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Classroom Study Material

ENVIRONMENT GEOGRAPHY AND DISASTER MANAGEMENT

November 2015 – August 2016

Note: September and October material will be updated in November 1st week.

Contents

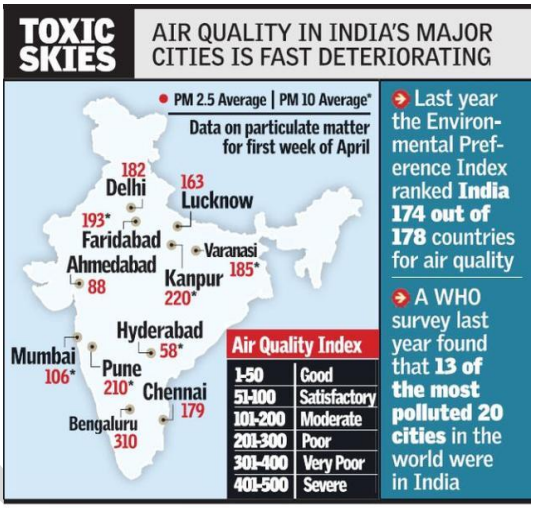
1. ENVIRONMENTAL POLLUTION

1.1. AIR POLLUTION

1.1.1. AIR POLLUTION IN INDIA: STATUS

Why in news?

- A new Report of International Energy Agency (IEA) has said that due to rising energy needs in India, air quality is bound to deteriorate further unless preventive steps are taken.
- A recent study by Greenpeace also shows that India has overtaken China's air pollution levels and that the average particulate matter exposure for Indians was even higher than that for Chinese.
- As per the latest analysis released by the Central Pollution Control Board (CPCB), in 2015, 41 Indian cities with a million-plus population faced bad air quality in nearly 60% of the total days monitored.



Situation of air quality in India;

- India houses 1/6th of world's population but uses only 6% of its energy. With energy use bound to rise pollutants like nitrates, sulphates and particulate matter is bound to increase.
- Presently, less than one per cent of India's population lives in areas that meet World Health Organisation air quality guidelines.
- However, the report says that with proper policy support this can be increased to 10% by 2040. Without policy efforts, sulfates and particulates would roughly double by 2040 and nitrates would grow almost 2.5 times

Suggestions by the IAEA Report

- First, set an ambitious long-term WHO-benchmarked air quality goal.
- Second, a clean AIR strategy for the energy sector: Avoid pollutant emissions, Innovate to reduce pollution abatement costs and Reduce emissions.
- Third, it calls for effective monitoring, enforcement, evaluation and communication using reliable data.

Strong measures needed

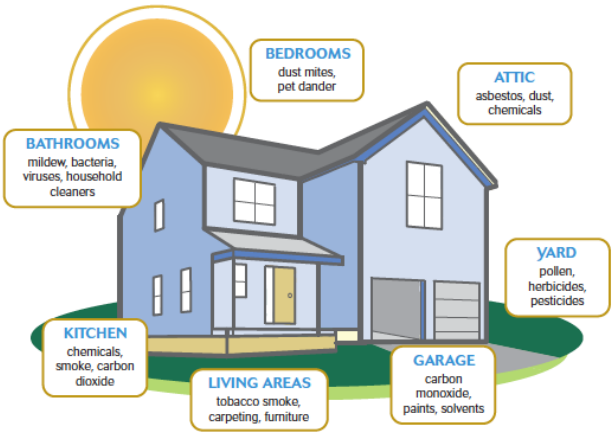
- Need to put pressure on policymakers and the polluters by improving the functioning of Air Quality Index
- Need to expand coverage from the present 23 cities to all agglomerates with a significant population and economic activity.
- They must be mandated to provide full and regular information within a given time-frame.
- Data must be put in open format to enable multiple channels of dissemination including novels methods like mobile apps.
- An action plan when the quality for air is bad. In China, for instance drastic measures like shutting down of schools, limiting production from factories etc. are taken when air quality goes severely bad.

Measures against vehicular pollution

- Odd-even policy- being practiced in Delhi
- Increasing cost of diesel vehicles as proposed by Budget 2016-17, NGT's direction of banning entry of diesel vehicles older than 10 years, ban on sale of heavy diesel private vehicles
- Implementation of BS-VI announced by government
- New measures like Congestion charges, license quota system, registration capping, parking charges, staggered working hours etc. should also be considered.
- Better public transport system and urban planning
- Construction dust and demolition activity control.
  - ✓ Building tarpaulin around area of construction.
  - ✓ Covering stored as well as moving construction material.
  - ✓ Masks to workers and sprinklers at site.

1.1.2. INDOOR AIR POLLUTION

Need



- The quality of air in and around buildings is seriously affected by gases (like CO2, CO, radon, volatile organic compounds), particulates, microbial contaminants or any mass or energy stressor that can induce adverse health conditions.
- In recent years the health problems due to indoor pollution is increasing, a syndrome called Sick Building Syndrome (SBS)
- Source control, filtration and the use of ventilation to dilute contaminants are the primary methods for improving indoor air quality in most buildings.
- A **big problem is absence of an effective air quality measurement system**.
- Many of the harmful chemical gases have low concentrations of ppb (parts per billion) levels and are extremely difficult to detect with current environmental sensor technology, which can only detect concentrations of parts per million (ppm)

Recent development

- Scientists have developed **graphene-based sensor and switch** to detect air pollution at homes.
- The sensor works by detecting the individual CO2 molecules adsorbed onto the suspended graphene one by one by applying an electric field across the structure.
- It brings remarkable improvement is detection limits from ppm to ppb levels. Further, it consumes very low power.

1.1.3. NEW RULES FOR MANAGEMENT OF CONSTRUCTION AND DEMOLITION WASTE

Why in news?

- The Construction and Demolition Waste Management Rules, 2016 notified by the environment ministry **aim at creating a process to recover, recycle and reuse this waste.**

Need

- Construction activity is **one of the main reasons for high air pollution** in Indian cities.
- 530 million tonnes of construction and demolition waste is generated in India annually.
- Currently, managed under the existing solid municipal waste management rules which are inadequate. Thus, it is not managed properly.

Notable points

- **Responsibility upon local authorities**
  - ✓ Permission for construction and demotion only after a complete waste management plan is presented to local authorities.
  - ✓ To keep a check on those who dispose waste illegally.
- **Responsibility upon large-scale generators:** they will have to pay relevant charges for collection, transportation, processing and disposal, as notified by the concerned authorities.
- **Emphasis on reuse**
  - ✓ Mandatory for local authorities to utilize 10-20% of construction and demolition waste in municipal and government contracts to lay drain covers etc.

Challenges

- The **main challenge is with respect to proper implementation of the rules.**
- Appropriate training is needed for contractors and officials before enforcing the clause.
- Appropriate resources, financial and human power, needs to be allocated to local authorities.
- This will also require scaling up of capacity-building and recycling infrastructure.

1.1.4. BHARAT STAGE VI NORMS BY 2020

Why in news?

- In a move to curb vehicular pollution, Indian government has decided to move up to the toughest emission standards **of BS-VI from the current BS-IV by April 2020** skipping BS-V standard.
- By switching to BS-VI, **India will join the league of the US, Japan and the European Union,** which follow Euro Stage VI emission norms.
- BS-VI is the Indian equivalent of Euro Stage VI.
- Currently BS-IV norms are currently followed across 63 Indian cities for petrol and diesel, while the rest still use BS-III fuel.

Bharat Stage Norms

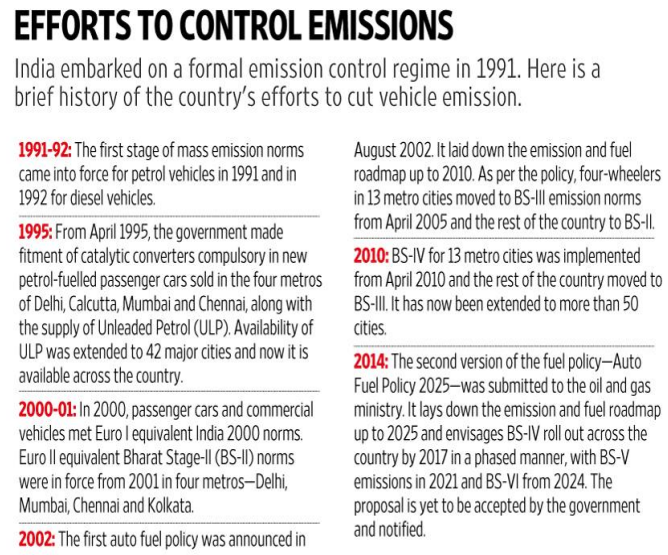
- Bharat stage emission standards are emission standards instituted by the Government of India **to regulate the output of air pollutants from internal combustion engine equipment, including motor vehicles.**
- The standards and the timeline for implementation are set by the Central Pollution Control Board under the Ministry of Environment & Forests and climate change.
- The standards, **based on European regulations were first introduced in 2000.**

Need

- Considering the environmental impact, rising pollution levels and health hazards due to vehicular pollution, has led to this decision.
- According to a study conducted by CSE, air pollution claims at least 10,000-30,000 lives a year in Delhi. It is one of the top 10 killers in the world and the fifth leading cause of death in India.

BS VI Norms

- The BS-IV compliant fuels have Sulphur concentration of 50 parts per million (ppm).
- This will come down to as low as 10 ppm in BS-VI compliant fuels and auto engines. This means a lower level of harmful emissions and reduced incidence of lung diseases.
- The switch to BS-VI norms will also reduce concentration of carbon monoxide, unburnt hydrocarbons, nitrous oxide and particulate matter from emissions.
- This jump will make a huge impact **and significantly bring down share of vehicular pollution in the overall air pollution of the country.**



Challenges

- Moving to BS-VI directly will require significant technological upgrades and auto companies may have to invest heavily. This can have the effect of making cars and other vehicles more expensive.
- Generally, it requires four years to graduate from one stage to another. Auto firms have flagged their concerns as jumping directly to BS-VI would not offer enough time for the design changes to be instituted. Even, the Auto Fuel Policy had recommended implementation of BS-VI norms by 2024.
- These firms are also worried about the funds to get this done.
- Directly aping the Euro norms is also problematic, considering that driving conditions in India are different from Europe.
- Further, improving the emission will not alone solve the problem of vehicular pollution as the number of vehicles is disproportionately high in Indian cities.

Way Forward

- Government should also focus on **raising the fuel standard and introducing policy initiatives that would influence passenger behaviour and cut personal travel kilometers by 25 per cent.**
- Government must show the diligence in making policy changes in partnership with State governments to clean up the air.

CSE 2010: (c) Bring out the salient features of the evolution and the current status of the 'Bharat Stage' vehicle emission norms in the country.

1.1.5. CATEGORIZATION OF POLLUTING INDUSTRIES

- India's environment ministry has sought to classify industrial units in a category of colours based on their pollution potential.
- The categorisation is based on a pollution index developed by the environment ministry taking into account the emissions, effluents, hazardous waste generated, and the resources it consumes.
- They would be classified on the basis of how they score on a scale ranging between 15 to 60:

Colour	Score	Examples
Red (Heavily Polluting)	60 and above	Petrochemicals, pharmaceuticals, sugar, paper and pulp, nuclear power plants, thermal power plants, tanneries, organic chemicals, fertilizers, fire crackers
Orange	Between 30-59	Coal washeries, glass manufacturing, paints, stone crushers, aluminum and copper extraction from scrap
Green	Between 15-29	Aluminum utensils, steel furniture, soap manufacturing, tea processing
White (Non-polluting)	Below 15	Air cooler, AC units, Chalk factories, Biscuit tray units

- The classification is for entire industrial sectors and not individual units.
- The system of annual renewal of certification will also be scrapped with this. The Environment Ministry has suggested five years renewal for red category, ten years for orange and one time certification for green. White industries would not require any green clearance.

Benefits

- This would place the **heavily polluting industries under greater scrutiny**.
- Low polluting industries would be saved from unnecessary hassles of periodic renewals. Thus, it would **facilitate ease of doing business**.
- **Better site selection for new red category industries** as they will not be allowed in ecologically sensitive areas.
- Colour coding would enable **easier financing** for environmental friendly industries.

1.1.6. NATIONAL GREEN HIGHWAYS MISSION

- The government this year launched the initial plantation drive on 1,500 km of National Highways at a cost of about Rs 300 crore under the National Green Highways Mission
- The government last year had flagged off its Green Highways (Plantation, Transplantation, Beautification and Maintenance) Policy 2015. The policy aims to help the environment, help local communities, and generate employment by planting trees along all the highways in the country.

Key features

- The vision of the policy is to provide dignified employment to local people and communities.
- Under this policy, every year 1% of the total cost of highway projects will go to the Green Highways Fund. That works out to around Rs. 1,000 crore every year.

- The policy's objectives include
  - developing a framework for the plantation of trees along highways,
  - reducing the impact of air pollution and dust,
  - providing shade on glaring hot roads during summer,
  - reducing the impact of noise pollution and soil erosion,
  - preventing the glare from the headlights of oncoming vehicles, and
  - generating employment.
- The Policy envisages a strict system of auditing whereby money will be released by the government to the empanelled agencies only if they have achieved a survival rate of 90% the previous year.
- The implementation and progress of plantation will be monitored via images by Indian Space Research Organisation or ISRO and audit will involve modern information technology tools.
- According to the policy, contracts for greening will be given to NGOS, agencies, private companies and government organisations with proven track record in the past in the field. Those selected will be responsible for the survival and health of trees and will be strictly monitored by a body appointed by the ministry.
- The target for the first year is to cover 6,000 km of highways.

1.2. WATER POLLUTION

1.2.1. INITIATIVES UNDER NAMAMI GANGE PROGRAMME

1.2.1.1. GANGA GRAM YOJANA LAUNCHED

- Government recently launched Ganga Gram Yojana in Hapur District of U.P.
- 1600 villages situated along the banks of river Ganga will be developed under this scheme.
- First phase of the programme will cover 200 villages.
- In these villages open drains falling into river Ganga will be diverted and alternative arrangements for sewage treatment will be made.
- The villages will have toilets in every house hold.
- It is proposed to incur and expenditure of Rs. One crore on every village.
- These villages will be developed under the **Sichewal model**.

About Sichewal Model

- This model is named after noted environmental activist Balbir Singh Seechewal who played a prominent role in reviving the Kali Bein rivulet (a rivulet of Beas river) in Punjab.
- This was done mainly by cooperation of the villagers in water management and waste disposal in a meticulous way.
- The model involves following techniques
  - Decentralized natural treatment system - oxidation pond & settling tanks
  - Processes used to remove floating materials
  - Maintenance of flow of water which ensures self-purification of the river

1.2.1.2. APPROVAL OF HYBRID ANNUITY BASED PUBLIC PRIVATE PARTNERSHIP (PPP) MODEL

- In this model, a part of the capital investment (upto 40%) will be paid by government through construction linked milestones and the balance through an annuity over the contract duration upto 20 years

Expected Benefits

- This will help taking up more number of projects with the same allocation as made available under NamamiGange programme with reduced financial liability in the initial years.
- Spreading the stakes of private participant over the entire period of concession would ensure continued operations over long term.
- Linking of performance standards with the annuities will ensure desired objective of treated water of appropriate standard.

- It would help gradual capacity building of the Urban Local Bodies by setting ground for recovery of user charges on Polluter Pays Principle.
- Development of the market for treated water will lead to reduced demand on riverine freshwater and will result in enhanced flows in river Ganga.
- These steps would also kick start the process of responsible use of water in general and go a long way in mitigating the projected water shortage in the country.

1.2.1.3. DEPLOYMENT OF GANGA TASK FORCE

- The first company of Ganga Task force Battalion was deployed at Garhmukteshwar.
- Three such companies will be deployed soon at Kanpur, Varanasi and Allahabad.
- Jawans of the Ganga Task force will be deployed on the banks of the river Ganga to ensure that industry and civilians do not pollute the river.

1.2.2. FLY ASH

Why in news?

- Recently an expert panel of MoEF has expressed concerns over use of fly ash for filling mines as this can have environmental consequences in the form of:
  - ✓ Contamination of ground water due to leaching of heavy metals in fly ash
  - ✓ Reduction in recharging of ground water due to fly ash filled mine voids
  - ✓ Ash-filled voids cannot support tree species because of poor root system development which in turn results in uprooting of trees even by low velocity winds.
- Since its findings are not conclusive, it has called for a 10-year exhaustive study over this issue.

About Fly Ash

- Fly ash is one of the coal combustion products and is composed of fine particles that are driven out of the boiler with flue gases. Ash that falls at the bottom of the boiler is called bottom ash.
- Fly ash includes substantial amounts of oxides of silica, aluminum and calcium. Element like Arsenic, Boron, Chromium, lead etc are also found in trace concentrations. It, thus, poses hazards to environment and health.
- However, at the same time due to the presence of these minerals fly ash has certain unique properties. It can be used as a construction material, filling old mines, building railway embankments, and reclamation of low-lying areas.

Situation in India

- Indian coal has very high ash content - 30-40% ash content as against 10-15% in imported coal.
- Indian government has realized that this limitation can be converted into an advantage and thus steps have been taken:
  - ✓ **2009 notification of MoEF provided guidelines** on ash utilization advocated its usage within 100 km radius of thermal power plants.
  - ✓ **New and innovative uses** are also taking place- especially initiated by power companies like NTPC in collaboration with Institutes like IIT-Delhi and IIT-Kanpur e.g. Manufacture of pre-stressed railway concrete sleepers
  - ✓ **Transportation cost :**Some States like Orissa have ordered the plants to subsidize the transport costs
  - ✓ Recently Maharashtra government has decided to come up with an **export policy** for fly ash in the light of demand from places like Singapore and Dubai.
- However, India is still not able to match the potential of its fly ash use. As per a recent study by CSE only 50-60% of the fly ash generated is being utilized.
- There is a need to increase the capability, giving incentives to industry and new technology introduction in this field.

1.2.3. YAMUNA FLOODPLAINS

Why in news?

- Recently Art of Living (AoL) had organized a cultural event on Yamuna's floodplain.
- The event came under criticism from environmental activists and NGOs because of the damage it was likely to cause to the floodplains due to construction activities of gigantic proportions.
- While the NGT allowed the event to take place, it ordered the AoL foundation to pay a fine of Rs. 5 crore for the remedial and restoration work.

What is floodplain?

- Floodplain is the area adjacent to a river that is not always under water, but is prone to flooding. It is an extension of the riverbed and is an integral part of any river-system
- It is an ecologically sensitive area.
- In the case of the Yamuna in Delhi, the area that is likely to get submerged at least once in a 25-year period has been classified as its floodplain.

Significance of Floodplain

- **Flood protection**: As it provides more room to the river in the event of its rise
- **Improve water quality**: When inundated, it acts as natural filters removing excess sediments and nutrients.
- **Recharged Aquifers**: Outside of a river's main channel, water flow is slowed and has more time to seep into the ground where it can replenish underground water sources.
- **Improved Wildlife Habitat**: home to some of the most biologically rich habitats on Earth.
- **Recreational Industries and Eco-tourism**: fishing, hunting, camping, hiking, wildlife watching and boating - greatly enhanced by the natural processes of rivers and healthy floodplains.

Impact on Environment

- One of the important functions of the floodplains is groundwater recharge. In the process of flattening, the surface gets hardened, and it severely impacts its groundwater recharge capability.
- Change in the natural gradient of the floodplain would diminish its flood-carrying capacity.
- Cutting of trees and dumping of debris impacts aquatic and bird population.
- Increased footfall would also affect the region.

1.2.4. POLLUTER-PAY PRINCIPLE

Why in news?

This year, the Delhi HC had ordered the organisation 'Art of Living' to pay a fine of Rs. 5 crore for polluting river Yamuna. The imposition of the fine traces its legality from the well established 'Polluter pay principle' of environmental jurisprudence.

Meaning

- Liability upon the polluter to pay for restoration and compensation.
- It sets to serve following purposes:
  - ✓ Social justice; it favours a curative approach so that taxpayer's money is not spent for the fault of another.
  - ✓ Deterrence effect which would promote efficient utilization of resources. In this way it helps in promoting sustainable development as well as it acts as a negative feedback mechanism upon the polluter.
  - ✓ It offers a practical solution which can be implemented.

Evolution in India

- It has been recognised as a general principle of international law.
- It was expressly mentioned under Principle 16 of Rio Declaration
- It was first recognised by the Apex Court in Vellore Citizen's case (1996) which read it under A.21 r/w Article 47, 48A and 51A(g) of the Constitution.
- It also find place in legislations such as Compensatory Afforestation Act, Nuclear Civil Liability Act.

Issues

- Identification of the polluter is difficult as the pollution may pass through several stages
- Common man's financial incapacity, unawareness and reluctance to engage in legal battles would leave many cases non-litigated
- Assessment of damages is difficult and uncertain
- Paying capacity of the polluter may not be enough to restore the damage caused
- Ethical issue whereby polluter is allowed to pollute by paying a penalty- no other liability is imposed which may not be enough deterrent for big and rich companies. Small firms may suffer in the process

1.3. SOLID WASTE

1.3.1. SWACHH BHARAT MISSION: RURAL-URBAN DISPARITY

- According to recently released **Swachhta Status Report** by the National Sample Survey Office (NSSO), more than half the rural population of the country still opts for open defecation.
- There exist widespread disparity between the rural and urban areas:
  - ✓ The survey estimates that 52.1% of people in rural India choose open defecation compared to 7.5% in urban.
  - ✓ Only 45.3% rural households have a sanitary toilet, while the figure is 88.8% in urban areas
  - ✓ USAGE: In villages, 95.6 per cent of persons from families having access to toilet at home or common facility was using it. This proportion is 98.7 per cent in cities.
  - ✓ **Cleaning Mechanism:** In 55% of villages cleaning was done by person employed by Panchayats or on contract payment. In 17% cleaning was done by residents themselves and about 22.6% were not cleaned. In comparison, in cities 73% was cleaned by person employed by local municipal bodies. The other fissures rest at 12% and 8.6% respectively.

Analysis

- A good observation is that families with toilet facility are using it.
- The cheaper bio-latrines promoted by WHO, used all across the world, are not preferred in rural India since these require regular pit-emptying, a task associated with severe forms of social exclusion.
- Local community empowerment is the most powerful tool in the efforts towards making India open-defecation free.

Swachh Survekshan

- This is an attempt by the Ministry of Urban Development to study and rank Indian cities on cleanliness.
- There will be three streams of data collection
  - ✓ Citizen feedback,
  - ✓ Municipality self-evaluation
  - ✓ Independent assessment
- The results are to be announced on the MyGov website.
- It will be helpful in measuring the impact of the mission year-on-year basis.
- Based on the findings, rules can be modified and new steps can be taken to correct the measures and effective and efficient implementation cab be ensured.

Parameters for evaluation

- Strategies to stop open defecation and integrate the city's solid waste management systems.
- Efficacy of communication strategies on information, education and behaviour change.
- Effectiveness of systems for sweeping, door-to-door collections and transportation of waste.
- Efficiency in processing and disposal of waste.
- How good is deployment of public and community toilets?
- Progress made in construction of household individual toilets.

1.3.2. NEW PLASTIC WASTE MANAGEMENT RULES

Why in news?

- Government recently amended the Plastic Waste (Management and Handling) Rules, 2011.

Main Changes

- **Increasing the minimum thickness of plastic carry bags** from 40 microns to 50 microns. This would increase the cost and the tendency to provide free carry bags would come down.
- **Responsibility of local bodies**: Rural areas are brought under the rules since plastic has reached rural areas as well. The *gram sabhas*have been given responsibility of implementation.
- **Extended Producer Responsibility**: Earlier, EPR was left to the discretion of the local bodies. First time, the producers and brand owners have been made responsible for collecting waste generated from their products.
- Producers are to keep a record of their vendors to whom they have supplied raw materials for manufacturing. This is to **curb manufacturing of these products in unorganised sector**.
- **Responsibility of waste generator:** All institutional generators of plastic waste shall segregate and store the waste generated by them in accordance with the Solid Waste Management Rules, and handover segregated wastes to authorized waste disposal facilities.
- **Responsibility of street vendors and retailers**: Not to provide such carry bags or fine would be imposed. Only the registered shopkeepers on payment of a registration fee to local bodies would be allowed to give out plastic carry bags on charge.
- To promote the use of plastic for road construction or energy recovery.

Why not ban plastic bags?

- As per the Environment ministry an eco-friendly product, which is a complete substitute of the plastic in all uses, has not been found till date.
- In the absence of a suitable alternative, it is impractical and undesirable to impose a blanket ban on the use of plastic all over the country.

1.3.3. SANITATION PROBLEM IN URBAN INDIA

Need for Septic Tanks

- Absence of centralized sewerage system in many places in Indian cities like unauthorized colonies;
- Only a third of urban houses in India are connected to the sewer system. Thus, septic tanks is a necessity as 100% sewerage is not practical due to enormity of costs, difficult terrains, energy required etc-
- So since septic tanks are a reality it must be part of formal Urban sanitation policy.

Issues with Septic Tanks in India

- Construction quality of these septic tanks is poor- so partial treatment takes place; BIS standards are there but not followed
- Manual emptying is done despite Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993
- No formal channel of disposal and treatment of this faecal sludge; Poor regulation and monitoring of collection and transport of this faecal sludge. It is disposed off in drains without being treated
- No specific legal provisions for management of sludge

Solution

- Improving construction quality- training of masons
  - ✓ New methods like Bio-digestors, vermin-filteration
- Regulation of private transportation- PPP required
- Promoting uses of faecal waste- like bio-diesel
- **NIMBY pejorative**; People would complain about garbage in the cities but refuse to acknowledge their own role in generating it.
- Per capita consumption waste generation has doubled in last decade.
- Simple solution required- putting individual at the center
- learning from the examples of successful cities across the world as well as taking lead from our own cities like Alleppey, Mysuru, Panaji and Bobbili, and try to replicate these models.

1.4. E-WASTE

1.4.1. NEW E-WASTE MANAGEMENT RULES

- Recently, the Ministry of Environment and Forests have proposed the E-waste (Management and Handling) Rules 2016 that will replace the earlier Rules of 2011

Background

- As per an expert report by Assocham-KPMG, India is the 5th largest producer of e-waste in the world discarding roughly 18.5 lakh metric tonnes of e-waste each year.
- **12% of the waste is contributed by the telecom sector alone**, with 25% of the mobiles in circulation ending up in e-waste annually.
- 95% of the e-waste in the country in handled by unorganized sector.

Main Features of the new Rules

- **Applicability**
  - ✓ Earlier it was applicable only to producers and consumers, dismantlers and recyclers. Now extended to Manufacturer, dealer, refurbishers and Producer Responsibility Organisation (PRO). This will help in leakage of e-waste to informal sector
  - ✓ Earlier only Electric and Electronic equipments were covered. Now even their components and spare parts are also covered. Also Mercury containing lamps like CFLs also included.
- **Extended Producers' Responsibility (EPR)**:
  - ✓ Extended producer responsibility (EPR) is a strategy designed to promote the **integration of environmental costs associated with goods** throughout their life cycles into the market price of the products.
  - ✓ Single EPR Authorization for Producers is now being made CPCB's responsibility to ensure pan India implementation.
  - ✓ Further, flexibility is given for ease of implementation of EPR provisions. Options like setting up of PRO, e-waste exchange, e-retailer, Deposit Refund Scheme are given to Producers to ensure efficient channelization of e-waste.
  - ✓ **Deposit Refund Scheme** is an additional economic instrument introduced.
  - ✓ Under **E-waste exchange** independent companies could offer services of sale and purchase of end-of-life equipments.
  - ✓ Collection is now exclusive responsibility of the Producer. There is no separate authorization needed for this as was required earlier.
  - ✓ A target based approach has been mandated for collection. This is 30% of the quantity of waste generated in first phase and will eventually move to 70% in 7 years.
- **Bulk Consumer responsibility**: They have to file annual returns. Health facilities have been added to the definition.
- **Participation of State government**: Involvement of state government for effective implantation of the rules and simultaneously ensure welfare, safety and health of the workers involved in this e-waste management sector.
- Provision on **Reduction of Hazardous Substances (RoHS) during manufacturing stage** has been brought in line with existing EU regulations. A provision for withdrawal and recall of the products in case of non-compliance is added.

A Much Needed Improvement

- India produces around 8 lakh tones of e-waste annually while 151 registered recycling facilities can handle only half of them.
- Presently, the e-waste management system suffers from proliferation of the informal sector. They adopts a highly unscientific way of handling waste that is extremely hazardous to environment and health. The new rules would help in putting a check on this.
- The success of bringing the consumer in the formal chain would depend on two things:
  - ✓ Better repurchase offer than the unorganized sector; Deposit Refund Scheme would help in this
  - ✓ Easy collection method

- Stress has been laid on simplification of procedures and flexibility on the part of the producers.
- Role of state government and other stakeholders is underscored that promises better implementation.

Challenges

- The recycling capacity needs to increase. Presently it can handle only half of the waste produced.
- Segregation of urban solid waste management has to improve where many e-waste get mixed.
- Habit of Indian households to cling on to defunct gadgets and not letting them go.

Way Ahead

- A great opportunity for India to deal with this growing menace which will assume great proportions if not addressed now with full vigour.
- An awareness campaign would help in implementation as well.

2. CONSERVATION MEASURES

2.1. FOREST CONSERVATION

2.1.1. REVIEW OF THE NATIONAL FOREST POLICY

Why in news?

- The Environment Ministry had tasked the Bhopal-based Indian Institute of Forest Management, an affiliated organisation, with reviewing and revising the existing forest policy.
- This is the first time that the policy was being re-looked since 1988 as it wanted to update the several changes in forest laws and provide a forward-looking policy that talked about increasing India's forest cover and tackling the effects of climate change.
- It may be noted that many demands have been made to **review the 1998 policy** as it does not meet the present day requirements.

Highlights of the study

This study was prepared for 'consideration of the government' and it was funded by **United Nations Development Fund** as well. In this light it is important to consider the major proposals of the study.

- **Increasing forest cover**
  - ✓ It aims to bring a minimum one-third of India's total geographical area under forest or tree cover through scientific interventions and enforcing strict rules to protect the dense cover.
  - ✓ This should be done replenishing it with **native species** rather than introducing exotic species
- **Carbon tax**: It proposes to levy environmental cess, green tax, carbon tax etc. on certain products and services
- **Diversion of land**
  - ✓ It underscores the need to exercise special caution in case of land diversion projects related to mining, quarrying, construction of dams, roads and other linear infrastructure
  - ✓ Use of state-of-the-art technology which causes minimum pollution and damage should be promoted.
- **Finance**: It calls for enhancement of the budget of the forestry sector so that objectives enshrined in the this policy can be achieved
- **Eco-tourism**: It calls for developing "sound eco-tourism models" with the focus on conservation while supplementing the livelihood needs of local communities.
- **Implementation**: The policy envisages that a national implementation framework be put in place within six months of the notification, to deliver on the commitments. It also urged states to formulate their forest policies and prepare an implementation framework.
- **Agro-forestry**: The policy also emphasized on large-scale expansion of agro-forestry and farm forestry through incentives and operational support systems such as lowering input costs and enabling access to reasonably priced quality planting material.

2.1.2. THE INVIOLATE FOREST POLICY

Forest areas are a source of huge mineral wealth as well as ecology and biodiversity. The pressure of development needs and the need to conserve environment presents a dilemma with respect to the forests.

Inviolate forest policy

- It seeks to declare certain areas as out of bounds for activities like mining.
- It was originally called the 'go-no go' area policy.
- First mooted during former environment minister Jairam Ramesh's tenure in 2009.
- It was a pro-forest policy that kept many coal blocks out of the mining permission.
- It used various criteria for classification of forests like forest density, forest type, biodiversity richness etc.
- However, with time and pressure the policy was diluted. It went through successive revisions with more dilution and opening of greater number of coal blocks for mining.

- The policy was revised for the 4th time in 2014 and since been kept under wraps.
- In November 2014, the **expert panel under TSR Subramanium** recommended the policy to be further pruned.

Issue

- India has a long-term goal of bringing 33% area under forest cover and creating additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030.
- Present forest cover is 24.16% of total geographical area (December 2015). The pressure on forests is going to further increase due to India's development needs.
- The government is, thus, expected to come out with a policy which sets out clear and scientific criteria to keep certain forests out of the out of bounds for mining and similar activities. It would lend a degree of certainty to the stakeholders about the areas which would be given green clearance to cut forests and mine. However, with the inviolate forest policy in limbo, this clarity is missing

2.1.3. COMPENSATORY AFFORESTATION FUND BILL, 2015

Why in news?

- The Compensatory Afforestation Fund bill, 2015 was passed by both Houses of the Parliament early this year.
- The Bill establishes the **National Compensatory Afforestation Fund** under the **Public Account of India**, and a State Compensatory Afforestation Fund under the Public Account of each state.

Background

- Currently Reserved Forest or a Protected Area (PA) land may be diverted under the Forest (Conservation) Act, 1980 for non-forest developmental activities like an industrial or infrastructure project with approval of central and state government.
- To compensate for diversion of forestland, afforestation must be done on a separate piece of land called as compensatory afforestation. In addition compensation must be paid for loss of forest ecosystem and biodiversity. Valuation of this forest ecosystem is called net present value.
- Cost for both is borne by agency responsible for diversion of forestland and money is collected by the state government for afforestation and forest development.
- In 2002, Supreme Court observed that these funds were not being utilized, and for this purpose an ad-hoc authority called compensatory afforestation fund management and planning authority (CAMPA) was set up. In the absence of permanent institutional mechanism more than Rs. 40,000 crores have accumulated which are being kept in Nationalized Banks and managed by CAMPA.

What bill does?

- Provides an institutional mechanism for safety and transparency in expeditious utilization of unspent amounts with ad hoc CAMPA to mitigate impact of diversion of such forest land.
- The National CAF and State CAFs will receive payments for: (i) compensatory afforestation (ii) net present value of forest (NPV), and (iii) other project specific payments.
- The National Fund will receive 10% and the State Funds will receive the remaining 90%.
- Establishes the National and State Compensatory Afforestation Fund Management and Planning Authorities to manage the National and State Funds.

- These Funds will be primarily spent on afforestation to compensate for loss of forest cover, regeneration of forest ecosystem, wildlife protection and infrastructure development.

Issues

Several factors that affect compensatory afforestation and forest conservation are

- A 2013 CAG report noted that state forest departments lack the planning and implementation capacity for afforestation.
- Procuring land for compensatory afforestation is difficult as land is a limited resource, and is required for multiple purposes, such as agriculture, industry, etc. This is compounded by unclear land titles, and difficulties in complying with procedures for land use.
- The compensatory forests are low in quality and lacks in richness of biodiversity of a natural forest. A High Level Committee on Environment Laws observed that quality of forest cover has declined between 1951 and 2014; one reason is poor compensatory afforestation plantations.
- The Bill delegates the determination of NPV (value of loss of forest ecosystem) to an expert committee, its computation methodology would be important.
- Fragmentation i.e. breaking up of large forest blocks into smaller patches creating new edges that expose forests to degradation.

Way forward

- Planned implementation of said act at State and local level is very urgent to mitigate impact of loss of forests land and biodiversity. Since large amount is being devolved at state level, therefore, timely monitoring is very important.
- It will help in achieving our target of 33% forest cover and 2.5 billion tonne of carbon sink as indicated in our INDCs.
- The Department related Parliamentary Standing Committee had recently in 2016 had made certain suggestions:
  - ✓ Provisions to be made for providing incentives to persons who are displaced or relocated elsewhere from eco sensitive zone.
  - ✓ Compensatory Afforestation Fund Management and Planning Authority (CAMPA) funds should be permitted to be used for acquiring lands in eco sensitive areas in order to overcome loss of forests and native species plants should be selected so that ecology of the area is maintained.
  - ✓ Need for people's participation at various stages.

However, these suggestions have not been incorporated into the final Bill.

2.1.4. PROTECTING SACRED GROVES

Why in news

- Recently, the State Medicinal Plant Board of Kerala has undertaken a project to protect these groves by activities **like bio-fencing, preparing inventory of plant wealth, cleaning up water bodies and creating awareness about conservation**.

What are sacred groves?

- Forest Fragments of various sizes, which are community protected and usually have a significant religious connotation for that community.

Significance of sacred groves

- Traditional uses
  - ✓ Medicinal use as it is a repository for plants with Ayurvedic properties.
  - ✓ Source of replenishable resources like fruits and honey
  - ✓ The groves are often associated with ponds and streams. They help in meeting the water requirement of communities and also in recharging aquifers.
  - ✓ Hunting and felling trees is a taboo. This vegetation cover helps in preventing soil erosion.

- Modern uses
  - ✓ In modern times, they have become biodiversity hotspots due to progressive habitat destruction in neighbouring areas.
  - ✓ They act as a rich gene pool including rare, threatened and endangered species.
  - ✓ Sacred groves in urban landscapes act as 'lungs' to the city as well

Threats

- Urbanization and encroachment
- Over-exploitation of resources like overgrazing and excessive firewood collection
- Religious practices; clearing them for construction of shrines and temples
- Invasion by invasive species

Protection measures

- The Wildlife (Protection) Amendment Act, 2002 had introduced a new protected area category called 'community reserve'. Sacred Groves have been put under this.
- Under this significant power is given to the local communities with respect to administration of these areas.
- Many NGOs also work with local people for their protection.

2.2. WATER CONSERVATION

2.2.1. WETLAND MANAGEMENT IN INDIA

Importance of Wetlands

> Wetlands are areas where water is the primary factor controlling the environment and the associated plant and animal life. They are defined as: *"lands transitional between terrestrial and aquatic eco-systems where the water table is usually at or near the surface or the land is covered by shallow water".*

- Vital part of the hydrological cycle, are highly productive, support exceptionally large biological diversity
- Provides services such as waste assimilation, water purification, flood mitigation, erosion control, ground water recharge, micro climate regulation.
- supporting many significant recreational, social and cultural activities besides being a part of the cultural heritage

Present Management Framework

- Earlier the Ministry of Environment and Forests was implementing two separate Centrally Sponsored Schemes (CSS), namely the National Wetlands Conservation Programme (NWCP) and the National Lake Conservation Plan (NLCP). This was later merged into a single scheme called National Plan for Conservation of Aquatic Eco-systems (NPCA).
- Under this scheme a central policy towards the conservation of wetlands is laid down, the programmes are monitored and an inventory of the wetlands is prepared.
- While the conservation and management of wetlands rests with the state governments, their plans are approved by the central government.

Prevailing Problems

- Restoration and conservation of wetlands becomes impossible once they are destroyed, as these are neither identified nor categorized.
- States, in coordination with the central government, failed to performed their statutory duty of identifying all wetlands in their respective jurisdiction as per the Wetlands (Conservation and Management) Rules, 2010
- Centre had violated sections of the Environment Protection Act 1986 which has increased the risk of losing the wetlands.
- Govt. has failed to prevent activity in and around the wetlands, as inventoried by ISRO in 2007 and 2011

New Rules

- Early this year, the MoEF had come out with new draft rules for conservation of wetlands in India. They have been recently into the public domain the government.
- In 2010, the MoEF had notified Rules for conservation and management of wetlands under the Environment Protection Act, 1986. The new rules will replace them.

Major changes from the old rules

- The Central Wetlands Regulatory Authority (CWRA) will be removed. The power of notification would rest with the chief ministers of respective states.
- There is no time limit for notification as against the period of 12 months stipulated in 2010 rules
- The numbers of restricted activities have been reduced.
- Earlier the decision taken by CWRA could have been challenged before NGT by a citizen. No provision of citizen check is present under the new rules.

Concerns with the new Rules

- The record of states in implementation of the rules has not been encouraging. It is observed that states are susceptible to yielding under local pressure. Recently the NGT reprimanded some states for not even notifying wetlands under the 2010 rules. In this light the decentralization without adequate checks could be counter-productive.
- The draft does away with the Central Wetlands Regulatory Authority, which had suomoto cognizance of wetlands and their protection.
- It contains no ecological criteria for recognising wetlands, such as biodiversity, reefs, mangroves, and wetland complexes as was mentioned in 2010 rules.
- It has deleted sections on the protection of wetlands, and interpretation of harmful activities, which require regulation, which found reference in the 2010 rules. It seems the protection has been diluted as restricted activities have been reduced drastically. Activities under vague terms like 'wise use' have been permitted.
- No role to local people and institutions have been given.

Other Issues in Wetland Management System

- Presently, only notified wetlands are given protection. Small wetlands get ignored in the process.
- The process of notification is initiated by the State government. So no avenue is available to the local people or bodies who are the major stakeholders.
- No data bank is available on wetlands except on the Ramsar sites. Without data the extent of wetlands is not ascertained and thus encroachment becomes easier.
- The Municipal bodies that are currently responsible for implementation of the rules related to wetlands lack technical expertise to identify a wetland.

Suggestions

- There is need for scientific criteria for identifying wetlands- an independent authority can help with respect to this.
- Use this method to create a data bank on wetlands; proper data of only Ramsar sites is present. In absence of proper data bank extent of wetland is not ascertained and encroachment becomes easier.
- Proper checks and balances- both on part of central government and citizens is required.
- The rules should be people-centric; involvement of town and country planning Board in identification of wetlands. More role to locals like fishing community, farming and pastoral community in management-they have experience as well as interest in their protection.

UPSC IN PAST

Q. Discuss the wetlands and their role in ecological conservation in India. (150 words) (MAINS 2009)

Q. List any eight 'Ramsar' wetland sites located in India. What is the 'Montreux Record' and what Indian sites are included in this Record? (150 words) (MAINS 2010)

2.2.2. PROGRAMMES FOR WATER CONSERVATION

The ministry has launched following programmes this year for water conservation:

2.2.2.1. JAL KRANTI ABHIYAAN

- Jal Kranti Abhiyaan is a program of central government for creating awareness on aspects of water security and water conservation.
- Under Jal Kranti Abhiyan two villages, preferably facing acute water scarcity are being selected as "**Jal Grams".**
- An integrated water security plan, water conservation, water management and allied activities are being planned for these villages by Panchayat level committee to ensure optimum and sustainable utilization of water.
- From each Jal Grams, one elected representative of Panchayat and one representative of the water users association are being identified as **Jal Mitra/ Neer Nari** and training is being imparted to them to create mass awareness about issue pertaining to water as well as providing necessary guidance in tackling water supply related routine issues.

It was launched on 5th June 2015. It has the following objectives:

- Strengthening grass root involvement of all stakeholders including Panchayati Raj
- Institutions and local bodies in the water security and development schemes (e.g.
- Participatory Irrigation Management (PIM);
- Encouraging the adoption/utilization of traditional knowledge in water resources
- conservation and its management;
- To utilize sector level expertise from different levels in government, NGO's, citizens etc; and
- Enhancing livelihood security through water security in rural areas.

- A card known as **Sujalam Card** (with the logo "Water Saved, Water Produced) is being prepared for every Jalgram which would provide the yearly status/information on availability of water for the village from all sources.
- Central Water Commission (CWC) and Central Ground Water Board (CGWB) are the nodal agencies for implementation.

2.2.2.2. JAL MANTHAN-2

About

- It is an event organized by Ministry of Water Resources, River Development & Ganga Rejuvenation to dwell on issues of optimal use of water resources and accordingly refine the policies.
- It is marked by the participation of the union and state ministers of related ministries/departments, senior officers of government and other stakeholders like representatives of NGOs and eminent water experts.
- The first JalManthan happened in November 2014. Its second edition was recently organized.

Highlights of Jal Manthan-2

- Its theme was '**Integrated Approach for Sustainable Water Management'**
- **Mission Kakatiya:** Helped in raising water levels in Telangana by restoring tanks and water bodies.
- Setting up more **reverse osmosis plants** to address the issue of increasing levels of arsenic and fluoride in the ground water.
- Need for a **National law on water**
  - ✓ 'Water' broadly falls in state list. There are more than 300 state laws on water. But they do not address the present concerns in a holistic manner.
  - ✓ Considering its critical importance in national development, water needs to be managed with a national perspective based on the acceptance of a few common fundamental principles.
  - ✓ The move also finds support with the 12th five year plan document and the Public Accounts Committee report in 2014-15.
  - ✓ However, this has been opposed by most of the states. Further, neither of commissions on Center-state relations namely the Sarkaria Commission and Punchhi Commission supports it.
- Lastly, the formulation of a **River Basin Management law** was also considered.

2.2.2.3. NATIONAL HYDROLOGY PROJECT

- The Rs. 3,679-crore National Hydrology Project (NHP) was approved by the Union Cabinet early in the year
- It aims **to collect hydro-meteorological data across India and use it for efficient water management in the country**.

Main Features

- It will set up a system for timely and reliable water resource data acquisition, storage, collation and management
- It will help to build capacity of state and central organisations in water resource management through the use of information systems and adoption of state-of-the-art technologies like remote sensing
- assist in promoting 'efficient and equitable' use of water, especially groundwater, down to the village level and provide information on quality of water as well
- help in gathering hydro-meteorological data which will be stored and analysed on a real-time basis and can be seamlessly accessed by any user at the state, district or village-level
- cover the entire country, unlike earlier hydrology projects that covered only 13 states
- Funding pattern- 50% would come from World Bank loans while the rest would be given as budgetary support.

Significance

- Better information to the public about availability of water in the country. Thus, prudent decision in activities like cropping pattern can be made.
- Increase in lead time in flood forecast from one day to at least three days.
- Mapping of flood inundation areas for use by disaster management authorities.
- Improved reservoir operations through seasonal yield forecast and drought management.
- Better assessment of surface and ground water resources in a river basin for better planning and allocation of resources.

2.2.3. GROUNDWATER MANAGEMENT

Water crisis was a recurrent theme last year. The unchecked exploitation of ground water is a cause as well as consequence of this. The government early this year has taken steps towards the successful management of ground water.

Government Efforts

- **Building pools**, dug wells using MNREGA- this was also announced in this year's budget speech
- Watershed development in specific areas**; Neeranchal scheme** was launched for this
- **Rainwater harvesting**- awareness, education, tax incentives, easy infra availability
- **National Acquifer map**; for location based implementation
- **Promoting rational use of ground water**; Cropping patterns, rationalization of electrical subsidy, agro-forestry, micro-irrigation practices etc
- **Greater awareness**- making use of extension services

National Water Framework Law

- The draft bills — the National Water Framework Bill and the Model Bill for the Conservation, Protection, Regulation and Management of Groundwater were uploaded by the government. They aim to decentralise water management and give more power to panchayats and gram sabhas to decide how water can be better used
- **Important Features**
  - ✓ Acknowledgment of citizen's right to safe water
  - ✓ Stringent rules on how corporations and large entities can extract ground water; ownership of land doesn't extend to ground water which is a community owned product. Groundwater would not be a free resource; even paid use will be allowed in a sustainable manner- ensuring equitable availability to all.

- ✓ fines ranging from Rs.5,000 to Rs. 5,00,000 depending on the level of infraction and who the perpetrators were
- ✓ More say to end-users of water, Panchayats and local bodies
- ✓ Priority wise use of ground water; top priority in the use of groundwater ought to be in meeting drinking, sanitation, food security, sustenance agriculture, the needs of women and only after that for industry.
- ✓ There will be an incentive for those who cultivate less water-intensive crops.
- ✓ There would also be groundwater security boards and groundwater protection zones that would be overseen by State bodies

2.2.4. PROJECT GREEN PORT

- With an aim to make major ports in India greener and cleaner, government has launched Project Green Ports. The project **has two verticals - Green Ports Initiative and Swachh Bharat Abhiyan.**
- The Green Port Initiative comprises **12 time-bound sub-initiatives.**
  - ✓ Some of the plans are preparation and monitoring plan,
  - ✓ acquiring equipment required for monitoring environmental pollution,
  - ✓ acquiring dust suppression system, setting up of sewage/waste water treatment plants/ garbage disposal plant,
  - ✓ setting up projects for energy generation from renewable energy sources,
  - ✓ completion of shortfalls of Oil Spill Response (OSR) facilities (Tier-1), prohibition of disposal of almost all kind of garbage at sea,
  - ✓ Improving the quality of harbor wastes etc.
- **Under Swachh Bharat Abhiyaan,** the Ministry **has identified 20 activities** with certain time-line to promote cleanliness at the port premises.
  - ✓ cleaning the wharf, repairing of sheds, cleaning and repairing of port roads,
  - ✓ modernizing and cleanliness of all the toilet complexes in the operational area,
  - ✓ Beautification and cleaning of parks, boards indicating cleanliness messages,
  - ✓ Cleaning and repairing of all drainages and storm water systems and tree plantation.
- In order to achieve these objectives, **regular training** will be provided to the staff in order to generate awareness and inculcate a positive attitude towards keeping the environment clean and green.

2.3. WILDLIFE/BIODIVERSITY CONSERVATION

2.3.1. CULLING OF ANIMALS

- Environment Ministry recently provided a spate of clearances allowing culling of several species in different states.
- The state Boards were permitted to declare animals that were coming in conflict with humans like nilgai, rhesus monkey, wild pigs etc. as **vermin** in Bihar, HP and Uttarakhand
- This means that those who kill these animals will, for a year, will not be subject to the jail terms and fines that hunting these animals typically invite.
- Wild animals are protected by the Wildlife (Protection) Act, 1972 under which animals and birds are classified, on the basis of threats they face, into four schedules.
- The highly endangered tiger is in the highest Schedule 1 and hares in Schedule 4.
- Each class gets different grades of protection and the law allows all, except Schedule 1 animals, to be temporarily slotted as Schedule 5 or 'vermin.'
- Nilgai, wild pig and rhesus macaque come under schedule 2 and 3.
- In response to a petition, SC refused to stay the notification that allowed for the culling.

Animal Welfare Board

- It is a statutory advisory body advising the Govt. on animal welfare laws and promotes animal welfare.
- It has questioned the "vermin" decision and called it arbitrary.
- It was established in 1960 under Prevention of Cruelty to Animals Act, 1960 and works under MoEF.

2.3.2. INCREASING MAN-ANIMAL CONFLICT

- A leopard was spotted in a school in the Whitefield area of Bengaluru creating panic for days. Many schools were asked to remain shut. Later 3 more leopards were spotted in the city. Such incidents have become common with many wild animals entering cities and causing damage to life and property.
- Reasons for Increasing Leopard Conflicts:
  - ✓ Due to afforestation and bad urban planning the quality of the habitat of the leopard has declined
  - ✓ Its prey base has also reduced.
  - ✓ The conservation policies in the country are biased in favour of other carnivores like Lion and Tiger.

Laws in Place to Address this Issue

- **Protocol by Environment Ministry** in 2011 listing the steps to be taken if a leopard strays into human habitation
  - ✓ Wild carnivores generally attack in self-defense and it is, thus, advisable to avoid provoking them.
  - ✓ The area should be cordoned off with barricades and all attempts should be made to keep the crowd and local people from approaching the animal
- **Translocation** is suggested. However, this does not solve the problem but only shifts it to a different place. In fact studies done by renowned ecologist Vidya Athreya show that human-animal conflict tend to increase after translocation.
- **Lethal control** has been banned since 1972. Further, lethal control may not reduce the density of a carnivore in an area because, as mentioned earlier, transient individuals may immediately occupy the vacated territories.

Alternate Suggestions

- Leopards are adaptable predators, adept at living close to humans as long as food and cover are available. Therefore, there is a need to maintain the existing tolerance by steps like:
  - ✓ **Improving techniques to protect livestock** with better pens and sheds.
  - ✓ **Reducing organic filth** so that feral dog and pig populations decrease, thereby decreasing the attractiveness of the area for leopards.
- A **robust and timely compensation/insurance scheme** administered by the local community.
- A **conservation policy solely focusing** on this issue.
- Further, there should be **better planning of cities**.

2.3.3. ENVIRONMENTAL CRIME ININDIA

What is environmental crime?

As per National Crime Records Bureau (NCRB) it includes violations under only five laws:

- the Forest Act, 1927;
- Wildlife Protection Act, 1972;
- Environment (Protection) Act, 1986;
- Air (Prevention and Control of Pollution) Act, 1981;
- Water (Prevention and Control of Pollution) Act, 1974 (as amended in 1988).

Reasons for under-reporting of environmental crimes in India

- NCRB data suffers inadequate coverage of laws whose violation would constitute a crime against the environment
- Pollution control boards (PCBs) which deal with air and water pollution, do not have enforcement officers, no mechanism to address complaints and have no policing functions. They just issue permits.
- Police authorities are often not aware of the laws under various environmental acts and hence do not record these as crimes under the Act.

2.3.4. CONSULTATION ON BIODIVERSITY FINANCE INITIATIVE BEGINS

- The Environment Ministry started a two-day National Stakeholder Consultation Meeting on Biodiversity Finance Initiative to conserve India's biodiversity.
- This National Stakeholder meeting has been organized to understand the BIOFIN project and to seek professional inputs from experts of various fields in strengthening the biodiversity conservation efforts in the country.
- The idea behind implementing BIOFIN is to first assess the gap between the 'available funding' and the 'required funding' for biodiversity conservation and then to plan for resource mobilization.

What is Biodiversity Finance Initiative (BIOFIN)?

- Biodiversity Finance Initiative – BIOFIN, is a new global partnership seeking to address the biodiversity finance challenge in a comprehensive manner – building a sound business case for increased investment in the management of ecosystems and biodiversity.
- BIOFIN is managed by the UNDP Ecosystems and Biodiversity Programme, in partnership with the European Union and the Governments of Germany and Switzerland.
- The Global Environment Facility is a further partner financing parallel in-country projects in support of the revision of National Biodiversity Strategies and Action Plans (NBSAPs).

2.3.5. ENVIRONMENT AWARENESS ACTIVITIES BY MOEF

Swacchta Pakhwada Campaign

- It is a part of the Government's effort to accelerate efforts to achieve total sanitization and cleanliness by October 2, 2019 under Swacchh Bharat Mission.
- Under it, a Swacchh Bharat Fortnight is being organised theme-wise by different Ministries.
  - ✓ For e.g. in June 2016, the Corporate Affairs Ministry observed Swachhta Pakhwada and asked firms and other stakeholders to carry out activities related to cleanliness for a fortnight.
  - ✓ Similarly, the Ministry of Environment, Forest and Climate Change organised the Swacchh Bharat Pakhwada earlier this month.
- It is totally voluntary and aims at creating awareness, targeting programmes, inviting pledges, spending of CSR etc.

Eco-Clubs

- The Eco-Clubs established under the National Green Corps programme of the Ministry carried out various activities relating to Swacchhta such as Safai Abhiyan at nearby commercial areas and cleaning of public wells, ponds and rivers of the locality.
- Other activities like tree plantation drive/greening neighbourhood, nukkad 'nataks'were performed;
- Volunteers took pledges on related themes; organised rallies and poster and slogan competitions on related themes.

National Green Corps Programme

- **National Green Corps** is a major initiative of MoEF for creating environmental awareness.
- It was launched in 2001-02 and aims at building cadres of young children working towards environmental conservation and sustainable development.
- It is operated through **Eco-clubs** which are set up in schools and registered as members of NGC.
- This programme exposes school children to in-depth field experiences, and provides opportunities to convert their ideas into creative action.
- The programme has a cascading effect as it seeks to redirect the consciousness of students towards environment friendly attitudes and actions and goes beyond schools, promoting school-society interactions to sensitize the society.

2.4. TACKLING CLIMATE CHANGE

2.4.1. CARBFIX PROJECT

Why in news?

- Recent reports show that the project was able to solidify 95% of the injected 250 tonnes of CO2 into calcite in 2 years, using 25 tonnes of water per tonne of CO2.
- This is a significant achievement and offers hope for future.

What is it?

- It is a project in Iceland that aims to lock away CO2 by reacting it with basaltic rocks.
- Carbonated water is injected into the rocks so that it reacts with Calcium, Magnesium or Silicate material present in Basaltic rocks. This is called enhanced weathering.
- Thus, the CO_2 is captured permanently without releasing any harmful by-products.

Issues

- Cost of the process is very high.
- Since the reactions are exothermic, it is reversible if the rocks are heated.
- The pumping activity generates seismic activity.

2.4.2. CLIMATE ENGINEERING SOLUTIONS

- Climate engineering refers to the deliberate and large scale intervention in the Earth's climate system with the aim of limiting adverse climate change.
- Generally two categories of engineering solutions:
  - **Greenhouse gas removal:** Examples
    - ✓ **Carbon capture and storage (CCS)**, where some of the carbon dioxide being emitted by coal-fired power stations is recaptured by physically sucking it in and transporting it elsewhere (like oilfields) to be sequestered underground.
    - ✓ **Biochar** which is created by pyrolysis of biomass
    - ✓ **Enhanced weathering** involves a chemical approach to remove carbon dioxide involving land or ocean based techniques. Examples of land based enhanced weathering techniques are in-situ carbonation of silicates.
    - ✓ **Afforestation**
  - **Management of Sunlight:** Here the plan is to reduce global warming by cutting down the heat absorbed by our planet from the sun. Examples:
    - ✓ **Stratospheric aerosol injection (SAI):** SAI involves spraying into the stratosphere fine, light-coloured particles designed to reflect back part of the solar radiation before it reaches and warms the earth. Sulphur Dioxide gas is used for the process.
    - ✓ **Cirrus cloud manipulation**: Here the cirrus clouds are removed or thinned so that their long-wave trapping capacity is reduced and thus cools the surface.
    - ✓ **Marine cloud brightening**: The low warm clouds which are highly reflective to sunlight are modified to increase their reflectivity.
    - ✓ **Space sunshade**: Obstructing sunrays with space based mirrors
    - ✓ Using pale-coloured roofing material or growing high albedo crops.

2.4.3. SPACE COLLABORATION TO TACKLE CLIMATE CHANGE

Why in news?

- The monitoring of GHG emissions can be done effectively and accurately by space satellites.
- Keeping this mind, 60 space-faring nations have agreed to engage their earth observing satellites, coordinate their methods and data to monitor human-induced GHG emissions.
- They will establish 'an independent, international system' to centralize data from satellites.

Significance

- This would help to get the best data possible on climate change with most authenticity.
- The satellites would also be used to verify the efforts of nations towards fulfilling their commitments under the Paris Agreement.
- The goal now will be to inter-calibrate these satellite data so that they can be combined and compared over time.
- The decision was taken at a meeting at New Delhi, which was called upon at the invitation of ISRO and French space agency Centre national d'étudesspatiales (CNES).

2.4.4. EFFICIENT AND SUSTAINABLE CITY BUS SERVICE PROJECT

Funding agreement

- India has signed a **$9.2-million grant agreement with the World Bank for the 'Efficient and Sustainable City Bus Service Project'** aimed at improving the efficiency of the transport and reduce greenhouse gas emissions.
- The project will **be classified under Global Environment Facility (GEF) grant with IBRD as the implementing agency.**
- The total cost of the programme is $113 million. The rest will be funded by the Centre, state and city governments for the funding of buses and ancillary infrastructure.

About the project

- The project has been designed to specifically focus on identifying institutional, regulatory and fiscal constraints to operation of sustainable city bus services.
- The project will complement **Union Government's Bus Funding Scheme,** which was launched to promote public transport in cities by modernizing their bus services.
- It will introduce modern Management Information Systems and Intelligent Transport Systems for better planning and management of operations.
- It will also provide technical support to drivers and vehicles for better fuel efficiency, etc.

2.4.5. CARBON TAX

- Burning of hydrocarbon fuels release CO2 which affect the environment and society adversely. Thus it has a a social cost that it higher than the private cost. Carbon tax is imposed on these hydrocarbon fuels so that these negative externalities are taken into account for. The purpose is to dissuade people from using products that require burning of hydrocarbon fuels and also use the revenue thereby collected for production of alternate products.
- It has been regularly suggested by international organisations like IMF

Indian Position

- In 2010 India introduced a nationwide carbon tax of 50 rupees per metric tonne of coal both produced and imported into India. In 2014, govt. has increased the Price to 100 rupees per metric tonne. It has been further increased from 100 Rs per tonne to 200 Rs per tonne now.
- A carbon tax will help India to meet their voluntary target to reduce the amount of carbon dioxide

Pros

- Using revenue for developing green technologies
- shifting the people from hydrocarbons to renewable methods; habits like cycling, car pooling etc which are healthy would be inculcated
- leads to socially efficient income

Cons

- Revenue might not come efficiently- implementation might be difficult, cost of administration would be high,
- Covert operations by tax evasion
- Production shift; to 'pollution havens'
- developing countries cannot manage increase in cost of essential fuels
- the increase in cost might be too less to lead a substantial influence

2.4.6. CLIMATE VIOLENCE

Meaning

- Violence caused on the environment and climate due to various ecological disputes and conflicts among human beings even for the basic resources such as water and forests is called climate violence.

Why in news?

- The Environmental Justice Atlas, a global effort, has placed India at the top of climate violence. According to the work more than 200 conflicts in India are caused by ecological disputes and scarcities of basic resources such as water and forests.
- The atlas is a work in progress and aims to map 2,500 environmental conflicts and injustices by the end of 2017.

Reasons for Climate Violence in India

- High population and poverty leads to fight for resources
- Latest focus on increasing industrialization
- Widespread corruption leading to ineffective implementation of environmental laws
- Ineffective management of resources

Suggestions

- Need to create a fit between knowledge generation and decision making
- Education and awareness among the masses as well as policy makers about climate violence
- Increasing accountability and transparency in decision making; more use of technology

2.4.7. STRANDED CARBON

Why in news?

- A London-based energy think tank has warned that fossil fuel producers across the world are wasting up to US $ 2.2 trillion after 2020 by investing in projects that could hinder world's fight against climate change.
- This is because much of to be discovered fossil fuel would remain unused because of the carbon budget.

What is stranded carbon?

- It refers to fossil fuel energy resources that cannot be burnt if the world is to adhere to a given carbon budget. Therefore some of proven reserves of fossil fuels will never be burnt and will remain stranded.

How much Stranded Carbon?

- Within the 2°C target; we only have about 1,100 Giga Tonnes (gt) of carbon dioxide (CO_2) that can still be emitted.
- Current proven reserves of fossil fuels are about 812 billion tonnes of oil equivalent (oil, gas and coal).
- Just burning all these proven reserves (not counting contingent reserves or those yet to be discovered) would generate about 2,512 gt of CO_2 equivalent emissions.
- Thus no more than 40 per cent of the existing proven reserves of fossil fuels can ever be burnt.
- Probably even less, as some of the carbon budget will be taken by non-fossil fuel applications like agriculture.

Implications

- The Middle East would need to leave about 40% of its oil and 60% of its gas underground
- The majority of the huge coal reserves in China, Russia and the United States would have to remain unused
- Undeveloped resources of unconventional gas, such as shale gas, would be off limits in Africa and the Middle East, and very little could be exploited in India and China
- Unconventional oil, such as Canada's tar sands, would be unviable.

2.4.8. COP 21: PARIS AGREEMENT

The 'Paris Agreement', the biggest environment agreement ever, was 'adopted' by more than 190 countries

- The overall goal of the Paris agreement, to keep global temperature rise to a specified quantum compared to pre-industrial levels, is pegged at either "below 1.5°C", or, as "well below 2°C".
- India felt that a transparency and accountability regime should not treat rich and poor nations alike
- India Position is **based on** logic that developing nation still lacks necessary technology to measure perils of climate change. For example, India does not have the capacity to measure automotive emissions based on vehicle use accurately, while the U.S. does that every year.

Salient feature of the Agreement

- **Developed country as Role model-** Extent to which developing countries would effectively implement their commitments would depend on developed countries living up to their own commitments on financing, technology transfer and capacity building.
- **On peaking of greenhouse gas emissions-** The discussion is on making it "as soon as possible" with the caveat that peaking requires deeper cuts of emissions by developed countries and longer periods for developing countries
- **Achieving zero GHG emissions growth by 2060-80 is proposed**
- **Fund mobilisation -** Appropriate pricing of greenhouse gas emissions in its many forms, is an important instrument for the reorientation of investment and finance flows consistent with a pathway towards low emission and climate resilient economies and societies.
- **Technology framework –** By providing overarching guidance to the work of the Technology Mechanism". It would promote and facilitate enhanced action on technology development and transfer.
- The agreement is much more **comprehensive** than the Kyoto Protocol which was limited to assigning greenhouse gas emission reduction targets for a group of developed countries
- It asks every country to make **"nationally determined"** contributions in the fight against climate change.
- It also seeks to establish a mechanism by which the climate actions of all the countries can be periodically monitored and evaluated to see whether the world was actually able to combat climate change and whether the actions needed to be scaled up

Win- Win Situation for all

- **Developed Nation-** The developed countries have ensured that henceforth climate actions would be taken by every nation and not just them, as was the requirement in the existing climate framework represented by the Kyoto Protocol of 1997.
- **Developing Nation-** The developing countries were able to take heart from the fact that the all-important principle of 'differentiation' – that developed nations, being primarily responsible for greenhouse gas emissions, must take greater action to fight climate change – has been retained, even though in a diluted form
- **The island nations and least developed countries —** Most vulnerable to climate change were happy to have forced the rest of the world to acknowledge the need to take a 1.5 degree path instead of the 2 degree it is more comfortable with**.**

Few of the issues with Paris Agreement

- No clarity on finance and technology transfer issues; the related IPR issues have not been covered.
- No mechanism for updated targets for countries based on stocktaking of carbon dioxide or equitable distribution of the remaining carbon budget for the world.
- Ignoring the CBDR-RC principle; putting developing and developed countries at same level. Though INDCs still allows the space for equitable targets for reduction, it is not guaranteed and it is thus believed that developing countries would be at a disadvantage.
- **Binding targets:** Countries have pledged their emission reduction targets. But these are only pledges. Even though China and USA have recently ratified Paris Agreement, the implication for violation of the pledges is not clear.

- **Periodic Revision of Target-** The emission reduction numbers don't add for now and they need to be revised every 5 years or so. Developed countries don't accept any criteria that includes historical accumulated emissions
- **Reporting action:** After 2020 once the agreement comes in to force countries will have to report back periodically how they are faring against their pledges. This could become the Trojan horse that brings parity between the two without saying as much.
- **Developing country targets-** most developing countries have made their targets for the Paris agreement conditional on the nature of the Paris agreement as well as the delivery of finance and technology. Developed countries want at least a part if not the full target from each developing country to be enshrined unconditionally
- **Technology transfer:** Developed countries oppose the proposals from different developing country groups including India to address issues of intellectual property resources, future technology development and an institutional arrangement for this under the Paris agreement.
- **Adaptation-** Developed countries see the core agreement as only about reducing emissions and accounting for these reductions
- Experts say that target of reducing the temperature by 2°C is over-optimism and not feasible.

2.4.9. FROM CBDR TO INDC

- Common but Differentiated Responsibilities and Respective Capabilities (CBDR–RC) is a principle within the United Nations Framework Convention on Climate Change (UNFCCC) that acknowledges the different capabilities and differing responsibilities of individual countries in addressing climate change.
- The principle of CBDR–RC is enshrined in the 1992 UNFCCC treaty, which was ratified by all participating countries.
- CBDR-RC has served as a guiding principle as well as a source of contention in the UN climate negotiations. Reflecting CBDR-RC, the Convention divided countries into "Annex I" and "non-Annex I," the former generally referring to developed countries and the latter to developing countries. Under the Convention Annex I countries have a greater mitigation role than non-Annex-I countries.

Reasons behind collapse of CBDR-RC

- **Starting of discomfort among Annex-I countries:** Many western countries were not ready to put constraints on their economies for a global cause that had no direct and immediate returns.
- **Growth of China:** The rapid growth of China from the 1990s too had started to hurt the interests of the West. Stricter emission standards for their industries would have made their products even more non-competitive against Chinese goods. It helped their case that China's emissions had overtaken the US as the world's leading emitter of GHGs.
- **U.S role:** The US refused to ratify the Kyoto Protocol and, for the first time since the birth of UNFCCC, started playing a proactive role in shaping the global architecture on climate change. The argument was that without restraining the emissions of China-and India, Brazil, South Africa, Mexico, etc.-no effective fight against global warming could be launched.
- Someof these countries, including Japan, Australia and Canada, walked out of the Kyoto Protocol.
- After several rounds of bargaining, persuasion and threats, the current formulation-on the basis of which a new agreement is to be finalized in Paris next month-was decided in Durban in 2013.

Emission cut in INDCs: Now every country needed to take demonstrable action, the quantum and extent of which was to be decided by the country itself.

Intended Nationally Determined Contribution (INDC)

- **What are INDCs:** INDC outlines the post-2020 climate actions they intend to take under a new international agreement.

India's INDCs contains the following proposals

- To reduce the emissions intensity of its GDP by 33 to 35 per cent by 2030, from 2005 levels
- To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030
- Increase the Share of Non Fossil Fuel Based Electricity
- Sustainable Lifestyles
- Cleaner Economic Development
- Technology Transfer and Capacity Building

India's achievements towards climate change till now

- Many policy measures have been taken to promote low carbon strategies and Renewable Energy have resulted in the decline of emission intensity of our GDP by 12% between 2005 and 2010.
- Currently, renewable energy, nuclear energy and hydropower together contribute about 30 per cent of the overall installed capacity.
- India is running one of the largest renewable capacity expansion programmes in the world. Between 2002 and 2015, the share of renewable grid capacity has increased over 6 times.
- India is one of the few countries where forest and tree cover has increased in recent years and the total forest and tree cover amounts to 24% percent of the geographical area of the country.

Significance of India's INDC

- India stated that the national plans given in the INDC depends on the unencumbered availability of clean technologies and financial resource from around the world. Such a position is **consistent with the principle of 'common but differentiated responsibilities'** that guides climate negotiations.
- INDCs announced by India are comprehensive, balanced, equitable and pragmatic and addresses all the elements including Adaptation, Mitigation, Finance, Technology Transfer, Capacity Building and Transparency in Action and Support.
- India has also decided to anchor a global solar alliance, INSPA (International Agency for Solar Policy & Application), of all countries located in between Tropic of Cancer and Tropic of Capricorn.
- During preparation of INDCs govt. held stakeholder consultations with the specific involvement of the key Ministries and State Governments. Interactions were also held with civil society organisations, think tanks and technical & academic institutions of eminence.
- India has to put economic growth before committing itself to cut down emissions.

Criticisms

- The INDC data estimate that between now and 2030, at least $2.5 trillion would be required for the country to meet climate change action requirements. It will be difficult to invest such a huge money without international help.
- Cutting down emission will slow down the economy, therefore needs is a comprehensive strategy.

Steps taken to achieve INDCs

- A scheme for development of 25 Solar Parks, Ultra Mega Solar Power Projects, canal top solar projects and one hundred thousand solar pumps for farmers is at different stages of implementation.
- The energy efficiency of thermal power plants will be systematically and mandatorily improved.
- The switch from Bharat Stage IV (BS IV) to Bharat Stage V (BS V) and Bharat Stage VI (BS VI) to improve fuel standards across the country is also planned for the near future.
- Urban transport policy will encourage moving people rather than vehicles with a major focus on Mass Rapid Transit Systems.

- Government of India's long term goal is to increase its forest cover through a planned afforestation drive through initiatives like Green India Mission, green highways policy, financial incentive for forests, plantation along rivers, REDD-Plus and Compensatory Afforestation Fund Management and Planning Authority
- India will have 40 per cent of the total installed power capacity in 2030 based on non-fossil fuel-based sources.

UPSC IN PAST: 2014 MAINS

Q. Should the pursuit of carbon credit and clean development mechanism set up under UNFCCC be maintained even through there has been a massive slide in the value of carbon credit? Discuss with respect to India's energy needs for economic growth.

2.4.10. HYDROFLUOROCARBONS (HFC): MONTREAL PROTOCOL

- HFCs replaced the ozone depleting CFCs under the agreement under Montreal Protocol. The problem is that they are highly potent GHG; so there is a need to phase out the use of HFCs as well
- **Issue:** under which protocol should it be kept?
  - ✓ Developed countries want it to be covered under Montreal Protocol- which has been very successful in controlling the emission of CFC and thus protecting the Ozone layer.
  - ✓ Developing countries, however, want it to be under UNFCCC's Kyoto protocol which deal with GHGs- Montreal deal with ozone depleting substances and HFCs is not one of them.
- The main reason, however, for these preferences is that Unlike the Montreal Protocol, in which each of the 195 signatories is equally responsible for eliminating the banned chemicals, the climate change arrangement puts "differentiated responsibilities" on developed and developing countries.
- Further, the developing countries like India fear that their domestic industry would be forced to buy patents for the new technology from companies based in developed countries like US at a very high cost to make the transition without adequate financial support.

Recent Development

- India has agreed to negotiate on the amendment to Montreal Protocol. The amendment will bring hydroflurocarbons (HFCs), commonly used as refrigerants and coolants, within the ambit of the Montreal Protocol.
- Further, India has agreed for a 'market-share' based approach for reduction in aviations emissions under ICAO (International Civil Aviation Organization)

2.5. CLEAN ENERGY

2.5.1. CLEAN ENERGY IN INDIA

Background

- India needs more than $200 billion (Rs 13 lakh crore) to meet its target of 175 GW of renewable energy by 2022.
- Renewable energy investment has increased from $8 billion in 2014 to $10.9 billion in 2015. However, this is still way behind the required amount.

Issues in financing

- The present system is mostly based on credit from different financial institutions (national, international, multilateral, etc.).
- However, due to high and variable interest rates and short tenor of debt (especially from Indian commercial banks), the cost of renewable energy increases by about 25-30% than similar projects in US.
- Majority of investment is focused on large-scale or grid-scale projects. Smaller projects like off-grid, rooftop, decentralized projects etc. get ignored in the process.
- Increased preference for solar energy is crowding out other innovating though riskier models like small hydro, biomass-to-energy projects.
- Focus is on renewable energy based electricity. Other applications like heating, cooling and productive and mechanical power receives less attention.

- General issues like uncertainty about revenue flows, projects delays, technology and project efficiency concerns etc.

Steps taken

- Indian government has taken several steps like Infrastructure Debt Funds, National Clean Energy Fund, bringing renewable energy under Priority sector lending etc.
- However, given the scale of its targets new innovative financial projects are needed.
- For example, the government is looking to create a **$1 billion equity fund for solar energy** and tap the potential of Global finance institutions like World Bank in this.

Way forward

- New policies and clarification from the state government on the solar sector on solar park allocation etc. This would bring more confidence from potential investors.
- Financial institutions must come up with innovative financial products for green finance. E.g. Green bonds, Yieldcos, dollar denominated PPA
- Small projects like roof-top panels must be aggregated to create investible portfolios.
- Need to find a balance between rural and urban projects. The latter receive more private investment due to better commercial opportunities.
- International institutions like World Bank must increase their contribution towards renewable energy. Today WB gives 5% to renewable. India demands this to be increased to at least 15%.

2.5.2. INTERNATIONAL SOLAR ALLIANCE (ISA)

Why in News

- On his recent visit to India, French president along with Indian Prime Minister has laid the foundation stone for an interim secretariat of the International Solar Alliance (ISA) in Gurgaon.
- Earlier, India and France had launched an International Solar Alliance (ISA) at the CoP21 Climate Conference Paris in Dec, 2015.
- The ISA Secretariat would be set up at National Institute of Solar Energy, Gurgaon in India.
- Indian government will provide land and $30 million to form a secretariat for the Alliance, and will support it for five years.

Sunshine Countries

The sunshine countries comprise all major countries which**come either completely or partly between the tropic of Cancer and the tropic of Capricorn.** It comprises 107 countries.

Objectives

- Promote solar technologies and investment in the solar sector to enhance income generation for the poor and global environment.
- Formulate projects and programme to promote solar applications.
- Develop innovative Financial Mechanisms to reduce cost of capital.
- Build a common Knowledge e-Portal.
- Facilitate capacity building for promotion and absorption of solar technologies and R&D among member countries.

Benefits to India

- Launching of ISA has set up the stage for India's proactive and forward-looking leadership on climate change and the transition to a less carbon-intensive growth trajectory.
- This will help India in meeting its solar energy target which is to generate the 100GW of solar energy by 2022.
- It will also help in bringing down the price of solar technology which will further help in accelerating the development of the country.
- It will also help India to meet its Intended Nationally Determined Contribution target.

Challenges Ahead

- **Funding:** Although alliance talks about developing "innovative financial mechanisms", it does not address how the capital would be provided.
- **Technology Sharing:** There is need to create a comprehensive framework to share the modern solar technologies at low cost.

2.5.3. DRAFT WIND-SOLAR HYBRID POLICY

Why in news?

- The draft National Wind-Solar Hybrid Policy aims at providing a framework to promote large grid connected wind-solar photovoltaic (PV) system for optimal and efficient utilization of transmission infrastructure is criticized for many reasons such as being restrictive and for lacking details about tariffs.

Key features of the Policy

- It proposes hybridization of existing solar PV and wind power plants apart from new projects.
- Low cost financing for hybrid projects may be made available through IREDA and other financial institutions like multilateral banks.
- For new hybrid wind-solar projects, the draft policy proposes to provide the developer with the option of using the hybrid power for captive use, third party sale or sale to state electricity distribution utilities.

Significance of the Draft Policy

- Given that critical infrastructure such as land and evacuation network for wind or solar project accounts for about 10-12% of overall project cost, hybrid projects would benefit from common infrastructure.
- The variability in generation profile is likely to be reduced to some extent, as generation from both the sources is at different intervals and in complimentary seasons.
- This would partially address the concerns of distribution utilities over the grid stability arising due to the intermittent nature of wind or solar generation.

Criticism of the Policy

- The draft policy is a good step, but is restrictive as it puts a cap on size of such units.
- The policy lacks in details relating to tariffs and financial incentives.
- It is restrictive in suggesting that hybrid capacity addition, for existing plants, must be limited to the sanctioned transmission capacity.

Way Forward

- Though the policy is a good step however the policy implementation needs to done very carefully - the evacuation policy needs to be clear, transmission augmentation might need to be done in most cases, scheduling and forecasting of delivered power needs to be calculated accurately, and plant layout needs to make sure that wind mills don't cast any shadows on the solar panels.
- Central Electricity Regulatory Commission (CERC) needs to come up with an FIT (Feed in Tariffs) (FIT is a payment made to households or businesses generating their own electricity through the use of methods that do not contribute to the depletion of natural resources, proportional to the amount of power generated) for Wind Solar Hybrid framework.

2.5.4. POLICY ON PROMOTION OF CITY COMPOST

Why in news?

- Union cabinet has given its approval for a Policy on Promotion of City Compost

What is compost?

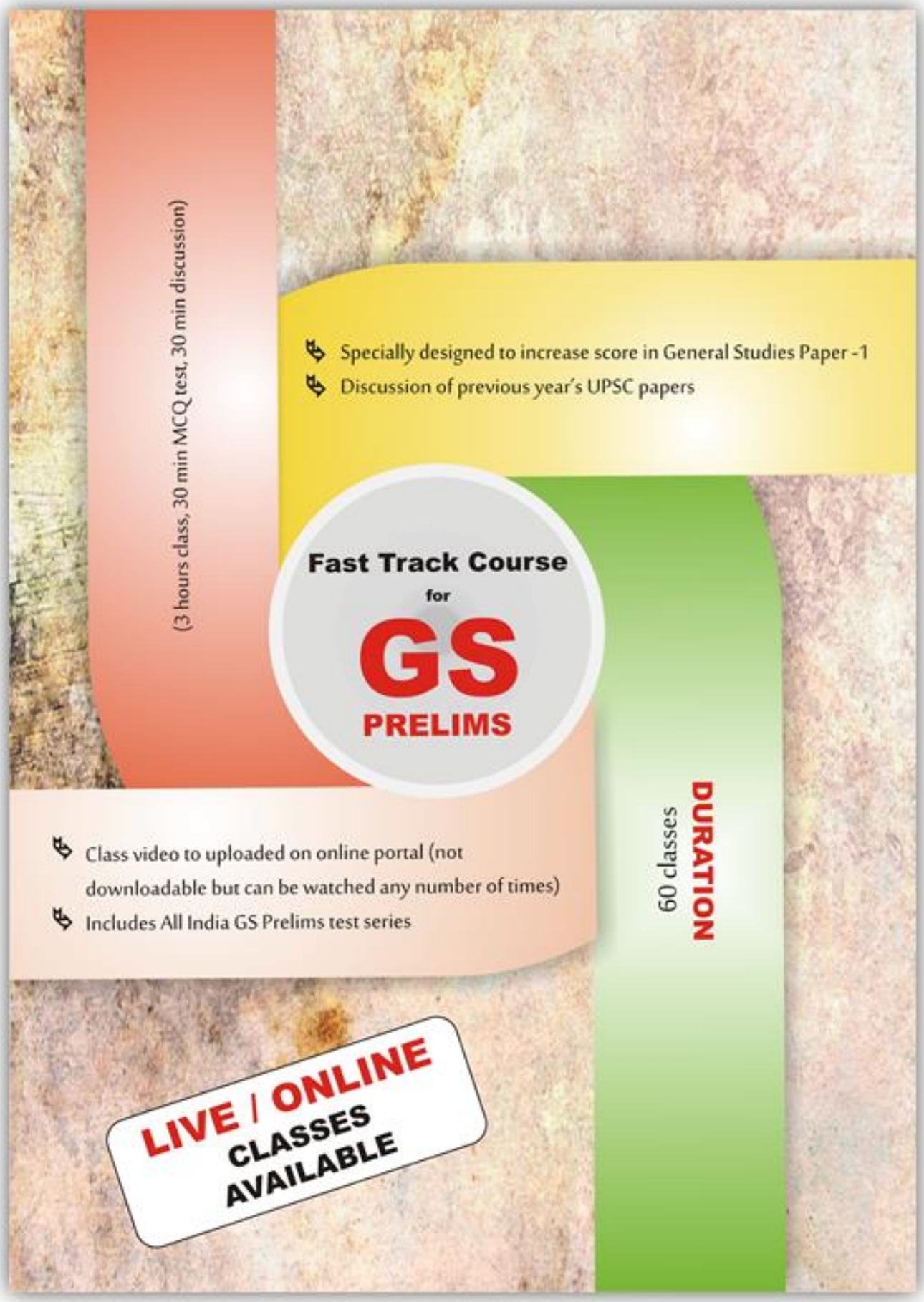
- Compost is organic matter that has been decomposed and recycled as a fertilizer and soil amendment.
- At the simplest level, the process of composting simply requires making a heap of wetted organic matter known as green waste (leaves, food waste) and waiting for the materials to break down into humus after a period of weeks or months

Salient Features of the Policy

- Market development assistance of Rs. 1500 per tonne of city compost for scaling up production and consumption of the product. It would lower MRP of city compost for farmers.
- Eco-Mark standard for City Compost.
- Distribution
  - ✓ Co-marketing by Fertilizer companies.
  - ✓ The companies will also adopt villages for promoting the use of compost.
- Information Education and Communication network
  - ✓ Concerned Ministry/Department will carry out IEC campaigns to educate farmers.
  - ✓ The Agricultural Extension Machineries including KVKs of ICAR will also make special efforts in this regard.
  - ✓ Initially, marketing and promotion of city compost is proposed to be done through the existing fertilizer companies. In due course, compost manufacturers and other marketing entities recognized by the concerned State Government may also be included for the purpose with the approval of Department of Fertilizers. The market development assistance shall be routed through the entity which is marketing it
- Monitoring
  - ✓ A joint mechanism will be set up by Department of Fertilizers, Ministry of Urban Development and Department of Agriculture to monitor and facilitate availability of adequate quantity of City Compost at terms mutually agreeable between compost manufacturers and Fertilizer Marketing companies.
  - ✓ They will also be authorised to resolve any co-ordination related issue that may arise.

Advantages of City Compost

- Soil health improvement
  - ✓ It contains useful soil microbes and humus that aerates soil, and improves water retention and resistance to both drought and water logging, thereby reducing irrigation requirements.
  - ✓ It can restore India's 21.7 million hectares of saline and alkaline soils.
  - ✓ To counter the galloping depletion of micro-nutrients in soil since heavy chemical-fertiliser use began.
  - ✓ Heavy-metal levels will come down when compost is used along with chemical fertilizers, since single super-phosphate and rock phosphate, for example, contain twice as much lead and 9-15 times more cadmium than the standards now specified for city composts.
- Environmentally better suited.
- Protects groundwater pollution
- Effective mechanism of solid waste management- Aligned with Swachh Bharat Mission – cleaner cities
- Employment generation in the urban areas and enhance the livelihood of waste managers.


(3 hours class, 30 min MCQ test, 30 min discussion)
Specially designed to increase score in General Studies Paper -1
Discussion of previous year's UPSC papers
Fast Track Course
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Class video to uploaded on online portal (not downloadable but can be watched any number of times)
Includes All India GS Prelims test series
60 classes
DURATION
LIVE / ONLINE
CLASSES
AVAILABLE

3. DISASTER MANAGEMENT

3.1. DISASTER PLANNING AND MANAGEMENT

3.1.1. DISASTER RISK INDEX OF THE WORLD

Why in news?

- India has been ranked 77th on the World Risk Index, topped by Island state of Vanuatu.

Country	Ranking
Nepal	108
China	85
India	77
Pakistan	72
Sri Lanka	63
Bangladesh	05

About the Report

- The World risk report analyses the role that infrastructure plays in shaping a country's disaster risk.
- The Index, calculated by the University of Stuttgart, ranks 171 countries according to their risk of becoming a victim of a disaster as a result of natural hazards

Details

- **Risk:** Inadequate infrastructure and weak logistic chains substantially increase the risk that an extreme natural event will become a disaster.
- **Response:** Challenges mostly lie in the 'last mile' of the logistics chain: organising transportation despite destroyed streets or bridges and ensuring fair distribution when there is a shortage of (for example) water, food, and shelter.
- **Relief:** Crumbling transport routes, unreliable electricity grids, and dilapidated buildings not only hinder humanitarian aid from overseas, but also delay crucial aid.

3.1.2. INDIA AND SENDAI AGREEMENT FOR DISASTER REDUCTION

- India has been designated as the **Champion for Disaster Risk Reduction (DRR)** for its efforts to facilitate regional support towards enabling community resilience in the Asia-Pacific region.
- United Nations Office for Disaster Risk Reduction (UNISDR), has declared India first regional champion after the **Sendai Agreement.**

What is Sendai Agreement?

The Sendai Framework for Disaster Risk Reduction 2015–2030 was adopted at the Third United Nations World Conference on Disaster Risk Reduction, held in March 2015 in Sendai (Miyagi, Japan).

- It is a 15-year non-binding agreement
- It says that state has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government and the private sector.
- It is improved version of the existing **Hyogo Framework.**

AIM- The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

The Sendai Framework Priorities

1. Understanding disaster risk;
2. Strengthening disaster risk governance to manage disaster risk;
3. Investing in disaster risk reduction for resilience;
4. Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction.

Sendai Framework's seven global targets

1. Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortalities between 2020-2030 compared to 2005-2015;
2. Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015;
3. Reduce direct disaster economic loss in relation to global gross domestic product by 2030;
4. Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030;
5. Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;
6. Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the framework by 2030;
7. Substantially increase the availability of and access to multi-hazardearly warning systems and disaster risk information and assessments to the people by 2030.

3.1.3. NATIONAL DISASTER MANAGEMENT PLAN

Why in news?

- The plan was unveiled this year. It is the **first major national plan for disaster management**.
- The plan aims to make India disaster resilient and reduces loss of lives.
- It is made keeping in mind the **Sendai Framework and Sustainable Development Goals (SDGs)**.

Major highlights of the plan

- **Comprehensive definition** of disaster
  - ✓ The plan is based on the four priority themes of the "Sendai Framework," namely:
    - understanding disaster risk,
    - improving disaster risk governance,
    - investing in disaster risk reduction (through structural and non-structural measures);
    - disaster preparedness- early warning and building back better in the aftermath of a disaster.
  - ✓ It covers all phases of disaster management: Prevention, Mitigation, Response and Recovery.
  - ✓ It covers human induced disasters like chemical, nuclear etc.;
- Planning
  - ✓ Planning for short medium and long run respectively 5, 10, and 15 years to deal with disasters.
- Integrating approach with role clarity
  - ✓ It provides for horizontal and vertical integration among all the agencies and departments of the Government.
  - ✓ The plan also spells out the roles and responsibilities of all levels of Government right up to Panchayat and Urban local body level in a matrix format.
  - ✓ Ministries are given role for specific disasters e.g. Ministry of Earth Sciences is responsible for Cyclones
  - ✓ The plan has a regional approach, which will be beneficial not only for disaster management but also for development planning.
  - ✓ It is designed in such a way that it can be implemented in a scalable manner in all phases of disaster management.
- Major activities
  - ✓ It also identifies major activities such as early warning, information dissemination, medical care, fuel, transportation, search and rescue, evacuation, etc. to serve as a checklist for agencies responding to a disaster.
  - ✓ It also provides a generalised framework for recovery and offers flexibility to assess a situation and build back better.
- Information & media regulation
  - ✓ To prepare communities to cope with disasters, it emphasises on a greater need for Information, Education and Communication activities.

- ✓ It calls for ethical guidelines for the media for coverage of disasters as well as self-regulation. The plan wants the media to respect the dignity and privacy of affected people.
- ✓ Also, in a move aimed to stop rumours and spread of panic, the plan directed the authorities to schedule regular media briefing (depending on the severity of the disaster) and designate a nodal officer for interacting with the media on behalf of the government

- Focus on training, capacity building and incorporating best international practices

Significance of the plan

- It closes a critical gap in our disaster management system- while most states and districts have prepared their plans, the national plan that was supposed to guide this process at the sub-national level was missing.

Missing points

- Unlike Sendai Framework or SDGs it does not set any goals or targets or a definite time frame.
- Further, a framework for funding is missing
- Apart from these some other improvements can be done. For example:
  - ✓ Role of corporate bodies need to be institutionalized
  - ✓ Inclusion of innovative methodologies- a judicious mix of new technology with traditional practices
  - ✓ Need to give space to disaster insurance provisions.

UPSC MAINS 2013

Q. How important are vulnerability and risk assessment for pre-disaster management? As an administrator, what are key areas that you would focus in a disaster management? (200 words)

3.1.4. IMPACT OF NATURAL DISASTERS ON ELDERLY PEOPLE

Chennai Floods that occurred at the end of last year revealed the grim reality of the disaster preparedness in large metropolises. Vulnerable sections of the society are worst affected during such calamities.

Background- Facts

- According the National Health Profile, released by the health ministry last year, the elderly in India i.e. the population above 60 years comprise **8.6% of the population** (103.8 million) and they are also a vulnerable section.
- According to census 2011, 10 per cent of Tamil Nadu's population is above the age of 60 years- 4, 64,122 people to be specific. By conservative estimates, as many as 5% of older individuals are living alone **(urban isolation).**
- For this population, the national health policy envisages an **effective capacity for routine emergency** and, "an army of community members trained as first responder for accidents and disasters."
- The Health policy envisages a network of emergency care that has an assured provision of life support ambulances linked to trauma management centers- one per 30 lakh population in urban and one for every 10 lakh population in rural areas will form the key to a trauma care policy.

Issues

- With no support system, India's greying population is **defenceless against natural calamities.**
- Senior citizens are likely to constitute a significant chunk of the total deaths in Chennai Floods.
- **Urban isolation** leading to helplessness during such disasters
- Number of elderly people were founded stranded during the floods for days without access to relief or rehabilitation
- **Inefficient administration-** the complete lack of ward-level data on vulnerable populations, such data is vital for any relief and rescue work to be successful
- **Lack of institutional capacity** to meet the goals for vulnerable population envisaged by the National Health Policy.

Way Forward

- **The institutional capacity** should be increased
- Relief, Rescue and Rehabilitation measures should be at the lightening speed for vulnerable section
- The phenomenon of urban isolation should be addressed by communities and NGOs can play a greater role to lessen psychological pressure on the vulnerable sections of the society
- Need of the greater awareness among people about the issues faced by the elderly
- Use of social media platform and technology to help.

3.1.5. FLOOD MANAGEMENT

Why in news?

Uttar Pradesh, Bihar and Madhya Pradesh were devastated by floods in August, this year. The main reasons were heavy rainfall in Himalayan foothill region, while U.P and Bihar at the times of floods had under normal rainfall recorded.

What is Flood?

Flood is a state of higher water level along a river channel or on coast leading to inundation of land that is not normally submerge. Flood therefore is a natural disaster which causes considerable damage to the crops, livestock and human life.

Causes of contemporary floods

- The rivers bring heavy sediment load from catchments. These, coupled with inadequate carrying capacity of rivers are responsible for causing floods.
- Drainage congestion and
- Erosion of river-banks.
- Obstruction of free-flow in rivers: Silting in deltaic areas

Other General Causes

- About 75% of the annual rainfall in India is concentrated in 3-4 months of the monsoon season. As a result there is very heavy discharge from rivers during the period causing widespread floods.
- Cyclones and Cyclonic circulations and cloud bursts cause flash floods and lead to huge losses.
- Storm Surges and Coastal Inundation.
- Meandering tendency of rivers
- **Urban Flooding:** In the cities and the towns is a recent phenomenon caused by increasing incidence of heavy rainfall in a short period of time, indiscriminate encroachment of waterways, inadequate capacity of drains and lack of maintenance of the drainage infrastructure. For ex: Chennai floods.

Vulnerability

- 40 million hectares out of a geographical area of 3290 lakh hectares is prone to floods.
- Every year 1600 lives are lost and the damage caused to crops, houses and public utilities is Rs. 1800 crores due to floods.
- This year nearly 160 were dead in Bihar and at least 2,00,000 had to be rehabilitated.

Institutional Framework

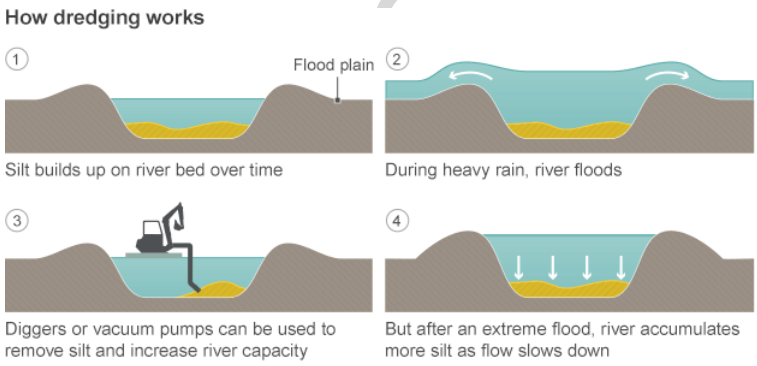
- As per the constitutional provisions, flood management is a state subject.
- The central government has taken various initiatives: enactment of the National Disaster Management Act, December 2005 and setting up of the NDMA.

- The National Executive Committee (NEC) with the Secretary of GOI of the ministry; and State Executive Committees (SECs) will cover the disaster aspect of flood management.
- **FMPs** Flood management Plans: The central ministries and departments concerned and the state governments will prepare their FMPs which will be holistic, participatory, inclusive, eco-friendly and gender-sensitive in nature and the implementation of which will result in a **flood- resilient India**. The plans will focus on the community and the collective efforts of the government and NGOs.
- Various programmes like Neeranchal-Watershed, River linking etc., are discussed below.

Flood Management

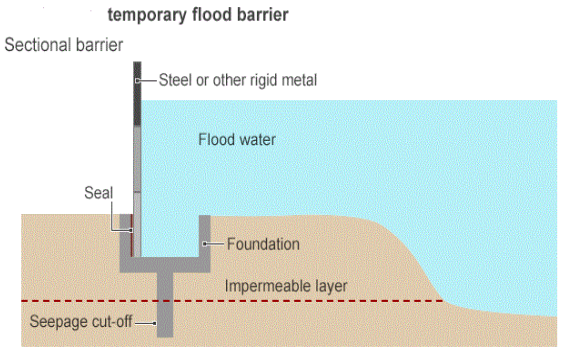
I. Minimizing flood risk

- Phase-I: These activities include identification and marking of flood prone areas on maps, preparation of close contour and flood vulnerability maps by the Central Water Commission (CWC)/ Ganga Flood Control Commission (GFCC)/Brahmaputra Board,
- Phase-II: These include implementation of the schemes for expansion and modernisation of the flood forecasting and warning network, execution of flood protection and drainage improvement schemes,
    - The efforts of the CWC, IMD, NRSA and the state governments will be integrated



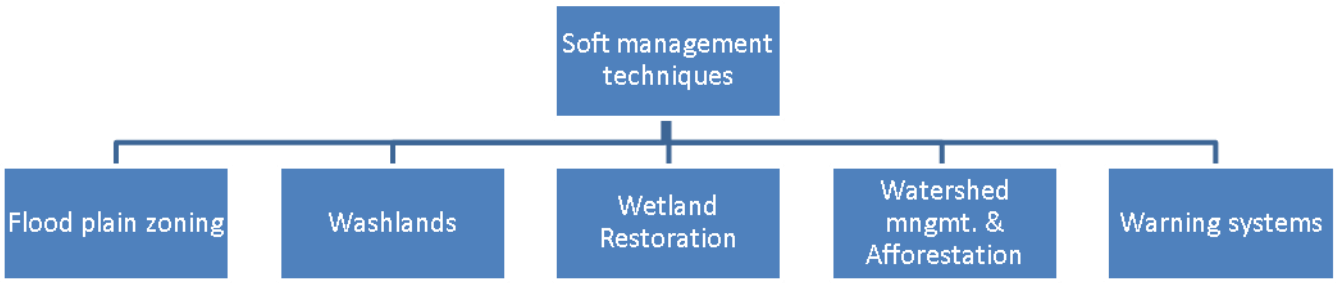
- Phase-III: Implementation of activities, which include construction of dams and catchment area treatment (CAT) works in India as well as neighboring countries.

II. Hard management techniques



- Dams: used to trap and store water, which can be released later.
- Embankments or Artificial levees : these are raised banks which makes the river's cross section larger and so it can hold more water. They can be expensive but are effective. In the US they are called levees, some where breached during Hurricane Katrina and flooded large amounts of adjacent land
- Flood walls/ River defences/ Coastal defences are built around settlements to protect them from floods. They look artificial and are expensive but are effective.
- Storage areas: Where water can be pumped out of the river and stored in temporary lakes. It can then be pumped back later.
- Dredging the river basins
- Inter-basin transfers

III. Soft management techniques

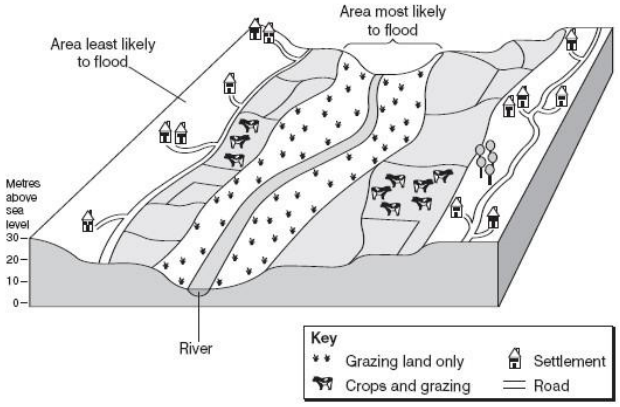


Washlands: are sections of the flood plain which are allowed to flood, therefore they are usually left as sports fields and nature parks.

Land use zoning/ flood plain zoning: is designed to prevent development in areas most prone to flooding and developments is only allowed in 'safe' areas.

Afforestation: The planting of trees in a river's catchment to increase interception, reduces soil runoff and also the uptake of water through the soil.

Warning systems: issued by flood protection agencies to enable people to react to the danger.



IV. Capacity Development and Response

- Flood Education
- Emergency search and Rescue
- Emergency relief

Way forward

- More consultative decision-making process in operations of large and medium dams that have an impact across state boundaries. This is important, the floods in Bihar can be attributed to release of waters from Bansagar dam, MP.
- A nation-wide Silt Management Policy. This can prevent the future floods of those types which took place in Bihar.

Related information: NDMA guidelines

- Shifting the focus to preparedness by implementing FMPs.
- Ensuring regular monitoring of the effectiveness and sustainability of various structures and taking appropriate measures for their restoration and strengthening.
- Continuous modernization of flood forecasting, early warning and decision support systems.
- Ensuring the incorporation of flood resistant features in the design and construction of new structures in the flood prone areas.
- Drawing up time-bound plans for the flood proofing of strategic and public utility structures in flood prone areas.
- Improving the awareness and preparedness of all stakeholders in the flood prone areas.
- Introducing appropriate capacity development interventions for effective FM (including education, training, capacity building, research and development, and documentation.)
- Improving the compliance regime through appropriate mechanisms.
- Strengthening the emergency response capabilities.

3.2. NEWS RELATED TO DISASTERS

3.2.1. DROUGHT PREVENTION AND MANAGEMENT

Why in news?

- Many areas in the country suffered drought in the early part of the year.
- Against backdrop of acute water crisis in states, SC ordered centre not to turn “blind eye” to the situation.
- In a PIL hearing, SC ordered the centre to ensure that Food Security Act is implemented across states.
- It also ordered the centre to release pending funds under the MNREGS, to be released by first week of April.

Ground situation

- The country has been suffering an extended period of El Niño, which adversely affects rains and overall productivity.
- The problem is aggravated by declining commodity prices leading to poor income of farmers.

- However, Centre is still lagging in relief measure :
  - ✓ In 2014-15 ,govt. owed close to Rs 12000 crore as pending liabilities in MNREGS
  - ✓ First Installment under MNREGS has not been released.
  - ✓ Wages paid by the govt. under MNREGS is lower wages than statutory minimum wages.
  - ✓ Food Security act is still not implemented across states.

- Droughts are not attributed to only scarcity of rainfall but more to inefficient management of water resources.
- For example, due to overexploitation of ground water without proper harvesting methods, limited recharge is taking place.

Drought Prevention Methods

- Increase investment in irrigation especially micro irrigation practices like drip irrigation. *Pradhan Mantri Krishi Sinchayi Yojna* would help in this.
- Improving the cropping pattern. E.g. one of the reasons for drought in Maharashtra is large-scale sugarcane farming which is a highly water intensive crop. Agro-climatic cropping pattern must be promoted by methods like MSP support.
- Also Water intensive crops like sugarcane should be replaced by drought resistant variety crops and crops like pulses in water scarce areas like Marathwada.
- The power and irrigation subsidy must be rationalized to reduce water wastage.
- Promoting conservation of water via rainwater harvesting techniques etc.
- MNREGA needs to be used for watershed management.
- Drought resistant crop varieties.

Drought Management

- Effective drought management has three important components:
  - ✓ drought intensity assessment and monitoring; need early forecasting so that an informed choice regarding crop varieties to be sown, planning the area to be sown and allocation of water resources can be done
  - ✓ drought declaration and prioritization of areas for drought management; and
  - ✓ development and implementation of drought management strategies
- Several interventions with respect to agriculture are also required:
  - ✓ Contingency plan in case of late monsoon
  - ✓ Arranging availability of seeds for immediate distribution
  - ✓ Creating awareness among the farmers on management practices like intercropping, mulching, weed control, intercultural operations
  - ✓ Encouragement of afforestation
  - ✓ Ensuring availability of quality fodder and cattle camps
- In order to prevent starvation in drought situation recourse can be taken to intensify the permanent income support measures. For example expanding employment under MGNREGS, providing special food rations under the PDS, and arranging for improved school meals.
- Co-ordination of Centre with states to implement the Manual for Drought Management 2009.
- National Disaster Policy for droughts proposed under National Disaster Management should be prepared without delay.

UPSC MAINS 2014

Q. Drought has been recognized as a disaster in view of its spatial expanse, temporal duration, slow onset and lasting effect on various vulnerable sections. With a focus on the September 2010 guidelines from the National disaster management authority, discuss the mechanism for preparedness to deal with the El Nino and La Nina fallouts in India. (250 words)

3.2.2. URBAN FLOODS

- Urban floods was a recurrent problem this year with several instances like Gurgaon gloods, Mumbai floods and the most disturbing Chennai floods.
- No doubt there was heavy rainfall in these regions to contribute to the process. But the fault mainly lies in poor urban planning which had aggravated the situation.

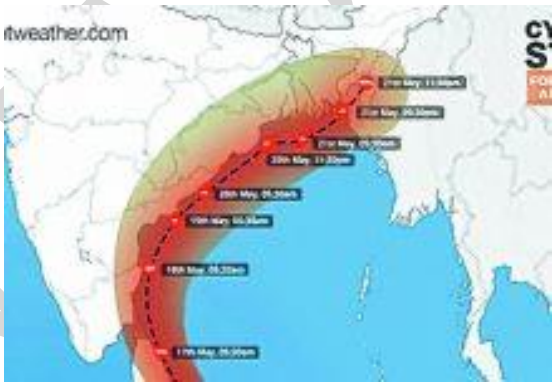
Fault in planning: The Case of Chennai

- The trend of reckless illegal construction that has shut outlets for water
- At least 300 water bodies have been converted into residential areas
- Most waterways, tanks and reservoirs are choked with silt, and their flow channels and banks have been encroached upon.
- Disconnected storm water drains preventing overflow from lakes and reservoirs to go straight into the sea thereby causing flooding on roads.
- Such disasters could have been prevented through planning, curbs on occupation of water bodies, and pre-monsoon desilting of drains and water channels.
- A key factor that should be taken into account is that the city needs an intricate drainage system to match its tremendous development.

It is a must task for the government to implement the real solution-keeping water bodies free of construction and habitation.

3.2.3. CYCLONE ROANU

What is it?



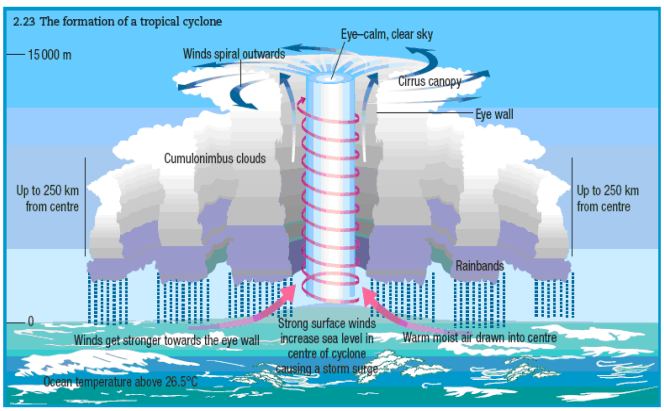
- Cyclone Roanu was the first tropical cyclone this cyclonic season.
- It originated in a deep depression area near Sri Lanka. It travelled closely along Indian coast and finally had landfall in Bangladesh.
- It caused heavy rainfall, flooding events, landslides and mudslides in Sri Lanka. It caused torrential rain falls in coastal regions of India like Odisha and Andhra-Pradesh.
- In Bangladesh it caused storm surge waves and heavy flooding.
- This resulted in many deaths and persons missing in Sri Lanka and Bangladesh.

Impact

- Many poor families lost most of their assets in Sri Lanka and Bangladesh-houses, food, crops and vital livestock. Also agricultural land was destroyed due to erosion etc.
- Access to safe drinking water was hindered as water points were ruined and ground contaminated
- Health supplies and sanitation materials became limited – leading to conditions of vector borne diseases such as malaria, water borne diseases such as diarrhea etc.
- On a positive note, it provided respite from heat in Odisha, Andhra, Telangana and Tamil Nadu.

How is this natural hazard managed?

- Preparation
  - ✓ Flood alerts, landslide alerts were issued in respective regions in all 3 countries.
  - ✓ Forces and personnel were mobilized: for example: In the low-lying areas of Chennai, the National Disaster Response Force positioned 4 teams of personnel.
  - ✓ Fishermen and trawlers were prevented to go into sea.
- Authorities in low-lying Bangladesh took more than 500,000 people into shelters as the cyclone made landfall
- Indian Navy has sent relief materials in INS Sunayana and INS Sutlej to flood-hit Sri Lanka.



What are tropical cyclones?

- They are intense depressions with very low central pressure.
- It has a warm central core or eye, largely cloudless. Around the eye is a great cylinder of clouds, torrential rain and violent winds.
- In 'eye wall' and 'rain-band' region, latent heat of the warm seawater is released. This acts as energy source to drive the system. Therefore they become less intense once cut off from the sea and eventually die.
- They are variously known as hurricanes (Caribbean), Cyclones (Indian Ocean), Typhoons (China Sea), Willy-Willies (Australia).

Where are tropical cyclones formed?

- They occur in tropical areas, where seawater is warm enough (>27 C) to feed the cyclone with latent energy.
- They don't occur close to the equator, even when seawater is warm. This is because of the low Coriolis force in equatorial areas. Coriolis force makes the winds have to turn into central low pressure.
- They form closer to the Equatorial trough and therefore in Indian Ocean we have 2 peak seasons of cyclone occurrence: May and September.

How are they measured?

- The wind speeds are maximum at 15-20 kms from the central 'eye'.
- These wind speeds are used as a measure of intensity. For ex: cyclonic storm has a velocity of 62-88 kmph acc. to IMD scale.

UPSC IN PAST: MAINS 2013

Q. The recent cyclone on the east coast of India was called "Phailin". How are the tropical cyclones named across the world?

4. AGRICULTURE AND ENVIRONMENT

4.1. GM CROPS

4.1.1. ALTERNATIVE TO BT COTTON

Why in news?

- The Union government is working to develop a suite of Bt cotton genes that can be integrated into traditional varieties and be made available to farmers.
- This would be a viable alternative to the current Bt Cotton technology, which is largely sourced from foreign company Mahyco Monsanto Biotech India Ltd. (MMB).
- It would be a joint collaboration of Council of Scientific and Industrial Research (CSIR) and the Department of Biotechnology (DBT).

Why the need to develop alternate variety

- Freedom from dependence on foreign technology.
- Improving the availability of seeds to the farmers at affordable prices.
- Under the present licensing system between seed companies and seed technology companies (like MMB), the availability and affordability of the seeds is not optimal. The government has even brought proposals to make changes to this royalty and technology sharing system and also seeks to regulate the seed prices. An indigenous alternative would address this issue as well.

About Bt Cotton

- Bt Cotton is a genetically modified variety of cotton that contains insecticidal genes sourced from soil bacterium targeted at key cotton pests.
- It is the only GM crop that is legally allowed in India at present. Gm food crops such as brinjal and mustard, which are in advanced stages of regulatory clearances, are yet to become available to farmers due to stringent opposition by anti-GM activist groups.

4.1.2. GM MUSTARD

Why in news?

The Genetic Engineering Appraisal Committee (GEAC), of the ministry of environment and forests has deferred a decision on allowing commercial cultivation of Mustard DMH-11.

What is GM Mustard?

- Mustard DMH-11 (Dhara Mustard Hybrid 11), a genetically modified (GM) crop, is a transgenic crop developed by Centre for Genetic Manipulation of Crop Plants at Delhi University and partly funded by the National Dairy Development Board.
- The resulting GM mustard, it is claimed, gives 25-30 per cent more yield than the best varieties such as 'Varuna' currently grown in the country.

Technology behind GM mustard

- It has been created using GM technology (alteration of DNA), involving incorporation of "**Barnase**" gene isolated from a soil bacterium called **Bacillus amyloliquefaciens**.
- It codes for a protein that impairs pollen production and renders the plant into which it has been introduced male-sterile.
- This male-sterile plant is crossed with a fertile parental line, containing, in turn, another gene, "**Barstar**", from the same bacterium that blocks the action of the "Barnase" gene.
- The resultant progeny, having both the foreign genes, is a hybrid mustard plant that is not only high-yielding, but also fertile and capable of producing seed/grain.

Arguments in support of GM mustard

- Research needed for long term food security issues amidst new pests infestation, effects of climate change and growing demand.
- In 2014-15, India imported 14.5 million tonnes of edible oils valued at $10.5 billion. Therefore, the need to raise domestic crop yields and cut dependence on imports.
- Country's cotton production has gone up more than 2½ times since Bt hybrids were first planted in 2002. Also, no adverse effects on human have reported (consumption of cotton seed oil, etc).

- We import edible oil from GM crop using countries.
- Delhi University's CGMCP has pledged to distribute the GM mustard for free.

Arguments against GM MUSTARD

- Long term adverse effects cannot be ascertained without proper research.
- The entire process is seen as a political one where the government pays heed to different lobbyists (opaque functioning of GEAC).
- The farmers also oppose the 'seed monopolies', which are causing price distortion and not adhering to government guidelines on price control in case of Bt Cotton. They are also not being made accountable for the losses due to pest attacks like the recent **pink bollworm**.
- Organic is a more sustainable option, as could be seen from the growing demand for such food.
- New varieties are input intensive. (water, fertilizer, etc)

Supreme Court's view

- The Supreme Court has sought an explanation from the central government on its proposed move to introduce herbicide resistant mustard, cotton and corn in the face of a court-imposed ban on their introduction.
- The top court had in a series of orders passed in February 2007, April 2008 and August 2008 sought to restrain both small-scale and large-scale field trials in any food crops as well as their commercial introduction in the country.

CIC's Order on Safety

- The Central Information Commission (CIC) has asked the Genetic Engineering Appraisal Committee (GEAC), under the Ministry of Environment to make public all the data pertaining to the safety of genetically modified (GM) mustard, except proprietary intellectual property data. It said that provisions of the Cartagena Protocol on Biosafety should be kept in mind.
- The ministry objected saying the information is exempted under the RTI clause related to commercial confidence of the third party: the Centre for Genetic Manipulation of Crop Plants. It also argued that since the trial is in a premature stage it would not be right to disclose the data.
- The Cartegena Protocol on Biosafety is an international agreement which aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health.

Way Forward

- Transparency of data and functioning - is crucial for public and scientific confidence in the GEAC's decision-making process.
- An independent and autonomous regulator which is insulated against pulls and pressures (envisioned in the lapsed Biotechnology Regulatory Authority of India Bill)
- A legislation to fix the liability of the seed monopoly is also desired.

UPSC IN PAST

The human population is slated to grow to 9 billion by 2050. In this context, many scientists predict that plant genomics would play a critical role in keeping out hunger and preserving the environment. Explain.

4.2. CLIMATE CHANGE & ENVIRONMENT

4.2.1. CLIMATE SMART AGRICULTURE

Why in news?

Recently the three-day Annual Forum of the Global Alliance for Climate-Smart Agriculture (GACSA) was organised at Rome by FAO.

Need for climate smartness in agriculture

- **Rising challenges of food security**: The UN Food and Agriculture Organisation (FAO) estimates that feeding the world population will require a 60 percent increase in total agricultural production.
- **Negative impact of Climate change on agriculture**: Climate change is already negatively impacting agricultural production globally and locally, particularly in low-income countries where adaptive capacity is weaker. Impacts on agriculture threaten both food security and agriculture's pivotal role in rural livelihoods and broad-based development.
- **Impact of agriculture on environment**: The agricultural sector, if emissions from land use change are also included, generates about one-quarter of global greenhouse gas emissions.

About CSA

- Climate smart agriculture (CSA) is an integrative approach to address these interlinked challenges of food security and climate change. It basically **aims at three main objectives**:
  - ✓ sustainably increasing agricultural productivity, to support equitable increases in farm incomes, food security and development;
  - ✓ Adapting and building resilience to climate change at multiple levels; and
  - ✓ Reducing and/or removing greenhouse gas emissions, where possible.
- It is **supported by Food and Agricultural Organisation (FAO).**

Elements of CSA

- CSA is not a set of practices that can be universally applied, but rather an approach that involves different elements embedded in local contexts. It relates to actions both on-farm and beyond the farm, and incorporates technologies, policies, institutions and investment.
- CSA approaches include four major types of actions:
  - ✓ Expanding the evidence base and assessment tools to identify agricultural growth strategies for food security that integrate necessary adaptation and potential mitigation
  - ✓ Building policy frameworks and consensus to support implementation at scale
  - ✓ Strengthening national and local institutions to enable farmer management of climate risks and adoption of context-suitable agricultural practices, technologies and systems
  - ✓ Enhancing financing options to support implementation, linking climate and agricultural finance

4.2.2. ORGANIC FARMING

Citing the **successful example of Sikkim**, Prime Minister had called for expansion of organic farming across the country as part of efforts to transform the agriculture sector, entailing better remuneration for the farmers.

Organic Farming

- Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity.
- Thus Organic farming uses natural fertilizers and pesticides and strictly limits (not eliminates completely) the use of synthetic and non-natural processes.

Principles of Organic Agriculture

- **Principle of Health**: Organic agriculture should sustain and enhance the health of soil, plant, animal and human as one and indivisible.
- **Ecological Principle:** Organic agriculture should be based on and work with living ecological systems and cycles, emulate them and help sustain them.
- **Principle of Fairness:** Organic agriculture should be built upon relationships that ensure fairness with regard to the common environment and life opportunities.
- **Principle of Care:** Organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

Advantages of Organic Farming

- Organic farming is definitely healthier and safe than non-organic farming.

- Organic farms have higher levels of soil biological activity and biodiversity;
- Farmers can reduce their production costs because they do not need to buy expensive chemicals and fertilizers.
- Organic agriculture causes less pesticide contamination in food, people and the environment;
- In the long term, organic farms save energy and protect the environment.
- Pollution of ground water is stopped.

Disadvantages

- Lack of convenience.
- Organic food is more expensive.
- Food safety concerns.

Scope

- About 1-2% of the world's food is produced with organic methods. The market however is growing very quickly - by about 20% a year. In Europe, Austria (11%), Italy (9%) and the Czech Republic (7%) are the countries in which organic food production as it its highest.

Government's Efforts

- Government is promoting organic farming through various schemes/ programmes under National Mission for Sustainable Agriculture (NMSA)/ Paramapragat Krishi Vikas Yojana (PKVY), Rashtriya Krishi Vikas Yojana (RKVY), Mission for Integrated Development of Horticulture (MIDH), National Mission on Oilseeds & Oil Palm (NMOOP), Network Project on Organic Farming of ICAR.

4.2.3. CLIMATE CHANGE VULNERABILITY OF INDIAN AGRICULTURE

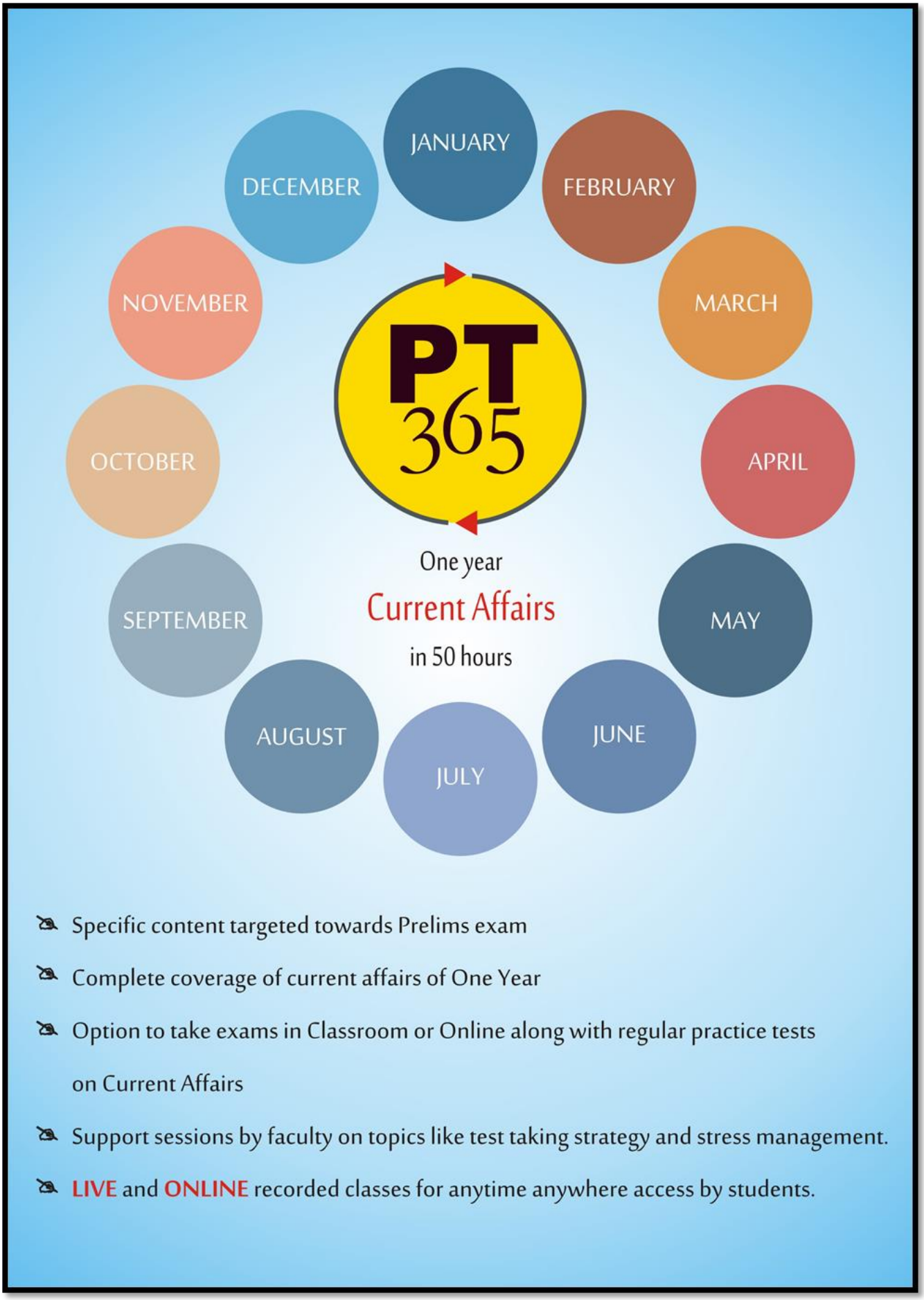
The vulnerability factor of Indian agriculture to climate change is very high. It is listed in the top 20 most vulnerable countries to climate change.

Reasons

- Uneven spatial and temporal distribution of water resources
- high presence of marginal farming and rain-fed agriculture
- less investment in irrigation, soil health etc- dependent on government support; in the event of floods, drought, soil pattern change etc individual farmers would not be able to do required amendments in cropping

Policy measures

- Increase agricultural productivity (as suggested by MS Swaminathan Committee report);
- Rural spending plan on agriculture infrastructure particularly on irrigation, soil testing labs, water harvesting techniques needs to be promoted (National Commission on Farmers)
- drought strategies at community level in rural areas- e.g. pond construction under MNREGA
- Timely rain forecast; **National Hydrology Project** is a good initiative towards this,
- Agro-climatic cropping pattern need to be incorporated; need to promote dryland farming
- Step up agricultural insurance


JANUARY
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OCTOBER
NOVEMBER
DECEMBER
PT 365
One year
Current Affairs
in 50 hours
Specific content targeted towards Prelims exam
Complete coverage of current affairs of One Year
Option to take exams in Classroom or Online along with regular practice tests on Current Affairs
Support sessions by faculty on topics like test taking strategy and stress management.
LIVE and ONLINE recorded classes for anytime anywhere access by students.

5. GEOGRAPHY

5.1. INDIAN GEOGRAPHY

5.1.1. POPLAR TREES IN KASHMIR

- Kashmir is known for its Pine trees. However, the pine forests have diminished significantly in last few decades due to large scale timber extraction.
- In the search for alternative, the Social Forestry Department introduced the *populous deltoids*, or Eastern Cottonwood or more popularly called Poplar.
- **Introduction of the species boosted the veneer and ply-based industry** in the Kashmir region while its timber, used for fruit-packing boxes, is a cost-efficient option for the horticulture industry, which forms the backbone of the state's economy.
- The financial benefits offered by growing poplars helped Kashmiri farmers look to agro-forestry as a better means of livelihood.
- In recent years, however, people have been **raising concern over the increased instance of infections caused by the cotton produced by the poplars**.
- As a result, the **HC of J&K has ordered the felling of all Poplar trees** in Kashmir valley.
- This is being opposed by many members of civil society who argue that poplar-induced allergy is not that significant when compared to other causes of allergy like dust, lawn grass etc.

5.1.2. PALAEOCHANNEL

Why in news?

- **Central Ground Water Board (CGWB)** under Ministry of Water Resources, River Development and Ganga Rejuvenation has been putting great emphasis on studying the various aspects of Palaeochannels in India so that its ground water potential can be optimally utilized.
- Recently it organized a workshop on this issue.

About Palaeochannel

- A palaeochannel is a **remnant of an inactive river or stream channel** that has been either filled or buried by younger sediment.
- A palaeochannel is distinct from the overbank deposits of currently Active River channels because its river bed is filled with sedimentary deposits which are unrelated to the normal bed load of the current drainage pattern.
- Palaeochannel forms when river channels aggrade, depositing sediment on their bed. For these channel deposits to be preserved, the flow must not re-occupy and re-erode them. For example, when the channel is in a net-depositional environment, or in a subsiding sedimentary basin.

Importance of Palaeochannel

- **Geological importance**
  - ✓ Understanding movement of faults
  - ✓ Preserving sediments and fossils useful for understanding past rainfall, temperature and climate- this could aid in understanding global warming and climate change as well
  - ✓ Preserving evidences of older Erosional surfaces and levels
- **Economic importance**
  - ✓ The old sediments contain deposits of minerals like Uranium, lignite and precious metals like gold and platinum
- **Ground water source**
  - ✓ Because of better flushing mechanism in the **ground water system of palaeochannels due to coarser nature of sediments and fast recharge**, the quality of ground water is often better than the surrounding environment.

5.1.3. INTERLINKING OF RIVERS: DATA

Why in news?

- Inter-linking of rivers is suggested as the solution to issues pertaining to drought and irrigation.
- Recently the government has also constituted a task force to study the prospects of inter-linking.

Data in support of interlinking

- There exist **widespread inter-basin inequality**; The Brahmaputra basin, for instance, can annually support nearly 13000 cubic metres per person, whereas the Mahi has a scarce 260 cubic metres per person
- It can boost per capita water availability for 220mn water-hungry Indians.
- An area twice the size of Andhra Pradesh can receive additional water for irrigation.

Data against inter-linking

- Possibility of displacing nearly 1.5 million people due to the submergence of 27.66 lakh hectares of land.
- Cost to government will be about Rs. 11 lakh crores.
- Ecological effect- less flow of water to seas. E.g. in the Krishna river basin water storage in major and medium reservoirs has reached total water yield with virtually no water going into the sea in low rainfall years.
- Ganga's topography is flat- so the dams would not substantially add to river flows. But the adverse effect on monsoon and Himalayan forests would continue to happen.
- Excess water with donor basins might not remain forever. E.g. melting of glaciers due to climate change will devoid the Himalayan rivers of the perennial source.

The Ken-Betwa Link Issue

- The Ken-Betwa river linking project aims to irrigate the drought-ravaged Bundelkhand region.
- It involves building a 288-metre **Daudhan dam**, and transfer of surplus water from the Ken river basin to the Betwa basin.
- This will submerge nearly 400 of the 4,300 hectares of the Panna tiger reserve.
- Experts suggest that the result could be drastic for the tiger population, as they have to adjust to the changes.
- Impact area will be far greater with associated activities related to construction, power houses etc.
- A team of **wildlife experts have submitted a report** on the environmental impact of the project.
- While not endorsing or disapproving the project, the Panel has advised the government to ensure two things:
  - ✓ The proposed canal should not hinder tiger movement; and
  - ✓ There should be enough habitable forest land developed to compensate for the loss of tiger reserve land.
- However, another set of experts believe that the benefits would outweigh the costs:
  - ✓ New water will draw herbivores and thus additional prey and carcass in the region, resulting in benefits for tigers and vultures
  - ✓ The area lost will be compensated; alternate forest land to the tune of double the area lost would be replenished with vegetation that had once existed in the region.
  - ✓ The benefits to mankind is huge- additional water to 6.35 lakh hectares of land helping nearly 70 lakh people of the region.

Way ahead

- Alternatives like curbing demand by efficient utilization of existing water resources before making such big plans.
- Judicious use of canal water, suitable cropping pattern, efficient irrigation mechanism like drip infrastructure, and reviving traditional systems such as use of tanks.

5.1.4. IMPACT OF THERMAL STRESS ON CORALS IN INDIA

- Instances of coral bleaching are being reported from Lakshadweep and parts of Andaman islands.
- This is mainly due to thermal stress in the form of increase in Sea Surface Temperature (SST) during April.
- The SST was in the dangerous range of 32 degree Celsius but it came down due to the rain in the Bay of Bengal. The **corals can survive when the SST is between 20-32 degree Celsius**.
- In Lakshadweep, bleaching was reported in the water around the islands of Kavarathy, Agathy and Bangaram. But it didn't reach alarming levels.

5.1.5. FOREST FIRE

Why in News

Due to recent forest fires in Uttarakhand which caused much havoc and have become a regular affair.

Causes: are both environmental and man-made

- **Environmental**
  - ✓ **Largely** related to climatic conditions such as temperature, wind speed and direction, level of moisture in soil and atmosphere and duration of dry spells. Other natural causes are the friction of bamboos swaying due to high wind velocity and rolling stones that result in sparks setting off fires in highly inflammable leaf litter on the forest floor.
  - ✓ The changing pattern in terms of global warming, rising instances of El-Nino etc are also affecting forest fires; this is due to the cumulative effect of rising temperature, change in precipitation patterns and air moisture, increasing heat waves, drier soil etc.
- **Man-made**
  - ✓ Small fires by grazers and gatherers
  - ✓ Shifting cultivation
  - ✓ Use of fire by villagers to ward off animals
  - ✓ Tourists- bonfire, cigarette butts
  - ✓ It is estimated that **90% of forest fires in India are man-made**

Types: Surface and Crown fire

- **Surface**: It spreads along the ground as the surface litters burns and is engulfed by the flames
- **Crown**: The crown of trees and shrubs burn, often sustained by a surface fire. Crown fire is very dangerous in coniferous forest because resinous material given off burning logs burn furiously. On hill slopes, if the fire starts downhill, it spreads up fast as heated air adjacent to a slope tends to flow up the slope spreading flames along with it. If the fire starts uphill, there is less likelihood of it spreading downwards.

Effect

- Loss of valuable timber
- degradation of catchment areas
- loss of biodiversity and extinction of plants and animals- loss of habitats
- reduction in forest cover; global warming, loss of carbon sink and increase in CO_2 emission
- Change in microclimate of the area, health hazards
- Soil erosion
- loss of livelihood for tribal people and the rural poor, as approximately 300 million people are directly dependent upon collection of non-timber forest products from forest areas for their livelihood

Why forest Fire has Become a Regular Affair in Uttarakhand?

- **The Problem of Chir Pine:** The composition of Uttarakhand forests has changed a lot in the last century. The humid evergreen broadleaf based forests have been replaced by dry stands of Chir pine. The move was initiated by the Britishers as they needed more timber for commercial use.
- **Problems with Pine:** The pine needles and cones are dry and resin rich. When they are shed in the pre-summer times they cover the ground and act as fire traps in summers. The fire catches and spreads rapidly killing other broadleaf trees as well. This enables pine to spread further.
- **This has other implications as well:**

- ✓ Chir pine has commercial value as timber but does not have much to offer for the biodiversity and wildlife
- ✓ Drying up of springs on the hillsides; coz the rainwater that percolated down the soil to feed water would now come rushes down to the plains because of absence of big broadleaf trees
- ✓ Further this increases the chances of floods in the plains

- Mass migration of villagers is also to blame; in recent years, migration from the state has checked the local utilisation of the needles, leaving more fuel for forest fires.
- Government policy- 1981 ban on felling of trees above 1,000 m elevation- leading to foul means like drying it up by fire
- The forest cover in Uttarakhand is reducing; the government policy includes plantation also in forests. However, by definition forest is 'a regenerative community of plants and trees'. Plantation serves only economic purposes not ecological.

Suggestion

- Need to cut down old pine trees so that broad-based leave trees establish themselves again; the ban on felling trees above 1,000 m elevation must be revoked
- Regular removal of pine needles- using local help, Forest SHGs, linking the activity with MNREGA etc; Pine needles can be used as bio-fuel and thus proper capital, technological and industrial support must be given.
- Modern fire-fighting techniques like the Early Forest Fire Detection Using Radio-Acoustic Sounding System, Doppler radar, etc. can also be used. Further, the use of modern forest fire detection and monitoring systems with help from the Forest Survey of India (FSI) and ISRO, as well as creating awareness among locals along with their participation, can be a better solution.

5.2. WORLD GEOGRAPHY

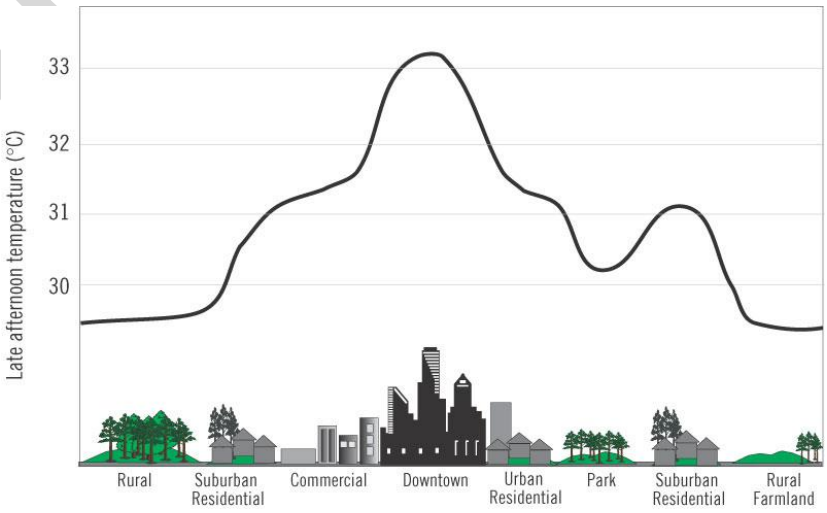
5.2.1. NEW MODEL TO STUDY URBAN HEAT ISLAND

Why in news?

- A new climate model to study the heat island effect in Abu Dhabi has been developed by researchers. The model, once completed, would help in tackling the effect across the globe.

About urban heat islands (UHI)

- Urbanization negatively impacts the environment mainly by the production of pollution, the modification of the physical and chemical properties of the atmosphere, and the covering of the soil surface. Considered to be a cumulative effect of all these impacts is the UHI.
- It is defined as the rise in temperature of any man-made area, resulting in a well-defined, distinct "warm island" among the "cool sea" represented by the lower temperature of the areas nearby natural landscape (figure 1).
- Though heat islands may form on any rural or urban area, and at any spatial scale, cities are favoured, since their surfaces are prone to release large quantities of heat.



- On an average the annual air temperature of a heat island in a city with 1 million people or more can be 1-3°C warmer than its surroundings which goes upto 12°C in evenings.
- Heat islands can affect communities by increasing summertime energy demands, air-conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality

- The major causes are vehicle, dark pavements, multi-storey buildings and air conditioners. Among these the use of ACs is most adverse as it creates a vicious cycle.
- The effects of a heat island can be reduced by developing efficient cooling systems, adding vegetation to buildings, cooling paved surfaces with reflective paint etc.

UPSC MAINS 2013

Bring out the causes for the formation of heat islands in the urban habitat of the world. (100 words)

5.2.2. EL NINO AND WARM WINTER

Why in news?

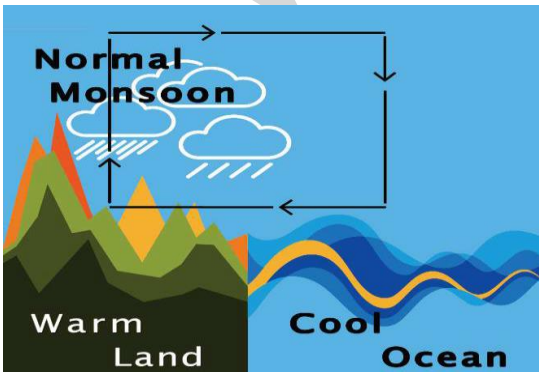
- This winter has been lesser cold and temperatures are 4-5 degrees Celsius above the normal for this time.
- Western parts of Rajasthan which used to experience extreme coldness, the average temperature is 5 to 8 degrees Celsius above normal.

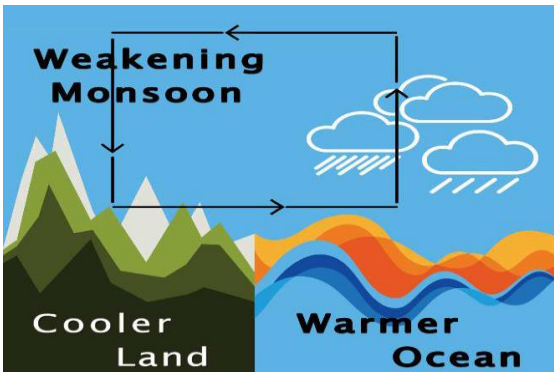
Reasons

- **Global factors:** Persisting El Niño phenomenon
  - ✓ By the time neutral conditions are expected to be established in the Pacific Ocean later this year, the El Niño would have persisted for 15 months, spanning two seasons.
  - ✓ Winters that follow an El Niño event are slightly warmer than usual.
  - ✓ Scientists say the Pacific warming spreads to the Indian Ocean with a lag of about 2-3 months, leading to a warming over the subcontinent.
- **Regional Factors:** Usually westerlies used to bring rain system in most of Northern and Eastern India, pulling down temperatures. But this year, the Westerlies have been **kept north of the Indian landmass by two different wind systems.**
  - ✓ An **anticyclonic wind system** that is usually located south of the Indian peninsula has been pushed northward, and is located where the westerlies are usually found at this time of the year. This anti-cyclonic system is warmer and drier.
  - ✓ **Jet streams** which used to locate in higher atmosphere, and generally operate in the mid-latitudes, north of the Indian landmass. But this year, they are positioned much to the south, aligned to the foot of the Himalayas and the Gangetic plains.

5.2.3. INDIAN OCEAN WARMING AND ITS CONSEQUENCES

- Recent studies have pointed out an increased warming over the Indian Ocean during the past half-century, the reasons for warming are not clear but the results have proved problematic for India.
- Increased warming in the ocean enhances the large-scale upward motion of warm moist air over the equatorial ocean.





- This upward motion over the ocean is compensated by subsidence of dry air over the subcontinent resulting in surplus rains over the ocean at the cost of the monsoon rains over land, thereby **drying the Indian subcontinent.**

a. Schematic illustration of the mean conditions (left) and weakening trend (right) of the monsoon

- **Decline in the marine phytoplankton** in the Indian Ocean – microscopic plants in the ocean which sustain the aquatic food web, absorb the solar radiation thereby influencing climate processes and biogeochemical cycles, particularly the carbon cycle.
- **Food security issues** as large scale distribution of fishes are associated with the phytoplankton's availability.

5.2.4. CHANGES AT THE POLES

5.2.4.1. RISING SEA COVER AROUND ANTARCTICA

- Recent observations present a contrary picture in the two poles of earth. While the sea cover around Antarctica is rising, the sea ice in Arctic sea is melting away.
- The **reason for this lies in the geology of Antarctica and the Southern Ocean**, a new NASA-led study has found.

What the study says

- **Two specific geological factors** in Antarctic region are playing a role.
  - ✓ The **topography of Antarctica** is influencing the flow of winds
  - ✓ The **depth of the ocean** around the landmass affect the circulation of ocean currents
- These two, in turn, affect the process of formation of Antarctica's sea ice cover and its sustainability.

How does it happen?

- The sea ice forms and builds up early in the sea ice growth season.
- This ice later due to winds gets pushed offshore and northward forming a protective shield of thicker, older ice that circulates around the continent.
- The persistent winds flowing down slope off the continent plays help in piling of ice up against the massive ice shield, enhancing its thickness.
- This thick band of ice protects and encapsulates the younger, thinner ice from being reduced by winds and waves.
- This ice drifts away from the continent as the sea ice cover expands creating ice factories conducive to rapid sea ice growth.

5.2.4.2. ANTARCTICA IS GAINING MORE ICE THAN LOSING: NASA

- Antarctica is currently gaining enough ice to outweigh the increased losses from the continent's thinning glaciers, a new NASA study has found.
- The research challenges the conclusions of other studies, including the Intergovernmental Panel on Climate Change's (IPCC) 2013 report, which says that Antarctica is overall losing land ice.

Its impact

- This net gain in ice would mean that Antarctica would not be contributing to sea level rises, but could help offset some of the major ice losses in places from Greenland and glaciers worldwide.
- Currently, it is believed that ice loss in Antarctica contributes to roughly 8% of global sea level rise. This rise can be seen in recent high tides in coastal cities like Miami.

Major concerns

- Authors of the study say the increasing loss of ice in the West Antarctic and the peninsula, plus slowing ice gains elsewhere on the continent, could mean that there will be overall losses of ice in the next 20 years.
- In fact, this may already be occurring, according to other researches which suggest the West Antarctic ice sheet is destabilizing, which would more than overcome the ice gains and could result in 3 meters of sea level rise.
- If this study is correct, and Antarctica is not contributing to this rise in sea level, that means scientists must be underestimating the impact from other sources of sea level rise-such as from melting from Greenland or the heating of the oceans.

5.2.4.3. SIMULTANEOUS TEMPERATURE RISE AND SHRINKAGE OF GLACIER ICE SHEETS AT NORTH POLE

- Temperatures at the North Pole rose above freezing point in December, 20 degrees Celsius above the mid-winter norm and reflecting latest abnormality in a season of extreme weather events.
- This rise in Temperatures at the North Pole is estimated to be due to very violent and extremely powerful depression caused by **Storm Frank.**
- This deep depression has pushed hot air as far as the North Pole, where temperatures are at least 20 degrees above normal, at around freezing point, between zero and two degrees.
- After tormenting the North Atlantic, the depression is expected to head towards Russia's Siberia, where the inhabitants can expect a heat wave of sorts.
- **El Niño has also been cited as a factor in the genesis of these devastating storms.**
- However, the sudden rise in winter temperatures in the North Pole **could interfere with the usual process of the growth of winter ice in the Arctic.**
- Sea ice during the winter maximum is becoming younger and thinner.

2015 HOTTEST YEAR ON RECORD

- Data released by NASA and NOAA (National Oceanic Atmospheric Administration) show that in 2015, the global mean surface temperature was the warmest on record and reach significant milestone of 1° Celsius above the pre-industrial era.
- In the Northern hemisphere (spring of 2015) the three-month global average concentration of CO2 crossed the 400 parts per million barrier for the first time.
- The year 2015 stands out because of the unusually strong El Niño.

6. ENVIRONMENT IMPACT ASSESSMENT

6.1. DRAFT NOTIFICATION TO AMEND EIA PROCESS

Why in news?

- The government has released the Draft Notification to amend the 2006 EIA.

Background of EIA

- The EIA process has its origins in the 1992 Rio Earth Summit where over 170 countries committed to balancing environmental concerns and economic needs. The EIA was a tool to do this.
- In India, it has been in place since 1994 and is also called the environment clearance process. It is the law that mandates that detailed studies be carried out before implementing projects that carry social risks and could damage the environment.
- The studies are discussed at public hearings before being evaluated by a set of identified experts who then recommend a decision to the Ministry or State government on the project.
- As more and more projects have been proposed on forests, common lands, coastal areas, and freshwater lakes over the years, citizens have brought to bear on this clearance process, values of aesthetics, attachment, sustenance, risk and trusteeship.
- Unsurprisingly, this complicates decision-making on big-ticket projects, and has earned this law many epithets such as 'stumbling block', 'bottleneck' and 'green hurdle'.
- Political parties, irrespective of their ideological moorings, have failed to recognise its value, and the government no longer has any legitimacy or finesse to mediate these nuanced debates.
- As a result, cases have piled up in courts, especially at the National Green Tribunal (NGT) that was set up to look into complaints regarding the environment clearance process.

About the Draft Notification

- In the newly proposed draft notification, the Ministry offers a way out to those who have violated environmental norms. It seeks to provide an Environment Supplement Plan (ESP) for projects that have already initiated construction activity and expansion before going through an EIA process.
- This would be tantamount to regularising corporate wrongs.
- The ESP will draw up an assessment and cost of damages which the project developer is expected to pay up. This would be an environmental fine but whether this would be an effective deterrent is a matter of debate- against environmental ethics. The fine cannot be used to restore the environmental damage

6.2. COASTAL REGULATION ZONE: SHAILESH NAYAK COMMITTEE REPORT

About Coastal Regulation Zone

- The coastal land up to 500m from the High Tide Line (HTL) and a stage of 100m along banks of creeks, estuaries, backwater and rivers subject to tidal fluctuations, is called the Coastal Regulation Zone (CRZ).
- It seeks to ensure livelihood security to the coastal communities, to conserve and protect coastal stretches and marine areas and promote sustainable development on scientific principles taking into account the dangers of natural hazards in the coastal areas and sea level rise.

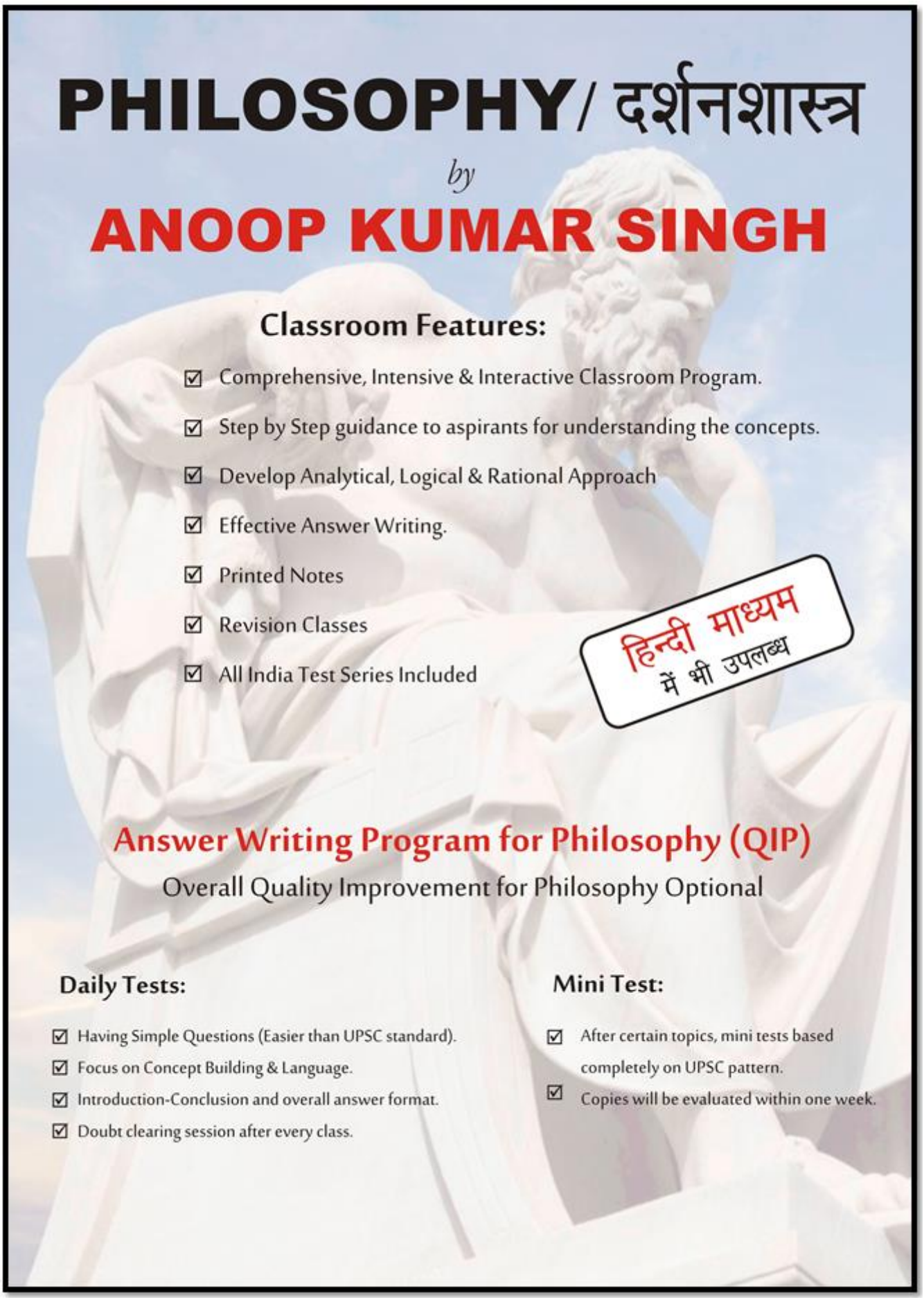
Background

- In 1991, the first coastal regulation zone (CRZ) notification was issued under the Environment Protection Act, 1986. It gave powers to the central government to restrict industrial activities and processes in an area for the protection of the environment along the Indian coastline.
- This notification was amended 25 times before it was comprehensively revised in 2011.

- In 2014, the ministry constituted a committee under Shailesh Nayak, a secretary in ministry of earth sciences, to look into issues raised by various coastal states regarding the 2011 CRZ notification.
- The committee submitted its report in January 2015 and the ministry has disclosed the report after an order from the Information Commissioner early this year ordering the ministry that it cannot deny the report under the Right to Information (RTI), Act.

Highlights of the report

- The committee found that the 2011 regulations, especially with regard to construction, have affected the housing, slum redevelopment, redevelopment of dilapidated structures and other dangerous buildings.
- Since January 2015, several dilutions appear to be taken from this report, such as
  - ✓ Allowing construction of monuments/memorials (Sardar Patel statue in Gujarat) in CRZ VI zones;
  - ✓ Proposal to allow high-rise buildings (Chennai) in CRZ II zones within 500 metre of the high-tide line;
  - ✓ Proposal to allow reclamation of land from sea (Mumbai) for facilities such as ports, roads, quays, harbours and others.
- The report proposes the devolution of powers to state and union territory governments along with local authorities as sought by several states.
- The report even suggests that both CRZ II and III zones (500 metres from the high-tide line that are developed and relatively undisturbed, respectively) should not fall under the environment departments of the State or Central Ministry, and instead be guided by the rules of State town and planning departments.
- It further proposes to reduce the "**no development zone**" to just 50 metres from existing 200 metres for "densely populated" areas.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Focus on Concept Building & Language.
Introduction-Conclusion and overall answer format.
Doubt clearing session after every class.
Mini Test:
After certain topics, mini tests based completely on UPSC pattern.
Copies will be evaluated within one week.

7. MISCELLANEOUS

7.1. ILED THE WAY CAMPAIGN

Why in news?

- Union Minister for Power, Coal and New & Renewable Energy launched the micro site www.iledtheway.in
- It is a campaign of Indian government to save energy by switching to Led bulbs.
- **Tag line:** To make India brighter and smarter

Importance of this micro site

- The micro site will attempt to reach out to all citizens in India and spread awareness about the nation-wide movement of #iLEDtheway, spearheaded by **Energy Efficiency Services Limited (EESL).**
- Through this micro site, consumers can take a pledge of switching to LED bulbs, which are safer, brighter and consume less energy.
- EESL has launched Domestic Efficient Lighting Programme (DELP) and has distributed over 2.4 crore LED bulbs to consumers under the scheme.
- Consumers who do not have access to the LED bulb distribution under the DELP scheme in their city/state, can pre-register for the scheme by sharing their contact details.
- The government aims to replace 77 crore conventional bulbs and CFLs with the LEDs under DELP and 3.5 crore street lights over 3-year period, making it the largest LED based lighting programme in the world.

7.2. DELHI'S ODD EVEN POLICY

What is Odd Even Policy?

- The policy envisages reducing the number of vehicles on Delhi roads by about 50%, which is expected to reduce the level of air pollution in the city.
- Odd numbered cars to ply on odd dates, even numbered cars on even dates.
- A fine of Rs 2000 will be imposed on people who violate the Odd-Even Formula.
- Odd-even policy will not be in effect on Sunday, it will be in force on other days from 8am to 8pm.
- There are few exemptions such as Women driving alone, VIP's, VVIP's etc.

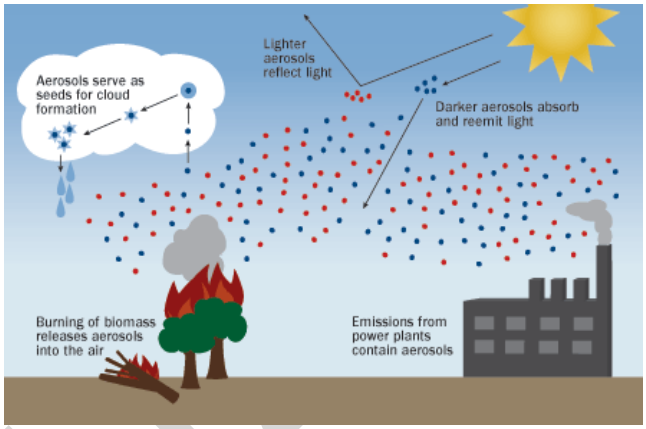
Need of such policy

- Levels of tiny particles known as PM 2.5 in the Indian capital often exceed those deemed safe by the United Nations World Health Organization.
- In the case of Delhi, the contribution of vehicles to air pollution is quite high. Certain studies estimate it to be up to 80% of the total.
- Base noise levels in the city have exceeded acceptable standards.
- Increasing number of vehicular count adds to air pollution and global warming.
- The growing vehicle population gives rise to unrestrained noise pollution and associated health effects and can cause both short term as well as long term psychological and physiological disorders.
- From an economic perspective, congestion on roads results in loss of man-hours as travel time gets longer.
- Slow-moving traffic leads to higher fuel expenditure at the household level and larger imports of crude oil at the macro level, which has implications for valuable foreign exchange.

Way Forward

- Through several advertisements and awareness campaigns, the government should aim at educating people. Campaign for use of public transport (Ab Bus Karein—let us take a bus) and car-pooling are two prominent examples in this regard.
- Strengthen the public transport system so that its capacity will be increased.
- Increasing road tax and parking charges which will discourage people from going for private vehicles.
- Use of high standard fuel such as Bharat Stage VI fuel as early as possible.

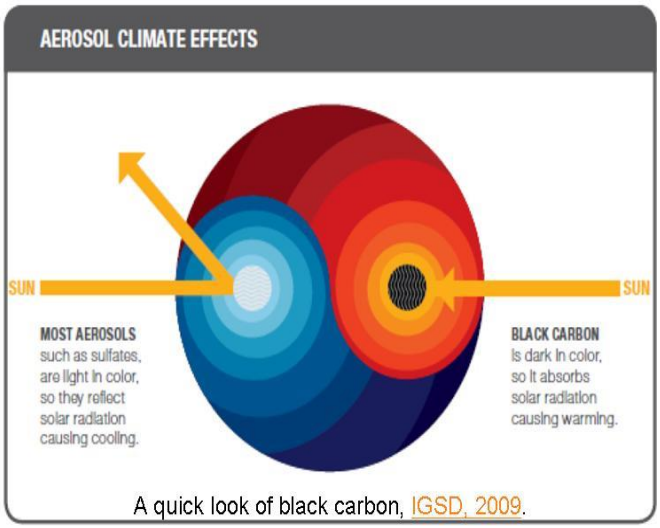
7.3. SAMAR



- The Indian Meteorological Department (IMD) has launched a System of Aerosol Monitoring and Research **(SAMAR)** which will help the country in studying concentration of black carbon in atmosphere due to air pollution and its impact on climate.
- It is a network of 16 Aethalometers, 12 Sky radiometers and 12 Nephelometers.

What are Aerosols?

- They are a subset of air pollution that contains gases, fumes and dust in harmful proportion.
- These particles can be both solid and liquid which also affects environmental visibility.
- They are suspended particulates in the atmosphere and have implications for climate and health through different mechanisms.
- Several studies have suggested that aerosols may be mitigating global warming by increasing the planetary albedo,
- Although the sign and magnitude of aerosol effects on climate are still uncertain as outlined in the Intergovernmental Panel on Climate Change (IPCC) reports.



A quick look of black carbon, IGSD, 2009.

What is Black Carbon?

- Black carbon (BC) aerosol assumes importance due to its high absorption characteristics, which in turn depends on its production mechanism.
- In addition to exerting its own radiative impact, black carbon aerosol can substantially contaminate other aerosol species, thereby altering the radiative properties of the entire aerosol system and in fact their ability to act as cloud condensation nuclei.
- The sources of BC are fossil fuel through burning of diesel and solid coal, indoor burning of biomass fuels for cooking and heating and outdoor burning of crop residues, savannas and forests.
- Black carbon warms the atmosphere due to its absorption and by reducing albedo when deposited on snow and ice

7.4. SNOWFLAKE CORAL

- Snowflake coral is posing a major threat to the coral reef colonies in the Gulf of Mannar, Gulf of Kutch and the Andaman and Nicobar Islands.
- It can destabilize the marine ecosystem because it may crowd out other species like corals, sponges, algae, ascidians that contribute to the rich marine biodiversity of the region.

What is Snowflake Coral?

- The snowflake coral, (Carijoa riisei) is a species of soft coral in the family Clavulariidae.
- It is **native to the tropical western Atlantic Ocean** and has spread to other areas as an invasive species.
- It was first reported as an invasive species from Hawaii in 1972. Since then, it has spread to Australia, Thailand, Indonesia and the Philippines.
- It is considered invasive because of its capacity to dominate space and crowd out other marine organisms.
- It is known to inhabit reefs and underwater structures such as shipwrecks and piers, attaching itself to metal, concrete and even plastic.

7.5. OCEANS TO HAVE MORE PLASTIC THAN FISH BY 2050

- Report Published by the **World Economic Forum**, says the world's oceans may have more plastic debris than fish by the year 2050.
- The study found that whopping 32 percent of all plastic packaging escapes collection systems and finds its way into natural ecosystems, including the oceans.
- This releases toxic chemicals that may be digested by fish and end up in the human food chain.
- This has potential to poison animals, which can then adversely affect human food supplies

FACTS

- Use of plastic bags has **increased by 20 times in past 50 years**
- Most plastic packaging is used only once then discarded
- **One-third of all plastic packaging escapes collection systems**
- **40 percent of plastics end up in landfills**
- **Only five percent of plastics are efficiently recycled**
- Plastics production will increase to 1.124 billion tonnes by 2050

Way forward

- The most effective way to stop plastic pollution in our oceans is to make sure it never reaches the water in the first place.
- We all need to do our fair share to stop plastic pollution: individuals need to recycle and never litter, but producers of single use plastic packaging need to do more.
- We need producers to design packaging so that it is fully recyclable, and so there is less waste.

We also need producers to help cover the costs of keeping their products out of the ocean.

7.6. THE AWARE PROJECT

- The **Atmospheric Radiation Measurement West Antarctic Radiation Experiment (AWARE) project** is located at McMurdo station in Antarctica.
- It has been undertaken by the United States to study the influence of weather patterns in Antarctica over mid-tropics and tropics latitude.
- Antarctica contains 90 percent of the ice on Earth and could raise sea levels worldwide if it were to melt. The study is needed to improve Earth system models to predict how the climate in the region will continue to change.

Significance of Antarctica

- **Atmospheric circulation**
  - ✓ The temperature gradient between the equator and the poles essentially drives the atmospheric circulation in the southern hemisphere in the form of three north-south systems: the polar cell, the mid-latitude Ferrel cell and the tropical Hadley cell. These cells are dynamically linked together.
  - ✓ Warming of Polar Regions changes the location of the boundary between the Polar and Ferrel cells. The strength of tropical circulations also changes.
- **Increasing precipitation**
  - ✓ A change in Antarctic cloud properties that led to a warming of Antarctica weakened the Southern Hemisphere Ferrel cell, and allowed the Hadley Cell on the other side to strengthen, which in turn resulted in more rainfall due to increased latent heat release over Southern Hemisphere tropical regions.

- **Climate warming:** An expanding Hadley cell is generally expected to result from a globally warming atmosphere, so the Antarctic warming from cloud property change is a positive feedback on a warming climate
- **Global heat sink:** Antarctica acts as a global heat sink as there is no insolation (i.e. solar radiation reaching the surface) but it loses more energy to space. Changes in this would affect global climate.
- **Wind system:** The wind system in Antarctica prevents warm air from the northern latitudes of the southern ocean from reaching the interior of eastern Antarctica which remains a cold, isolated desolate region, losing energy to space.

7.7. NASA'S CORAL EXPERIMENT

Need for a survey

- Often called **'rainforests of the sea'** Coral reefs are one of the most important and diverse ecosystems of the world.
- They are, however, very fragile and are under threat from climate change, ocean acidification, improper fishing practices, agricultural run-off, oil spilling etc. Thus, they are getting degraded at a fast rate.
- However, **very little of world's reef area has been studied scientifically.**
- Virtually all measurements have been made by expensive, labour-intensive diving expeditions that cover only a few reefs.
- Thus, it is important to estimate the extent of damage to them so that the gravity of the problem is understood and concrete steps be taken towards their protection.

Coral Project

- NASA has embarked on an air-borne three-year field experiment called **the Coral Reef Airborne Laboratory (CORAL)**, which aims to survey the conditions of the major reefs of the world through remote-sensing.
- It will survey the condition of entire reef systems in Hawaii, Palau, the Mariana Islands and Australia.
- CORAL will involve the aerial deployment of a spectrometer called PRISM (Portable Remote Imaging Spectrometer) which will use optical data, underwater photographs and reef primary productivity data for analysis.

Importance of Coral Reefs

- Protect shorelines by absorbing the wave energy. The survival of many island is dependent on them
- Controlling the CO2 in the ocean water
- Importance for marine ecology
- Best breeding ground for fishes
- Eco-tourism

7.8. DECLINING POLLINATORS: UN REPORT

Background

- A new UN report has warned that **many species of wild bees, butterflies and other insects that pollinate plants are shrinking toward extinction**.
- The report is based on the studies done by a scientific panel brought together by the Intergovernmental Platform on Biodiversity and Ecosystems Services (IPBES).
- Two out of five species of invertebrate pollinators, such as bees and butterflies, are on the path toward extinction

Importance of pollinators

- Pollinators are **important to growing fruits, vegetables and cash crops** though not so much for cereal crops.
- Food output worth more than $250 depend on pollinators especially industries like coffee, fruits

Reasons for the decline

- Changing nature of agriculture with reduced diversity and wild flowers for pollinators to use as food
- pesticide use
- habitat loss to cities
- disease, parasites and pathogens
- global warming

Solutions

- The IPBES report makes a number of recommendations
  - ✓ Strong regulations underlying pesticide use; promoting organic farming.
  - ✓ restoration and protection of habitats for wild pollinators; e.g. planting strips of wild flowers to attract pollinators to field of crops, growing plants in back gardens in cities.
  - ✓ Better land management. This can be included in the 'smart city mission'.
  - ✓ Improvement in the science of pollination by monitoring wild pollinators, investment in R&D
- For better monitoring of ecosystems of the country, India has **launched a programme to establish a network of Indian Long Term Ecological Observatories (I-LTEO).**

About IPBES

- Created in 2012, the IPBES seeks to provide scientific information about biodiversity and ecosystem services to policymakers of the member countries.
- Its secretariat is in Germany and is administered by the UN.

7.9. GYPS VULTURE REINTRODUCTION PROGRAMME

Why in news?

- It was launched last year by Government of Haryana by putting ten captive bred vultures in pre-release aviaries close to Jatayu Conservation Breeding Centre at Pinjore in Haryana.
- It is Asia's first Gyps Vulture Reintroduction Programme
- Recently, two **Himalayan Griffons** were released in the wild as part of this programme.
- The programme is an ex-situ means of conservation whereby some vultures are kept at the breeding center for some time and then released into the wild.
- As vultures play a vital role in keeping the environment clean, their breeds should be increased and the government should constantly work to increase their numbers.

Status of vulture species in India

Mainly four kinds of vultures are found in India

- **Gyps species**- also called Indian vulture, Long-billed, slender billed vulture- Critically endangered
- **Himalayan Griffon**; closely related to Indian Gyps- not endangered; only **Near Threatened**
- **Red-Headed Vulture**- Critically endangered
- **Egyptian Vulture**- Endangered as per IUCN

Why is population of vulture declining?

- Mainly due to use of **Diclofenac**, a drug which is given to cattle for inflammation and pain. The drug results in kidney failure in vultures when it enters its body through the Caracas.
- The government has banned Diclofenac since 2006 but its illegal use remains in force. People need to be made more aware of the use of alternate drug **Meloxicam**

7.10. TRANSBOUNDARY MANAS CONSERVATION AREA (TRAMCA)

- The second monitoring of big cats across the Transboundary Manas Conservation Area (TraMCA) covering Manas National Park (MNP) in Indian side and the Royal Manas National Park (RMNP) in Bhutan has found altogether 21 individual tigers.

- The first monitoring in TraMCA in 2011-12 found 14 individual tigers in the landscape.
- The latest tiger monitoring, carried out by the MNP, RMNP, National Tiger ConservationAuthority (NTCA), WWF-India and conservation group Aaaranyak last year, covered an area of 560 sq km across the two protected areas.
- Apart from the increase in number, the results also indicate of the presence of a healthy core breeding tiger population in the region, which can well serve as a source population for tigers for Bhutan as well as North Eastern region of India.
- Findings also suggest that there is unhindered movement of the tigers and wildlife across the corridors of cross border forests. This underscores the importance of maintaining the connectivity between the respective protected areas comprising the landscape, for long term conservation of the big cats.
- Transboundary Manas Conservation Area (TraMCA) covers Manas National Park (MNP) on the Indian side and the Royal Manas National Park (RMNP) in Bhutan
- TraMCA, floated in 2008, is a joint initiative of India and Bhutan for trans-boundary biodiversity conservation.

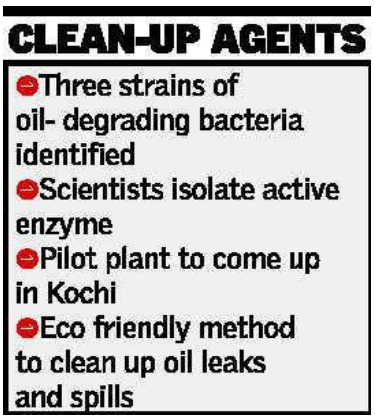
7.11. OIL DEGRADING BACTERIA TO UNDERGO FIELD TRIALS

Why in news?

- The Malabar Botanical Garden and Institute of Plant Sciences, Kozhikode, has joined hands with Bharat Petroleum Corporation Limited (BPCL) for field trials to establish the oil-degrading properties of three new strains of bacteria.
- The key hydrocarbon-degrading enzyme produced by the bacteria has been isolated and purified and laboratory tests have been successful.
- This active enzyme **(Catechol 2, 3- dioxygenase)** produced from three new strains of oil-degrading bacteria (two species of Burkholderia and one species of Pseudomonas) is going to be used in pilot plant in Kochi.

What is Bioremediation?

- It means the use of microorganisms to degrade environmental pollutants.
- Advantages of Bioremediation:
  - ✓ Less expensive
  - ✓ Conventional methods like mechanical removal, burial, evaporation, dispersion, and washing are expensive and can lead to incomplete decomposition, leaving residual contaminants to pollute soil and water.
  - ✓ Employed in areas that are inaccessible without excavation. For ex: spills affecting ground water.
  - ✓ Clean up petroleum pollutants from the environment conserving aquatic wildlife without negatively affecting bio-diversity.



Bioremediation related technologies

- **Bioventing**- an in situ remediation technology that uses microorganisms to biodegrade organic constituents in the groundwater system.
- **Bioleaching**- extraction of metals from their ores through the use of living organisms instead of using harmful chemical substances such as cyanide etc.,
- **Land farming**- ex-situ waste treatment process that is performed in the upper soil zone or in biotreatment cells. Contaminated soils, sediments, or sludges are transported to the Landfarming site, incorporated into the soil surface and periodically turned over (tilled) to aerate the mixture
- **Composting**- Aerobic bacteria and fungi decompose the organic matter into compost used as fertilizer.
- **Bio-augmentation**- the addition of archaea or bacterial cultures required to speed up the rate of degradation of a contaminant.
- **Bio-stimulation**- modification of the environment to stimulate existing bacteria capable of bioremediation.

7.12. GREEN CORRIDOR PROJECT

Why in news?

- Recently eight states have proposed to issue tenders worth Rs 5,000 crore for the projects.

What is green corridor project?

- A project for evacuation of renewable energy from generation points to the load centres by creating intra-state and inter-state transmission infrastructure.
- The intra-state transmission component of the project is being implemented by the respective states and the Power Grid Corporation of India (PGCIL) is implementing inter-state component.
- It is being implemented in two parts
  - ✓ Power Grid is setting up the first corridor connecting states rich in renewable energy.
  - ✓ A second corridor would connect the solar parks in Andhra Pradesh, Madhya Pradesh, Karnataka, Rajasthan and Gujarat.
- The present renewable capacity of the country is 40,000 MW. The Grid can handle 30,000 MW. An additional system for 10,000 MW would be issued by September of this year.

Finance

- It is a Rs. 40,000 crore transmission network project. The intra-state projects are worth Rs 11,000 crore.
- German bank KfW and the National Clean Energy Fund will pick up 40% of the tab each and the rest 20 per cent will be with the respective states.
- These projects will be awarded through transparent bidding to speed up transmission for upcoming solar parks.

Significance

- Distribution network is one of the weakest links in India's power infrastructure. This is a step towards mending that.
- This is a step towards realizing India's target of achieving 175 GW energy from renewable sources.
- The problem of voltage fluctuation in integrating conventional grids with renewable energy grids would be taken care of by the German technology and support.

7.13. UDAYPUR DECLARATION: BRICS

Why in news?

- A meeting of BRICS ministers on Disaster Management was held in Udaypur, Rajasthan. It ended with the adoption of Udaypur Declaration.

Major takeaways

- It laid bare the common thread of challenges on disaster issues faced by all the BRICS nations. These were:
  - ✓ mainstreaming of disaster risk reduction,
  - ✓ use of advanced technology in providing early warning,
  - ✓ need for adequate funding to deal with rehabilitation and reconstruction after a disaster
  - ✓ the impact of climate change on disasters
- Member nations have resolved to set up a dedicated Joint Task Force for Disaster Risk Management for regular dialogue, exchange, mutual support and collaboration.
- Agreement on a road map for implementation of the three-year Joint Action Plan on exchange of Information/ experiences on disaster management, research & technology exchange on forecasting and early warning for floods and extreme events and capacity building.

Significance

- This is a new milestone in collaboration and cooperation among BRICS countries in the field of disaster management.
- Since all member nations face similar challenges it would be effective to address them jointly.

7.14. ECOLOGICAL EXPERIMENTAL ZONES

Why in news?

- China will set up several national ecological experimental zones to carry out reforms in the "ecological civilization" in a bid to improve the environment damaged by fast-paced development in the past three decades.

Aim

- The aim is to incorporate certain ecological friendly practices in these zones which are also aligned with the development needs.
- Consequently, these zones can be projected as 'ecological civilizations'
- The best practices will be replicated all across the country.
- Major progress to be achieved by 2017 and full-fledged systems to be established by 2020.
- Targets were set in the plan, including the water quality of over 90 per cent of water systems in the province will reach optimal level, 23 cities will enjoy good air quality on over 90 per cent of days, and forest coverage will pass 66 per cent by 2020.

Implementation

- Main experiments will include the following:
  - ✓ Establishing a property rights system of natural resource assets as well as systems that reflect market values of ecological products, thereby introducing economic incentives into ecological protection.
  - ✓ Optimising land and space planning by explicitly reserving land and space for ecological protection, and never overstepping the 'red line'.
  - ✓ Improving officials' performance evaluation to reflect their 'ecological performance' such as resource depletion or environmental degradation on their watch.
  - ✓ Compiling natural resource balance sheet and natural resource asset auditing.

Significance

- The strategy is something which the world especially developing countries like India would look forward to and to replicate the efficient policies.
- Its success can be a boon to the world environment as China is the biggest polluter in the world.

7.15. GLOBAL WARMING IMPACT ON OCEAN CURRENTS

Why in news?

Scientists have used a group of elephant seals to observe changes in the circulation of the world's oceans.

Details

- The research showed how "bottom water" - a dense type of water created by salt leaching out of sea water when it freezes over during the Antarctic winter - is being affected by melting ice shelves.
- Thermohaline circulations: are thereby affected. Also its depth is getting affected, making it shallower.

Impact

- Melting rate of ice-shelves can increase.
- Affect the production of bottom water.
- Changes in the production of bottom water would also impact Antarctic sea life that relies on the nutrients and gases in the water to survive.
- Can have far reaching impacts on climate i.e., on Gulf stream and North Atlantic Drift over the long term.

7.16. STEPS TAKEN FOR PROTECTION OF ENDANGERED SPECIES: MOEF

Why in news?

In a written reply to a question in Lok Sabha on steps taken for protection of Endangered species, this information was given by Minister of Environment, Forest and Climate Change.

Details

- **Legal protection**: has been provided to wild animals against hunting and commercial exploitation under the provisions of the Wild Life (Protection) Act, 1972. (For ex: Schedule 1 animals etc.,)
- The **Wild Life (Protection) Act, 1972 has been amended** and made more stringent.
- **Protected Areas**:
  - ✓ National Parks, Sanctuaries,
  - ✓ Conservation Reserves and Community Reserves

  Covering important wildlife habitats have been created all over the country under the provisions of the Wild Life (Protection) Act, 1972 to conserve wild animals and their habitats.

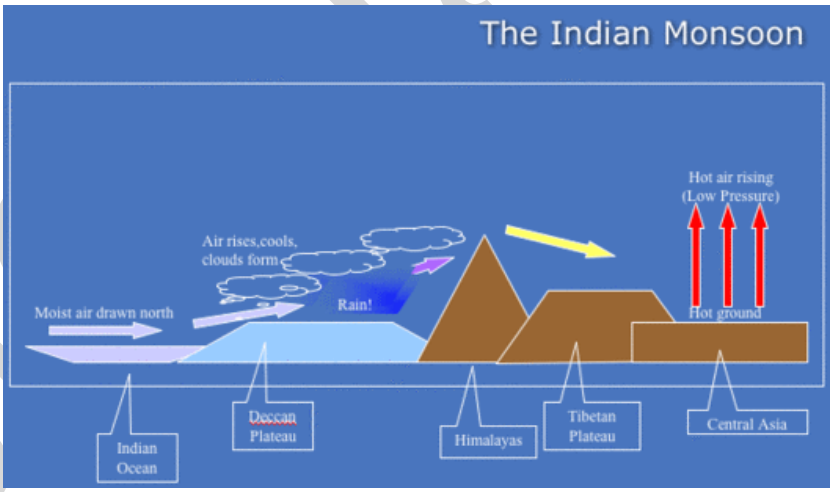
- Financial and technical assistance by centre under:
  - ✓ 'Integrated Development of Wildlife Habitats' -- Recovery programs for sixteen species have been prioritized for taking up such recovery programs which include:
    - Mammals: Snow Leopard, Bustards (including Floricans), Hangul, Nilgiri Tahr, , Asian Wild Buffalo, Manipur Brow-antlered, Malabar civet, the great one-horned rhinoceros, Asiatic Lion, Swamp deer
    - Aquatic: River Dolphin, Marine Turtles, Dugongs and coral reefs,
    - Birds: Edible-nest Swiftlets, Nicobar Megapode, Vultures, and Jerdon's Courser.
  - ✓ 'Project Tiger' and 'Project Elephant' for providing better protection to wildlife, and improvement of its habitat.

7.17. CLOUDS, POLLUTION AND MONSOON

Why in news?

Researchers have found that the high pollution in Northern and Central India, can affect the monsoonal systems. This happens due to change in formation of clouds.

Using satellite data and regional climate models, IIT Bombay researchers have found that deforestation (converting woody savanna to crop land) in north-east India and north-central India has led to a 100-200 mm reduction in summer monsoon rainfall in these two regions.



How?

- The Indian summer monsoon season begins when the land surface becomes hot enough to drive a powerful rising motion of air in the atmosphere, producing heavy precipitation. Cooler, humid air over the Arabian Sea flows inland to compensate for the rising air. Air in this compensating circulation encounters the surface heating and also rises, perpetuating the cycle.
- At the smallest scales, an increase in tiny particles in the atmosphere can shade the land surface while absorbing sunlight aloft, causing a reduction in the heat that reaches the surface.
- Clouds that do form in these polluted environments are less likely to rain and more likely to persist because the droplets are smaller. These longer-lived clouds further cool the surface and weaken the circulation.
- In this way more air pollution can mean weakening of monsoonal systems.

7.17.1. IMPACT OF DEFORESTATION ON RAINFALL

Why in news?

A team from IISc sought to gauge the composition of the rain in the city through isotopes of oxygen and hydrogen. The quantities of these isotopes vary in the ocean and land, and their composition in the rainfall can give an indication to the source of the rain.

Details

- The phenomenon of oceans heating up during Indian summers —and other global weather phenomena — leads to much of the moisture during the monsoon.
- However, as the swirls of wind and cloud make their way inland, they pick up evaporation and moisture of the rainforests, vegetation and inland waterbodies.
- This recycling over time makes a significant contribution to the rainfall as the monsoon progress inlands and loses some of the oceanic contribution,
- For the Northeast monsoon, when moisture is picked up from the Bay of Bengal, the patches of green in the Eastern Ghats contribute to the rainfall here.

7.18. EASTERN HIMALAYAN SYNTAXIS IS MOVING NORTHWARDS

- **Optically Stimulated Luminescence (OSL) thermochronometry** is a new technique being used to study the northward movement of the Himalayan syntaxis (convergence of mountain ranges, or geological folds), a gorge along the Parlung river in Tibet.
- The eastern Himalayan syntaxis is an ideal location to study the effects of erosion on tectonics — very tall mountains over 7,000 metres high and powerful rivers.
- As rocks rise to the surface from the earth's crust, they start cooling down.
- At specific temperatures, the minerals such as quartz contained in the rocks start capturing electrons while continuing to rise, and they cool correspondingly.
- In this new technique, by observing the history of concentrations of electrons, the researchers estimate the temperature profile against the time and then translate this into knowledge of the depth as a function of time.
- This gives them an understanding of the rate at which the rocks rose to the surface.
- The new data showed that the rate of erosion had increased in the last 1 million years, to rates which could not be explained simply by river incision but the help of tectonic uplift was essential to explain it.
- Previous studies on the wider geological context, also indicated continued northward migration of the dome, which are consistent with the new data.

7.19. GLOBAL GREEN AWARD

Why in news?

The steering committee of the International Union for Conservation of Nature and Natural Resources (IUCN) informed Dr. Dhrubajyoti Ghosh, the **first Indian environmental activist** to receive **the Luc Hoffman award.**

Details

- He mapped the area of East Kolkata wetland which is a swathe of water bodies spanning over 100 sq. km.
- This is fast shrinking due to **illegal filling of fishponds.**
- He innovatively calculated the economic value of its loss and presented it in Net Present Value which could be easily used in GDP and other mathematical calculations.
- For this he was presented **Luc Hoffman award.**
- He also studied about what happens to the city sewage, after it reaches wetlands.
- East Kolkata Wetlands is **"wetland of international importance"** under the Ramsar Convention.

7.20. COUNTRY'S FIRST TIGER REPOSITORY

- Country's first repository on tigers, under the new Tiger Cell of Wildlife Institute of India (WII)
- Working with the National Tiger Conservation Authority (NTCA) on tiger conservation and population estimation, the WII has generated a huge database of more than 23,000 images of tigers to be maintained by the tiger cell.
- The repository will help in identification of possible source of tiger skin if caught at any place, studying projects before clearances.
- The Tiger Cell will assist in population assessment of tigers, law enforcement, wildlife forensics, infrastructure development, smart patrolling and advisory role in policy formulation.

8. PAST YEAR QUESTIONS FOR REFERENCE

2015

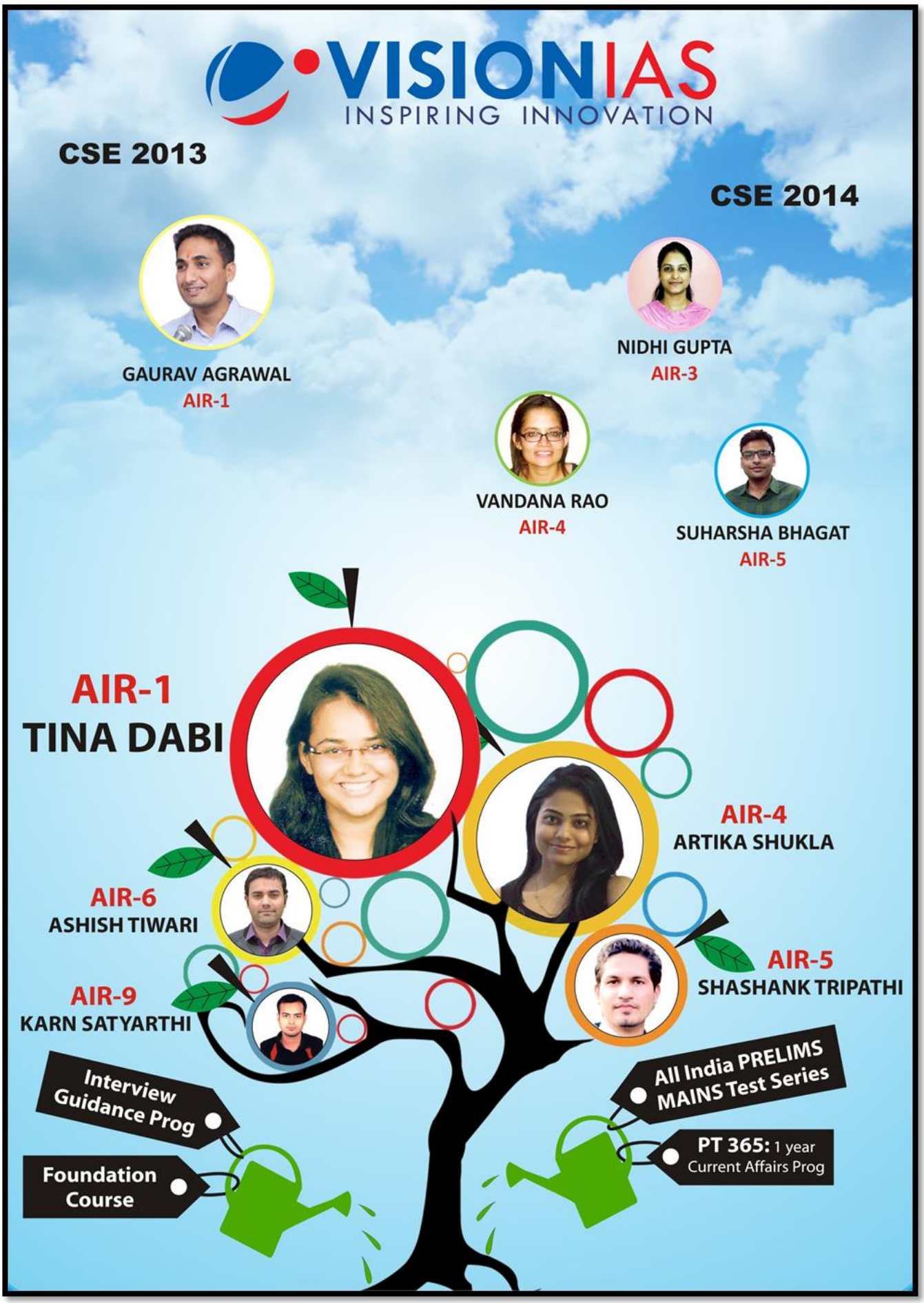
- The Namami Gange and National mission for clean Ganga (NMCG) programmes and causes of mixed results from the previous schemes. What quantum leaps can help preserve the river Ganga better than incremental inputs?
- The frequency of earthquakes appears to have increased in the Indian subcontinent. However, India's preparedness for mitigating their impact has significant gaps. Discuss various aspects.

2014

- Should the pursuit of carbon credit and clean development mechanism set up under UNFCCC be maintained even through there has been a massive slide in the value of carbon credit? Discuss with respect to India's energy needs for economic growth. 2014
- Environmental impact assessment studies are increasingly undertaken before project is cleared by the government. Discuss the environmental impacts of coal-fired thermal plants located at Pitheads. 2014
- Drought has been recognised as a disaster in view of its party expense, temporal duration, slow onset and lasting effect on various vulnerable sections. With a focus on the September 2010 guidelines from the National disaster management authority, discuss the mechanism for preparedness to deal with the El Nino and La Nina fallouts in India.

2013

- Write a note on India's green energy corridor to alleviate the problems of conventional energy. 2013
- What do you understand by run of the river hydroelectricity project? How is it different from any other hydroelectricity project?
- Enumerate the National Water Policy of India. Taking river Ganges as an example, discuss the strategies which may be adopted for river water pollution control and management. What are the legal provisions for management and handling of hazardous wastes in India?
- How important are vulnerability and risk assessment for pre-disaster management. As an administrator, what are key areas that you would focus in a disaster management?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