CURRENT AFFAIRS – 2019

ENVIRONMENT

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PART – 1

ENVIRONMENT

INDEX

POLLUTION

DISASTER MANAGEMENT

CLIMATE CHANGE

MISCELLANEOUS

ENVIRONMENT

BIODIVERSITY

World lost 87 per cent wetlands in 300 years

Why in news?

The world has lost 87 per cent of its wetlands in the past 300 years, says a study on land degradation released at the sixth plenary session of Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) in Colombia on March 26.

Reasons

- Rapid urban expansion and
- Unsustainable management of croplands and grazing lands.
- The estimated economic cost of biodiversity and ecosystem services lost because of land degradation is more than 10 per cent of annual global gross product.

Consumers- Least affected

The consumers benefiting from the overexploitation of natural resources are the ones least affected by land degradation, and therefore, have no reason to take action.

- Example - Case of mining metal.
  - It is extracted from one region and the end user is in another region. It's the people in the mining area who are affected and the end user is least affected.

Conclusion

If necessary steps are not taken, the study projects that by 2050, land degradation and climate change are likely to force 50 to 700 million people to migrate. By 2050, land degradation and climate change will together reduce global crop yields by an average of 10% and in some regions by up to 50%. In the future, most degradation will occur in Central and South America, sub-Saharan Africa and Asia areas that still have a lot of land suitable for agriculture.

Protection of Wetlands and lakes

Why in news?

The Cabinet Committee on Economic Affairs has cleared the decks for a single conservation programme for both wetlands and lakes.

- On February 7 it approved the merging of the National Lake Conservation Plan and the National Wetlands Conservation Programme. These two centrally sponsored schemes are currently being implemented by the Union Ministry of Environment and Forests (MoEF).

National Plan for Conservation of Aquatic Eco-systems (NPCA)

- The new integrated programme.
- It will be operational during the 12th Plan period and will cost an estimated Rs 900 crore, with the Central government and respective state governments sharing the cost in the ratio 70:30.
- The Central government and the governments of north-eastern states would share the cost in the ratio 90:10.

- NPCA will help promote better synergy and avoid overlap of administrative functions.
- It will be governed by a uniform policy and clear guidelines, and will operate through the implementation of sustainable conservation plans.

Objectives

- The principal objectives of NPCA will be holistic conservation and restoration of lakes and wetlands through an integrated and multidisciplinary approach with a common regulatory framework.
- This will enable enhancement of water quality, as well as enrichment of biodiversity and the ecosystem.
- The scheme will also contribute to reduction of pollution loads and improvement in goods and services provided by these water bodies to stakeholders.

Wetlands

- Wetlands are shallow water-bodies with high biodiversity and productivity.
- They play an important role in bio-geochemical cycles and have potential for wastewater treatment.
- Lakes, on the other hand, are relatively deep water bodies, valued primarily for their large volumes of water.
- They are used as a source of drinking water and for navigation, irrigation, improving micro-climate and have eco-tourism potential.

Wetlands vanishing 3 times faster than forests

Why in news?

Wetlands, among the worlds most valuable and biodiverse ecosystems, are disappearing at an alarming speed amid urbanisation and agriculture shifts.

Global report on the state of the world's wetlands

The convention, adopted in the Iranian city of Ramsar nearly a half-century ago, issued its first-ever global report on the state of the world's wetlands. The report found that around 35% of wetlands which include lakes, rivers, marshes and peatlands, as well as coastal and marine areas like lagoons, mangroves and coral reefs were lost between 1970 and 2015. Today, wetlands cover more than 12 million square km, warning that the annual rates of loss had accelerated since 2000.

While the world has been increasingly focused on global warming and its impact on oceans and forests are increased. Directly or indirectly, they provide almost all of the world's consumption of freshwater and more than 40% of all species live and breed in wetlands. Animals and plants who call wetlands home are particularly vulnerable, with a quarter at risk of extinction.

Wetlands also provide a livelihood for more than one billion people, while mitigating floods and protecting coastlines. They are also a vital source of food, raw materials and genetic resources for medicines. The Ramsar Convention has been ratified by most of the world's nations, including the U.S., China and India, and has designated more than 2,300 sites of international importance.

NITI Aayog report about shifting cultivation

Why in news?

The NITI Aayog report recommends doing away with the practice of having divergent approaches towards shifting cultivation.

NITI Aayog report

- The "inconsistency and incongruence among policies of various departments" of the Central and state governments regarding shifting cultivation needs to be done away with.
- Central as well as State government departments of forests and environment, agriculture and allied departments often have divergent approaches towards shifting cultivation.
- In the uplands of northeast India—Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura—shifting cultivation, locally known as jhum, continues to be a dominant mode of food production and the economic mainstay of many rural households.

Policy contradictions and their cause

- Shifting cultivation lands fall under the purview of agriculture when they are in the cultivation phase, but the same lands come under forests during the fallow phase.
- Thus, the same piece of land is subjected to different laws, regulations and management, which become self-contradictory.
- It affects upland farmers, restricting their control, decisions and investments on such plots.
- This ambiguity needs to be addressed and shifting cultivation lands with long fallow cycle should be categorised as a distinct land use, thus removing their categorisation as 'abandoned land', 'wastelands' and 'Unclassed State Forests'.
- The oversight has led to the present policy incoherence and contradictions in the management of shifting cultivation.

Forest vs Agriculture

The Forest Policy (1988) considers jhum lands as forest land and it discourages shifting cultivation. Forest departments want to 'rehabilitate' the jhum lands through social forestry and energy plantations. However, agricultural development programmes promote agriculture, horticulture and cash crops on jhum lands as such lands are perceived as arable agricultural land. Multiple Central and state government agencies target jhum lands for cultivating cash crops like timber trees, tea, coffee, and rubber.

Categorising shifting cultivation lands

Shifting cultivation fallows must be legally perceived and categorised as 'regenerating fallows', which may, if given sufficient time, regenerate into secondary forests. The government has to realise that the practice of shifting cultivation could increase forest cover through the regenerating fallows. The forest cover and forest cover change assessments, in future, need to acknowledge the additional forest cover resulting from regenerating fallows.

Road map for transformation of shifting cultivation

- A range of enabling programmes and policies is needed to provide the right environment to support communities to overcome the challenges.
- The government's policy think tank recommends launching "Mission on Shifting Cultivation: Towards Transformative Changes" under the Ministry of Agriculture & Farmers' Welfare.
- The mission should set an institutional mechanism that ensures inter-ministerial convergence, particularly with the Ministry of Environment, Forest and Climate Change and Ministry of

Development of North Eastern Region, as well as with other related ministries/departments at the centre and NE states.

- While facilitating transformations in shifting cultivation, the government needs to adopt a 'landscape or systems' approach and not a crop-based approach as mountain agriculture has a landscape approach that links agriculture, animal husbandry and forest.
- Integration of various land use elements at the landscape level is fundamental for the success of the transformation of shifting cultivation in northeast India.

Shifting Cultivation

- It is traditional agricultural practice that involves clearing vegetative forest cover on land and slopes of hills, drying and burning it before onset of monsoon and cropping on it thereafter.
- After harvest, this land is left fallow and vegetative regeneration is allowed on it till the plot becomes reusable for same purpose in cycle.
- In north east India, it is called as jhum cultivation. People involved in such cultivation are called Jhumia.
- Shifting cultivation is considered as important mainstay of food production for considerable population in northeast India in states like Arunachal Pradesh, Nagaland, Mizoram, Meghalaya, Tripura and Manipur. Shifting cultivation causes in long term causes problem of land degradation and threat to ecology of the region at large.
- Burning of forests provide temporary nutrients like potash to soil. Burning of forests results in emissions of greenhouse gases (GHGs) such as CO2, NO2. It also increases surface run off of rainwater leading to soil erosion.

Mangroves destruction violates fundamental rights of citizens

Why in news?

The Bombay High Court banned destruction and cutting of mangroves in Maharashtra. The bench also prohibited any sort of commercial exploitation of the mangroves. All mangrove land will fall in Coastal Regulation Zone-I category as per both the CRZ notifications of 1991 and 2011.

Fundamental Rights

The destruction of mangroves offends the fundamental rights of the citizens under Article 21 of the Constitution of India. In view of the provisions of Articles 21, 47, 48A and 51A (g) of the Constitution of India, it is a mandatory duty of the State and its agencies and instrumentalities to protect and preserve mangroves.

Maharashtra

In August 2016, Maharashtra had notified 15,087.6 hectares of mangroves across the state as reserved forest. It made constructions within 50 metres of a mangrove belt illegal. However, this notification excluded 10,000 hectares of privately-owned mangrove land. In its latest direction, the high court has asked Maharashtra government to identify all such private plots and declare them as protected or reserved forest area within 18 months in accordance with the Indian Forests Act, 1927. The jurisdiction of those lands will then be transferred to the Maharashtra Forest Department.

Other directions issued

- Stop dumping of rubble/garbage/solid waste on the mangrove areas;
- The state government has to constitute a committee that shall be responsible for preservation and conservation of mangroves, and restoration of reclaimed mangroves areas;
- A grievance redressal mechanism needs to be created within three months wherein general public can lodge complain if destruction of mangroves takes place;
- State government has to replant destructed mangroves and restore mangroves areas which are illegally reclaimed;
- The state has to ensure that criminal law is set in motion against all those who commit offences punishable under section 15 of Environment Protection said Act of 1986.

The high court passed these directions in response to a public interest litigation filed by the Bombay Environment Action Group (BEAG) regarding the destruction of mangroves in Maharashtra. In 2015, a report by the Bombay Natural History Society revealed that rampant bund building, unsustainable aquaculture and industrial growth are severely damaging mangroves in the Konkan coast. In an interim order on October 6, 2005, the court had asked the state to conduct a detailed mapping of mangroves across Maharashtra through satellite remote sensing. The court will again hear the case on December 1 when the state government will have to report compliance with the above directions.

Alien, Invasive and thriving

Why in news?

Recently, the Madurai Bench of the Madras High Court, hearing a public interest litigation petition seeking the removal of invasive trees from over 22,000 hectares in the Western Ghats, directed the National Board for Wildlife to look into the issue and pass appropriate orders.

Invasive species

While invasive species of flora like eucalyptus, wattle, pine and cypress trees, as well as *Lantana camara* plants, are proliferating across the Nilgiris upper slopes, *Prosopis juliflora*, parthenium and eupatorium have spread on the biosphere's lower slopes. Weeds like scotch broom (*Cytisus scoparius*) and gorse have also begun to spread profusely in habitats like Avalanche, Upper Bhavani and the Mukurthi National Park, home to the endangered Nilgiri tahr, the State animal.

Wildlife also affected

Mudumalai Tiger Reserve too has been impacted by the spread of invasive plants, especially *Lantana camara* and parthenium. Around 70% of the tiger reserve has been taken over by lantana, leading to a diminishing fodder base for herbivores within the reserve. While invasive species of flora have had an impact on biodiversity in the Nilgiris, restoration ecologists and experts who have worked in the region for many years have urged caution in dealing with their removal. Wildlife continues to thrive in the Western Ghats, including the Nilgiris biosphere, despite the invasive species. But he admitted that the benefit to the native system from the alien species was low. Invasive species in the forest ecosystems of Tamil Nadu have resulted in a loss of biodiversity, with an adverse impact on the ecology and economy.

A lowdown on the threat posed by them

Invasive species do not allow any shrub or local species of grass to grow around them. They grow in dense fashion, leaving little space for wildlife to pass through. A resin oozes from some species during the

monsoon, which turns the soil acidic. Invasive species like Lantana spread all over an area and create a mat-like structure. They lead to retrogression and a change in the original vegetation in the longer run, degrading and destroying biodiversity.

In the process, herbivores such as the Indian gaur, spotted deer and sambar do not get the required grass, shrubs and plants they feed on. If the herbivores are affected, carnivores like tigers and panthers also suffer. Some of the invasive trees are not deep rooted and get easily uprooted during storms and fall on roads, creating problems for users. Apart from other factors, monoculture plantation of eucalyptus and wattle could endanger the Nilgiri tahr as it could affect the heart of its habitat, the grasslands. They can lead to the movement of wildlife. The Indian gaur population from the wild has started migrating to Kodaikanal town in search of fodder. It is a major problem in areas such as Thadiyankudisai, Thandikudi, Pannaikkadu and Kmbarayur as well.

Researchers dive in to restore coral ecosystems

Why in news?

Coral reefs are among the most diverse ecosystems on earth, and their role in maintaining marine biodiversity is of no small measure.

Coral bleaching

It is well documented that coral systems around the world are bleaching and dying due to climate and chemical changes in the sea water. A team from National Centre for Coastal Research, Chennai, plans to work on coral monitoring and restoration in the Gulf of Mannar region.

The team will also set up an acquatech park which will help local persons rear marine ornamental fish towards a sustainable livelihood. The group has prior experience in studying corals across the country. They have successfully transplanted and nurtured corals in the Lakshadweep region. Now they are set to work in the Gulf of Mannar.

Corals

Corals have a symbiotic relationship with the unicellular algae dinoflagellates. An increase in sea surface temperatures leads to coral bleaching and the breaking of this relationship. This ecosystem is so sensitive that an increase of sea surface temperature by one degree can cause the corals to bleach and die. Apart from sea surface temperatures, increase in carbon dioxide levels in the sea water and a change in its chemical composition can also trigger bleaching.

Coral reefs in India

Coral reefs in India are only seen in some localities around the Gulf of Mannar, Gulf of Kutch, Lakshadweep islands and Andaman and Nicobar Islands.

Which is responsible for bleaching?

In many of these places, bleaching of corals and related cnideria species such as giant clam and tentacle sea anemone have been observed by the team. The methods include reducing harvest of herbivorous fish and minimising anthropogenic causes of bleaching.

Mapping of corals

The National Centre for Coastal Research, which comes under the Ministry of Earth Sciences, conducted a mapping of corals for Gulf of Kutch, Gulf of Mannar, Lakshadweep and Andaman and Nicobar islands over a period of five years, from 2000 to 2005.

Their results were startling, as they found less than 40% of the coral reefs in India were still alive. From 2005 to present, the team, with support from Department of Science and Technology, has surveyed the area around

Agatti and Kavaratti islands in the Lakshadweep, and in an area approximately one acre, transplanted branching corals, massive corals and foliac corals.

Over the last decade, this region has seen restoration of live corals in these areas. The team found that the branching coral *Acropora* could grow 25 cm in 3 years. Another genera, *Pocillopora*, grew 15 cm in 3 years.

Conclusion

The researchers plan to replicate the model in the Gulf of Mannar region, and towards this end, they have set up a centre in a 25-acre piece of land near the Rameshwaram coast. Partnering with Gulf of Mannar Marine National Park Authority, they will first monitor the 21 islands in this region and identify degraded areas. After the monsoons, they plan to start transplantation work with branching coral species.

Flightless Bird Research Centre

The Kerala Veterinary and Animal Sciences University (KVASU) have set up a flightless bird research centre. The centre has been setup on the university campus at Pookode in Wayanad district. The centre envisages carrying out research on adaptation and comparative physiological studies of flightless birds such as the ostrich, rhea, and emu, and artificial incubation of their eggs.

Ravaged by a caterpillar

Why in news?

Maize crop of Karnataka is being destroyed by a small greenish-brown worm with dark lines along its length and an inverted 'Y' on its head. It looks like any of the thousands of pests that infest fields in India each year, but this one is special. Karnataka is one of the largest maize producers in India, and maize is the third most widely produced cereal in the country.

The fall armyworm

The fall armyworm (Spodoptera frugiperda), a native of the Americas, first seen in Asia five months ago. Since its identification in the State's Shivamogga district in May, the pest has reached as far as West Bengal and Gujarat. There are six phases in the fall armyworm's life, and between the first and the last, its appetite changes dramatically. Within days, it turns from a light feeder into a voracious eater that can wipe out farms. After pupation, adult moths emerge.

Other alien attacks on farm fields

This isn't the first time a foreign visitor is poised to wreak havoc on Indian farms. In 2008, the papaya mealybug, a Central American native, entered the country and destroyed plantations in several States. Then, in 2014, the tomato pinworm, or Tuta absoluta, a South American moth, was spotted in Karnataka. Within a couple of years, it had reached Maharashtra, Gujarat, Delhi and other regions, where it caused widespread damage to tomato crop.

The rise in invasives

Some researchers have argued that India has traditionally been extra vulnerable to invasive species because of its history of political invasions. From the Mughals to the British and the Portuguese, everyone brought their share of noxious weeds, insects and trees. Consider the case of the Lantana species, camara, which was first introduced by the British as an ornamental hedge in the 19th century. Today, it is widespread across India and threatens biodiversity by taking over forest understorey and grabbing resources from other species. Another invasive, congress grass, is thought to have piggybacked via wheat shipments from the U.S. under the 1950s

PL-480 Food for Peace program. But the entry of invasives has been rising the world over in the last few decades, and one likely reason is increased trade. Out of several factors such as a country's population density and amount of cropland, it was the degree of international trade that best predicted the number of invasives.

Alien species

Such alien species which migrate to a new geography from their native lands can be a huge risk to both agriculture and wildlife. They could be insects, trees, weeds or viruses. Many of them tend to die out in new environments. Some become naturalised, like a few eucalyptus species have in India. Naturalised aliens maintain their population and do not pose a great risk to biodiversity. A small percentage of them turn invasive, and spread uncontrollably. The absence of natural predators from their original homes allows them to disrupt ecosystems and cause massive economic losses.

Destruction caused by fall armyworm

The earliest published reports of widespread destruction by the fall armyworm come from Georgia, U.S. in the 18th century. The fall armyworm was known as a particularly voracious pest. Though it preferred maize, it ate nearly 80 other plants. Nearly 200 million people here depend on maize for nutrition, and they are all at risk from the little brown caterpillar. One of the worst attacks occurred in 1912. According to reports, the pest swept almost the entire U.S. east of the Rocky Mountains, destroyed the corn and millet in the southern U.S., severely injured cotton and truck crops etc. Even today, it continues to be a major cereal pest in both North and South America. In 2016, the pest turned up in the west African country of Nigeria. Initially, farmers confused it with another Spodoptera species native to the region. Today, two years later, the pest has spread to 43 countries on the continent. It is expensive to control it. In June, the Food and Agriculture Organisation said it had invested $20 million in controlling the pest in Africa, and was looking for another $23 million.

There are several reasons why the armyworm is thriving

It reproduces rapidly, and the continent's tropical and sub-tropical climates allow it to feed all year round. In contrast, fall armyworms die in Canada's frigid winters. Each summer, new populations of the moth migrate to Southern Canada from warmer states in the U.S. like Texas. Such migration isn't hard for them; the Spodoptera moth is known to be able to fly around 1,400 km. This is another reason why it spread so quickly to new countries after it landed on African shores. Researchers speculate that it might have hitched a ride in cargo containers on commercial aircraft or in someone's cabin baggage, and reached to Africa. According to the European Union Notification System for Plant Health Interceptions, Spodoptera frugiperda was intercepted 14 times by EU quarantine officers in 2017. It was caught piggybacking on all kinds of organic material flowers from Kenya, bonnet peppers from Mexico, and cucurbits from Suriname, to name a few.

How did it enter India?

To get into India, the fall armyworm would have either had to fly here, or make it past India's plant quarantine system. This caterpillar has several stages in its life cycle, during which it does not need food to survive. Out of these stages, the pupal and adult moth stages can survive for days without food. Such pupae or moths could easily have hitched a ride on maize shipments into India. In 2018 alone, India imported 500 million tonnes of maize. Further, the experience of the European Union shows that armyworms can survive on fresh fruits and vegetables too. India's imports of fresh fruits and vegetables are not high, but they are not non-existent either. According to the data from the Ministry of Food Processing Industries, in 2016-17, India's imports of edible vegetables were worth $1,371 million.

India's quarantine system

The first line of defence is a quarantine system, under which imports of grains and plants that can host such insects are inspected at shipping ports, airports and land border crossings. This system is built around the Plant Quarantine (Regulation of Import into India) Order of 2003.

The order, in turn, is notified under an Act that is over a century old:

- The Destructive Insects and Pests Act of 1914

Under the Plant Quarantine Order, grains or plant material can come to India only through notified points of entry. Imports at each of these points are to be inspected by officers from the Directorate of Plant Protection. In India, this responsibility lies with the Directorate of Plant Protection, Quarantine & Storage, with its headquarters in Faridabad, Haryana. Unfortunately, the directorate is failing in its task of policing Indian borders. It is short-staffed and hamstrung by the lack of a strong legislation. Quarantine stations do not have key experts and required tools and infrastructure. There are also gaps in regulating the import of plant materials by individual passengers. Under the Quarantine order, around 2 kg of cut flowers and dry fruits are exempt, but any seeds or larger quantities of flowers must be accompanied by a certificate declaring that they are free of pests and microbes. If not, passengers arriving at international airports are required to declare them. 99% of the people don't do that.

Time for a new law

The Destructive Insects and Pests Act is subsidiary to the Customs Act, 1962, quarantine officers must wait for customs officers to flag suspicious goods before they can check them. The customs officer may not suspect anything, because what they are looking for is entirely different from what a quarantine officer wants to examine.

In 2013, after widespread recognition of the lapses in the current quarantine system, a new Bill called the Agricultural Biosecurity Bill was tabled in the Lok Sabha. The Bill borrowed from some of the most stringent quarantine regimes in the world, such as the U.S., Australia and New Zealand. Unlike India's Directorate of Plant Protection, Quarantine and Storage which comes under the Ministry of Agriculture, the U.S.'s Animal and Plant Health Inspection Service (APHIS) and AQIS are autonomous bodies. The Bill envisaged setting up a similar body in India, called the Agricultural Biosafety Authority of India. Quarantine officers would have wider powers under this Bill. And the authority could even penalise States for not following its directions in controlling an invasive species outbreak. But as of today, this Bill has lapsed.

Conclusion

Quarantine systems to be strengthened at the internationals airports in the State. Prominent signboards should be installed in airports warning passengers of the dangers of bringing exotic fruits and flowers into the country. Training of plant quarantine officers and for providing them with equipment to detect dangerous species. The Australian Quarantine and Inspection Service (AQIS), for example, employs sniffer dogs to detect agricultural material on passengers. It also has scanners that can detect organic material such as seeds in baggage. Several Indian airports do not have this. When such items are found, stringent penalties are necessary.

Paddy across 4,000 hectares infested with armyworm

Mythimna Separata, popularly known as armyworm, has begun devouring the paddy crop. According to a preliminary estimate, paddy crop on more than 4,000 hectares in the district has been infested with armyworm. The worms hide under soil clods and in cracks along the bunds of paddy fields during the day. They are nocturnal and migrate from one field to another at night.

India loses natural resources to economic growth

Why in news?

A report on environment accounts was released by the Ministry of Statistics and Programme Implementation.

Economic growth

In fact, it says that when the average growth rate of gross state domestic product (GSDP) during 2005-15 for almost all the states was around 7-8 per cent, 11 states registered a decline in their natural capital. While 13 states showed a marginal growth in the range 0-5 per cent, just three states saw their natural capital increase by more than 5 per cent. This model of economic growth may not let the country sustain the rate of development for long.

What report says?

Monitoring the natural capital is important and should be one of the determiners for sustainable development. The natural capital are those elements of the nature that provide valuable goods and services to humans, such as the stock of forests, food, clean air, water, land, minerals, etc. The natural capital accounting (NCA) method has been used, in this report, to account for income and costs associated with natural resource used, based on a framework approved by the United Nations in 2012 called the System of Environmental Economic Accounts (SEEA).

States parameters

The report also reveals few positive trends. For example, Andhra Pradesh, Gujarat, Jharkhand, Kerala, Maharashtra and Odisha show an increase in parameters such as transition of fallow land to farmland, increase in forest cover along with growing carbon stock and new sources of minerals. It, however, shows alarming effects of climate change, urbanisation and decline in forest resource.

Water: Less snow, glaciers, inland and coastal wetlands

Climate change has had a huge impact on water resources. The report shows a 24% decline in the area under snow and glacier in some states and also notes the impact of climate change on wetlands/water bodies in Himachal Pradesh, Sikkim and Jammu Kashmir.

Forest: Reducing stock

In the last 6 years, the rate of growth of forest stock has reduced by more than 10% in almost all states. From 2006-07 to 2010-11, all states, except Goa and Sikkim, have shown such a decline. However, from 2010-11 to 2015-16, even though there was a marginal change in forest cover in Assam and Uttarakhand, growing stock has reduced by more than 10 per cent. But in the case of Jharkhand, Madhya Pradesh, Maharashtra and Rajasthan, despite a marginal change in forest cover, growing stock has significantly increased by more than 10 per cent.

In the northeast, total growing stock has decreased from 1122.12 million cubic metres (cum) in 2006-07 to 958.34 million cum in 2015-16. Arunachal Pradesh and Assam, which contribute around 58 per cent of growing stock in the northeast, have shown a significant reduction in growing stock within the forest.

The country is dependent on imports wood and wood products to fulfil its domestic demand. So the growing stock is a crucial forest resource, the decline of which may be a harbinger of trouble for the economy.

Urbanisation

Conversion of agricultural land to meet needs of urban population will affect productive capacity. While mentioning the use of agricultural land for urbanisation, the report says that high rate of urban growth is likely to affect a productive capacity in states like Punjab, Haryana, Karnataka, Telangana and West Bengal. It calls

for better utilisation of land in a sustainable manner to fulfil the demands of growing population without increasing the degraded land.

To sustainably use natural resources

This first statement on environment accounts strengthens and supports monitoring of sustainable development goals on zero hunger, sustainable cities and communities, life on land. Several countries are compiling natural capital accounts (NCA) to make economic decision making on natural resources an informed process. They want to use NCA as the basis for compiling indicators to monitor progress of sustainability policies. India is participating in the Natural Capital Accounting and Valuation of Ecosystem Services project launched by the United Nations Statistics Division (UNSD).

Native shade trees better for carbon storage

A team in their survey identified that native shade trees affects carbon sequestration and tree diversity better than any other. The researchers quantified shade tree species diversity and the amount of organic carbon sequestered in the trees by measuring wood, root, litter and soil biomass. Across all plots, the researchers identified a total of 86 native tree species; and the total carbon stocks rose with increasing tree diversity. Native trees in coffee estates and forests displayed high and comparable carbon stocks (approximately 193 and 222 megagrams (Mg) of carbon (C) per hectare respectively) as well as tree diversity (around 45 tree species). However, the introduction of silver oak negatively impacted both carbon stock and diversity.

Gujarat may soon declare its first biodiversity heritage sites

Why in news?

The Gujarat Government is working towards declaring two sites an indigenous mango forest in Chinchli village of Dangsand an inland mangrove site in Guneri village of Kutch on the Western Indo-Pakistan border as Biodiversity Heritage Sites (BHS). The sites, proposed by the Gujarat Biodiversity Board (GBB), will be the state's first biodiversity heritage sites.

Guneri

Guneri, nearly a hundred years old, is a natural inland mangrove site spread over 33 hectares including the buffer zone. Generally, mangroves are grown in coastal areas. However, the site in Guneri has inland mangrove of considerable height. It also has the presence of wildlife like chinkara, ratel, and some migratory birds.

Chinchli region

The Chinchli region in Dang district has a unique indigenous mango forest spread over 2,357 hectares in Piplaidevi Range. It contains 2,708 huge indigenous mango trees. The region also has 68 species of trees, 25 species of shrubs, 100 species of herbs, 50 species of climbers, 25 species of grass and 20 species of lower groups of plants like moss. As per estimates, Chinchli could date back to over 200 years. The region is hilly and some of the cliffs of the hills are a natural nesting site of endangered vultures.

Centre exempts 3,115 sq km from Ecologically Sensitive Areas in Kerala

Why in news?

The Union Ministry of Environment, Forests and Climate Change (MoEFCC) has lifted the restrictions imposed on new projects and activities in 3,115 sq km of human settlements, plantations and Kasturirangan committee on the conservation of the Western Ghats.

Section 5 of the Environment (Protection) Act

The amendment to the direction issued under Section 5 of the Environment (Protection) Act (EPA) effectively exempts the 3,115 sq km from the restrictions on granting environmental clearance for five categories of projects and activities which have maximum interventionist and damaging impacts on ecosystems. The report of the High Level Working Group, had recommended the demarcation of a total of 59,940 sq km as ESA in the six States bordering the Western Ghats, namely Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu.

Extent of ESA in Kerala

The extent of ESA in Kerala was pegged at 13,108 sq km, an area spread over 123 villages. Following widespread protests and political turmoil, the Kerala government, on the basis of ground-level verification, had proposed that the ESA be limited to 9,993 sq km, including 9,107 sq km of forests and 886 sq km of non-forest area. Approving the State government's recommendation, the draft notification issued by the MoEFCC on March 10, 2014, had reduced the territorial extent of ESA in Kerala by 3,115 sq km. Taking this reduction into account, the MoEFCC had reworked the figures and notified a total of 56,825 sq km as ESA instead of the original 59,940 sq km. Subsequent notifications issued in 2015, 2017 and 2018 had also demarcated the same area as ESA. The amendment notified, states that the direction would be applicable only to 56,825 sq km of ESA as mentioned in the draft notification.

SC directs Centre to declare 10 km area around national parks as eco-sensitive

Why in news?

The Supreme Court directed the Union Environment Ministry to declare 10 km area around 21 national parks and wildlife sanctuaries across the country as 'eco-sensitive zones'.

Parks and Sanctuaries

A Bench led by Justice Madan B. Lokur took the initiative after its amicus curiae informed the court that the State governments have taken no effort to protect the area around these sanctuaries and parks. The parks and sanctuaries are

- the Pobitora sanctuary in Assam;
- Hemis and Kishtewar national parks,
- Changthang, Hokersar, Trikuta sanctuaries in Jammu and Kashmir;
- Jogimatti, Thimlapura and Yadahalli Chinkara sanctuaries in Karnataka;
- Deolgaon Rehekuri and Thane Creek Flamingo sanctuaries and
- the Malvan marine sanctuary in Maharashtra;
- Siroi National Park and Khongjaingamba Ching sanctuary in Manipur;
- Baghmara Pitcher Plant sanctuary in Meghalaya;
- Fakim and Puliebadze and Rangapahar sanctuaries in Nagaland;
- Dr. Bhimrao Ambedkar bird sanctuary and
- Pilibhit sanctuary in Uttar Pradesh and
- the Jorepokhri sanctuary in West Bengal.

Sikkim's highest forest zone could get denser

Why in news?

The cold climes on high-altitude mountain tops make it usually difficult for trees to grow above the timberline (the last canopy forests on the mountains). Though global warming is changing this in many of the world's high mountains and causing timberlines to move upward, the eastern Himalaya may be an exception. The zone of uppermost canopy forests here are unlikely to shift upwards but will get denser.

What study says?

Timberlines, the uppermost limit of canopy forests that gradually gives way to the treeline (beyond which trees do not grow) are limited by climate: factors including low temperatures and high winds on mountain tops prevent woody tree growth higher up. Timberlines, therefore, serve as indicators of climate change. To find out if a similar pattern exists in the eastern Himalaya, scientists studied the composition and regeneration of woody trees in the timberline ecotone (transition zone) between the timberline and treeline, of Khangchendzonga National Park. Across nine contiguous sites in the Park, the team studied tree composition in this ecotone which lay between 3,787 and 3,989 metres above sea level. Among the 20 woody tree species they recorded here, the Bhutan firr Abies densa, the woolly rhododendron Rhododendron lanatumand the small-leaf rowan Sorbus microphylla dominated the vegetation. Environmental factors such as elevation, slope and humus played a role in this species composition. The density of trees in the timberline ecotone was significantly higher than that of its western Himalayan counterparts. To study regeneration of the dominant timberline species in the ecotone, the researchers recorded seedlings, saplings and trees in this zone. Bhutan fir seedlings regenerated well here and elevation (along with humus and slope) played a role in this regeneration too. The zone contained high numbers of seedlings and saplings. According to the authors, this indicates that the ecotone could become denser in the near future. However, there were no tree seedlings or saplings beyond the treeline.

The entire wilderness in the world could disappear in a couple of decades

Why in news?

The study, led by researchers from the University of Queensland in Australia and the Wildlife Conservation Society in New York, paints the first global picture of the threat to the world's remaining wildernesses.

What study says?

Scientists are warning that if human beings continue to mine the world's wildernesses for resources and convert them into cities and farms at the pace of the previous century, the planet's few remaining wild places could disappear in decades. Today, more than 77 percent of land on earth, excluding Antarctica, has been modified by human industry, according to a study published Wednesday in the journal Nature, up from just 15 percent a century ago.

The parts of the world most in need of protecting are in some of the largest and most powerful nations. More than 70 percent of wilderness areas can be found in Russia, Canada, Australia, the United States and Brazil. Wilderness, the study's authors said, is defined as an area not subject to direct human use. These areas are the only places on earth that have natural levels of biodiversity, and can continue to sustain plant and animal species on an evolutionary time scale. Moreover, these spots often act as the world's lungs, storing carbon

dioxide that would otherwise be released into the atmosphere. Wild areas provide a lot of life support systems for the planet.

Mapping of World's oceans

In 2016, the scientists mapped the world's terrestrial wildernesses. This year, they did the same for the world's oceans.

More of the oceans have been affected by human industry including oil exploration, shipping and commercial fishing than have the world's land mass. 87 percent of the ocean has been modified by the direct effects of human activities.

Conclusion

He warned that developing countries like Brazil and China are eager to catch up with more industrialized nations. Each step those countries take has a compounding effect on the environment: Developing mines also means building roads and refineries. Healthy ecosystems are crucial in their own right for biodiversity and mitigating climate change, but more importantly, said the researchers, they are home for hundreds of millions of indigenous people, who rely on the wilderness to survive and thrive.

SPECIES CONSERVATION

Fishing Cat

Why in news?

Despite multiple threats, the Fishing Cat was recently downlisted to "Vulnerable" from "Endangered" in the IUCN Red List species assessment.

Fishing cat

The fishing cat *(Prionailurus viverrinus)* is a feline with a powerful build and stocky legs. The fishing cat is nocturnal and apart from fish also preys on frogs, crustaceans, snakes, birds, and scavenges on carcasses of larger animals. It is capable of breeding all year round but in India its peak breeding season is known to be between March and May.

Habitation

Fishing cat is a symbolic species of floodplains, deltas and coastal wetlands of South and Southeast Asia. They have a patchy distribution from Sind in Pakistan to Cambodia. The South Asian countries of India, Nepal, Bangladesh and Sri Lanka hold the core of the global Fishing Cat population. In India, it is largely restricted to the floodplains of Ganga, Yamuna, Brahmaputra, Sundarbans Delta and smaller coastal wetlands along the Bay of Bengal formed by Mahanadi, Godavari and Krishna rivers.

Development: the biggest threat

Habitat loss due to development activities is the number one threat to the Fishing Cat. This is happening mainly due to contradictions in policies. India is a signatory to the Ramsar Convention on Wetlands and considers "marshlands" (Fishing Cat habitat) as wetlands. Even our Central Wetland Rules, 2017 give it the same recognition. However, the Wasteland Atlas of India, 2010, considers them as "wastelands". As a result, the Union Ministry of Water Resources has recommended that waterlogged areas should be reclaimed as per its Command Area Development and Water Management Programme. Big pisciculture farms instead come up replacing natural riparian vegetation.

Disappeared in East Kolkata Wetlands

The Fishing Cat has disappeared from the East Kolkata Wetlands due to intensive aquaculture the last dead cat was found in 2012. Shrimp farming is another growing threat to mangrove habitats of the Fishing Cat. Between 1989 and 1999, shrimp farms increased by 10 times in the Godavari region by eradicating mangroves.

Other reasons

- Private ownership of ponds and aquaculture leaves very little room for tolerance.
- Threats from hunting for meat and skin.
- Tribal hunters indulge in ritual hunting practices throughout the year.

Conservation efforts

- The Fishing Cat Project, a part of The Fishing Cat Working Group (Small Wild Cat Conservation Foundation), that began in 2010 gave some recognition to the cat.
- In 2012, the West Bengal government officially declared the Fishing Cat as the State Animal and the Calcutta Zoo has two big enclosures dedicated to them.
- The government also formed Fishing Cat Protection Committees in all blocks of Howrah district. All three tiers of the rural councils were involved in Fishing Cat awareness generation.

- From 2016, a programme called "Know Thy Neighbours" (a Fishing Cat monitoring protocol by the community) was initiated under which enthusiastic residents were given a camera trap so that they could monitor their backyard cats.

Fishing Cat Project

In Kolkata

The Fishing Cat Project provided scientific evidence of the cat's presence repeatedly for legal battles taken up by PUBLIC, a non-profit which works on environmental issues in and around Kolkata, to safeguard wetlands. Another non-profit Human & Environment Alliance League (HEAL) is working on documenting the remaining marshy patches in south Bengal along with the Fishing Cat Project the plan being to work with implementing agencies to safeguard these habitats from development.

In Odisha

In Odisha, Wild Orissa, a non-profit, and Mahavir Pakshi Suraksha Samity (a group of erstwhile poachers) are involved in Fishing Cat research work. The Godavari Fishing Cat Project and the Eastern Ghats Wildlife Society is also doing commendable grassroots conservation work.

Tiger relocation to Satkosia

Why in news?

Conservationists in Odisha have raised questions about the relocation of tigers to the state's Satkosia Tiger Reserve (STR). Since June, a male from Kanha Tiger Reserve and a female from Bandhavgarh Tiger Reserve in Madhya Pradesh have been relocated to STR.

The two are part of the Odisha government's proposal to get three pairs of tigers from Madhya Pradesh in the next five years.

Government plan

In November 2017, the Wildlife Wing of the Odisha Government had submitted a plan for the relocation to improve the tiger population of the reserve. The budget of the plan is around Rs 26 crore. The Central government will bear 60 per cent of the cost. The tiger population of STR had come down to a single tiger, which prompted the government to seek tigers from Madhya Pradesh.

Tiger population in 2007

In 2007, it had 12 tigers as per the state government census, which fell to one in 2017 within 10 years.

Why did Satkosia lose its tigers in the first place?"

- After spending a minimum of Rs. 15 crore of National Tiger Conservation Authority (NTCA) money on patrolling, protection and management of the reserve the tiger count fell down.
- Another reason may be the methodology of tiger population estimation for the ambiguity over the tiger population in the reserve.
- Earlier, tigers were counted based on pug marks. But now, there are camera traps. It is difficult to ascertain the exact number in Satkosia.
- The government violated the NTCA's Standard Operation Procedure in translocating these tigers by not conducting a public hearing in the villages around the reserve.
- Meanwhile, the tigress preyed on a calf in the village of Bipradiha in Dhandatope range, bordering the STR on September 1, creating panic among the villagers.

Just six sub-species remain – Tiger

Why in news?

Six different sub-species of tigers exist today, scientists confirmed on October 25, amid hopes the findings will boost efforts to save the fewer than 4,000 free-range big cats that remain in the world.

What findings say?

The six include the Bengal tiger, Amur tiger, South China tiger, Sumatran tiger, Indochinese tiger and Malayan tiger. Three other tiger subspecies have already gone extinct: the Caspian, Javan and Bali tigers. Key threats to tigers' survival include habitat loss and poaching. How to best conserve the species and encourage both captive and wild breeding has been a matter of debate among scientists, in part because of divisions over how many tiger sub-species exist. Reversing the decline of tigers means "maximizing the efforts to preserve the genetic diversity, evolutionary uniqueness, and potential of the species *Panthera tigris*.

Losing our stripes

A success story gone wrong?

With 414 tiger deaths in four years (2015-18), India records highest toll between two censuses. Almost half of tiger deaths in the last three years were reported outside tiger reserves.

According to the National Tiger Conservation Authority's (NTCA) records till December 24, 2018, there were 96 cases of tiger deaths in the country. Of these, 41 were have been reported outside tiger reserves. A Wildlife Crime Control Bureau which stated that a total of 384 tigers have been killed between the period of 2008 to 2018. By one estimate, between 1875 and 1925 alone, some 80,000 tigers were killed in India.

No policy for protection of tigers outside reserves

Ninety-eight tiger bodies were recovered in 2017 while 17 were presumed dead on the basis of body parts seized. The highest number was reported from Madhya Pradesh (28), followed by Maharashtra (21) and Assam (16), accounting for about 55 per cent of the total number of deaths. The data also revealed that 54 tiger deaths, or about 47 per cent of the total deaths, were recorded outside tiger reserves. This is not surprising as about 40 per cent of India's tiger population is believed to be living in forests outside tiger reserves. In 2016, the tiger mortality figure was 122, which was over 50 per cent more than that in the previous year when the total tiger deaths were 80.

Human animal conflict

Humanity's conflict with tigers has gradually increased since the 1970s, when India launched a nation-wide tiger conservation project in 1973 that carved out sanctuaries and national parks and made it a crime to kill a big cat. Though methods for counting tigers have changed, census evidence suggests the number of tigers has since gone up, from about 1,800 then to 2,226 in 2014. India now has 50 tiger reserves that cover 2.12 per cent of the country's total geographical area. According to the tiger census of 2014, India was home to 2,226 tigers, or about 60 per cent of the world's wild tiger population of about 3,890. Pressure on their habitat and poaching had seen their population decline to a low of 1,411 in 2006.

Gangetic dolphins may soon become extinct

Why in news?

The population of Gangetic River Dolphin granted non-human personhood by the Union government in 2017 is on further decline and may soon become extinct. This warning has come from the first report commissioned under Namami Gange to the Dehradun-based Wildlife Institute of India.

What report says?

The recently released report says that the population of the Gangetic Dolphin, which was declared national aquatic animal in 2009, is on the verge of extinction due to construction of dams and barrages. Besides, continuous disturbance from movement of large vessels in the river may cause unprecedented decline in dolphin population as has been the case with China's Yangtze River Dolphin that became extinct. It is also likely that the modification of the river habitat for navigation, such as dredging, river training and canalisation may damage its habitat.

Where the species was sighted?

During the assessment, the species was sighted in places such as Brijghat and Narora (upstream Kanpur), from Bhitaura to Ghazipur, between Chhapra and Kahalgaon (in Bihar) and in other such places where the depth of the river ranged between 4 and 7 metres. The significant point here is the depth of the river, or in other words, the flow of the river, which is on continuous decline due to hydroelectric projects and dams.

Conditions of other species

Besides Ganges Dolphin, the report also highlights how population of several other aquatic species along the Ganga is continuously going down. The number of otters (only 13 species survive in the world, including three in India) is declining due to construction of large-scale hydroelectric projects, reclamation of wetlands for human settlement and poaching and contamination of waterways. Various species of birds both resident and migratory crocodiles, turtles and amphibians are bearing the brunt of human interventions.

Issues in three stretches of the Ganga

Upper stretch

In the upper stretch (Gaumukh to Haridwar), 28.6 per cent of Bhagirathi river channels have turned 'ecological deserts'; so is the case with 35.2 per cent of Alaknanda channel. This, according to the report, can be attributed to 16 existing, 14 ongoing and 14 proposed hydroelectric projects on the Bhagirathi and Alaknanda river basins—the tributaries of the Ganga. This is a highly sensitive stretch hosting habitats for endangered species such as otters, the snow trout and the golden mahseer. The Tehri dam has led to the decline in golden mahseer population, a fish that features in the red list of International Union for Conservation of Nature (IUCN). Climate change is acting as double whammy for the stretch as the flow in headwaters is vulnerable to the retreat of Gangotri Glacier.

Middle stretch

The flow in the middle stretch of the river (Haridwar to Varanasi) has been reduced to merely 10 per cent of the natural flow, courtesy, water abstraction for various canals in the middle and upper stretches. This stretch hosts gharial, mugger, turtles and island-nesting birds; all of which are getting adversely affected. Construction and sand mining has disrupted the lateral connectivity of the river, pointing to the fact that the stretch has become hotbed for illegal commercial activities.

Lower stretch

Farakka Barrage is the centre of woes when it comes to the lower stretch of the Ganga: Varanasi to Ganga Sagar in West Bengal. The barrage has changed the salinity regime, water transparency, suspended sediments and altered freshwater fish assemblage the stretch which is habitat for Gangetic River Dolphin, otters, gharials, saltwater crocodile, and other aquatic species. Most of these are critically endangered species according to IUCN.

Plastic is main problem

Plastic has also caused significant damage to this stretch. Kolkata produces 2,114 tonnes of solid waste per day of which 10 per cent is plastic. The untreated plastic waste disrupts biodiversity and reaches the Bay of Bengal at a rate of 0.12 million tonnes per year.

Citizen science initiative helps save hornbills

A recent citizen science initiative of documenting Indian horn-bills is providing valuable inputs for the conservation of this unique bird.

What is this initiative?

The Horn-bill Watch initiative (www.hornbills.in) is an interactive web interface that allows a person to report on horn-bills anywhere in India. People can record the observation of a live horn-bill, note its call or report a dead, hunted or captive bird.

How will this data help?

The data on the presence of horn-bills outside protected areas would be crucial in identifying and protecting their habitats from possible threats and development projects.

Species Distribution in India

There are nine horn bill species in India. States from where the most sightings were recorded are Karnataka, Maharashtra, Tamil Nadu, Assam and Arunachal Pradesh. Hornbills were reported from across 70 protected areas in the country. While 41% of the observations were made within protected areas, 59% were made outside.

Some Important Hornbills

The endangered Narcondam hornbill is restricted to an area of 6 sq.km. of the Narcondam Island in the Andaman. The rufous-necked hornbill is a vulnerable or near threatened species. Further, the Austen's brown horn-bill and the great horn-bill were observed in several States in northeastern India. Other important species of hornbill include the oriental pied hornbill and the Indian grey hornbill.

12 satellite-tagged vultures take wing from Nepal

Why in news?

In a first for Asia, Nepal released 12 satellite-tagged white-rumped vultures, eight of which are captive-bred chicks born to vultures in captivity.

Vulture breeding and recovery programme

This signifies a huge step for the vulture breeding and recovery programme in not just Nepal but the entire subcontinent, as India's captive-bred vultures too await their turn. This is Nepal's second vulture release; last year, it released six captive-reared (wild chicks reared in captivity) satellite-tagged white-rumped vultures. Eliminating the illegal use of diclofenac (its consumption through cattle carcasses is lethal to vultures) is

crucial to complement conservation measures, including the breeding programme (where vultures are reared and bred in captivity, and released in the wild to prevent species extinction). Before release, the birds are fitted with satellite and wing tags; these are now providing interesting information about the movement of Nepal's vultures. Eleven wild birds tagged in Nepal have visited India's Uttar Pradesh (in 2017, the birds were released just 15 km from the India-Nepal border).

White-rumped vultures

Of these, one has been particularly adventurous: it flew twice to Shimla in Himachal Pradesh and back, and is currently in Jammu and Kashmir. The Indian government has granted permission to satellite-tag captive-bred white-rumped vultures in Haryana's Pinjore, one of the conservation breeding centres in India. Here, as the vultures await their satellite tags from the government, survey teams monitor availability of diclofenac in local pharmacies and test for its residue in cattle carcasses. Of India's nine vulture species, four (including the white-rumped) are categorised as "critically endangered" by the International Union for Conservation of Nature.

Human–leopard conflict in the Himalaya

Why in news?

Human–animal conflict is common in the Himalaya like any other region where wildlife and people live together. A study of patterns of leopard attacks here reveal that some areas are high-risk zones requiring urgent conservation measures for the safety of both man and beast.

Conflict in Himalaya

The foothills of the eastern Himalaya in northern West Bengal called the dooars, a landscape comprising tea plantations and forests alone have witnessed more than 700 leopard attacks on people between 1990 and 2016. In the western Himalaya (Pauri Garhwal in Uttarakhand), numerous leopards have been killed in retaliation to the human deaths and injuries they have caused. Scientists studied patterns of leopard attacks in both these regions.

They visited 101 sites of attacks to confirm the details of incidents. On an average, leopards killed more than three and injured 11 people in Pauri each year between 2006 and 2016; in turn, 121 leopards met their ends at the hands of people. In the dooars, while 420 people were injured between 2011 and 2016 alone, there were barely any retaliatory killings.

The researchers find that around 97% of animal attacks in the dooars and 60% in Pauri resulted in human injuries. While a majority of the victims in Pauri were children and youth, middle-aged tea estate workers were most at risk in the dooars. Despite this, 368 interviews with locals in both areas revealed that 41% of respondents in Pauri and 75 % in the dooars were positive towards the presence and conservation of leopards. They suggest that immediate measures including regular monitoring by wildlife managers and local response teams, providing proper lighting in villages and clearing bushes around houses would be crucial to mitigate conflict.

260 leopards poached since 2015

Why in news?

According to information given to Parliament by the Ministry of Environment, Forest and Climate Change (MoEFCC), 260 leopards have been poached since 2015.

What report says?

64 cases of leopard poaching were recorded in 2015, 83 in 2016, 47 in 2017 and 66 till October 2018. Poaching of leopards was reported by 19 States. Uttarakhand recorded highest number of poaching cases (60) followed by Himachal Pradesh (49). According to the Delhi based Wildlife Protection Society of India, 163 cases of poaching and seizures of body parts were recorded in 2018- an increase from 159 in 2017. In recent past, several incidents of leopard deaths due to road and rail accident have taken place in states like Maharashtra and Karnataka.

As ice melts, walruses need protection

Why in news?

Given a choice between giving birth on land or sea ice, Pacific walrus mothers would most likely choose ice. Likewise, they prefer sea ice for molting, mating, nursing and resting between dives for food. Trouble is, as the century progresses, there's going to be far less ice around.

Findings

The federal government in 2008 listed polar bears as a threatened species because of diminished sea ice brought on by climate warming. That year the Center for Biological Diversity petitioned to do the same for walruses. Pacific walrus males grow to 12 feet long and up to 1,815 kg more than an average midsize sedan. Females reach half that weight. Walruses dive and use sensitive whiskers to find clams and snails in dim light on the sea floor.

Inaccessibility protected walruses for decades, but a rapid decline in summer sea ice has made them vulnerable. In the Chukchi Sea between Alaska and Russia, where Pacific walrus females and juveniles spend their summer, ice could be absent during that season by 2060 or sooner.

Since 1981, an area more than double the size of Texas 1.58 million square km has become unavailable to Arctic marine mammals by summer's end. By late August, as sea ice recedes beyond the shallow continental shelf, female walruses and their calves face a choice stay on ice over water too deep to reach the ocean floor for feeding or come ashore for rest periods, where the smallest animals can be crushed in stampedes triggered by a hunter, aeroplane or bear.

Walruses also could find more humans in their habitat with a reversal of U.S. policy on Arctic offshore drilling. Designating walruses as threatened would mean oil exploration companies would have to consult with federal wildlife officials to make sure drill rigs don't endanger the animals.

New leaf-warbler bird species discovered in Indonesia

Why in news?

Rote, a tiny, dry Indonesian island, has given a new songbird species to science. Measuring just about 10 cm in length and weighing about 8 grams, the yellow-orange colored bird was sighted by a joint research team.

About the bird

Using DNA studies and morphological analysis, they confirmed it was a new species and named it Phylloscopus rotiensis after the Rote island, the only locality where it can be found. The bird is

unique among the Asian warblers because it has an unusually long bill. The researchers propose that the new bird be given an IUCN categorisation of "Vulnerable." Human population growth trends are expected to continue, bringing with them increased rates of road-building and land cover conversion and further decreasing the amount of habitat available to the Rote Leaf Warbler.

India home to two new gecko species

Why in news?

The spot-necked day gecko and the Anaimudi day gecko, both very distinctly-patterned lizards found only in the higher reaches of the Agasthyamalai and Anamalai hill ranges in the Western Ghats, are the latest additions to India's reptile fauna.

About the species

Researchers were surveying reptiles in Kerala's Shola National Parks in 2013 when they came across a predominantly greyish-brown-coloured gecko. The features they studied included the lengths of various body parts such as tail and fingers, lamellae (fine, plate-like structures on the base of gecko feet that help them scale vertical surfaces) and tubercles (tiny raised projections on their bodies). They compared these with the morphology of other similar-looking lizards to establish *Cnemaspis anamudiensis* or the Anaimudi day gecko, as a new species. Both these diurnal geckos are currently known only from single localities in high-elevation forests located at more than 1,200 metres above mean sea level in the Ghats. There is a possibility that these day geckos could be present in the surrounding hills but more detailed surveys would be required to confirm this.

461 elephants electrocuted in country in 8 years since 2009

Why in News?

Between August to October 2018, more than a dozen elephants were electrocuted in the eastern and northeastern part of India, including seven elephants in Odisha's Dhenkanal district.

Highlights

An analysis of data pertaining to elephant deaths in India due to electrocution between 2009 and November 2017 points out that, every year, about 50 elephants have died on average due to electrocution. A total of 461 elephant deaths due to electrocution occurred in the eight years between 2009 and November 2017. A closer look at the data reveals that States in the eastern and northeastern region of the country have accounted for most of these deaths in Odisha, 90 elephants died of electrocution; 70 elephants died of electrocution in Assam; 48 elephants in West Bengal; and 23 elephants in Chhattisgarh.

Karnataka, which has the highest population of elephants, has recorded the highest casualties by electrocution, numbering 106. While 17 elephants died in Kerala, in Tamil Nadu, the number of deaths in the same period was 50. According to the all-India synchronised census of elephants in 2017, their population was 27,312. The States with the highest elephant population are Karnataka (6,049), followed by Assam (5,719) and Kerala (3,054).

Background

Elephant is the largest terrestrial mammal of India. Elephant being wide ranging animal requires large areas. As per our mythology, elephant took birth from celestial waters and thus are closely associated with rains / water because of the belief. Asian elephants were believed to be widely distributed – from Tigris – Euphrates

in West Asia eastward through Persia into the Indian sub-continent, South and Southeast Asia including Sri Lanka, Java, Sumatra, Borneo and up to North China. About 60% of the Asian elephant population is in India. Old literatures indicate that even during the Moghul period, elephants were found all over India including many part of Central India like Marwar, Chanderi, Satwas, Bijagarh and Panna. However current distribution of wild elephant in India is confined to South India; North East including North West Bengal; Central Indian states of Orissa, South WB and Jharkhand; and North West India in Uttarakahnd and UP.

Project Elephant

Project Elephant (PE) was launched by the Government of India in the year 1992 as a Centrally Sponsored Scheme with following objectives:

- To protect elephants, their habitat & corridors
- To address issues of man-animal conflict
- Welfare of captive elephants

India gets its first dedicated elephant hospital near Taj Mahal

Why in news?

India's elephants now have their first fully equipped dedicated hospital near the Taj Mahal, complete with wireless digital X-Ray, laser treatment and dental X-ray facilities. The 'jumbo' hospital is the result of a collaborative effort between the Uttar Pradesh Forest Department and conservation NGO Wildlife SOS. The veterinary hospital has modern medical facilities for the treatment of elephants in distress including thermal imaging, ultrasonography, hydrotherapy, tranquilization equipment and quarantine facilities. Located near Agra, the facility is in the Farah block of Mathura near the Elephant Conservation and Care Centre (ECCC) run by Wildlife SOS.

Key highlights

India's first elephant hospital is jumbo sized: with a built-up area of almost 12,000 square feet that includes an observation area for the overnight monitoring of elephants under treatment using Close Circuit Infra-Red CCTV cameras. Training courses would be organized by Wildlife SOS to spread knowledge on elephant medical care, humane elephant management and veterinary procedures to spread compassion. In 2010, Wildlife SOS established the ECCC, which is currently providing lifetime care and treatment for over 20 rehabilitated pachyderms, rescued from illegal captivity and circuses where they were ill-treated and subjected to cruelty. The Elephant Hospital was built entirely with private donations and CSR support.

Make elephant corridors eco-sensitive zones

Why in news?

The National Green Tribunal (NGT) has asked the Ministry of Environment, Forests and Climate Change (MoEF&CC) to consider declaring all elephant corridors in the country as eco-sensitive zones.

What NGT says?

NGT has given two weeks time to the Ministry to look into the issue and to proceed in the matter for the declaration of such areas as eco-sensitive zones. The observations came while the green panel was hearing a plea that highlighted the increasing number of unnatural elephant deaths taking place in the state. The petition said, "Owing to the increased denudation and loss of their forest habitats, elephants have come increasingly into conflicts with humans and faced deliberate retaliatory killings and accidents at railway crossings, high tension power lines, power fences, and trenches."

Eco-sensitive zones

The Environment Protection Act, 1986 does not mention the word "Eco-sensitive Zones". The section 3(2)(v) of the Act, says that Central Government can restrict areas in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards

Besides the section 5 (1) of this act says that central government can prohibit or restrict the location of industries and carrying on certain operations or processes on the basis of considerations like the biological diversity of an area, maximum allowable limits of concentration of pollutants for an area, environmentally compatible land use, and proximity to protected areas. The above two clauses have been effectively used by the government to declare Eco-Sensitive Zones or Ecologically Fragile Areas (EFA). The same criteria have been used by the government to declare No Development Zones.

Criteria

The MoEF (Ministry of Environment & Forests) has approved a comprehensive set of guidelines laying down parameters and criteria for declaring ESAs. A committee constituted by MoEF put this together. The guidelines lay out the criteria based on which areas can be declared as ESAs. These include Species Based (Endemism, Rarity etc), Ecosystem-Based (sacred groves, frontier forests etc) and Geomorphologic feature based (uninhabited islands, origins of rivers etc).

Greater flamingoes visit Hope Island after 25 years

Why in news?

Recently a flock of five greater flamingoes were spotted on the Coast of Hope Island in East Godavari River Estuarine Eco (EGREE) System after a long gap of 25 years.

2016 Water Bird Census

These were last seen in a group about two and a half decades ago, while a lone flamingo was recorded in the 2016 Asian Water Bird Census in East Godavari district.

Greater Flamingoes

- The Greater Flamingo birds are the most widely found species among the Flamingo.
- These are long-legged and long-necked birds which are the filter feeders and get their characteristic pink colour from their diet of brine shrimps and algae available in the coastal wetlands.
- flamingoes are the indicators of healthy coastal environment,
- The species inhabits shallow eutrophic water bodies such as saline lagoons, saltpans and large saline or alkaline lakes.
- The species nests in large dense colonies on mudflats or islands of large water bodies.
- The species suffers from low reproductive success if exposed to disturbance at breeding colonies (e.g. from tourists, low-flying aircraft) or if water-levels surrounding nest-sites lower resulting in increased access to predation from ground predators such as foxes and feral dogs.
- IUCN Status: Least Concern (LC)

Rare Bird Sighted in Chinnar Sanctuary

Sri Lankan Frogmouth has been noticed on the eastern side of the Western Ghats for the first time in Kerala's Chinnar Wildlife Sanctuary. Sri Lankan Frogmouth is usually found on the western side of the Western Ghats. The main feature is that it lays only one egg a year after the mating season in April-May. It is also found in Karnataka, Goa, and Maharashtra. It was believed that the species had gone extinct in the State. The Chinnar Wildlife Sanctuary is on a project to study its habitat and make a favourable environment for it. Chinnar Wildlife Sanctuary is a protected area located in the rain shadow region in the eastern slope of Western Ghats, adjoining Tamil Nadu. Chinnar Wildlife Sanctuary was declared as a wildlife sanctuary in August 1984. The Park provides ecological connectivity between the Anamalai Tiger Reserve and Eravikulam National Park.

Frogmouth

The frogmouths are a group of nocturnal birds related to the nightjars. They are found from the Indian Subcontinent across Southeast Asiato Australia.

A forest filled with butterflies

Why in news?

Parambikulam Tiger Reserve, one of India's protected forest areas, turns a garden with dream flowers floating all over. The sight repeats as dusk falls in. Wafer thin canvases bearing a splash of colours flutter all around, filling the reserve with a splendour that matches the aura of a forest full of butterflies. A recent survey held in the reserve spotted 221 varieties of butterflies, 11 of which were endemic to the area.

Survey initiated by

The survey, initiated jointly by the Department of Forest and Wildlife, Parambikulam Tiger Conservation Foundation, and the Wayanad-based Ferns Naturalists Society, was held between November 9 and 12. Sixty experts and 50 forest protection staff participated in the survey in the reserve. This is the fourth consecutive year that the butterfly survey is being organised in Parambikulam.

Major species

The major species spotted during the four-day initiative include Small Palm Bob, Silverstreak Blue, Orange-tail Awl, and Red-disc Bushbrown. Among them, Orange-tail Awl gets active only during early morning hours and late in the evening. The survey was held in different topographies and forest areas, including evergreen forests, dry deciduous forests, moist deciduous forests, shrubs and meadows, which lie in areas such as Aanapanthi, Parambikulam, Kuriarkutty and Nelliampathy.

Surprise find

One of the biggest surprises of the survey is the spotting of Red-disc Bushbrown, a high-altitude species endemic to Western Ghats. The survey team had also recorded migration patterns of the rare species Dark Blue Tiger and Common Crow. Buddha Peacock or Buddha Mayoori, which was recently declared as State butterfly of Kerala, was found in abundance in some areas of the forest. The survey had also recorded over 100 butterfly host plants in the reserve.

Involvement of tribes

A pioneer in community-based ecotourism, Parambikulam tries to ensure foolproof conservation with the active involvement of 234 members of six tribal settlements inside its limits. The reserve has many firsts to its credit, made possible through the participation of tribal people. Being a protected forest area, the reserve has nearly five endemic flora varieties and has had 29 direct sightings of tigers. Ever since the Joint Forest Participatory Management was introduced, there have been no incidents of poaching in the reserve.

Nuclear capable missile test endangers sea turtles in Odisha

Why in news?

While India's missile development programme has nothing to do with the endangered Olive Ridley sea turtles, the test firing of nuclear strategic ballistic missile Agni-IV recently from the Integrated Test Range (ITR) at APJ Abdul Kalam Island off Odisha coast and regular missile tests from the island has put a question mark on the future of the mass nesting of turtles at the coast.

Where it happened?

This is happening near the Gahiramatha beach, which is the world's largest nesting site for the turtles. In the past too, environmentalists have expressed concern over the activities during the turtle season from November 1 to May 31 in Kalam Island (previously known as Wheeler Island).

What the issue actually?

Renowned environmentalist late Bankabihari Das had for the first time, in 1997, drawn the attention of the then chief of Defence Research and Development Organisation (DRDO) Dr APJ Abdul Kalam, to the flood lights that disoriented the hatchlings at Wheeler's island. He had also urged Kalam not to test any missile at the island during the turtle season. Kalam responded immediately assuring that the defence authorities would take all necessary action to ensure that the turtles were safe.

At the Northern Indian Sea Turtle workshop in Bhubaneswar in 1997, Kalam had assured large number of environmentalists that the DRDO will not harm the turtles by building missile test range at the island. The principal chief conservator of forests had also urged the chief of DRDO many times not to launch any missiles from the island during the turtle season. The country's endeavour to increase its defence arsenal has proved disastrous for its endangered marine species.

Rare albino orangutan released back into the wild

Why in news?

The world's only known Albino Orangutan has been released back into the jungle

About Rare albino orangutan

The orangutans are three extant species of great apes native to Indonesia and Malaysia. Orangutans are currently only found in the rainforests of Borneo and Sumatra. Their forest habitat in Indonesia and Malaysia is rapidly disappearing, putting the future of Asia's only great ape in peril. There are two species of orangutan – the Bornean and Sumatran – both are currently critically endangered. Destruction of forests for logging, paper, palm oil and mining are main cause of their habitat shrinkage.

Remote islands are easy targets for alien species

Why in news?

A recent study which analysed over 250 tropical and subtropical islands has pointed out that being isolated does not protect islands from alien species. Rather, remote islands are more susceptible to alien invasion, be it

from plants or mammals. With the increase in anthropogenic activities like trade and transport, the biogeographical borders are broken down and the human-aided introduction of alien species has been on the rise.

Invasive Alien Species

Alien species become 'invasive' when they are introduced deliberately or accidentally outside their natural areas, where they out-compete the native species and upset the ecological balance. Invasive animal species pose a threat to biodiversity and human well-being. Common characteristics of invasive species include rapid reproduction and growth, high dispersal ability, phenotypic plasticity (ability to adapt physiologically to new conditions), and ability to survive on various food types and in a wide range of environmental conditions.

Invasive alien species have invaded and affected native biota in almost every ecosystem type on Earth, and have affected all major taxonomic groups. In economic terms, the costs of invasive alien species are significant. Total annual costs, including losses to crops, pastures and forests, as well as environmental damages and control costs, have been conservatively estimated to be in the hundreds of billions of dollars and possibly more than one trillion. This does not include valuation of species extinctions, losses in biodiversity, ecosystem services and aesthetics.

Kashmir stag

Hangul

The hangul, the state animal of Jammu and Kashmir, is an endangered species. But the recent discovery that the animal, long thought to be confined to the Dachigam National Park, has begun using an old migratory route has given fresh hope to conservationists.

Location

Located not far from Srinagar and spread over an area of 141 sq km, the denuded forest range of the national park connects south Kashmir's Tral-Pahalgam axis with central Kashmir's Ganderbal-Sonamarg axis.

The upper passes of Dachigam, at an altitude of 14,000 ft, received the season's first heavy snowfall on November 3, which sounded the bugle for the annual migration of the Kashmir stag, locally known as hangul, from the Dagwan river in Upper Dachigam (at an altitude of 7,500 ft) to Lower Dachigam (5,500 ft).

The national park is considered the last undisturbed home of the hangul, a sub-species of the European red deer, in Kashmir. The animal was classified as 'critically endangered' by the International Union for Conservation of Nature (IUCN).

First identification

First identified by Alferd Wagner in 1844, the species is believed to have travelled all the way from Bukhara in Central Asia to Kashmir. It is the only sub-species of red deer in India. In the last week of November this year, the first ever satellite-linked, collared female was sighted returning to Dachigam from the species' summer pastures in the Sindh Forest Division, near Gurez. Though Gurez is very close to the Line of Control (LoC), the guns here have fallen silent since the 1999 war between India and Pakistan. The movement of Indian Army machinery has also reportedly come down. Because of this fragile peace, the hangul appears to have rediscovered the traditional route that it used as a summer grazing corridor at least until the 1900s.

The movement of the collared hangul on the Dachigam-Wangat-Tulail axis highlights the need to provide a continuous passage for fragmented traditional hangul habitations on the two flanks of the Dachigam sanctuary. This means connecting adjoining sanctuary areas into an unbroken safe zone of 800 sq. km (up from the present 141 sq. km). It is necessary if the hangul is to multiply and survive rising man-made and natural pressures on its habitations.

Collaring the hangul

Collecting data around hangul biology, behaviour, and ecology would have helped experts plan management interventions for the long-term survival of the species. However, for unknown reasons, the collared male became untraceable around 2015 and was presumed dead. Scientists concluded that the herds (excluding individual sightings in and outside Dachigam) would restrict their movements to within the Dachigam National Park due to the summer movement of non-local grazers from Jammu to the upper passes and meadows in Kashmir for sheep-rearing.

Traditionally, the hangul is a long-ranging animal, which, in common parlance means, it travels long distances, and has in the past been spotted in areas ranging from the upper meadows of Kishtwar in the Chenab Valley to Gurez's Tulail and Dras in Kargil.

The much-awaited movement of a collared hangul, which managed to travel a distance of around 20 km to Tulail in Gurez, is a potential breakthrough for the endangered species, as its new-found mobility could help restore traditional routes, lessen the pressure on Dachigam, and help the species to breed in a better environment.

Another collared hind was found moving towards the Surfrao, Akhal and Kangan blocks of the Sindh Reserve forest and even crossed the mighty Sindh Nallah, but its movement was restricted from Yechihama onwards due to human and livestock grazing disturbances. The animal was found to have spent a few days in and around the Yechihama-Ganiwan forests and meadows and then moved back and forth between Dachigam National Park and the Yechihama-Ganiwan forests through the same route.

However, the migration of the collared hangul and its herds across the treacherous route could not have been easy. In July, a fawn was found trapped at Kangan's Bonibagh area, down the slopes of Dachigam towards the south. Though a tragic incident, the trapped fawn was another indication that the herd was back to using the corridor to Tulail, which was last known to be active in the early 1900s.

A shikar (hunting) map drawn during the era of Maharaja Hari Singh (1895-1961) mapped the hangul's presence with multiple corridors. But it also depicted a continuous one from Kupwara's Keran to Bandipora's Gurez in north Kashmir to Kishtwar in Jammu, via the upper reaches of Srinagar and south Kashmir's Pulwama and Anantnag. Kishtwar is a broken corridor now. However, the two flanks of the Dachigam could be restored to allow the animal to grow and multiply in a more friendly habitat.

Buoyed by news of the hangul's newfound mobility, the State Wildlife Department is now working towards expanding the boundaries of Dachigam towards the Wangat Conservation Reserve and the Sindh Forest Range, south-west of the Raman Nallah in Gurez's Tulail valley, in north Kashmir's Bandipora. On the southern flank of Dachigam, Shikar Gah Conservation Reserve in Tral, Khiram Conservation Reserve in Pulwama could be connected for a contiguous passage to Dachigam.

Conflict takes its toll

The challenges the hangul faces are many. Besides its being poached for 'trophies' and its meat, the 30-year-long insurgency and border conflict between India and Pakistan is another major threat to its survival. Militant and Indian Army movements, often with dogs accompanying a patrol party, are chasing the hangul away from its natural habitats and into human populated areas even in Dachigam. In 2017, the Central Reserve Police Force (CRPF) increased its presence at Lower Dachigam in the forest range in order to react to any law and order situation in the nearby colonies more effectively. But it was the hangul that suffered as a result of the fresh movement of troops inside the national park.

Earlier, the Kargil war, in 1999, had forced the Indian Army to restrict the movement of non-local grazers — those who live in the plains of Jammu in the winter and return to the upper reaches of the Kashmir Valley in

the summer and tend their flocks there till the winter sets in — to the meadows of Kargil in the summers. This ended up putting extra pressure on the meadows in and around Dachigam, resulting in the displacement of the hangul population from its natural habitat.

Under pressure on multiple fronts, the hangul's breeding pattern is also showing some worrying trends. According to official records, the male-female ratio is now 15-17 males per 100 females, down from 23 males per 100 in 2004. This is far below the ideal ratio of 50-70 males per 100 females. The fawn to female ratio is 22 fawns per 100 females, as against the ideal of 30 fawns per 100 females. The fawn survival rate has also declined.

The Wildlife Department has also set up vigil and monitoring pickets on the recently discovered corridor towards Gurez in the Sindh Forest Division to ensure the free movement of hangul during summers and help study its migration pattern. One monitoring and control centre has been set up at Haknar Gund in the Dachigam-Wangat belt in central Kashmir. The Wildlife Department has proposed the suspension of vehicular traffic between Srinagar and Sonamarg when the hanguls arrive for a crossover, taking the highway. These pickets will also help keep poachers away.

The department has written to the government to ask security forces, including the CRPF and the Indian Army, to limit the use of patrol dogs in the corridors used by the the hangul.

Census next year

Officials admit that the hangul population has seen a decline. Numbers and figures are not important to interpret at this stage. Restoring a viable ecosystem for the animal is the first step towards giving an impetus to the endangered species. A fresh census will be done in 2019, which will help us understand any new pattern.

The hangul, which lives up to 10 years, has a unique role in the region's food chain. As a major herbivorous animal, it ensures that grassland lines, which are pastures between or above the forest ranges, in the upper reaches survive and are not swept away by the forest ranges. Second, a hangul can satiate the hunger of a leopard for five to 10 days, thereby reducing man-animal conflict.

POLLUTION

Heavy metal contamination

Why in news?

Researchers from Mahatma Gandhi University, Kottayam have found high levels of heavy metal contamination in banana fields in 3 southern Indian states.

Highlights of the Report

The report assessed the level of nutrient and toxic heavy metals in banana fields. The study covered three south Indian states, Kerala, Karnataka, and Tamilnadu. It is found that heavy-metal contamination in green revolution fields is due to decade –long use of chemical fertilizers or plant protective chemicals. 286 soil samples were used for sample analysis.

Important Results

The quantitative assessment of ten metals done in these soils included Calcium, Magnesium, Manganese, Zinc, Iron, Copper, Lead, Nickle, Chromium, and Cobalt. The amount of Cu observed in many fields was higher than the previous reports. The amount of Co observed in 25 fields was above its threshold levels expected for normal soils. The amount of Pb observed in all the soils appeared quite normal. The amount of Ni observed in 14 soil series exceeded the upper limit of contamination. Calcium levels were reaching the threshold levels. Cr was detected in all the samples. Magnesium content was found to be unusually high of about 900 mg/Kg. Normally magnesium content of soil in South Indian soil is known to be between 30 and 220 mg/Kg.

Causes of high contamination

Decade-long use of chemical fertilizers without proper soil testing, Calcium is used to maintain the soil pH and over the years has accumulated in the soil, Manganese is a major component of pesticide used against fungal diseases like Fusarium wilt gets accumulated in the soil if overused, High Iron concentration is mainly due to the laterite-based soil of the Deccan Plateau.

About Heavy-Metals contamination

Heavy metals are metallic elements with an atomic number greater than 20, They are trace elements having a density at least five times that of water, Some of these elements are necessary for growth, development and functioning of living organisms, These include Copper, zinc, chromium, iron etc.

Those which are unnecessary include cadmium, lead, mercury, However, beyond a certain limit all of them are toxic for plants, animals and humans. These elements penetrate the body by inhalation, ingestion and skin absorption. If heavy metals accumulate in body tissues faster than the body's detoxification a gradual build-up of these toxins occurs. Vegetables provide the trace elements and heavy metals. Minor or trace elements are essential for good health if they come from an organic or plant source. In contrast, if they come from an inorganic or metallic source, they become toxic. Vegetables and fruits accumulate higher amounts of heavy metals because they absorb these metals in their leaves. The excessive amount of these metals in food is associated with:

- Cardiovascular, kidney, nervous, bone diseases
- Decreasing immunological defences
- Intrauterine growth retardation
- Impaired psychosocial faculties
- Disabilities associated with malnutrition
- Upper gastrointestinal cancer

Fuel from air and water

More carbon dioxide in the atmosphere

Continuously burning more and more of organic fuel, such as coal and crude oil, over the last century across the world, the amount of the oxidation product, carbon dioxide (CO_2), in the atmosphere has reached alarming levels, causing global warming and climate change.

Why not convert carbon dioxide into solid carbonate rocks?

Direct air capture (abbreviated as DAC) of the gas and converting it from the biosphere (obtained from biological sources such as burning fuel by us) to the geosphere (as rocks and minerals) has been done by a company in Switzerland, called Climeworks.

What they did?

They have put up a plant in Iceland, where they bury CO_2 (or sequester it) into solid calcium carbonate ($CaCO_3$) rocks, just as basalt; they also sell the CO_2 to greenhouses and beverage makers. An even better method would be to convert it back into hydrocarbon fuel through a reverse reaction, a process termed as air to fuel or A2F.

To capture the undesirable product CO_2, run it through a reactor in an efficient manner and use it to combine with hydrogen (obtained through electrolysis of water) and generate the hydrocarbon fuel. The whole process is what is termed as 'carbon-neutral-fuel production' by them.

Capturing CO_2 from ambient air itself is not new. This was attempted as early as the 1950s, as a pre-treatment of air; and in the 1960s, it was attempted to use as feedstock for the production of hydrocarbon fuels in mobile nuclear power plants.

Procedure

The interesting points to note in the above chemical reaction cycle are: CO_2 is pumped in step1 and comes out in step 3, where it can be captured and stored for making fuel by reacting with hydrogen in a separate reactor. Water which is a reagent in step 4 is a product in step 2. And $Ca(OH)_2$, a reagent in step 2 is released in step 4. Thus the whole process is not just carbon-neutral but appears to be inorganic-chemical-neutral as well. It is estimated that 1 million tons of CO_2 can be converted to 30 million gallons of jet fuel diesel, or gas.

Oysters turn into pollution trackers

Why in news?

French researchers hoping to get an early warning on pollution in the ocean have found oysters stationed near offshore oil platforms can detect minute amounts of hydrocarbons as each one constantly filters dozens of gallons of water every day.

More about the Research

Oysters could alert scientists to tiny infrastructure cracks before they become catastrophic oil spills that threaten wildlife and coastal communities. Oysters are ideal for nearly real-time analysis because they notice the surrounding noises and temperature and light variations.

To study the reactions, Researchers have come up with an electrically isolated aquarium using concrete and plastic foam blocks, old bicycle tube tires and tennis balls at the world's second-oldest marine research station, on the Bay of Arcachon in southwest France. Electrodes are attached to oysters in the tank, allowing

researchers to measure how quickly each oyster's valves are opening and closing to filter the water for food. Spikes in valve cycles are the first alert that the mollusc has become stressed, with larger increases corresponding to higher hydrocarbon concentrations.

Why reducing emissions from deforestation, forest degradation remains a challenge

Why in news?

Forests are important carbon sinks. Between 1990 and 2007, the world's forests stored about 2.4 gigatonnes of carbon per year. Limiting global temperature rise to 1.5°C by 2100 will not be possible without carbon sequestration by the forests. By 2050, the world would need to sequester and store 8 gigatonnes of carbon dioxide (GtCO2) annually on average.

About REDD+

Realizing that forests have large mitigation impact on climate change, a global mechanism to tackle deforestation and forest degradation called Reducing Emissions from Deforestation and Forest Degradation (REDD+) was formalised in 2007 at the United Nations Conference of Parties (CoP) on climate change. But according to a recently released policy brief by the Centre for Science and Environment, there is no convincing evidence to establish the contribution of REDD+ in halting or reversing global deforestation trends.

The report of the Policy brief by the Centre for Science and Environment (CSE) says, developing countries would need between the US $17 and $28 billion per year to reduce global emissions from deforestation by 50 percent between 2005 and 2030. The slowdown in political momentum in REDD+ and the global economic crisis have been held responsible for the poor quantum of REDD+ finance commitments post-2010.

Why India struggles to implement REDD+?

Under its Intended Nationally Determined Contributions, India proposes to create a carbon sink of 2.5-3 billion tonnes of CO2 by 2030 through the forestry sector. To that end, initiatives like the Green India Mission have been proposed to increase forest cover by 5 million hectares. While the country formulated a Draft National REDD+ Policy detailing the objectives, it lacked clarity on how the programme will be implemented. Even before REDD+ can be implemented in India, the country needs to take corrective measures to prevent diversion of thousands of hectares of forests to development projects. Similarly, the REDD+ rules developed under UNFCCC are difficult to implement due to complex and diverse forest governance issues across countries. The UNFCCC does not have enough funds for REDD+. The Green Climate Fund, considered the most popular financing option, has also failed to mobilized money from developed countries. This has also affected the credibility of REDD+ under UNFCCC.

Key reforms needed in the REDD+ mechanism

While the CSE policy brief argues that REDD+ can achieve synergy between climate change mitigation and equitable distribution of resources with forest-dwelling communities, it calls for "a bottom-up initiative owned largely by communities with technical and funding support from state/regional governments and national governments". Besides developing safeguards against land grabbing and resource alienation, India needs to ensure that at least 70 per cent of the payments from carbon revenues should be made directly to forest users as cash transfer. REDD+, according to CSE, should not become a "mechanism to promote exclusionary conservation where protected areas and their buffer zones form the major chunk of the project area". Instead, REDD+ project areas should be a healthy mix of smallholder farms and sustainably managed forest areas, preferably by communities.

REDD+ has failed to achieve its objectives

Why in news?

A new study by Delhi-based non-profit Centre for Science and Environment (CSE) has revealed that Reducing Emissions from Deforestation and Forest Degradation (REDD+), the programme initiated by the United Nations in 2005 to mitigate climate change through enhanced forest management in developing countries, has largely failed to achieve its objectives.

Initiatives of REDD+

Large-scale finance for REDD+ has been a major issue as carbon markets have not materialised and international funding commitments for REDD+ have been much lower than expected," says the report, titled 'Rethinking REDD+'. REDD+ implementation costs have been high and benefits for local communities from REDD+ projects have been minimal.

Since its formalisation in 2006, REDD+ had emerged as the most prominent global mechanism to integrate the role of forests in climate change. It was touted as a win-win situation for biodiversity conservation, carbon sequestration and local livelihoods. More than 300 REDD+ initiatives have taken off since 2006. The mechanism has been enshrined in the Paris Agreement of 2015, and its implementation is transitioning from smaller, isolated projects to larger, jurisdictional programmes with support from bilateral and multilateral agencies. However, the CSE report reveals that the performance of REDD+ in halting or reversing deforestation remains questionable. The report is an assessment of the REDD+ implementation experiences in India, Kenya and Tanzania. It highlights the need to rethink the REDD+ mechanism based on these experiences and the findings emerging from new research on the potential of forests to mitigate climate change.

Ganga and the death of its crusader

Why in news?

D. Agarwal, 86, who was on a fast to save the Ganga, died following a heart attack.

About Dr. G.D. Agarwal

Dr G. D. Agrawal is a notable environment activist and patron of Ganga Mahasabha (An organisation founded by Madan Mohan Malviya in 1905, demanding removal of dams on Ganga). The environmentalist was vocal on disallowing hydroelectric projects in Uttarakhand along the Ganga. In a letter to Prime Minister Narendra Modi in June 2018, he declared his intention to go on a fast as several of his demands had not been met. His key demands included a special law to deal with pollution and encroachment on the Ganga, and maintaining the environmental flow of the river to prevent pollution. Agrawal died on 11 October 2018, after being on an indefinite fast since 22 June 2018, demanding the government act on its promises to clean and save river Ganga.

About Ganga Mahasabha

Ganga Mahasabha is an organisation dedicated to the Ganga, founded by Madan Mohan Malviya in 1905. After a long struggle, British India agreed on 5 November 1914 that the uninterrupted flow of the Ganges is the rudimentary right of Hindu believers. The day is known as a 'Aviral Ganga Samjhauta Divas' (Uninterrupted Ganga flow agreement day) in the history of India and the agreement came into existence on 19 December 1916 which is known as Agreement of 1916. The sanctity of the agreement is not preserved by the state and central governments of India after independence though it is legally valid. More and more river water is diverted for irrigation use converting the river into a polluted sewer.

Why rivers are becoming more polluted?

There are poor infrastructures available in large number of cities and towns located near rivers. Managing sewage requires steady funding of treatment plants for all urban agglomerations that discharge their waste into rivers, and also a reliable power supply. Rapid urbanisation is widening the gap since infrastructure planning is not keeping pace with growth in housing.

Recent CPCB report

A finding of Central Pollution Control Board shows that the number of critically polluted segments of India's rivers has risen to 351 from 302 two years ago. The study also underscores the failure of many national programmes run by the Centre for river conservation, preservation of wetlands, and water quality monitoring. This is a strong indictment of the departments responsible for environmental protection.

Main sources of pollutants in Ganga

Though the industrial pollution, volume-wise, accounts for about 20%, its toxic and non-biodegradable nature has a disproportionate impact. The industrial pollutants largely emanate from tanneries in Kanpur and distilleries, paper mills and sugar mills in the Kosi, Ramganga and Kali river catchments. The municipal sewage, at a billion litres a day, accounts for 80% of the pollution load.

Measures that need to be taken

Sustained civil society pressure on governments is vital to ensure enforcement of laws by the SPCBs and Pollution Control Committees. On the industrial side, the plan to bring all liquid effluent discharge from textile units and tanneries to zero has to be pursued vigorously, giving industries the assistance to help them choose the best technologies for the recovery of waste water for reuse.

Conclusion

A 2013 World Bank study estimated that environmental degradation is costing India at least $80 billion a year, of which losses to rivers form a significant part. Urgent measures are needed to revive India's many dying rivers, protect its agriculture, and prevent serious harm to public health from contaminated water.

Microplastics, now, in human stool

Why in news?

So far a cause of concern mostly for marine environment, microplastics have now been found in human stool. The study shows that microplastics have entered the human gut.

Microplastics

Microplastics are extremely tiny plastics of size 5mm to 1mm (size of a grain) which do not get disintegrated. And, for the human body they are nothing but toxins.

What study says?

The study says that increased plastic pollution can cause contamination of foods, which may affect the gastro intestinal tract. "Microplastic may harm via bioaccumulation (especially when the intestinal barrier is damaged) and can serve as a vector for toxic chemicals or pathogens. Moreover, ingested plastic may affect intestinal villi, nutritional uptake and can induce hepatic stress. Since human data is very scarce, we are the first to quantify and characterize microplastic in human stool.

Causes

Microplastics can affect nervous sand gastric systems. Pregnant women and children are the most vulnerable. This study should not create panic because if microplastics enter body in small amount, they do not cause any harm as such. But if it is ingested in large amount, it can be harmful. In the longer term, they can even be carcinogenic.

How do microplastics enter our bloodstream?

Pollution causes plastic to accumulate in the sea, where it is ingested by sea animals, thus integrating plastic into the food chain. The consumption of seafood allows microplastics to enter the bloodstream in humans. Even sea salt might be potential source of the same. But it is just not the seafood or sea salt. In the week before sampling, some dishes with plastic wrapping were consumed and some amounts of water were drunk from plastic bottles (11 per cent fizzy drinks).

Type of plastics

11 types of plastic were analysed and at least two among them--PET and polystyrene were found to be the most common types of plastics used in wrapping food items in India by the Global Alliance Against Incinerators (GAIA) and 10 other environmental groups in a study released earlier this year.

Microplastics found in all sea turtle species

Tests on over 100 sea turtles spanning three oceans and all seven species have revealed microplastics in the guts of every single turtle. Synthetic particles were found, the most common being fibres, which can come from clothing, tyres and cigarette filters, and equipment such as ropes and nets.

BS-VI transition

Why in news?

The apex court orders the automobile industry to not sell its unsold stock of BS-IV vehicles after April 1, 2020.

SC order

The Supreme Court has barred automobile industry from selling or registering any vehicle meeting Bharat Stage-IV (BS-IV) emissions standard–the current emissions standard in India—after the Bharat Stage-VI (BS-VI) emissions standards come into force on April 1, 2020.

This ruling implies that the automobile industry cannot build inventory and sell unsold stock of BS-IV vehicles after April 1, 2020. This sets aside the original BS-VI rules of the Ministry of Road Transport and Highways that required only the new models to be "manufactured" as of and after April 1, 2020 to meet BS-VI emission standards and gave time to upgrade the existing models to meet the new standards. Now, BS-VI vehicle rollout will start immediately from April 1, 2020. Auto industry cannot overproduce and create an inventory of BS-IV and continue to sell post this date. The industry cannot argue for their right to only "manufacture".

Transition to BS-VI

This transition to BS-VI emission standards—a unique step in India to leapfrog by skipping BS-V standards and by advancing the timeline of its enforcement from the original proposal of 2025 to 2020--is expected to lower emissions from new vehicles by at least 80 to 90 per cent. Given that a vehicle remains on the road for a minimum of 10 to 15 years, it is critical that roll out of cleaner technology is not delayed. This will require the automobile industry to take steps in advance to stop production of BS-IV vehicles. An available report shows that several companies have already created capacity to produce BS-VI compliant vehicles and some of them are even exporting to European markets that meet the Euro-VI standards. Therefore, allowing sale of cheaper and more polluting BS-IV compliant vehicles after April 1, 2020 will put the progressive players at substantial price and market disadvantage and will be wrongly penalised due to continued dumping of older technologies.

Picking out silent ghosts in the deep

Why in news?

The United Nations Environment Programme (UNEP), in a 2009 study titled 'Abandoned, Lost or Otherwise Discarded Fishing Gear', states that almost 6,40,000 tonnes of all fishing gear (approximately 10% of the total usage) is lost or discarded in our oceans annually, in bad weather or when nets get stuck to the rocky bottom.

Ghost nets are classified under Abandoned, Lost or otherwise Discarded Fishing Gear (ALDFG), which includes lines, traps, hooks, dredges and buoys. Ghost nets can kill marine wildlife, including vulnerable species, and destroy the benthic ecosystems that exist at the lowest level of a body of water. The problem has been worsening with the global expansion in fishing operations, and the availability of more durable gear. High quality synthetic nets can last in the oceans for centuries, and lead to micro-plastic ingestion by aquatic life. A 2010 Marine Fisheries Census by the Central Marine Fisheries Research Institute (CMFRI) said there were about 1,30,000 gillnets and drift nets in operation in India. Ghost nets usually found about 12 km off the coast of Puducherry, at depths of about 50 m. They are also washed to shallower sites at a depth of about 18 m, about 5 km off the shoreline. 'Dive Against Debris Session' by Temple Roof Foundation for certified divers to voluteer for water clean-ups.

What is Ghost fishing net?

'Ghost Fishing' is what fishing gear does when it has been lost, dumped or abandoned. Nets, long lines, fish traps or any man made contraptions designed to catch fish or marine organisms are considered capable of ghost fishing when unattended, and without anyone profiting from the catches.

Results of Ghost Fishing

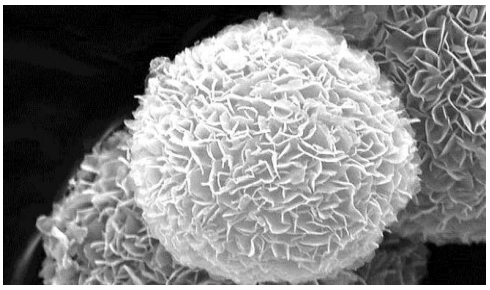
Entanglement of marine species in ghost nets can lead to exhaustion, suffocation, starvation, amputations of limbs, and, eventually, the death of a marine animal. Entangled fish often act as bait, attracting larger predators such as turtles, sharks, and dolphins, which may themselves become entangled.

Various Problematic Fishing Methodology

1. Gillnets: Gillnets are sets of panels of uniform mesh size, which form a large net-wall hanging vertically in the water. Suspended in the top- or mid-depths of the water (a drift gillnet), or anchored to the seafloor (bottom gillnet), gillnets trap fish by their gills. They are very effective – and particularly destructive.
2. Trawling: it involves dragging a large fishing net with heavy weights behind a boat, either mid-water or across the bottom. The net indiscriminately catches or crushes everything in its path. Consequently, by-catch is extremely high and nets are often lost due to snagging on the bottom.
3. Purse seine is a long wall of netting deployed around a school of fish and pulled tight, thus enveloping the school of fish (and any other animals) in a purse-like structure.
4. Fish Aggregating Devices (FADs): these are man-made objects used to improve a vessel's catch by attracting fish beneath them. FADs are usually a square of bamboo with netting and buoys attached. Sometimes a solar-powered GPS tracker is also on board to allow the boat that deployed it to track it. The devices are either in a static location or deployed in the open ocean as drifting devices (dFADs).

Tiny spheres can trap water pollutant

Why in news?



Scientists at Rice University in the US have developed tiny spheres that can catch and destroy bisphenol A (BPA), a synthetic chemical used to make plastics that often contaminates water. This new material helps in overcoming two significant technological barriers for photocatalytic water treatment.

Bisphenol A (BPA)

BPA is commonly used to coat insides of food cans, bottle tops and water supply lines. BPA that seeps into food and drink is considered safe in low doses, but prolonged exposure is suspected of affecting the health of children and contributing to high blood pressure.

Tiny spheres

The micron-sized spheres resemble Venus' flytrap (a carnivorous plant) of particles and has tiny flower-like collections of titanium dioxide petals of less than 100 nanometers size. It has two-faced structure, with hydrophobic (water-avoiding) cavity and hydrophilic (water-attracting) outer surface. BPA is hydrophobic and naturally attracted to the cavity. Once trapped, reactive oxygen species (ROS) produced by the spheres degrades BPA into harmless chemicals.

States other than Delhi-NCR can use existing stocks of firecrackers for Diwali this year

Why in news?

The Supreme Court (SC) has imposed conditions for the use and sale of firecrackers in the upcoming Diwali, Christmas and New Year eve.

Important Facts

According to SC ruling, once the existing stocks of crackers are used up, no new polluting crackers can be made in the cracker factories. The Supreme Court also clarified that only "green crackers" will be sold in the Delhi-NCR region during this Diwali and other festivals. It, however, allowed the firecrackers which have already been produced to be sold in other parts of the country this Diwali and other festivals and occasions. The ban came on the basis of a petition filed by two infants through their fathers in 2015. Who pleaded for their right to life.

Supreme Court partial ban

Fixed time slots: The reduced time window is applicable across the country. The judgment reduced the time for bursting crackers during Deepavali and other festivals to two hours: between 8 p.m. and 10 p.m. For Christmas and New Year, the time slot allowed is just half-an-hour, between 11.55 p.m. and half-past midnight. Licenced traders: SC restricted the sale of green and improved crackers only through licensed traders. Banned sale via online sites: Any e-commerce company found selling crackers online will be held for contempt of court, and the court may also impose monetary penalties in that eventuality. Community engagement: It also directed the Centre to encourage community cracker bursting during Diwali and other festivals in Delhi-NCR. Decibel levels: The firecrackers generating noise level exceeding 125 dB at four metres distance from the point of bursting shall be banned.

Exemption to southern states

The court has allowed Tamil Nadu, Puducherry and the adjoining southern States, which celebrate Diwali in the morning, to burst crackers for two hours in the day. TN had earlier challenged the SC order of fixed time

slots violating its people right to religion protected under Article 25 of the Constitution. The decision to finalise the time slots has been left to the respective State authorities.

Significance of the ban

Right balance: The Supreme Court has struck a balance between the interests of the firecracker industry and the right to public health by allowing the manufacture and sale of only "green" and reduced-emission or "improved" crackers, while banning those that are loud and toxic to man, animal and the environment.

Opposing the ban

Business persons dealing with firecrackers defended their case quoting other reasons for increase in air pollution like wind and temperature and said that ban would deprive them of their right to do business. The Centre, too, has opposed a complete ban on the sale of crackers during festivities across the country.

India sets target to reduce pm level by 2030

Why in news?

India has set a target to reduce particulate matter (PM) by 30 per cent in five years, with 2019 as the base year, the Ministry of Environment, Forests and Climate Change (MoEFCC) said at the World Health Organisation summit on air pollution in Geneva.

India set target

Six months after releasing a draft of the National Clean Air Programme (NCAP), which was criticised for not setting targets to reduce air pollution, the MoEF has set a target to cut down PM levels by 30 per cent. Union Environment Minister Harsh Vardhan was not present at the first Global Conference on air pollution and health in Geneva. The conference was in response to air pollution proving to be a grave concern for health, especially for children in several countries, including in India. A WHO study had earlier pointed out that 14 out of the world's 20 most polluted cities were in India.

Don't compare air pollution to smoking

Why in news?

Anti-tobacco activists are expressing concern that comparing the ill-effects of air pollution to that of smoking will result in trivialising the catastrophic effects of smoking.

Comparing air pollution to smoking is based on a formula proposed by a Berkeley Earth study that draws equivalence between the hazards of the two. It also promotes the theory that it is all right to smoke as the air that we breathe is equally harmful. However, the author's metaphor is being misinterpreted and it is belittling something as serious as tobacco control. Activists are also worried that the misinterpreted comparison promotes a philosophy that one might as well smoke because it's no worse than breathing polluted air. The argument also weakens the resolve of the government, the civil society and public health activists in controlling the tobacco menace.

Comparison between Cigarette smoke and Air pollution

The common ingredients of air pollution are mainly carbon monoxide, carbon dioxide, nitrogen oxide, volatile organic compounds and suspended particulate matter. Cigarette smoke, in addition to all the above, is made of nearly 7,000 toxic chemicals and at least 69 of them are highly carcinogenic. Moreover the dose or concentration of the suspended particulate matter in the air per day and per lifetime is nearly 200 times lesser than that from cigarettes. When a smoker is present in the room, the indoor pollution levels are much higher than outdoor pollution at times.

One in 8 deaths in India due to air pollution, life expectancy down by 1.7 years

Why in news?

The first comprehensive estimates of deaths, disease burden, and life expectancy reduction associated with air pollution in each state of India by the India State-Level Disease Burden Initiative.

What study says?

The estimates show that India with 18 per cent of the global population has a disproportionately high 26 per cent of the global premature deaths and disease burden due to air pollution. The average life expectancy in India would have been 1.7 years higher if the air pollution level were less than the minimal level causing health loss. States in north India had some of the highest levels of both ambient particulate matter and household air pollution, especially Bihar, Uttar Pradesh, Rajasthan, and Jharkhand. States Delhi, Haryana, and Punjab in north India had some of the highest ambient particulate matter pollution exposure in the country. Contrary to the popular association of air pollution only with respiratory diseases, in India, the disease burden because of air pollution also includes ischaemic heart disease, stroke, chronic obstructive pulmonary disease, and lung cancer, commonly associated with smoking. Household air pollution is reducing in India, facilitated by the Pradhan Mantri Ujjwala Yojana.

Importance

The facts should generate political momentum to address air pollution if it is to not become a major public health crisis in India. State wise data is the most useful input for public policy which can be used for targeted interventions.

GM plants can remove cancer-causing pollutants from home

Why in news?

Researchers at the University of Washington in the US have genetically modified a common houseplant pothos ivy to remove chloroform and benzene, from the air around it, exposure to both of which have been linked to cancer.

What research says?

Scientists have genetically modified a common houseplant to remove cancer-causing pollutants from our homes. While a variety of air filters in our homes can keep allergens and dust particles at bay, some hazardous compounds are too small to be trapped in these filters. Small molecules like chloroform, which is present in small amounts in chlorinated water, or benzene, which is a component of gasoline, build up in our homes when we shower or boil water, or when we store cars or lawn mowers in attached garages. Both benzene and chloroform exposure have been linked to cancer. The modified plants express a protein, called 2E1 that transforms these compounds into molecules that the plants can then use to support their own growth.

Protein 2E1

The team decided to use a protein called cytochrome P450 2E1, or 2E1 for short, which is present in all mammals, including humans. In our bodies, 2E1 turns benzene into a chemical called phenol and chloroform into carbon dioxide and chloride ions. 2E1 is located in our livers and is turned on when we drink alcohol. So it's not available to help us process pollutants in our air. And 2E1 can be beneficial for the plant, too. Plants use carbon dioxide and chloride ions to make their food, and they use phenol to help make components of their cell walls.

Introduction of 2E1 to pothos ivy

The researchers made a synthetic version of the gene that serves as instructions for making the rabbit form of 2E1. Then they introduced it into pothos ivy so that each cell in the plant expressed the protein. Pothos ivy

does not flower in temperate climates so the genetically modified plants won't be able to spread via pollen. Plants in the home would also need to be inside an enclosure with something to move air past their leaves, like a fan.

Sea-weed eating microbes used to develop sustainable plastics

Why in news?

According to the United Nations, plastic accounts for up to 90 per cent of all the pollutants in our oceans, yet there are few comparable, environmentally friendly alternatives to the material.

Sea-weed which produces zero toxic waste

Scientists have developed biodegradable plastics derived from microorganisms that feed on sea-weed which produces zero toxic waste and can be recycled into organic waste. Plastics take hundreds of years to decay. So bottles, packaging and bags create plastic 'continents' in the oceans, endanger animals and pollute the environment. Plastic is also produced from petroleum products, which has an industrial process that releases chemical contaminants as a byproduct.

Bioplastics

A partial solution to the plastic epidemic is bioplastics, which don't use petroleum and degrade quickly. But bioplastics also have an environmental price: To grow the plants or the bacteria to make the plastic requires fertile soil and fresh water, which many countries, including Israel, don't have. The researchers harnessed microorganisms that feed on seaweed to produce a bioplastic polymer called polyhydroxyalkanoate (PHA). Plastic from fossil sources is one of the most polluting factors in the oceans.

Bioplastics may not be a viable alternative to plastic

Why in news?

Researchers at the University of Bonn in Germany found that Bioplastics, often promoted as a climate-friendly alternative to petroleum-based plastics, may lead to an increase in greenhouse gas emissions. But shifting to plant-based plastics could have less positive effects than expected.

Causes

An increased consumption of bioplastics in the following years is likely to generate increased greenhouse gas emissions from cropland expansion on a global scale. Plastics cause fossil fuel depletion and climate change. It is estimated that by 2050, plastics could already be responsible for 15% of the global CO_2 emissions.

Bioplastics are climate-neutral

On the other hand, bioplastics are in principle climate-neutral since they are based on renewable raw materials such as maize, wheat, and sugarcane. These plants get the CO_2 that they need from the air through their leaves. The study found that it takes a lot of time for the switch to bioplastics to pay off.

The fate of plastics in our cities

Why in news?

Segregation of organic waste from non-biodegradable material at source was made mandatory in April 2016, but it is yet to catch on. Segregation, or the separation of organic waste from plastic, paper and metal, is the foundation of recycling. Yet, the vast majority of India's 8,000 cities and towns don't do this. As a result, a million tonnes of plastic waste ends up in landfills and in the environment each year.

Status of segregation

Segregation at source has been legally required across India since April 2016, when the Ministry of Environment, Forests and Climate Change notified the Solid Waste Management rules. Yet, almost three years later, some of the top solid-waste generators, including Delhi, Mumbai, Kolkata and Chennai, don't even have data on segregation, according to an April 2018 study by the Indian Council for Research on International Economic Relations (ICRIER). Among the handful of big cities that do segregate, Bengaluru and Pune lead, with about 50% segregated at source. A few small cities perform well too. For example, Tirunelveli in Tamil Nadu segregates 100% of waste, while Panaji hits about 90%.

Role of waste pickers

In cities like Mumbai, where segregation is extremely low, the informal sector plays a crucial role in keeping plastic out of landfills. The sector includes waste pickers, who riffle through garbage dumps to retrieve plastic, and '*kabadiwallah*s', or itinerant buyers.

This is why, despite India's poor record at segregating, the country has traditionally been among the largest recyclers of polyethylene teraphthalate (PET) the plastic used in soft-drink bottles. According to a 2017 study by the National Chemical Laboratory Pune, India recycles 90% of its PET waste annually, while the number is 72.1% in Japan and 48.3% in Europe. This is all down to the country's almost 4 million waste pickers. Once they retrieve the PET, they turn it over to recycling companies, who make items including polyester and denim.

Along with PET, products made of polyethylene and polypropylene also find favour with waste pickers. But their value to waste pickers depends on how heavy these items are. Collecting a thick polypropylene basket is worth the effort, because it fetches more money, but collecting a thin polypropylene carry bag is not.

Even recyclable plastics, like polypropylene, become useless when they are soiled, because washing them raises the cost of recycling substantially. This is why segregation is critical to prevent soiling, and recovering such plastics isn't a technological problem, but a civic one.

Plastic as fuel

When plastic is burnt, industries must extract fossil fuels again to make new plastics. Secondly, burning plastics without emissions is tough. In cement kilns, for example, RDF (Refuse-Derived-Fuel) must be incinerated at more than 1,000°C to prevent the release of pollutants such as dioxins and furans. For this, pollution-control boards must monitor cement kilns, and this monitoring is often not stringent.

Yet another problem with RDF is the economics. To create the fuel, plants must segregate waste. This adds to the cost of the fuel, making it unattractive compared to coke. These barriers have kept RDF-use from taking off. Bengaluru, for example, has had numerous standoffs between its cement manufacturers and the city municipal corporation, because the former often refuse to accept RDF for fuel.

The way forward

In 2017, Indians generated about 72 million tonnes of municipal solid waste per day. Out of this, about 6.5 million tonnes was plastic. The solution to this giant environmental problem is within reach. For segregation, greater civic awareness is a must. But municipalities must also set up the infrastructure and notify their solid-waste management policy under the 2016 rules. So far, only a few cities have done this. Another feature missing from the Indian landscape is the idea of "extended producer responsibility" (EPR). Under the 2016 Plastic Waste Management rules, plastic producers were required, within six months, to set up infrastructure to recycle the items they manufactured.

Recycling smartphones may help keep gorilla habitats intact

Why in news?

India is ranked fifth among the world's top e-waste producing countries after the US, China, Japan and Germany. Discarded phone could be a major reason for the dramatic decline in gorilla populations in the Democratic Republic of the Congo (DRC).

Metals

Metals, including gold and coltan (primarily used in the production of tantalum capacitors for electronic devices), used to manufacture cell phones can be recovered from old mobile phones, there will be less incentive to mine gorilla habitats for the same minerals. The authors point out the barriers to recycling used phones, including lack of e-waste recycling points in many countries, secrecy around the phones' mineral composition, privacy concerns around accessing old data, and just plain hoarding.

The 'conflict' metals (also referred to as 3TG--tungsten, tantalum, tin and gold), which are mined in the eastern Democratic Republic of Congo (DRC), not only destroy gorilla habitats, but also fund wars and human rights abuses. Activists and affected communities in Congo have repeatedly called for attention to the links between their country's minerals and its protracted armed conflicts. The group recommends that all companies, including publicly traded, privately held, US and foreign companies, using 3TG minerals should conduct supply chain due diligence.

Global E-Waste Monitor, 2017

The Global E-Waste Monitor, 2017, published by the United Nations University estimated that India generates about 2 million metric tonnes of electronic waste, or e-waste, annually (2016). Nearly 82% of this is personal devices. The report ranked India 5th among the world's top e-waste producing countries, after the US, China, Japan and Germany. According to a 2017 ASSOCHAM-KPMG study, Electronic Waste Management in India, computer equipment accounts for almost 70% of e-waste.

Grauer's gorillas

The recent population estimates of Grauer's gorillas, according to the DRC, show a dramatic 73-93% decline, with less than 4,000 remaining in the wild. The species is now listed as critically endangered.

Death in the air

Why in news?

Most Indian cities will become unliveable in the future if there is no pro-active and decisive action by the government to tackle air pollution.

What is the status of air pollution in India?

The World Health Organisation announced that nine out of the top 10 most polluting cities in the world were in India. The Global Burden of Disease Study 2017 shows that one out of eight deaths in India is attributable to air pollution and in absolute terms, the number stands at 12.4 lakh people. Also, country's mean particulate matter (PM 2.5) of 90 micrograms/cubic metre is the worst in the world with as much as 77% of the population exposed to significant air pollution. The Energy Policy Institute at University of Chicago has estimated that residents of New Delhi will live nine years longer if the air quality in the Capital met the WHO standards (PM 2.5 of 25 micrograms per cu metre or less).

What could be the effects?

Foreign tourist inflow into Delhi, which is a part of Golden Triangle (Delhi-Agra-Jaipur), has dropped by 30% so far this season (mid-October to March). India's attraction as an investment destination is primarily its demography but the falling air quality, over time, will leave its young work force unhealthy thereby affecting

productivity. If that happens, foreign investors will start looking elsewhere to set up manufacturing capacities. Domestic manufacturers will eventually follow them leaving the 12 million people joining the work force every year with an uncertain future.

What are the judicial interventions in this regard?

As successive governments have failed to measure up to the situation, it has been the Supreme Court (SC) that has taken the lead to force a change in most instances. For example, in the case of Delhi, adoption of CNG as a fuel, implementation of the emission standards, shifting polluting industries out of the capital or shutting down coal-based power plants were all pushed by the supreme court. The judiciary has also intervened again after the 2016 smog in the National Capital Region (NCR). It has called upon the Ministry of Environment to come up with an air quality index which classifies the conditions as poor, very poor and severe. It also sought an emergency action plan that will be implemented depending on the severity of the problem, which is under implementation this year. SC has also asked for a comprehensive action plan that can be implemented round the year rather than during an emergency. This action plan should not just be for New Delhi but should be extended across the country with clear short, medium and long-term goals. Following this, the government recently released the concept note on National Clean Air Programme (NCAP).

Chloroform emissions may slow down Ozone layer recovery

Why in news?

The study says that between 2010 and 2015, emissions and concentrations of chloroform in the global atmosphere increased significantly. Chloroform is mainly used in manufacturing products like Teflon and various refrigerants.

Background

Two years after the discovery of the Antarctic ozone hole in 1985, the Montreal Protocol on Substances that Deplete the Ozone Layer was signed to phase out the ozone-depleting chlorofluorocarbons (CFCs).

Chloroform

Chloroform has been termed as "very short-lived substance" (VSLS), and hence, the Montreal Protocol did not stipulate regulating this compound. However, if the chemical lingered in the atmosphere long enough it is likely to decompose into ozone-destroying chlorine.

What findings say?

The findings reveal that post 2010 global chloroform emissions rose gradually and reached a high of 324 kilotons per year in 2015. Two stations in East Asia one in Hateruma, Japan, and the other in Gosan, South Korea reported dramatic increases in the frequency and magnitude of spikes. The researchers predict that if concentrations remained steady at 2015 levels, ozone recovery would be delayed by about five months. And if these emissions continue to rise till 2050, then the recovery could be delayed by four to eight years.

France's ban on bee-killing pesticides

Why in news?

A ban on five neonicotinoid pesticides enters into force in France on September 1, placing the country at the forefront of a campaign against chemicals blamed for decimating critical populations of crop-pollinating bees.

Neonicotinoids

With its ban, France has gone further than the European Union, which voted to outlaw the use of three neonicotinoids clothianidin, imidacloprid and thiamethoxam in crop fields. Heavily agriculture-reliant France banned these three neonicotinoids plus thiacloprid and acetamiprid, not only outdoors but in greenhouses too. These are the only five neonicotinoid pesticides hitherto authorized for use in Europe.

PM Modi launches 'Swachhata Hi Seva Movement' in New Delhi

Why in news?

Modi launched the 'Swachhata Hi Seva Movement', urging Indians to actively participate in the cleanliness mission. It is a part of the Swachh Bharat campaign and will go on for two weeks (September 15-October 2). PM said, "The contribution of India's nari shakti (women power) in the Swachh Bharat (clean India) mission is immense." "Youngsters are ambassadors of social change. The way they have furthered the message of cleanliness is commendable. The youth are at the forefront of a positive change in India".

Current status

More than 90 per cent Indians have access to toilet, as compared to less than 40 per cent in 2014. Over 4.25 lakh villages, 430 districts, 2800 cities/towns, and 19 states and UTs have been declared open-defecation free.

Cyclonic storm 'Daye'

Why in news?

Heavy rain lashed Odisha as cyclonic storm 'Daye' crossed the State at Gopalpur in Ganjam district. Southern and coastal Odisha received heavy rain that caused inundation.

The water level in the Jalaka river was at the 6.30-metre mark against the red level of 5.5 metres The water level was also rising in Budhabalanga and Baitarani rivers. Chief Minister sanctioned gratuitous relief for seven days at ₹60 per day per person and ₹45 per day for children below 12 years in Malkangiri district.

Environment Pollution (Prevention and Control) Authority (EPCA) Reconstituted

Why in news?

Centre has reconstituted the Supreme Court-empowered Environment Pollution (Prevention and Control) Authority or the EPCA, which is tasked with taking various measures to tackle air pollution in the National Capital Region. The tenure of the last EPCA expired on October 3. EPCA is also mandated to enforce Graded Response Action Plan in the city as per the pollution levels; brought in more members.

National Capital Region is in a state of environmental emergency. For a purely winter phenomenon, air quality is way worse than is acceptable throughout the year. Improvements usually happen by going from the 'very severe' category to the 'very poor'.

EPCA

EPCA- constituted under the provisions of the Environment (Protection) Act, 1986. Though it has existed for 20 years, its term is extended by specific notifications issued by the Government. The latest notification is dated October 3, 2018, when it was reconstituted by including new members.

The reason why EPCA is an authority, and not just an advisory committee?

Because the committee has powers similar to those enjoyed by the Centre. Specifically, it can issue directions in writing to any person, officer or authority, including for– stoppage of electricity, water and other services. If its directions are not followed, it has powers to file criminal complaints before courts (Section 19). The last two decades have witnessed a drastic decline in environmental quality in the NCR region, paralleling the EPCA's reluctance to be proactive.

Fallback

EPCA specifically stated that "it never needed to invoke the powers under Section 19 of the Environment (Protection) Act, 1986′. EPCA has not initiated even a single criminal complaint before a magistrate till date. EPCA has been empowered to take suo motu action as well as on the basis of complaints made by any individual, representative body or organisation functioning in the environmental issues sector. One of the EPCA's important powers is the redressal of grievances through complaints. There is no representative from any other state other than Delhi. Further, given that the EPCA has been empowered to initiate prosecution, the presence of officials from so many departments and municipal corporations is a cause for concern.

Positives

At the same time, one can't underplay the EPCA's efforts to improve the environment. For example, the authority is to thank for the Supreme Court's recent decisions about pet coke and BS VI compliance for vehicles. However, assisting the Supreme Court is not the authority's primary function.

India's first "sewer cleaning machine" to end the unsafe practice of manual scavenging

Purpose

To reduce sewer deaths and put an end to the unsafe practice of manual scavenging, the Sulabh International introduced India's first "sewer cleaning machine".

Target

The machine, Sulabh International founder Dr Bindeshwar Pathak said, "will do away with 99 per cent of manual scavenging" in the country, where at least one worker has died while cleaning sewers or septic tanks every five days since the beginning of 2017.

Function

With the machine, a worker won't have to enter the sewers. But if the need arises and a person has to go, then the machine is fully equipped with gas checking machine, protective gears and dress to protect the workers from harmful gases.

Mechanical desilting of manholes and to flush out sewer lines using the powerful jetting pump. It is also capable of de-choking sewer lines using specially designed flexible steel rods. The quick-view pipe view camera is designed to felicitate inspection of manholes, sewer, tunnels, tanks, mainline and other lateral pipeline facilities. The machine costs Rs 43 lakh, was unveiled on the occasion of World Toilet Day 2018.

Air pollution sensors to be certified from September

Why in news?

Government plans on certifying pollution monitoring instruments to improve the measurement and forecast of air pollution episodes.

It is part of an initiative to boost local manufacturing while anticipating a massive demand for such instruments as part of the government's National Clean Air Programme (NCAP).

NCAP envisions setting up 1,000 manual air-quality-monitoring stations (a 45% increase from the present number) and 268 automatic stations (triple the current 84). It also plans to set up pollution-monitoring stations in rural areas.

Currently most of the instruments used by organisations are imported samplers.

DST would take the lead on technology interventions and the CSIR-NPL will be the certification agency for air quality measurement instruments. Certification of PM2.5 and PM10 volume samplers will commence from September, 2018.

DISASTER MANAGEMENT

Wind, solar farms could bring rains to Sahara Desert

Why in News?

A massive wind and solar installation in the Sahara Desert would increase precipitation and vegetation in the world's largest hot desert.

Study

The study is among the first to model the climate effects of wind and solar installations while taking into account how vegetation responds to changes in heat and precipitation. The wind and solar farms simulated in the study would cover more than nine million square kilometers and generate, on average, about three terawatts and 79 terawatts of electrical power, respectively.

Global energy demand

In 2017, the global energy demand was only 18 terawatts, so this is obviously much more energy than is currently needed worldwide. The model revealed that wind farms caused regional warming of near-surface air temperature, with greater changes in minimum temperatures than maximum temperatures.

Precipitation will increase

The greater nighttime warming takes place because wind turbines can enhance the vertical mixing and bring down warmer air from above. Precipitation also increased as much as 0.25 millimetres per day on average in regions with wind farm installations. Solar farms had a positive effect on temperature and precipitation. Unlike the wind farms, the solar arrays had very little effect on wind speed.

They found that the large-scale installation of solar and wind farms can bring more rainfall and promote vegetation growth in these regions. The rainfall increase is a consequence of complex land-atmosphere interactions that occur because solar panels and wind turbines create rougher and darker land surfaces. The increase in rainfall and vegetation, combined with clean electricity as a result of solar and wind energy, could help agriculture, economic development and social well-being in the Sahara, Sahel, Middle East and other nearby regions.

A rare confluence of events led to flooding in Kerala

Why in news?

A combination of four factors led to extreme flooding across Kerala in 2018, a study says.

Four Factors

The four factors are:

- above normal seasonal (May-August) rainfall,
- extreme rainfall events occurring almost across the State during the season,
- over 90% reservoir storage even before the onset of extreme rainfall events, and
- the unprecedented extreme rainfall in the catchment area of major reservoirs in the State.

Findings

Above normal seasonal rainfall

The summer monsoon rainfall in Kerala from May to August this year was 2,290 mm, which was 53% above normal. The average rainfall during the summer monsoon period (June-September) is about 1,619 mm. This makes 2018 Kerala's third wettest year in the last 118 years (1901-2018); 1924 and 1961 were the wettest years with about 3,600 mm of annual rainfall.

Extreme rainfall

Second, till August 21, Kerala witnessed a few extreme rainfall events covering almost the entire State. These extreme rainfall events have very low probability of recurrence in any given year.

Over 90% reservoir storage

Third, Kerala received 1634.5 mm rainfall during the period May 1 to August 7, which is more than the average rainfall (1619.37 mm) during the summer monsoon period (June-September). As a result, six of the seven major reservoirs in the State had over 90% storage before August 8, well before Kerala received the unprecedented extreme rainfall events.

Unprecedented extreme rainfall

Finally, the catchment areas of major reservoirs in the State received extreme rainfall never before witnessed in the State. The role of other factors such changes in how infrastructure has grown at the expense of vegetation and drainage remains to be studied.

IMD calls Titli, Luban cyclones "rarest of rare" occurrences

Why in news?

Cyclone Titli caused immense damage in Odisha and Andhra Pradesh despite several warnings.

Rarest of rare occurrences

The India Meteorological Department (IMD) called the formation of the two very severe cyclones Titli and Luban on two sides of the Indian mainland as 'rarest of rare' occurrences. The IMD also said the movement of both these storms was unique. While Titli changed its direction and moved towards the northeast after making a landfall, Luban too kept going in different directions over the 9 days that it travelled through the south-eastern Arabian Sea towards Yemen and Oman on the Gulf coast and then made landfall on October 13.

Immense damage in Odisha and Andhra Pradesh

Titli, brought with itself, strong winds, torrents of rain and a metre high storm surge which inundated the coastal areas. While the IMD said it was because of their warnings that the loss could be minimized, cyclone Titli and the ensuing flood caused more devastation in Odisha and Andhra Pradesh than expected.

NCCR develops system to estimate, predict flooding within Chennai

Why in news?

In 2015, unprecedented and sudden floods paralysed Chennai with over 18 lakh people being displaced. Following this, at the behest of the office of the Principal Scientific Advisor to government of India, research institutions, and IITs, got together to build a flood warning system customised for use in Chennai.

C-FLOWS

Carrying the acronym C-FLOWS, which stands for Chennai FLOod Warning System, the six-module ensemble can predict flooding due to heavy rainfall, sea-level rise and increase in water levels of the three rivers Cooum, Adyar and Kosasthalaiyar that traverse the city. The State government shared data such as

ward boundaries, population details, and infrastructure available across Tamil Nadu, which has been used in the warning system.

Knowing the elevation at different spots, the system can predict the way the area would flood based on different scenarios that have been simulated. Inputs were taken from the India Meteorological Department (IMD) on forecast and National Centre for Medium Range Weather Forecasting (NCMRWF), which gives the prediction for rain 10 days in advance.

Data from IMD, NCMRWF, INCOIS and Tamil Nadu State government are brought together in an online hub along with the field data and the remote sensing data to observe the situation in real time. Authorised personnel can use a mobile app, which has been developed alongside, to collect data from flooded areas such as geotagged photographs and add to the database. This fifth module helps capture the ground reality and provide primary information for decision makers to plan relief and mitigation operations. The decision support system is an online GIS query portal which can answer questions on quantum of flooding in specific localities, flood proximity.

Only 32% of India is resilient to drought

Why in news?

The increasing variations in rainfall, frequent drought and heat waves along with changes in evapotranspiration tend to alter the hydrological balance.

Findings

This is turn affects the ecosystem productivity. A study was therefore carried out in India to assess the resilience of terrestrial ecosystem to drought at the district and State level. Based on data from 2000 to 2014, only 241 of 634 (about 38%) districts were found to be resilient to drought or dry conditions. The remaining 62% of districts were non-resilient to varying degrees slight (180 districts), moderate (80 districts) and severe (133 districts). While the resilient districts covered nearly 32% of the area of India, the remaining 68% was non-resilient, with the severely non-resilient districts alone covering nearly 30% of India. And only 10 of the 29 States and Union Territories had more than 50% resilient area.

What study found?

The study found about 75 districts had forest cover that was greater than 40% of the district area, and more than half of such districts were resilient. In contrast, about 65% of the districts with less than 20% forest cover were non-resilient. At 42%, districts with temperate climate had a higher tendency to be resilient than the ones with tropical (32%) and dry (38%) climate. About 48% of the country's districts have temperate climate followed by tropical (30%) and dry (20%). Despite the dense forest cover in the Western Ghats, Kerala had only about 19% resilience while Sikkim had 100%. At 17%, Karnataka had even lesser resilience than Kerala.

14th Formation Day of National Disaster Management Authority (NDMA)

Theme of the Year: "Early Warning for Disasters"

Early warning is a major element of disaster risk reduction and can minimize the loss of lives and economic impacts. Timely early warning is key to a structured and efficient response.

Measures to be taken

Early warning systems need to involve the communities at risk. Generate public awareness. Effectively disseminate warnings, and Ensure there is a constant state of preparedness.

Background

On 23 December 2005, the Government of India enacted the Disaster Management Act, which led to the creation of National Disaster Management Authority (NDMA), headed by the Prime Minister, and State Disaster Management Authorities (SDMAs) headed by respective Chief Ministers, to spearhead and implement a holistic and integrated approach to Disaster Management in India. Parent department: Ministry of Home Affairs.

India may face an intense and increased water deficit next year

Why in news?

Water deficits will increase and intensify in India in 2019, says the latest edition of Global Water Monitor & Forecast Watch List.

About WSIM (Water Security Indicator Model)

The report is presented by IScience (US based LLC) states the findings from the latest Water Security Indicator Model (WSIM). ISciences Water Security Indicator Model (WSIM) monitors and forecasts water anomalies on a near global basis. WSIM includes algorithms to assess the impacts of water anomalies on people, agriculture and electricity generation. WSIM has been run continuously since April 2011 and has been validated against subsequent monitoring based on observed data.

Details of the Forecast

The forecast predicts severe to exceptional surplus water for regions including Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh and Mizoram. Moderate to severe deficits were forecast for Bihar. From February through April, deficits in India are expected to moderate overall and some regions in the country's eastern third will normalize. However, intense deficits will persist throughout Gujarat and Madhya Pradesh and along the Tungabhadra River through Karnataka. The forecast for the final months May through July (2019) indicates primarily moderate deficits in India and pockets throughout the region. The 12-month forecast through July 2019 indicates exceptional (greater than 40 years) water deficits in Maharashtra, Telangana, Andhra Pradesh, Karnataka, and Madhya Pradesh.

Expected El-Nino Impact

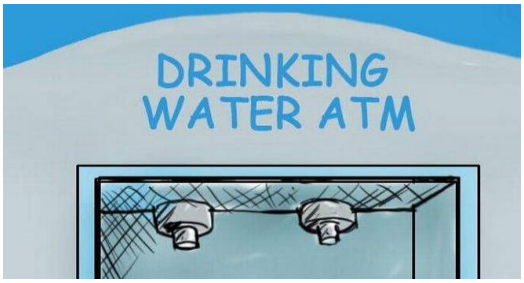
Though this September's extreme heat was unrelated to El Niño which usually introduces warm dry conditions. El Niño is being blamed for low rainfall during the June-to-September monsoon season. The monsoon rain deficits have caused drought-like conditions in almost a third of Indian districts, and added stress for the farmers.

Coffee production to decline

India's coffee production is expected to fall to its lowest in five years due to flood damage to plantations in southern states such as Kerala and Karnataka. India exports about three quarters of the coffee it produces, and flood damage has been reported in all key producing areas of the country.

Water ATMs may help in bridging safe water gap

Why in news?



The government is increasingly starting to accept small water enterprises such as water ATMs and community purification plants as an alternative solution to the safe drinking water challenge. A recent report by the Comptroller and Auditor General of India (CAG) pointed out that only 18% of the rural population has access to potable piped water, failing to meet

the 2017 target of 50%. India is ranked at 120 out of 122 countries on the Water Quality Index as 70% of the country's water supply is contaminated.

What is Water ATM?

A water ATM is an automated water vending machine that dispenses pure drinking water. It can be installed in urban and rural localities which do not have access to clean and pure drinking water. A water vending machine works like any regular bank ATM, the only difference being that it provides water instead of money.

A new report by Safe Water Network (SWN)

The government needs to spend Rs. 44,000 crore on 2.2 lakh small water enterprises to provide safe drinking water to about 37 crore people, mostly in urban slums where piped water infrastructure is difficult to build, and in rural areas with contaminated water sources. While such enterprises cost only a fraction of piped water infrastructure, policy changes and at least a doubling of tariffs are needed to help them bridge the safe water gap. Community water purification plants have grown from less than 12,000 in 2014 to almost 50,000 in 2018 as they have been incorporated into government planning. To reach the government's Har Ghar Jal target of 100% piped water by 2030, almost Rs. 5 lakh crore of infrastructure investment will be required, says government data. SWN estimates that if the government is willing to spend less than 10% of that amount on small water enterprises, it could provide safe drinking water at a fraction of the cost.

Cyclonic Storm Phethai

Cyclonic Storm Phethai is the sixth named cyclone of 2018 North Indian Ocean Cyclone season. The previous five named cyclones are Sagar, Mekunu, Luban, Titli and Gaza. Formation Cyclone Pethai has emerged as a deep depression in the Bay of Bengal around 900 kms off Chennai on 15 December 2018. It was expected to bring heavy rainfalls in the coastal areas of north Tamil Nadu, Andhra Pradesh, Chhattisgarh and Odisha.

Volcano-triggered tsunami toll climbs to 222 in Indonesia

Why in news?

Indonesian tsunami strikes without warning due to landslide on Krakatau volcano.

What is the reason?

As per the scientist, underwater landslide could be the leading theory which might have triggered the killer waves. Underwater landslide when occur, it pushes land into the ocean and displaces the ocean surface causing the vertical displacement of water. This is the second major tsunami that Indonesia has dealt with in the past few months. In late September, an earthquake triggered a huge tsunami that hit the Indonesian city of Palu, killing around 2,000 people.

A tsunami can also be caused by other things that move vast amounts of water, from storms to underwater landslides, which experts think is the most likely explanation for what happened in the Sunda Strait. The fact the tsunami was triggered by a volcano, and not by an earthquake, may be the reason why no tsunami warning was signaled.

Subsidies on irrigation efficiency may negatively affect water use

Why in news?

The decrease in water availability at watershed levels due to subsidies is a critical concern for India considering the monsoon response to global warming.

What study says?

A new study has pointed out that increased irrigation efficiency does not translate into more water availability for other uses at the watershed level. The subsidies for increasing irrigation efficiency are intended to increase crop production as well as more return flow from irrigated areas that can be allocated to urban, domestic and industrial uses. But this does not seem to be happening.

In Rajasthan

It cites Rajasthan as one of the examples where increased irrigation efficiency due to approaches such as drip irrigation has led to increase in crop yields and agricultural incomes. At the same time, there is also an increase in irrigated area and water withdrawals.

Groundwater management

While groundwater management is under the purview of state governments, the central government incentives to the state focus on irrigation efficiency as a step towards climate resilience.

2017 study

A 2017 study had reported that farmers adopting drip irrigation are generally commercial scale farmers who can afford the high costs and are also aware of increasing water demand from drip irrigation. Considering that nearly 80 per cent of water supply for both irrigation and domestic use is from groundwater, dependence on irrigation efficiency for groundwater sustainability may be misplaced.

Increased irrigation efficiency

The increased irrigation efficiency, in fact, reduces the usable return flows despite increased crop transpiration and reduced evaporation which are the intended beneficial use of irrigation water. The water availability at watershed levels decreases because subsidies for irrigation efficiency lead to increases in irrigated areas and water withdrawals as well as driving a choice of more water-intensive crops. This is clearly a critical concern for India considering the monsoon response to global warming.

Reduced monsoon rainfall

Much has been written about the reduced total monsoon rainfall over India during the 20th century with a striking increase in rainfall extremes, spatial variability and a threefold increase in widespread floods. Future projections indicate a continued drop in water availability as well crop yields for most major crops. Consistent with the global trends, irrigation in India also accounts for well over 75 per cent of the total water consumption.

Water supply from canals and traditional wells

In 1960-61, canals and traditional wells contributed nearly 60 per cent of the water supply for irrigation with less than 1per cent water withdrawals from tube wells. By 2012-13, canals and traditional wells contributed only about 40% but the withdrawals from tube wells are up at 46 per cent. Correspondingly, the total area under cropping systems has increased by about 45 per cent but the area under irrigation has tripled during these decades. This shows up as nearly equal amounts of grain production in both Kharif and Rabi seasons whereas the Kharif used to be the dominant cropping season in the 1960s with twice the annual production compared to Rabi.

To deal increased irrigation efficiency leading to increased water withdrawals, need to establish data networks to track not only crop transpiration but also total inflows and recoverable outflows of irrigation water but also the losses to unrecoverable sinks such as evaporation. Explicit caps on extraction as well irrigated areas are also recommended to ensure effective and real increases in irrigation efficiency.

Water withdrawals

Water withdrawals for irrigation depend on crop selections as well as soil types. Risk perception by farmers based on weather forecasts, access to loans and crop insurance also play a role. The use of subsidies for water withdrawal must be combined with the weather and extended range forecasts as well as seasonal outlooks. This will need trust-building so that irrigation can be planned based on weather forecasts despite their uncertainties. Behavioural economics and other novel approaches can be brought to bear on maximizing agricultural production with minimal water use instead of focusing on marginal increases in yields with unbounded water use. Ensuring real increases in irrigation efficiency requires carefully combining subsidies with caps and trade offs of water withdrawal, irrigated area, electricity use, crop selection, weather and extended range forecasts as well as seasonal outlooks and other market factors.

Ocean mean temperature can better predict Indian summer monsoon

Sea surface temperature (SST)

Sea surface temperature (SST) is routinely used for predicting whether the total amount of rainfall that India receives during the monsoon season will be less or more than the long-term mean of 887.5 mm. Now, scientists from Pune's Indian Institute of Tropical Meteorology find that ocean mean temperature (OMT) that has better ability to predict this than the sea surface temperature. Compared with SST which has a 60% success rate of predicting the Indian summer monsoon, OMT has an 80% success rate.

In addition to better predictive success, the information on whether the amount of monsoon rainfall will be more or less than the long-term mean will be available by the beginning of April, two months before the southwest monsoon can set in. This is because OMT is analyzed by measuring the ocean thermal energy during the period from January to March. Southwest monsoon sets in around June 1 each year in Kerala.

Sea surface temperature gives information only about the thin upper layer of the ocean and does not reflect the thermal energy available in the upper ocean. The variations in the upper ocean thermal energy conditions are mainly responsible for summer monsoon activity.

The heat content of the upper ocean creates more impact on monsoon than sea surface temperature, which is restricted to the skin of the ocean. The SST is restricted to a few millimetres of the top ocean layer and is largely influenced by strong winds, evaporation, or thick clouds. In contrast, OMT, which is measured up to a depth of 26-degree C isotherm, is more stable and consistent, and the spatial spread is also less.

The 26-degree C isotherm is seen in depths varying from 50-100 metres. The researchers analyzed 25-year OMT data from 1993 to 2017. They found that unlike SST, OMT was able to correctly predict 20 out of 25 years whether the amount of rainfall during the summer monsoon was more or less than the long-term mean. The prediction based on sea surface temperature was correct only for 15 out of 25 years.

Similarly, OMT showed better success in predicting above or below-average rainfall years compared with SST. For instance, OMT was able to successfully predict 13 out of 16 below average rainfall years and seven out of none above average rainfall years during the period 1993-2017. In contrast, the prediction based on SST was correct only in 10 out of 16 below average rainfall years and five out of nine average rainfall years. The reason why OMT performs better than SST is that OMT better represents the upper ocean thermal energy conditions. And the variations in the upper ocean thermal energy conditions are mainly responsible for the summer monsoon.

India lost $79.5 billion loss due to climate-related disasters in the last 20 years

Why in news?

India lost $79.5 billion to climate-related disasters in the last two decades.

Report

At least 91% of all major disasters recorded from 1988 to 2017 were climate-related, according to the Economic Losses, Poverty and Disasters 1998-2017 report, released by the UN Office for Disaster Risk Reduction in Geneva. The largest number of people (2 billion) were affected by floods, which accounted for 43.4% of these disasters, followed by droughts, which affected a further 1.5 billion people. However, storms were among the most frequently occurring disasters, along with floods.

Country-wise

While the US recorded the biggest monetary losses, reflecting high asset values, China suffered a significantly higher number of disasters. India is among five countries after the US, China and Japan and Puerto Rico, which have witnessed the greatest economic losses due to climate-related disasters. While absolute economic losses might be concentrated in high income countries, the human cost of disasters falls on low- and lower middle-income countries.

people in low-income countries are six times more likely to lose all their worldly possessions or suffer injury in a disaster than people in high-income countries. People exposed to natural hazards in the poorest nations were more than seven times more likely to die, than equivalent populations in the richest nations.

There has been a “dramatic rise of 251%" globally in direct economic losses from climate-related disasters in the last 20 years. In the period 1998-2017, disaster-hit countries reported direct economic losses of $2.9 trillion, 77% out of which was caused by climate-related disasters.

Disclaimer

World has already warmed by 1 °C and the impact is evident in terms of extreme weather events, flooding, melting of Arctic ice and rise in sea levels and warned that it would be difficult to limit global warming to 1.5 °C above pre-industrial levels, unless urgent, unprecedented measures are taken.

CLIMATE CHANGE

Bangkok climate negotiations

Why in news?

The conference of the UN Framework Convention on Climate Change recently ended in Bangkok.

Outcomes

The purpose of the meet was to draft a rulebook for the Paris Agreement ahead of a crucial international conference in Poland in December. But it ran into difficulties over the issue of raising funds to help poorer nations. Some developed countries led by the U.S. are unwilling to commit to sound rules on raising climate finance. Earlier, U.S. under the Trump administration has rejected the Paris agreement in which the rich countries pledged to raise $100 billion a year by 2020 to help developing countries reduce their greenhouse gas (GHG) emissions.

Developed countries contributed heavily

- Historical the developed countries have contributed heavily to the accumulated CO2 burden. It now measures at about 410 parts per million (ppm) of CO2 in the atmosphere, up from 280 ppm before the industrial revolution.
- If scientific estimates are correct, the damage already done to the West Antarctic Ice Sheet is set to raise sea levels. A 2° Celsius rise in global temperature will also destabilise the Greenland Ice Sheet.
- This will also drive more mass migrations of people on account of failed agriculture and the associated conflicts. Hence the developed countries are ignoring their historical responsibility.
- Obstructing the transition to a carbon-neutral pathway is also short-sighted, simply because the losses caused by weather events are proving severely detrimental to all economies.
- Additionally, walking out of developed countries have created a financial and leadership vacuum. This was followed by other developed countries that are unwilling to create sustainable financial commitment to realise the objectives of Paris agreement.

Responsibilities of India and China

There is international pressure on China and India to cut GHG emissions. Both countries have committed themselves to a cleaner growth path.

India

India reported annual CO2 equivalent emissions of 2.136 billion tonnes in 2010 to the UNFCCC two years ago. Recent estimates show that the GHG emissions intensity of its GDP has declined by 12% for the 2005-2010 periods.

China

China has suspended construction of 103 new coal-fired power plants, and announced plans to invest more than $360 billion into renewable energy by the end of the decade.

Both have the responsibility of climate leadership in the developing world and Innovative instruments (climate bond, social impact bond, catastrophic risk insurance, etc.,) could be leveraged to realise a "Green Economy". It needs to be accompanied by a supportive framework in the form of a rulebook that:

- Binds the developed countries to their funding pledges.
- Provides support for capacity building.
- Transfer of green technologies on liberal terms.
- Thus the responsibility lies in the domain of both developed and developing countries to go beyond expediency and take the actions needed to avert long-term catastrophe.

Balanced and robust Paris rulebook

Why in news?

The negotiators at Bangkok have struggled to elaborate on several agenda items under the Paris Agreement Work Programme (PAWP) to finalise the 'Paris Rule Book' in Katowice and implement the Paris Agreement. The Bangkok climate intersession was added as an extra session to advance on the little progress achieved at Bonn intersession held in May this year. On the final day of Bangkok negotiations, it was clear that the progress on agenda items was extremely slow and lacked uniformity.

The Process

Ahead of the Bangkok talks, the co-chairs of the three negotiating bodies—Ad hoc Working Group on Paris Agreement (APA), Subsidiary Body of Finance (SBI) and SBSTA—produced informal tools for each agenda item which formed the basis of discussions at Bangkok. Parties showed optimism and faith in the tools for focused work and organised informal consultations to produce revised tools or iterations on different agenda items.

CSE's major intervention

CSE organised a roundtable on new market mechanism with 25 select experts, including policymakers, researchers and civil society. It proposed to form a sink mechanism under the non-market approaches under Article 6 of the Paris Agreement. In the Kyoto mechanism, the option of trading sink units lead to cheap emission reductions without real emission cuts to fossil fuel. Therefore, CSE advocates that sink must be non-tradeable. The proposal, which was pushed at all meetings and forums at Bangkok climate intersession, drew huge interest. Indian delegation referred CSE's proposal at an informal consultation on market mechanism at the Bangkok Climate Intersession.

The way forward

Even though the compilation text represents ownership of Parties and captures their views and stances on various topics under discussion, there is great deal of complexities and scale to be covered, partly also because of the time-consuming technical nature of the negotiations. At present, the text is bracketed and contains several options under each agenda item. Identifying and determining convergence zones would not be easy, especially considering the tough stance of Parties on various elements. Hence, the compilation text represents only the beginning of the process of negotiations in Katowice.

It will be a mammoth task to have a robust and balanced rulebook that will reflect fair and equitable progress on all issues across the PAWP, considering that there is precisely only two weeks of negotiating time for the final rulebook to be adopted. There is a question mark on the collective political will to deliver on the mandate of the Paris Agreement. The role of co-chairs and incoming Presidency becomes crucial in finding a way forward to help the Parties in streamlining the options before political decisions can be taken by the Heads of States at Katowice. It also remains to be seen whether the upcoming climate events and dialogues, including the Global Climate Action Summit, One Planet Summit, the IPCC Special Report on 1.5 Degrees, and the Talanoa Dialogues are able to generate positive momentum in the run up to Katowice and make the work of co-chairs and Polish Presidency any easier.

Wetlands are key for accurate greenhouse gas measurements in the Arctic

Why in news?

A new study has indicated that wetlands in the Arctic are key to determining the amount of Greenhouse Gases (GHGs) in the region.

What study says?

- The study found that for the 10-year period from 2006 to 2015, the tundra of Western Russia had likely remained a "net carbon sink", sequestering atmospheric CO2 through plant uptake and growth.
- This signal varied little between all the years and was particularly strong in wetlands, which were "hotspots" for carbon uptake.
- Wetlands are also "hotspots" of methane emissions in the region, making the identification of wetlands essential for determining the regional carbon budget.
- The study assumes importance since the Arctic is rapidly warming, with stronger effects than observed elsewhere in the world.
- The Arctic regions are particularly important with respect to climate change, as permafrost soils store huge amounts of the Earth's soil carbon.
- Warming of Arctic soils and thawing of permafrost can have substantial consequences for the global climate, as the large C stored in soils could be released to the atmosphere as the greenhouse gases carbon dioxide and methane.
- The release of these heat-trapping gases, in turn, has the potential to further enhance climate warming.

Heat trapped below Arctic surface could melt entire region's ice

Why in news?

'Archived' heat trapped below the surface of the Arctic has the potential to melt the entire region's sea ice. Thus the Arctic sea ice is not just threatened by the melting of ice around its edges.

Details

Warmer water that originated hundreds of miles away has penetrated deep into the interior of the Arctic. The study traced the source to waters hundreds of miles to the south, where reduced sea ice has left the surface ocean more exposed to summer solar warming. In turn, Arctic winds are driving the warmer water north, but below the surface waters.

This means the effects of sea-ice loss are not limited to the ice-free regions themselves, but also lead to increased heat accumulation in the interior of the Arctic Ocean that can have climate effects well beyond the summer season. Presently this heat is trapped below the surface layer. Should it be mixed up to the surface, there is enough heat to entirely melt the sea-ice pack that covers this region for most of the year.

Wintertime ice growth in Arctic sea slows long-term decline

Why in news?

The findings showed that since 1958, the Arctic sea ice cover has lost on average around two-thirds of its thickness and now 70 per cent of the sea ice cap is made of seasonal ice.

What research says?

While sea ice in the Arctic continues to be on the decline, a new research from the US Space agency suggests that it is regrowing at faster rates during the winter than it was a few decades ago. The findings showed that since 1958, the Arctic sea ice cover has lost on average around two-thirds of its thickness and now 70 per cent of the sea ice cap is made of seasonal ice, or ice that forms and melts within a single year. But at the same time, that sea ice is vanishing quicker than it has ever been observed in the satellite record, it is also thickening at a faster rate during winter. To explore sea ice growth variability across the Arctic, the team used climate models and observations of sea ice thickness from the European Space Agency's CryoSat-2 satellite. They found that in the 1980s, when Arctic sea ice was on average 6.6 feet thick in October, about 3.3 extra feet of ice would form over the winter. This rate of growth may continue to increase, and in the coming decades.

Arctic had second-lowest sea ice coverage this year

Why in news?

NOAA's annual report card on the Arctic measures the changing climate of the polar region including warmer air and ocean temperatures and declines in sea-ice that are driving shifts in animal habitats.

What record says?

The Arctic region experienced second lowest overall sea-ice coverage on record this year, due to the continuing global warming trend, according to a US National Oceanic and Atmospheric Administration (NOAA) report. The report also found that the number of grazing animals in the region, such as the Arctic caribou and wild reindeer populations, dropped by 56 per cent in two decades, with the largest declines in Alaska and Canada. NOAA's annual report card on the Arctic measures the changing climate of the polar region including warmer air and ocean temperatures and declines in sea-ice that are driving shifts in animal habitats. The report shows that the Arctic region experienced the second-warmest air temperatures ever recorded as well as the second-lowest overall sea-ice coverage.

Earlier plankton blooms

The region also experienced earlier plankton blooms due to early melting of sea ice in the Bering Sea. The report also includes multi-year environmental changes, including a long-term population decline of the region's iconic wildlife species, the caribou. Other multi-year essays focused on the expansion northward of toxic harmful algae and significant concentrations of microplastic pollution that are transported by ocean currents into the Arctic Ocean from other parts of the global ocean.

Arctic caribou and wild reindeer populations dropped sharply from 4.7 million to 2.1 million a 56 per cent decline grazing animals in two decades, with the largest declines in Alaska and Canada. Scientists attribute the declines to Arctic warming, which is increasing the frequency of drought, affecting the quality of forage. Longer, warmer summers also increase flies, parasites and disease outbreaks in the herds.

Foam manufacturers are undermining the Montreal Protocol

Why in news?

To save on the higher cost of alternatives, Chinese foam manufacturers are using banned chlorofluorocarbons that are considered more potent than carbon dioxide in causing global warming.

Chlorofluorocarbons

CFCS are chemical compounds that eventually rise into the stratosphere and stay there for a long time before being broken apart by the Sun's ultraviolet radiation and releasing chlorine atoms that go on to destroy ozone

molecules. Stratospheric ozone protects life on the planet by absorbing these ultraviolet radiation, which can cause skin cancer and cataracts, suppress immune systems and damage plants.

NASA observation

US space agency NASA reported a decline in ozone-depleting substances (ODS), specifically chlorine, since 2005. Chlorine from chlorofluorocarbons (CFCS) is going down in the ozone hole, and that less ozone depletion is occurring because of it.

The success was attributed to the Montreal Protocol, a global treaty signed in 1987, to protect the ozone layer from depletion. Under it, the production and consumption of all CFCS officially ended in developed countries in 1996 and in developing countries by 2010.

Again have problem

A significant rise of 25 per cent in the emissions of a banned ODS, CFC-11 or trichlorofluoromethane, between 2012 and 2016. CFC-11 not only has high potential for ozone depletion, it is also considered 4,750 times more potent than carbon dioxide in causing global warming.

China, the defaulter

While there can be multiple reasons behind the rising emissions of CFC-11

- The UK-based non-profit, Environmental Investigation Agency (EIA), to probe into the matter.
- In July, it found that China's foam making industry was illegally using CFC-11 as a blowing agent.
- Since CFC-11 is cheap, compared to other alternatives, the industry uses it to manufacture polyurethane foam or PU foam, which is widely used as an insulation material in buildings as well as in refrigerators, freezers, coolers and heaters.

Foam manufacturing units in China

The sudden peak in emissions over the four-year period, despite the ban of CFCS, shows laxity in environmental regulations in China, home to over one-third of the global foam industry. According to the Executive Committee of the Montreal Protocol's Multilateral Fund, there are over 3,500 foam-manufacturing units in China.

As part of its probe, the EIA surveyed 21 Chinese foam manufacturers and found that 18 were using CFC-11 illegally to save on the higher cost of alternatives, such as hydrochloro- fluorocarbons like HCFC-141b, which is to be phased out in China by 2026.

Earlier investigation

This is not the first time China has been implicated in illegal production, consumption and trade of banned ODS. Earlier, investigations by EIA and the United Nations Environment Programme between 2009 and 2013 found that ODS constituted the 12th largest global black market, accounting for US $67.7 million in 2011. Since then, trends in gases being illegally produced and smuggled have changed as the world enters the phase-out period for HCFCS. A 2016 update by EIA on illegal smuggling networks found that while illicit trade of CFCs had reduced, it was replaced in the black market by HCFCS. In 2014, a discrepancy of nearly 30 per cent existed in the supply chain of HCFC-22 or chlorodifluoromethane as compa red to the export quantities reported by China. The country is responsible for about 70 per cent of the global HCFC production and more than 50 per cent of the consumption.

Largest consumer of ODS

China is also the world's largest consumer of ODS. At its peak in 1998, consumption stood at 167,000 tonnes. By 2013, the figure fell to 15,690 tonnes. By comparison, South Korea, the second-highest consumer of ODS, had an annual consumption of over 2,000 tonnes.

Largest emitter of Greenhouse gases

Experts say for an aspiring nation like China balancing the economy and the environment is often a tricky matter. As the Chinese economy flourished in the past three decades, it suffered massive ecological damage. At present, the Asian giant is the world's largest emitter of greenhouse gases and faces multiple challenges in tackling pollution related to air, water and soil. Environmental degradation costs it anywhere between 3 and 10 per cent of its Gross National Income. Millions of premature deaths and increasing burden of illnesses such as cancer have prompted China to tighten environmental regulations. Since 2015, the country has strengthened its existing environmental protection mechanisms by bringing in new laws.

Rectifying the situation

China has revamped its Ministry of Ecology and Environment (MEE) to address non-adherance to green regulations. Harsh penalties for environmental degradation and the imposition of taxes on polluting industrial units have been introduced under a 10-year environmental policy. It also pledged biennial inspections of erring industries. Till the beginning of the year, it had penalised over 30,000 companies and 6,000 officials.

While China promises to make every effort possible to stamp out this latest controversy over the illicit use of CFC-11, the spotlight is back on the Montreal Protocol and its effectiveness in dealing with the prevention of ozone depletion. The Protocol requires sustained political will and increased financial support to developing countries to ensure that they meet the future challenges in eliminating ODS.

Governments to raise carbon prices

Why in news?

New OECD report calls for governments to raise carbon prices much faster if they are to meet their commitments on cutting emissions and slowing the pace of climate change under the Paris Agreement.

Report of OECD

A new report by the Organisation for Economic Co-operation and Development (OECD) titled "Effective Carbon Rates 2018: Pricing Carbon Emissions through Taxes and Emissions Trading" was released in Paris on September 18. It presents new data on taxes and tradeable permits for carbon emissions in 42 OECD and G20 countries accounting for around 80 per cent of global emissions. It finds that today's carbon prices while slowly rising are still too low to have a significant impact on curbing climate change.

Carbon pricing gap

The report shows that the carbon pricing gap which compares actual carbon prices and real climate costs estimated at EUR 30 per tonne of CO2 was 76.5 per cent in 2018. This compares favourably with the 83 per cent carbon gap reported in 2012 and the 79.5 per cent gap in 2015, but it is still insufficient. At the current pace of decline, carbon prices will only meet real costs in 2095. Much faster action is needed to incentivise companies to innovate and compete to bring about a low-carbon economy and to stimulate households to adopt low-carbon lifestyles.

The report measures carbon prices using the Effective Carbon Rate, which is the sum of three components:

- specific taxes on fossil fuels,
- carbon taxes and
- prices of tradeable emission permits.

All three instruments increase the price of high-carbon relative to low- and zero-carbon fuels, encouraging energy users to go for low- or zero-carbon options. The vast majority of emissions in industry and in the residential and commercial sector are entirely unpriced. The carbon pricing gap is lowest for road transport

(21 per cent against the EUR 30 benchmark) and highest for industry (91 per cent). The gap is over 80 per cent in the electricity and the residential and commercial sectors.

Country analysis of carbon prices

Country analysis on 2015 carbon prices shows large variations, with carbon pricing gaps ranging from as low as 27 per cent in Switzerland to above 90 per cent in some emerging economies. France, India, Korea, Mexico and the United Kingdom substantially reduced their carbon pricing gaps between 2012 and 2015. Yet, still only 12 of the 42 countries studied had pricing gaps of below 50 per cent in 2015.

Climate change affecting the flora and fauna of the high Himalayas

Why in news?

Research by the Wildlife Institute of India indicates that the upper reaches are warming, putting the very survival of plants, insects, birds, mammals and fish, at risk.

Study

- A new study by Dehradun-based Wildlife Institute of India (WII) has revealed that the upper reaches of the Himalayas are warming, something that will put local flora and fauna at tremendous risk.
- The study was begun in 2016 and is being monitored by the National Action Plan on Climate Change. It was conducted in the basin of the Bhagirathi river near Gaumukh in Uttarakhand.
- The study region is located at an altitude between 3500-4500 metres. At 4,500 metres, the maximum temperature touches 5 degrees Celsius, while the minimum plunges to -14. At 3,500 metres, the maximum temperature is 10 degrees Celsius, while the minimum is around -2.5 degrees Celsius.
- The study has revealed that there has been a rise of at least 0.5 degrees Celsius in the temperature of the area, accompanied by an almost 10 per cent variation in humidity levels.
- The temperature variation is affecting plants and consequently, animals, in the region.

Flowering patterns and budding of leaves are now happening in May instead of June. Rains are happening in late September which is unusual since this is the autumn season. In response to the changed temperatures in alpine meadows which are the grazing and hunting sites for the species inhabiting the region, premature budding and flowering happens in plants. This leads to a change in the activities of insects. In response, birds will have to change their patterns.

Flora

- Flora affected include the Himalayan birch, White lily, Tibetan sea buckthorn, Spotted heart orchid, Himalayan fir and Sikkim Rhubarb.

Mammals

- Mammals likely to be affected include the Snow leopard, Musk deer, Kashmir stag and Himalayan mouse hare.

What we know about Special IPCC report

Why in news?

The International Panel on Climate Change, the world's foremost scientific body on climate change, is set to give a verdict that can have huge ramifications for the world. It will tell governments what we know about climate change and also how much governments are failing to live up to the goals set in the 2015 Paris Agreement. In 2014, IPCC's 5th Assessment Report gave the most emphatic warning on global warming and provided the scientific underpinning for the Paris Agreement.

Here are three things to help you understand the upcoming report and IPCC in general:

What the report is about?

A panel of the United Nations, IPCC is supposed to give neutral and scientific updates about the global warming, impacts and mitigation actions. The intergovernmental body has 195 nation members and is based in Geneva. Thousands of experts from health, climate science, and economists volunteer to prepare its reports.

The upcoming report is part of the Talanoa Dialogue, in which parties to the Paris Agreement consider the gap between aims and implementation. It will be held in December at an annual United Nations climate meeting in Katowice, Poland.

Challenges

Experts believe that it is an enormous challenge to keep warming below a threshold of 1.5 degrees Celsius. Yet, global warming is already set to breach the lower limit for warming of 1.5 degrees, says a leaked version of the draft report. Although geo-physically possible, this would require drastic and rapid reductions in Green House Gas (GHG) emissions by governments. A sharp shift from fossil fuels as well as removal of carbon dioxide (CO2) from the atmosphere is needed. Under current trajectories, where temperature increase is already hovering just over 1 degree Celsius compared to pre-industrial levels, the 1.5 degree target will be breached in the 2040s, even before the middle of the century.

American interference

For almost a week, discussions have being held at Incheon, Republic of South Korea but were seen to be politicized. The IPCC concludes three reviews (global warming, climate change impacts and tackling related problems) with a crucial Summary for Policymakers. If governments want, they can seek amendments to the summary. The leaked draft of comments from governments shows that the US is trying to misinterpret facts and push domestic (anti) climate change policies. It questions the science and methodologies used to present impacts at 1.5 °C, and say that there are way too many challenges and uncertainties involved. America's comments not only dominate the draft but also dilute the objective of the IPCC's Report and Summary for Policymakers, which is to help policymakers understand the implications of warmer world and scale up ambition to devise sound and effective climate policies.

Climate change causing sea snail shells to dissolve

Why in news?

Shelled marine creatures living in increasingly acidified oceans face a fight for survival as the impacts of climate change spread, a study suggests.

Findings

Researchers assessed the impact of rising carbon dioxide levels on the large predatory "triton shell" gastropod. They found those living in regions with predicted future levels of CO2 were on average around a third smaller than counterparts living in conditions seen throughout the world's oceans today.

However there was also a noticeable negative impact on the thickness, density, and structure of their shells, causing visible deterioration to the shell surface. The study found that the effects are down to the increased stresses placed on the species in waters where the pH is lower, which reduce their ability to control the calcification process. The researchers have warned other shellfish are likely to be impacted in the same way, threatening their survival and that of other species that rely on them for food.

The research was conducted at a marine volcanic seep off the coast of Shikine-jima in Japan where carbon dioxide bubbling up through the seabed lowers seawater pH from present-day levels to future predicted levels. Using computed tomography (CT) scanning, the scientists measured the thickness, density and structure of the shells, with shell thickness halved in areas with raised CO2 while average shell length was reduced from 178mm in sites with present day levels to 112mm. In some cases, these negative effects left body tissue exposed and the shell casing dissolved, with the corrosive effects of acidification far more pronounced around the oldest parts of the shell.

World Heritage sites threatened by climate change

Why in news?

A recent study reveals that the World Heritage sites were threatened by climate change.

What are the highlights?

The study assesses the risk due to sea level rise by the end of the century at 49 UNESCO coastal Heritage sites. It presents a risk index that ranks the sites according to the threat they face from today until the end of the century. The sites featuring highest on this index in current conditions include Venice and its Lagoon, Ferrara, City of the Renaissance, and its Po Delta and the Patriarchal Basilica of Aquileia. All these sites are located along the northern Adriatic Sea in Italy where extreme sea levels are the highest. This is because high storm surges coincide with high regional sea-level rises here. Dozens of UNESCO World Heritage sites in the Mediterranean are under severe threat of coastal erosion and flooding. By the next century flood risk may increase by 50% and erosion risk by 13% across the region.

What are the challenges?

The Mediterranean region has a high concentration of UNESCO World Heritage Sites. Many of these are in coastal locations as human activity has historically concentrated around these areas. The steep landscape and small tidal range in the area has meant settlements often located close to the waterfront. So rising sea levels pose a threat to these sites and settlements. But more information on the risk at a local level is needed. Also, the approaches to adaption and protection vary across the region due to large social and economic differences. Besides, Heritage sites face many challenges to adapt to the effects of sea-level rise as it changes the value and 'spirit of place' for each site.

What lies ahead?

Further monitoring is required to better understand the effects of climate change on heritage sites and other natural hazards. The study has identified areas with urgent need for adaptation planning. The iconic nature of such sites can be used to promote awareness of the need to take action to mitigate climate change. In some cases, relocation of individual monuments may be technically possible too.

Oceans heating faster

Why in news?

According to a new study published in journal 'Nature', the scientists have noted that the global oceans may be absorbing up to 60 percent more heat since the 1990s than older estimates had found.

New novel method in the study

Unlike earlier studies, which relied on tallying the excess heat produced by known man-made greenhouse gas emissions, the new research does not measure the ocean's temperature directly. Rather, it measures the volume of gases, specifically oxygen and carbon dioxide, which have escaped the ocean in recent decades and headed into the atmosphere as the ocean heats up. Both gases (oxygen and carbon dioxide) are soluble in

water, but the rate at which water absorbs them decreases as it warms. By measuring atmospheric oxygen and CO2 for each year, scientists were able to more accurately estimate how much heat oceans had absorbed on a global scale.

Findings of the study

The world's oceans have absorbed 60% more heat than previously thought over the last quarter of a century. This difference represents an enormous amount of additional energy, originating from the sun and trapped by Earth's atmosphere the yearly amount representing more than eight times the world's annual energy consumption. It found that for each of the last 25 years, oceans had absorbed heat energy equivalent to 150 times the amount of electricity mankind produces annually. The mankind must once again revise down its carbon footprint, with emissions needing to fall 25%compared to previous estimates to avoid a warming of two degrees Celsius (3.6 Fahrenheit). The warming found in the study is "more than twice the rates of long-term warming estimates from the 1960s and '70s to the present".

Implications of the new study

The new research underscores the potential consequences of global inaction. Rapidly warming oceans mean that seas levels will rise faster. More heat will be delivered to critical locations that already are facing the effects of a warming climate, such as coral reefs in the tropics and the ice sheets of Greenland and Antarctica. The world could now move towards having a smaller "carbon budget" than once thought. Carbon budget refers to the amount of carbon dioxide humans can emit while still being able to keep warming below dangerous levels.

Ice age crater discovered beneath Greenland glacier

Why in news?

An international team lead by researchers University of Copenhagen in Denmark have discovered a 31-km wide meteorite impact crater buried beneath the ice-sheet in the northern Greenland. This is the first time that a crater of any size has been found under one of Earth's continental ice sheets. The researchers worked for last three years to verify their discovery, initially made in the 2015. The research is described in a new study just published in the internationally recognized journal Science Advances.

About the Crater

The crater measures more than 31 km in diameter, corresponding to an area bigger than Paris, and placing it among the 25 largest impact craters on Earth. The impact crater is large enough to swallow the District of Columbia and is the first impact crater found beneath one of our planet's ice sheets. Formation: The finding suggests that a giant iron asteroid smashed into during the last ice age, an era known as the Pleistocene Epoch that started 2.6 million years ago.

NASA says more glaciers in Antarctica are losing ice

Why in news?

In recent years, researchers have warned that Totten Glacier, a behemoth that contains enough ice to raise sea levels by at least three metres, appears to be retreating because of warming ocean waters.

NASA study

A group of glaciers spanning one-eighth of East Antarctica's coast have begun to lose ice over the past decade, hinting at widespread changes in the ocean, a NASA study has found. East Antarctica has the potential to reshape coastlines around the world through sea level rise, but scientists have long considered it more stable than its neighbour, West Antarctica.

Totten glacier

Totten Glacier is a large glacier draining a major portion of the East Antarctic Ice Sheet, through the Budd Coast of Wilkes Land in the Australian Antarctic Territory. The catchment drained by the glacier is estimated at 538,000 km^2 (208,000 sq mi), extending approximately 1,100 km (680 mi) into the interior and holds the potential to raise sea level by at least 3.5 m (11 ft). Totten drains northeastward from the continental ice but turns northwestward at the coast where it terminates in a prominent tongue close east of Cape Waldron. It was first delineated from aerial photographs taken by USN Operation Highjump (1946–47), and named by Advisory Committee on Antarctic Names (US-ACAN) for George M. Totten, midshipman on USS Vincennes of the United States Exploring Expedition (1838–42), who assisted Lieutenant Charles Wilkes with correction of the survey data obtained by the expedition.

Other glaciers nearby Totten

The researchers used new maps of ice velocity and surface height elevation. Walker found that four glaciers west of Totten, in an area called Vincennes Bay, have lowered their surface height by about three metres since 2008. Farther east, a collection of glaciers along the Wilkes Land coast have doubled their rate of lowering since around 2009, and their surface is now going down by about 0.24 metres every year. These levels of ice loss are small when compared to those of glaciers in West Antarctica. However, they speak of nascent and widespread change in East Antarctica.

Warming leads to water crisis in Himalayas

Why in news?

Researchers from Ohio State University in the U.S. showed that climate change could have devastating effects on vulnerable residents in the Andes mountains and the Tibetan plateau. Climate change is driving glaciers in the Himalayas to melt more rapidly than at any point in the last 10,000 years, and could soon cause water supply shortage in parts of India, Pakistan, and Nepal.

Highlights of the Study

By 2100, the best case scenario is that half of the ice will disappear. Worst-case scenario: two-thirds of it will. And you've got all those people depending on the glacier for water. Researchers showed that while water supply is declining, demand is rising because of growing populations. The glaciers in Peru supply critically needed water for people, crops and livestock. The international research team dubbed the plateau the "Third Pole" because it contains the largest stores of freshwater in the world outside of the North and South poles.

Measures and Policies for Tackling Climate Change by India

Under the Paris Agreement, India has submitted its Nationally Determined Contribution (NDC) to the UNFCCC. To reduce Emission Intensity of its Gross Domestic Product (GDP) by 33 to 35 percent by 2030 from 2005 level, to achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030 with the help of transfer of technology and low-cost international finance including from Green Climate Fund (GCF), to create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030. The other targets pertain to sustainable lifestyles; climate friendly growth path; climate change adaptation; climate change finance; and capacity building and technology.

India to host key meetings ahead of Poland climate talks

Why in news?

India is hosting two key meetings in New Delhi with a group of countries called the 'Like Minded Developing Countries' (India, China, Venezuela and Iran) and BASIC (Brazil, South Africa, India, China) ahead of the December climate talks in Katowice, Poland.

Discussion with other countries

India was having discussions with at least 40 countries, including China, to forge alliances and compel developed countries to make good on promises, made over the years, to provide enough finance and technology to stem global warming. These meetings are important, said Union Environment Secretary C.K. Mishra, for countries to craft a common front to ensure that the rules, which will govern how the 2015 Paris climate pact that will come into force from 2020, are implemented fairly.

About Conference of Parties (COP)

The Conference of Parties (COP) is a league of at least 190 countries signatory to the United Nations Framework Convention on Climate Change (UNFCC). The UNFCCC is a "Rio Convention", one of three adopted at the "Rio Earth Summit" in 1992. The UNFCCC entered into force on 21 March 1994. All States that are Parties to the Convention are represented at the COP, at which they review the implementation of the Convention and any other legal instruments that the COP adopts and take decisions necessary to promote the effective implementation of the Convention, including institutional and administrative arrangements. The COP meets every year to discuss ways to address issues related to climate change, unless the Parties decide otherwise. The first COP meeting was held in Berlin, Germany in March, 1995.

About PreCOP

PreCOP is a meeting of representatives of global business and government delegations preceding the COP24 Climate Summit in Katowice. Its open formula creates a space for holding inspiring discussions, exchanging arguments and finding solutions before the start of the full-scope formal negotiations with almost 200 countries during the COP24 Summit in December.

What is COP24?

COP24 is the informal name for the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC). In accordance with a decision of the 22nd Session of the Conference of the Parties to the Climate Convention (COP22) in Marrakesh in November 2016, the successive climate summit will be held in Poland. Poland was selected to host this event within the framework of the Eastern European Group (EEG). Poland will hold the Presidency of the Climate Convention for the third time. COP24 will take place from 3-14 December 2018, in Katowice, Poland.

COP24 in Katowice, Poland

Why in News?

COP24 took place from 2-14 December 2018, in Katowice, Poland. Poland held the Presidency of the Climate Convention for the third time.

What is COP24?

COP24 is the informal name for the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC). The Conference of the Parties (COP) is the supreme body of the UNFCCC, consisting of the representatives of the Parties to the Convention. COP holds its sessions every year and takes decisions which are necessary to ensure the effective implementation of the provisions of the Convention and regularly reviews the implementation of these provisions.

United Nations Framework Convention on Climate Change (UNFCCC)

- UNFCCC is an international environmental treaty adopted on 9 May 1992 and opened for signature at the Earth Summit in Rio de Janeiro from 3 to 14 June 1992, entered into force on 21 March 1994.
- The UNFCCC objective is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.
- Currently, there are **197 Parties** (196 States and European Union) to the United Nations Framework Convention on Climate Change.

Paris Agreement 2015

- Parties to UNFCCC agreed to strive to limit the rise in global warming to well under 2 degrees Celsius, over pre-industrial levels by 2100, under Paris Agreement 2015.
- Nationally determined contributions (NDCs) were conceived at Paris summit which require each Party to prepare, communicate and maintain successive nationally determined contributions (NDCs) that it intends to achieve.
- Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.
- Paris Agreement replaced earlier agreement to deal with climate change, Kyoto Protocol.
- USA recently pulled out from the agreement seriously damaging the global effort to reverse climate change, as USA is one of the largest Greenhouse Gas emitter.

Important Outcome of Summit

Paris Rulebook

The COP-24 finalized a "rulebook" to operationalise 2015 Paris Agreement. The rulebook set out how countries will provide information about their Nationally Determined Contributions describing their domestic climate actions, mitigation and adaptation measures.

What are the key features of the rulebook?

Climate action plan

The Paris Agreement prescribes that all countries must have an individual climate action plan to be periodically updated and submitted to the UN climate body. The rulebook prescribes what actions can be included in the action plan, how and when to submit them.

GHG information

The Paris Agreement wants every member country to submit information about their greenhouse gas emissions every 2 years. The rulebook specifies which gases to measure, what methodologies and standards to apply while measuring them.

National Determined Contributions (NDCs)

The Paris Agreement mandates nationally determined contributions by nations i.e., nations can determine how to reduce their emissions. The rulebook says that support will be provided to the developing countries with respect to NDCs.

Climate finance

The Paris Agreement wants developed nations to offer climate finance to developing nations. The rulebook mentions what type of financial flows – loans, concessions, grants – can be categorized as climate finance. It mentions how they should be accounted for and the type of information about them required to be submitted.

Issues in Conference

Disagreement on Intergovernmental Panel on Climate Change (IPCC) Report: The 1.5°C Report, produced by the Intergovernmental Panel on Climate Change in October 2018, was not acknowledged as an evidence-based cause for alarm by the U.S., Saudi Arabia, and Russia.

No ambitious action promised: The absence of any indication towards increasing "ambition" of climate actions, so as to rein in temperature rise at 1.5°c at a faster pace, was one major disappointment of the Katowice conference.

Issue of Equity: Provisions did not reflect the principles of common but differentiated responsibilities. Poorer nations vulnerable to climate change also wanted more clarity on how an already agreed $100 billion a year of climate finance by 2020 will be provided.

- The principle of common but differentiated responsibilities holds that although all countries are responsible for the development of global society, each has a different set of capabilities that they can contribute to this project.
- It recognizes the historical correlation between higher levels of development and a greater contribution to the degradation of global environmental resources by developed countries and enables the sharing of responsibility accordingly.

Market Mechanism: The conference could not reach a consensus on voluntary market mechanisms. Article 6 of the Paris Agreement talks about setting up a market mechanism for trading of carbon emissions. An emissions trading system already exists under the Kyoto Protocol, though it has become ineffective over the last few years and is meant to end with the end of Kyoto Protocol in 2020.

- Market-based mechanisms provide flexible instruments reducing the costs of meeting emissions targets. Emissions trading systems, Joint Implementation (JI) mechanism and the Clean Development Mechanism (CDM) established under the Kyoto Protocol are market-based mechanisms.
- CDM allows a developed country with an emission-reduction commitment under the Kyoto Protocol to implement an emission-reduction project in any of those developing countries Certified Emission Reduction *(CER)* credits, each equivalent to one tonne of CO2.
- The countries which are unable to reduce their emissions in their business in a cost-effective manner in their country, they can invest in clean projects in developing countries. (Joint Implementation).

Carbon Credits: Developing countries like China, India, and Brazil argued that their accumulated unused carbon credits should be considered valid in the new market mechanism.

- In the recent years, as several countries quit Kyoto Protocol, and no country was feeling compelled to meet its 2020 emission reduction targets, there has been virtually no demand for carbon credits. As a result, developing countries like China, India and Brazil have accumulated huge amounts of unused carbon credits.

- The developed countries questioned the authenticity of the unused carbon credits, pointing to weak verification mechanisms of the Kyoto Protocol. The discussion over carbon markets is deferred to the next year.

Carbon Credit

A carbon credit is a permit or certificate allowing the holder to emit carbon dioxide or other greenhouse gases. Carbon trading involves trading of carbon one of the market-based mechanisms set up under Kyoto Protocol.

India's Stand at the conference

India reaffirmed its INDCs commitments to meeting the goals under the 2015 Paris Agreement. India argued that delicate balance reached between developed and developing countries must be retained, and the principles such as equity, climate justice and Common but Differentiated Responsibility and Respective Capabilities must be given its due. India expressed strong reservation over the lack of equity in the global stock-take i.e. taking stock of collective progress toward achieving the goals of the Paris Agreement in the rule book of the agreement. It sought a robust transparency regime for countries to disclose their emissions.

Conclusion

The 1.5°C Report, which was produced by the IPCC in October 2018 states at current rate of emissions, the world is set to breach the global warming limit of 1.5°C between 2030 and 2052. This report present clear challenge to the world to deal with climate change. Therefore, the urgency to arrive at the consensus for contentious issues like climate financing, transparent stock taking issues of climate justice need to be arrived.

World Bank unveils US $200 billion in climate action investment for 2021-25

Why in news?

World Bank has unveiled US $200 billion in climate action investment for 2021 to 2025 to fight impact of climate change. The move coincides with Conference of Parties-24 (COP24) United Nations Climate Summit in Katowice, Poland. The breakdown of US $200 billion will comprise approximately 100 billion in direct finance from World Bank. Around one-third of remaining funding will come from two World Bank Group agencies and rest will be private capital mobilised by the World Bank Group.

The fund

This US $200 billion in climate action investment, amounts to World Bank's doubling of its current five-year funding. It also represents significantly ramped up ambition of World Bank to tackle climate change and sends an important signal to the wider global community to do the same. This amount is also double of World Bank's earlier commitment for its current five-year funding.

State of the Global Climate in 2018

Why in news?

The World Meteorological Organisation (WMO) unveiled the State of the Global Climate in 2018 Report.

Highlights of the report

- Extreme weather events impacted close to 62 million people in 2018 and displaced more than two million as of September of that year.

- The physical signs and socio-economic impacts of climate change are accelerating as record greenhouse gas concentrations drive global temperatures towards increasingly dangerous levels 2018 witnessed a record sea level rise and high land and ocean temperatures.
- 2018 was the fourth warmest year on record, and the four warmest years on record all took place between 2015 and 2018. The average global temperature is now around one degree Celsius above preindustrial levels.
- 2018 also sets a new record for ocean heat in the top 700 meters (approximately 2,297 feet) and top 2,000 meters (approximately 6,562 feet).
- Carbon dioxide concentrations in the atmosphere have jumped from 357 parts per million (ppm) in 1994 to 405.5 ppm in 2017. Flooding which was the climate-related disaster that impacted the largest number of people in 2018 more than 35 million.
- The global mean sea level hit a new record and was around 3.7 millimetres higher than in 2017. Arctic sea ice extent registered record lows for February and January of 2018.
- The maximum extent in March of that year was the third lowest in the 1979 to 2018 satellite record.
- Climate change could reverse progress made in fighting global malnutrition.
- In 2017, the number of people suffering from malnutrition increased to 821 million, and this was partly due to by droughts related to El Niño.
- Around 125 million more people were exposed to heat waves between 2000 and 2016and the average heat wave grew 0.37 days longer compared to heat waves between 1986 and 2008.
- WMO has warned that the world would witness temperatures increase 3-5C by the end of the century. Unveiling the report the UN Chief called on countries to come with concrete plans at an upcoming climate summit.

Region	**Impact of climate extremes on food security**
Southern Africa	Dry spells and tropical cyclones kept cereal production in 2018 at below-average levels and number of people affected by food insecurity increased significantly in southern regions.
East Africa	Although ample rains boosted production prospects, resulting floods contributed to food insecurity.
Asia	Cereal harvests likely to be below-average in the Near East and Commonwealth of Independent States due to rainfall deficits and conflict.
Latin America and the Caribbean	Cereal production in 2018 will see a 7.3 per cent decline from the record output in 2017. This is mostly due to drought-reduced maize outputs in Argentina and Brazil.
Philippines	Over 550,000 hectares of agricultural land were affected due to Typhoon Manghkut/Ompong and the country's food supply is disrupted for the following months. The loss of livelihood for farmers and fisher folk during the September-October harvest can worsen food insecurity and malnutrition.

India third largest contributor to carbon emission

Coal use hampers

Recently representatives from more than 190 countries have begun discussions at the UN Climate Change Conference (COP 24) in Katowice, Poland, on ways to equitably cut carbon emissions. However global carbon emissions are set to hit an all-time high of 37.1 billion tonnes of CO2 in 2018, according to researchers at the University of East Anglia (UEA) and the Global Carbon Project. India, the third-highest contributor, is projected to see emissions rise by 6.3% from 2017. The 2.7% projected global rise in 2018 has been driven by appreciable growth in coal use for the second year in a row, and sustained growth in oil and gas use. Though coal use contributed to the rise in 2018 from last year, it still remains below its historical high in 2013 but may exceed that if current growth continues.

China and US rocks global emission

The 10 biggest emitters in 2018 are China, US, India, Russia, Japan, Germany, Iran, Saudi Arabia, South Korea, and Canada. The EU as a region of countries ranks third. China's emissions accounted for 27% of the global total, having grown an estimated 4.7% in 2018 and reaching a new all-time high. Emissions in the US, which has withdrawn from its commitment to the Paris Agreement, account for 15% of the global total, and look set to have grown about 2.5% in 2018 after several years of decline.

About Global Carbon Project

1. The Global Carbon Project (GCP) established in 2001 is the organisation that seeks to quantify global carbon emissions and their causes.
2. The main object of the group has been to fully understand the carbon cycle.
3. The project has brought together emissions experts and economists to tackle the problem of rising concentrations of greenhouse gases.
4. It releases the Global Carbon Atlas, a tool for the visualization of data related to the global carbon cycle.

Rising temperature to cut living standards of 600 million Indians

Why in news?

600 million Indians could see a dip in living standards by 2050 if temperatures continue to rise at their current pace, as per World Bank.

Hotspots

Seven of the 10 severest or most vulnerable 'hotspots' in India would be located in Maharashtra; the rest would be in Madhya Pradesh and Chattisgarh. In the absence of major climate mitigation, nearly 148 million Indians will be living in these severe hotspots in 2050, according to the report.

Vulnerable States

Central, northern and northwestern India emerge as the most vulnerable. Chhattisgarh and Madhya Pradesh, which are predicted to experience a decline in living standards of more than 9%, are the top two 'hotspot' States, followed by Rajasthan, Uttar Pradesh, and Maharashtra.

Temperature prediction

India's annual temperatures to rise by 1°C to 2°C by 2050, even if preventive measures are taken as per Paris climate change agreement of 2015. If no measures are taken, average temperatures in India are predicted

to increase by 1.5°C to 3°C. If emissions continued at the current pace, India could see a 1.5% decline in its GDP by 2030.

NABARD launches Centre for Climate Change in Lucknow

Why in news?

NABARD launched a centre for accelerating concerted action on climate change. A total of 35 climate change projects, with financial outlay of Rs 1,592 crore are in various stages of implementation in different states. India has experienced the impact of climate change on agriculture and rural livelihoods, Agriculture and Farmers.

Measures needed

Promoting micro irrigation, soil health cards, integrated farming models and traditional farming would help de-risk farmers.

About NABARD

NABARD Came into existence on 12 July 1982 by transferring the agricultural credit functions of RBI and refinance functions of the then Agricultural Refinance and Development Corporation (ARDC). Set up with an initial capital of Rs.100 crore, its' paid up capital stood at Rs.10,580 crore as on 31 March 2018. Consequent to the revision in the composition of share capital between Government of India and RBI, NABARD today is fully owned by Government.

Headquarters- Mumbai.

MISCELLANEOUS

Deal inked for biofuel research

Why in news?

The Department of Biotechnology (DBT) has signed a three-year, Rs. 11 crore deal with The Energy and Research Institute to set up a centre to produce "advanced biofuels and bio-commodities." This is the fifth such dedicated centre for bioenergy-research and development set up by the Department.

Others

The others are located at

- The Indian Agricultural Research Institute, New Delhi;
- The Indian Institute of Technology-Guwahati;
- Transtech Green Power Limited, Jaipur; and
- The Oil and Natural Gas Energy Centre in the National Capital Region.

The bio-centre would be focussed on not only developing technology but also commercialising it.

Centre to give Indian Forest Act a facelift

Why in news?

The MoEFCC has started the process of "comprehensively amending" the backbone of forest governance in India the Indian Forest Act, 1927 (IFA).

Weeding out process

The process would involve the examination of all the sections of the Act. The obsolete provisions will be weeded out and provisions fit for the present will be introduced. The amendments will also include definitions of terms like forests, pollution, ecological services etc. There is no definition of forest in any Indian law pertaining to forest or its governance.

Defining Forests

According to the 1996 Supreme Court order, the dictionary definition of the word forest is taken to be the legal definition too. This description covers all statutorily recognised forests, whether designated as reserved, protected or otherwise for the purpose of Section 2(i) of the Forest Conservation Act (1980). The term forest land, occurring in Section 2, will not only include forest as understood in the dictionary sense, but also any area recorded as forest in the government record irrespective of the ownership.

Impact of amendment

The legal definition of forests will have huge ramifications on the conservation of forests as well as the implementation of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. The amendments will include changes to punishments and fines prescribed in the IFA, incorporate provisions related to carbon sequestering, ecological services etc.

Why such move?

The provisions of IFA, like the amount of the fines prescribed for violating the law, were set according to that time and they are very low for today. Moreover, many laws concerning forest government have been implemented since 1927, with this amendment they try to address conflicts which might be there in these laws with respect to the IFA. Many reports like the MB Shah report of 2010 and the TSR Subramanian report of 2015, have talked about amending the IFA.

Recent amendments in the IFA

The Indian Forest Act, 1927 was amended to add new changes to transform the bamboo sector. Before, bamboo was categorised as a tree. As a result, felled or extracted bamboo, whether found in or brought from a forest, was considered as "timber". The Act empowered state governments to regulate the trade and movement of bamboo. After amending Section 2(7) of Indian Forest Act, 1927, bamboo is no longer a tree and felled bamboo too is not timber. So any bamboo grown in private or homestead land by millions of farmers does not require a felling permission or transit permission from any state forest department.

NGT raps Ministry over groundwater notification

Why in news?

The National Green Tribunal shows concern over Union Water Resources Ministry for its notification pertaining to groundwater extraction.

Important Facts

India is the largest user of groundwater in the world, which is about 25% of the global groundwater extraction. Ground water extraction in India is used primarily for irrigation in agricultural activities.

Important Features of New Draft

The draft guidelines make it mandatory for the industries, mining and infrastructure projects, other than those of government, to obtain a no-objection certificate for withdrawing groundwater. The government has decided to exempt farmers from taking NOC for extracting water on ground that "livelihood of farmers is dependent on agriculture'. The draft guidelines also call for a 'Water Conservation Fee' based on quantum of ground water extraction to be paid to states. Government infrastructure projects, government water supply agencies and group housing societies/private housing societies with only basic amenities will be exempted from such fees and Government mining projects will also be exempted from paying such fees. The experts working in the field are not happy and say this will further deteriorate the groundwater situation in the country. The guidelines levy a paltry fee but have totally done away with the need to recharge the groundwater. This means pay and keeps exploiting the ground water.

Government Argument

According to the ministry, there was a need for a uniform regulatory framework for groundwater usage keeping in mind increased number of litigations over water in various courts. Uniform guidelines across the country will help in mitigating discriminatory practices in regulation.

WCF and its Impact

The WCF payable varies with the category of the area, type of industry and the quantum of ground water extraction. The high rates of WCF are expected to discourage setting up of new industries in over-exploited and critical areas as well as act as a deterrent to large scale ground water extraction by industries, especially in over-exploited and critical areas. The WCF would also compel industries to adopt measures relating to water use efficiency and discourage the growth of packaged drinking water units, particularly in over-exploited and critical areas.

Winter solstice 2018

Why in news?

The winter solstice 2018 took place on December 21. It is the time of the year when one of the Earth's poles has its maximum tilt away from the Sun. Winter Solstice happens twice yearly, once in each hemisphere.

Winter Solstice

The term 'solstice' is derived from two Latin words "sol" which means sun, and "sistere" meaning standstill. Winter Solstice marks the shortest day of the year in the northern hemisphere. On Winter Solstice the sun appears at its most southern position, directly overhead along the Tropic of Capricorn. On the other hand Winter Solstice marks the longest day of the year in the Southern hemisphere. Even though the solstice gets an entire day of recognition, it happens in an instant when the North Pole is at its farthest tilt of 23.5 degrees away from the sun. As a result the North Pole would be beyond the sun's reach, and plunges it into total darkness. At Winter Solstice the sun had reached its southernmost point in the sky in the Northern Hemisphere and afterwards will begin its trek northward in the sky. After Winter Solstice the days will be longer in the Northern Hemisphere. The 2018 Winter Solstice is special because it will be followed the next day by a full moon, called the Cold Moon, which will be visible in the night with the Ursid meteor shower.

NITI Aayog's SDG index

Why in news?

According to the 'SDG India Index Baseline Report 2018' released, Kerala and Himachal Pradesh are the front runners with an score of 69 out of 100, followed by Tamil Nadu with 66. Uttar Pradesh was worst performing state with a score of 42, followed by Bihar and Assam.

Top performing states

- Kerala score 69 and
- Himachal Pradesh score 69
- Tamil Nadu with 66.

Reasons for top ranking

- Kerala's top rank is attributed to its superior performance in providing good health, reducing hunger, achieving gender equality and providing quality education.
- Himachal Pradesh ranks high on providing clean water and sanitation, in reducing inequalities and preserving mountain ecosystem.

Worst performing state

Uttar Pradesh was worst performing state with a score of 42, followed by Bihar and Assam.

First of its kind

The index, first of its kind for states in India, took into account 13 out of 17 goals specified by United Nations as SDGs. Four goals were left out because of lack of data at the state level. Under the index, states are monitored on real time basis across 62 of 306 national indicators outlined by the UN. The UN sponsored SDGs have 17 goals, 169 targets and 306 national indicators.

Union Territories

Among the union territories, Chandigarh was at the top due to its exemplary performance in providing clean water and sanitation to citizens.

Conclusion

States with a score of 100 were termed Achievers, those with 65-99 were Front Runners; 50-64 were Performers and states with score between 0 and 49 were termed Aspirants. The world is now in the third year of the era of SDGs, which were adopted by 193 countries at the UN Sustainable Development Summit in September 2015. The SDGs, which came into effect from January 1, 2016, have 2030 as their deadline for achieving the targets.

Organophosphorus pesticide detection gets simpler

Why in news?

Presence of pesticides in parts per billion in apples, tomatoes can be detected using metal-organic framework (MOF) has been able to detect organophosphorus pesticides. It has been found that the ability to detect the pesticides was unaffected by the presence of surfactants as they are used to dissolve pesticides in water.

Organophosphorus pesticide

Organophosphorus pesticides are used to control insect vectors which are found in food and commercial crops, infestations in buildings, man or domestic animals. It can be absorbed by all routes, including inhalation, ingestion, and dermal absorption. The main target organs are the nervous system, respiratory tract and cardiovascular system.

Drawbacks of currently available methods for pesticide detection

They have challenges such as complicated procedure to prepare samples, longer time to analyse samples, need for sophisticated instruments and lack of portability for use infield use.

National Green Tribunal (NGT) has directed the Chief Secretaries on stubble burning

Why in news?

NGT said there was a need to find out a long-lasting solution to the problems of stubble burning and directed the chief secretaries of four states to appear before it to explain ways to prevent it.

States

Punjab, Haryana, Uttar Pradesh and Delhi to remain present on November 15 after applying due diligence and strategic planning for action to prevent crop burning.

Background

The green panel was hearing the matter after taking note of a news report published in English daily titled, "All fiddle as crop stubble burns, farmers say solutions out of reach."

As per the report:

- crop burning shoots up the carbon dioxide levels in the air by 70 per cent.
- every year in October, the air quality in Delhi, Punjab and Haryana plummets as farmers set the leftover stubble and loose straw on fire after paddy is harvested using combines.

Measures take to prevent crop burning

Slapping fines on farmers, subsidising equipment that allow seeds of the next wheat crop to be planted with the stubble still on the fields.

National Policy for Management of Crop Residue - 2014

Provided assistance to farmers by way of machinery and equipments to avoid stubble burning. However, the problem still subsists.

MSP

We make it clear that the existing Minimum Support Price (MSP) Scheme must be so interpreted so as to enable the concerned states to wholly or partly deny the benefit of MSP to those who continue to burn the crop residue"- NGT. 3 years since its verdict in the Vikrant Tongad case, in which it had passed a slew of directions to stop crop burning, but the Punjab had shown a lethargic approach. Punjab also failed to tie up with any company, private or public, which could utilise the crop residue; transportation and use of stubble as fuel in power plants.