasons, mostly are rising sea surface temperatures due to climate change, marine pollution.

Coral bleaching

It occurs when corals lose their symbiotic algae due to death of algae. The corals lose their colour due to this. The bleaching, if limited, is reversible when favourable conditions arise.

you need to define it properly

Back-ground is not required anyway

Remarks

Conditions for coral formation:

- Temperatures between $22^{\circ}\text{C} - 30^{\circ}\text{C}$ are best (limits are $18^{\circ}\text{C} - 35^{\circ}\text{C}$).
- Depth of around 60 feet is ideal. They cannot survive above water. Justify it.
- Availability of sunlight for photosynthesis.
- Fresh water flow to maintain supply of nutrients, like waves, ocean currents.
- Cannot form at ^{high} sedimentation locations like at mouth of estuaries.

Recent environmental conditions for bleaching:

- Increased sea surface temperatures.
- This is due to climate change and global warming.
- Increased occurrence of El-Niño also affects corals.

The environmental causes like global warming need long term approach but anthropogenic causes like marine pollution, unsustainable exploitation can be controlled

Remarks

easily. This would ensure healthy marine ecosystem.

Q17. Habitat-III conference of the United Nations came with a new urban agenda that sets the global vision of urbanisation for the next 20 years. Discuss this new urban agenda and how far the smart cities mission is able to achieve the objectives.

(12.5 Marks)

More than 50% of global population lives in urban areas and it's fast increasing. This has given rise to associated issues like unsustainable exploitation of resources, increased use of fossils, global warming, sanitation, safety, equity issues.

In this context, the Habitat-III discusses it elaborately as it has set up following agenda:

- Sustainable Development - use of renewables, public transport.
- Equitable development - inclusion of every section like poor, women, youth, aged.
- Use of technology - digital transactions, internet highways.
- Bettering governance structures - provisioning of essential and public services.
- Enhanced and innovative financing.

The smart cities mission : aims to develop cities in

Remarks

with use of technology, e-governance, better traffic management, better civic amenities, infrastructure etc. This would increase livability and governance level of cities.

However, it lacks in addressing the sustainable development, equitable development and finance components vis-a-vis the Habitat III agenda.

Thus; what we need is the combination of smart cities with sustainable cities to meet increasing demand of urbanisation and towards sustainable future.

Remarks

Q18. What do you understand by carrying capacity of ecology? Answer in context of India, where many states have reached the limits of their capacity, due to mass tourism.

(12.5 Marks)

Carrying capacity of the ecology can be its capacity in terms of resources which can be ~~sustainably~~ sustained by it to feed a particular section of earth's population and its economy.

The over-exploitation and breaching of this capacity is seen in terms of progressively nearing of earth's overshoot day since last few decades.

In India, the states with high tourist potential are unsustainably exploiting and harming the ecology.

→ Eg. Many national parks have areas littered with waste.

→ The coastal areas hosting mangroves are being destroyed.

Remarks

You must refer to the model answer for better understanding.

3

- Flood plains and seismic zones in Himalayan and Gangetic region are being encroached to meet demands of mass tourism.
- Destruction of habitats of animals due to tourism activities has led to increased man animal conflict. Ex: the leopard seen in Bangalore school area, the nilgai & rhesus monkey in Himachal Pradesh.

Steps need to be taken to promote sustainable and eco-tourism - balancing the needs of ecology as well as economy (employment)

Remarks

Q19. Recently IMD has declared that, during year 2017, summers will be hotter than normal. In such circumstances what preventive steps should be taken to ensure that such situations does not affect normal life and turn into disaster? (12.5 Marks)

- 2016 was the hottest year on record. But 2017 has been forecast to be hotter. The reasons quoted by IMD are ① El-Nino - as the warming of ocean reaches the land 2-3 months late; ② global warming.

The heat waves caused due to this lead to loss of lives - human, animal; loss of agricultural production; affects schools, health of population in general - heat strokes & dehydration. In light of this, following preventive steps can be taken:

- Awareness among people is the best way - to ask people stay indoors, hydrate themselves.
- schools can be kept shut.
- Temporary summer shelters and provision of water at places.

Remarks

There are diverse range of problems which are to be taken care of.

→ Alarming people on aboveaverage hot days, in advance.

3. In long term:

→ Reforestation along roads and cleared patches to reduce effect of global warming.

→ Shelters through schemes like Housing for All, PM-Awas Yojana (Rural), to protect homeless. ~~and~~

These steps would go a long way in preventing the hazards of heat waves and keep population safe and healthy.

Remarks

Q20. Sendai Framework adopted during 3rd UN World Conference on Disaster Risk Reduction, in Japanese city of Sendai is the first major UN agreement on the post 2015 development agenda. In this regard discuss India's Post Sendai initiatives. (12.5 Marks)

Sendai Framework on Disaster Risk Reduction is the successor to Hyogo framework. It points out 4 priority areas and 7 targets for action and would be for period 2015 to 2030. It shows way to move from Disaster management to Disaster Risk Reduction.

In light of this, India which loses \$10 bn annually over disasters (UN Risk Assessment - 2015), has taken following steps, post-Sendai:

→ The National Disaster Management Plan, 2016

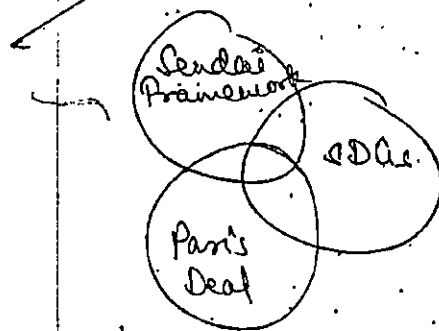
- India is one of the first countries to adopt a plan in line with Sendai Framework and Sustainable Development Goals.
- It clearly demarcates the responsibilities for all during disasters.

Remarks

Discuss more steps taken by India in this direction

→ After Sendai, India ratified Paris Climate Deal as well as the Sustainable Development Goals agenda - both of which contain disaster management in them; thus integrating disaster management into development agenda.

5



→ In line with priority 4 of Sendai - 'disaster preparedness and building back better', India has been strengthening NDRF with both manpower and technology.

→ SDG cross sensitive fund to update NDRP with inventory to deal with disasters like tents, medical kits, emergency communication equipments.

→ Education: Proposed Disaster Management Institute at JNU and Civil Defense Academy, Nagpur.

The steps are in right direction

Remarks

and what is needed is their implementation to make India disaster resilient.