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Colour Codes:

1. Recently in News & Very Important
2. Important for Prelims + Mains
3. Important for Prelims
4. Very Important for Prelims
5. Important for Mains
6. Key Word or Key Phrase

{Envi – CC – 2021/01} Global Warming & Arctic region

[IE](#) | [Prelims + Mains](#) | GS3 > Environmental Pollution & Degradation | GS3 > Climate Change

Present situation of Arctic

- The **region is warming up twice as fast as the global average.**
- Since 1980, the volume of Arctic sea ice has declined by as much as 75 per cent.
- The **Northern Sea Route (NSR)** which would connect the North Atlantic to the North Pacific through a short polar arc is slowly opening due to the melting of ice.
- A trickle of commercial cargo vessels has been going through NSR every summer since the last decade.
- Models predict that this route could be ice free in summer by 2050.



Concerns

- The loss of ice & the warming waters will affect sea levels, salinity levels, & current precipitation patterns.
- The **Tundra is returning to swamp** (→ **loss of forest** → **loss of carbon sink**), the **permafrost is thawing** (→ **exposing the subsurface carbon sinks**), & wildfires are devastating interior Canada & Russia.

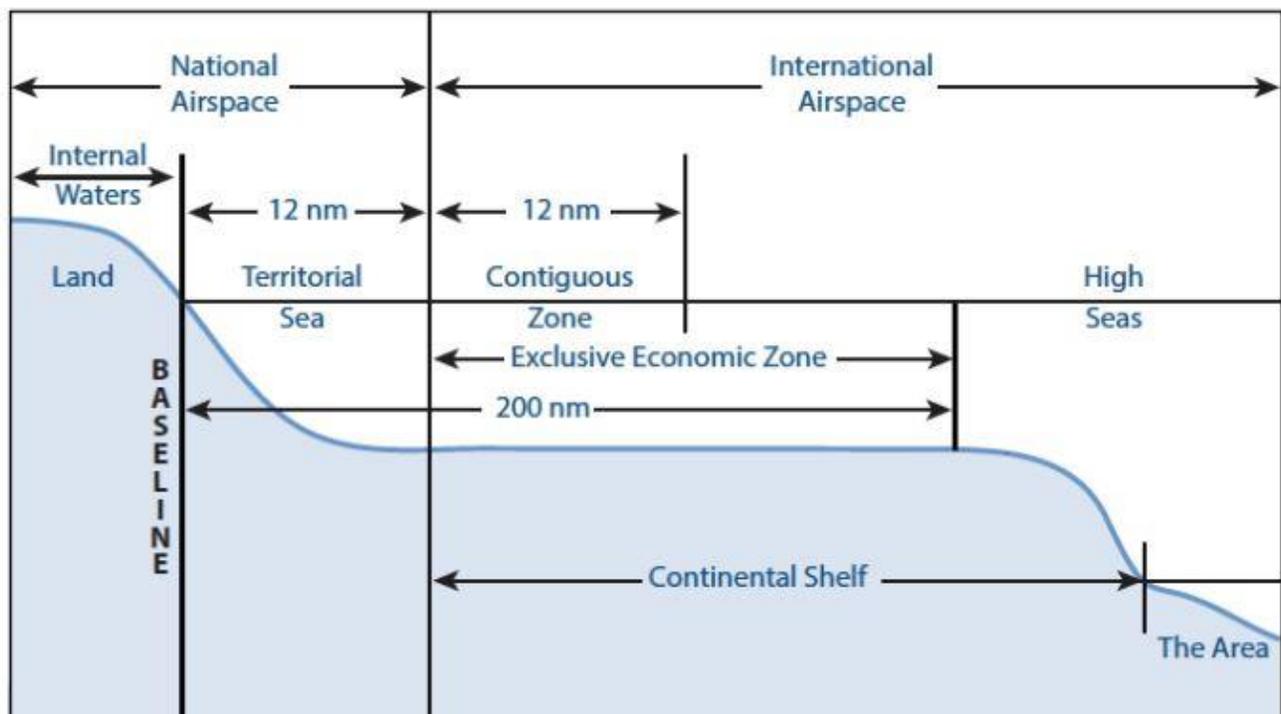
- The phenomenally rich biodiversity of the Arctic region is under serious threat.

New Opportunities

- The opening of the Arctic presents **huge commercial & economic opportunities**, particularly in shipping, energy, fisheries, & mineral resources.
- Commercial navigation through the NSR is the most tempting: The distance from Rotterdam to Yokohama will be cut by 40 per cent compared to the Suez route.
- Access to unexploited resources
 - ✓ Unexplored oil & natural gas deposits are estimated to be **22% of the world's unexplored resources**, mostly in the **Arctic ocean**
 - ✓ mineral deposits including **25 per cent of the global reserves of rare earths** are buried in **Greenland**.

Challenges associated with new opportunities

- Navigation conditions are dangerous & restricted to the **summer**.
- **Lack of deep-water ports**, a need for icebreakers, shortage of workers trained for polar conditions, & high insurance costs add to the difficulties.
- Mining & deep-sea drilling carry massive costs & **environmental risks**.
- The complication is that, **unlike Antarctica, the Arctic is not a global common**.
- There is **no treaty that governs it**, only the UN Convention of Law of the Sea (**UNCLOS**) deals it.



- Large parts of it are under the sovereignty of the five littoral states — **Russia, Canada, Norway, Denmark (Greenland) & the US** & exploitation of the new resources is well within their rights.
- They have put in overlapping claims for extended continental shelves, & the right to sea-bed resources.
- In 2007, Russia embedded a flag on the seabed below the North Pole to bolster its claim.
- **The US, not a party to UNCLOS**, is under pressure to strengthen its Arctic presence.
- Russia claiming that the NSR falls within its territorial waters (the US believes it lies in international waters).
- China has been projecting the **Polar Silk Road** as an extension of the BRI for economic advantage.

Impact on India

- India's extensive coastline makes us vulnerable to the impact of Arctic warming on ocean currents.
- Research in Arctic melting will help us understand of climatic changes in the **Third Pole — the Himalayas**.
- The strategic implications of an active China in the Arctic & its growing economic & strategic relationship with Russia are self-evident.
- **India** has **observer status** in the [Arctic Council](#), which is the predominant inter-governmental forum for **cooperation on the environmental & development** (though not the security) aspects of the Arctic.

Previous UPSC Mains Questions

1. Why is India taking keen interest in resources of Arctic Region? (2018)
2. How does cryosphere affect global climate? (2017)
3. What is the economic significance of discovery of oil in the Arctic Sea & its possible environmental consequences? (2015)

{Envi – Conservation – 2021/01} Integrated Development of Wildlife Habitats

[TOI](#) | **Prelims + Mains** | GS3 > Conservation

- **Context:** Conservation of Caracal cat (put under **Indian critically endangered list**) will get financial **Integrated Development of Wildlife Habitat (IDWH)**.
- IDWH is an on-going **Centrally Sponsored Scheme**.
- Under IDWH, **financial assistance is provided to State/UTs** for protection and conservation of wildlife.

Components of the scheme

1. **Support to Protected Areas** (National Parks, Wildlife Sanctuaries, Conservation & Community Reserves)
2. **Protection of Wildlife Outside Protected Areas**

3. Recovery programmes for saving critically endangered species and habitats.

The list of critically endangered (locally) species under recovery programme

1. Asian Wild Buffalo
2. Asiatic Lion
3. Brow-Antlered Deer or Sangai
4. Dugong
5. Edible Nest Swiftlet
6. Gangetic River Dolphin
7. Great Indian Bustard
8. Hangul
9. Indian Rhino or Great One-horned Rhinoceros
10. Jerdon's Courser
11. Malabar Civet
12. Marine Turtles*
13. Nicobar Megapode
14. Nilgiri Tahr
15. Snow Leopard
16. Swamp Deer
17. Vultures (entire group of species found in India)
18. Northern River Terrapin
19. Clouded Leopard
20. Arabian Sea Humpback Whale
21. Red Panda
22. Caracal cat (questions can be asked in multiple ways based on this topic in prelims)

{Envi – Conservation – 2021/01} Nilgiri Elephant Corridor Case

[TH](#) | Prelims + Mains | GS3 > Conservation

- **Context:** SC upheld the Tamil Nadu (state) government's authority to notify an 'elephant corridor' and protect the migratory path of the animals through the Nilgiri Biosphere Reserve.
- It was the State's duty to protect a "keystone species" such as elephants – Supreme Court.



TYPES OF SPECIES



Keystone Species

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It is a species whose **addition to or loss** from an ecosystem leads to **major changes** in the occurrence of at least one other species.

If keystone species is **lost**, it will result in the **degradation of the whole ecosystem**.

Considered more important in **determining the presence of many other species** in that ecosystem.



Eg: **Top Level Predators**



Indicator Species

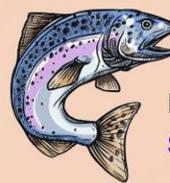
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It is the one who's **presence or absence or abundance** reflects the environmental condition.

They serve as **early warning mechanism or signals** because they are **sensitive to environmental conditions**.

Also Known as **Sentinel Species**.



Eg: **Frogs, Lichens, Salmon**



Endemic Species

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They are **native to a single specific geographical location** such as an island, state, nation, country or other defined zone

A rare alternative term for a species that is endemic is '**precinctive**' (species that are restricted to a defined geographical area).

Eg: **Western Ghats-> Lion-tailed macaque**

Eg: **Western Ghats-> Nilgiri Tahr**

Eg: **Himalayas-> Red Panda etc.**

Eg: **Eastern Ghats-> Flying Squirrel**

Eg: **Eastern Ghats-> Civet**



Invasive Alien Species

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An Exotic Species which is **introduced in an area (Intentionally or Unintentionally)**.

Once introduced they **multiply so rapidly** that they destroy the local habitat of an area.

Eg: **Lantana, Fall Army Worm, Eucalyptus, Wattle, Prosopis Juliflora, Common Water Hyacinth**



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Flagship Species

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It is a species chosen to **represent an environmental cause**, such as an ecosystem in need of conservation.

These species are chosen for their **vulnerability, attractiveness or distinctiveness** in order to engender support and acknowledgement from the public at large.

Eg: Indian Tiger, African Elephant, Giant Panda of China, Kangaroo of Australia



Umbrella Species

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The Species which are **selected for the conservation of an entire ecosystem** which forms an important part of National Parks and Wildlife Sanctuaries.

Eg: Tigers are an example of an umbrella species.

Efforts to save wild tigers in forests also accomplish the goal of saving other species there, such as leopards, boars, hares, antelopes, and monkeys.



Foundational Species

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Foundation species is a **dominant primary producer in an ecosystem** both in terms of abundance and influence.

It is the species that creates or maintains an ecosystem.

Eg: Kelp in kelp forests
Eg: Corals in coral reefs.

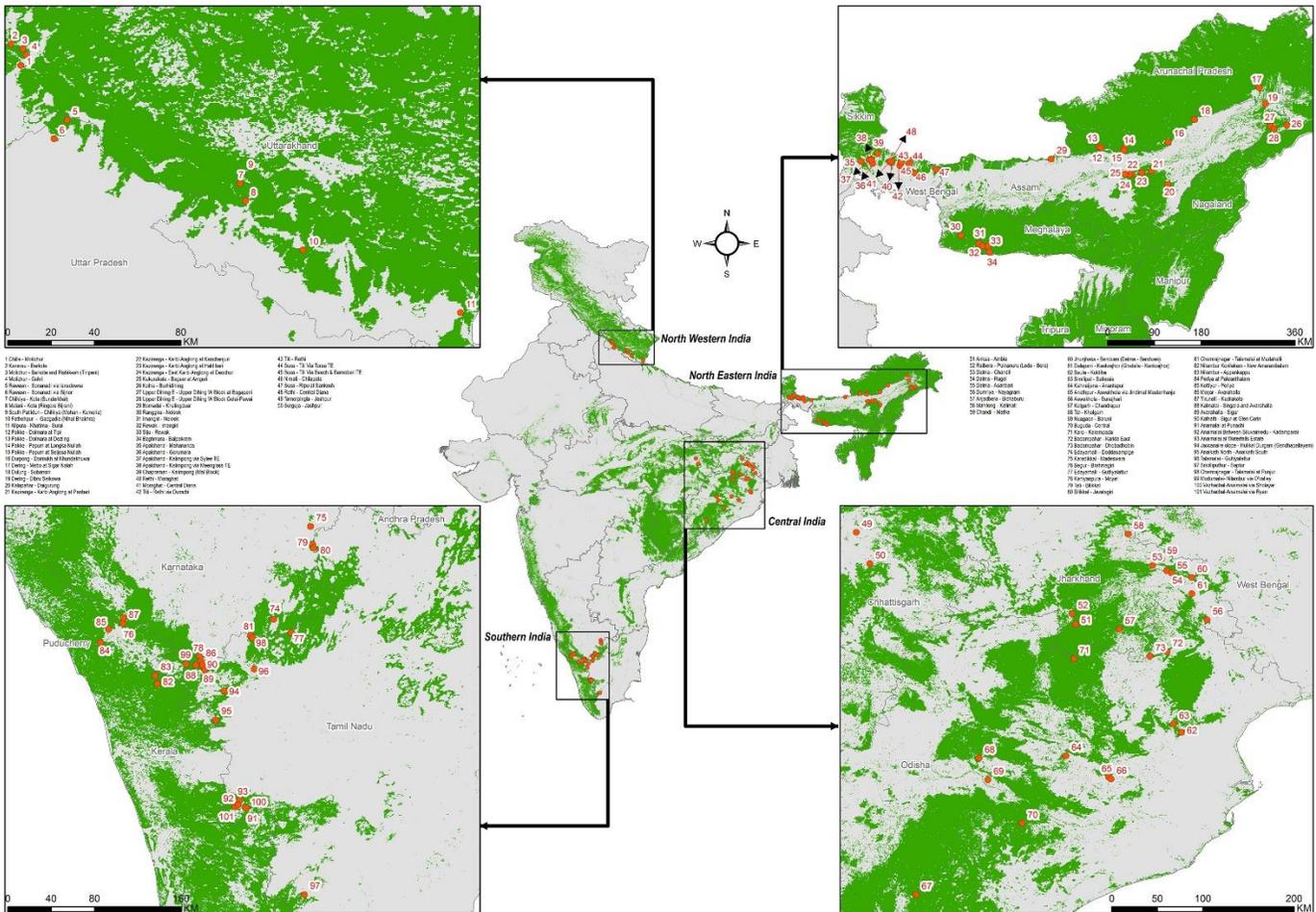


Elephant Corridor

- Elephant corridors are **linear, narrow, natural habitat linkages** that allow elephants to move between secure habitats without being disturbed by humans.
- There are **88 identified elephant corridors** in India (names not important).
- Out of total 88 corridors,

- ✓ 22 in north-eastern India (prelims point)
- ✓ 20 are in south India,
- ✓ 20 in central India,
- ✓ 14 in northern West Bengal
- ✓ 12 in north-western India.

RIGHT OF PASSAGE ELEPHANT CORRIDORS OF INDIA

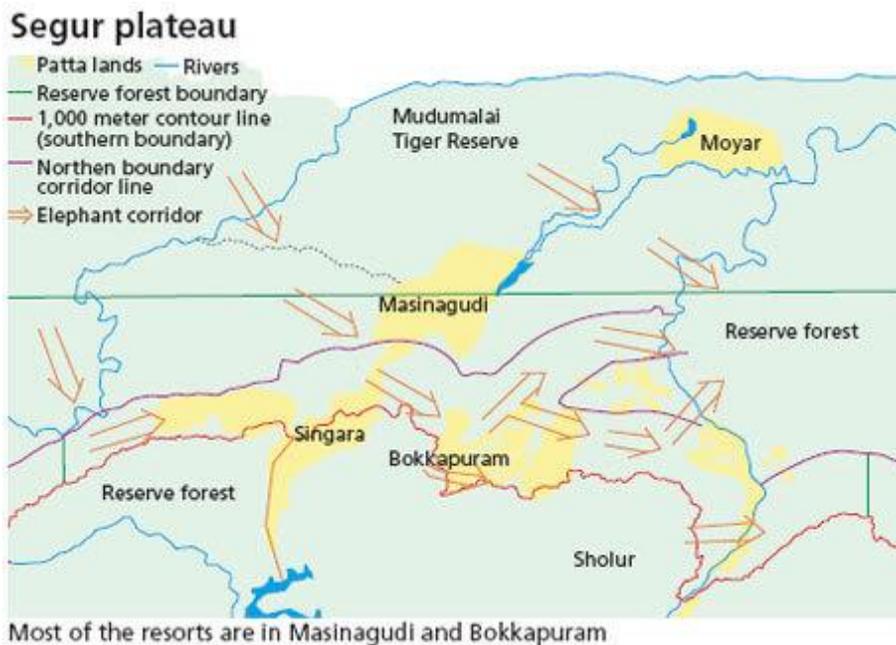


Source and Credits: WTI

Nilgiri Elephant Corridor

- It is the largest protected forest area in India, spanning across **Tamil Nadu, Karnataka & Kerala.**

- It is situated in the **Masinagudi area** near the **Mudumalai National Park** in the Nilgris district.
- The corridor is situated in the ecologically fragile **Sigur plateau**, which connects the Western & the Eastern Ghats & sustains elephant populations & their genetic diversity.
- It has the **Nilgiri hills** on its southwestern side & the **Moyar river valley** on its northeastern side.
- The elephants cross the plateau in search of food & water depending on the monsoon.



[Source & Credits](#)

{Envi – Conservation – 2021/01} Vulture Conservation Breeding Centres

[TH](#) | Prelims | GS3 > Conservation | **Basics:** [Indian Vulture Crisis](#)

- Context: To increase the availability of food for vultures in the Mudumalai Tiger Reserve (MTR), the Forest Department is allowing dead cattle from a nearby cow shelter to be left for the scavengers.
- In a bid to save endangered species of vultures from extinction, the **National Board for Wildlife** has approved a new plan that proposes setting up Vulture Conservation Breeding Centres in some States.
- A captive breeding centre would come up in the buffer zone of Mudumalai Tiger Reserve.
- **Critically endangered Oriental White-backed Vultures, Indian white-rumped vulture & long-billed vulture** are found here.

{Envi – IUCN – 2021/01} Caracal Cat

[TOI](#) | **Prelims** | GS3 > Conservation

- **Context:** Caracal put on **critically endangered list under Indian List of critically endangered species.**

- Its conservation will get financial support under **Centrally sponsored Integrated Development of Wildlife Habitat (IDWH)**.
- Now total **22 wildlife species** are under recovery programme for critically endangered species.
- It is medium sized wild cat.
- Found in parts of Rajasthan & Gujarat in India.
- **IUCN Red List: Least concerned since they are found in abundance in Africa.**



[Source and Credits](#)

{Envi – Laws – 2021/01} Wildlife Advisory Boards

[PIB](#) | Prelims | GS3 > Conservation

- **Context:** The **Standing Committee of National Board of Wildlife (SC-NBWL)** has approved the advisory for management of Human-Wildlife Conflict (HWC) in the country.
- The Committee also approved the inclusion of **Caracal, a wild cat** found in some parts of **Rajasthan** and **Gujarat**, in the list of **critically endangered species (Indian CR List; not IUCN List)**.
- The Standing Committee of NBWL considers proposals after a series of levels of scrutiny and have recommendations of the State Chief Wildlife Warden, State Government and the State Board for Wildlife.
- **The advisory envisages:**
 - ✓ **Empowering gram panchayats** in dealing with the problematic wild animals as per Wild Life (Protection) Act, 1972.
 - ✓ Utilising add-on coverage under the Pradhan Mantri Fasal Bima Yojna for crop compensation against crop damage due to HWC.
 - ✓ Augmenting fodder and water sources within the forest areas.
 - ✓ Payment of a portion of ex-gratia as interim relief within 24 hours of the incident to the victim/family.

National Board for Wildlife (NBWL)

- NBWL is a **statutory body** constituted under **Wildlife (protection) Act 1972**.

History of National Board for Wildlife

- Due to the rapid decline in wildlife population, the GOI had constituted an advisory body designated as the **Indian Board for Wildlife (IBWL)** in 1952.
- The **Wildlife (Protection) Act 1972** was enacted for providing special legal protection to wildlife.
- It laid special emphasis on endangered species of fauna.
- As per the **Wildlife (Protection) Amendment Act, 2002**, a provision was incorporated for the constitution of the National Board for Wildlife, replacing the Indian Board for Wildlife.

Members of National Board for Wildlife

- The National Board for Wildlife has 47 members with the **Prime Minister in the Chair**.
- The **Minister in charge of the MoEF** in GOI is the Vice-Chairperson.
- The Additional Director General of Forests (WL) & Director, Wildlife Preservation is the Member-Secretary.

Other members include:

- ✓ three Members of Parliament (two from Lok Sabha and one from Rajya Sabha),
- ✓ five NGOs and
- ✓ 10 eminent ecologists, conservationists and environmentalists.

Duties

- The board is **advisory in nature** and advises the GOI in conservation of wildlife and forests.
- **It has the power to review all wildlife-related matters and approve projects in and around national parks and sanctuaries.**
- **No alternation of boundaries in national parks and wildlife sanctuaries can be done without the approval of the National Board for Wildlife.**

Wildlife Advisory Board (State Board for Wildlife)

- Wildlife Advisory Board is a **statuary body** of the state (UT) government.
- The **Wildlife (Protection) Act, 1972** mandates the **State (UT) Government** to constitute a Wildlife Advisory Board.
- **Minister in charge of Forest** in the **State (UT)** is the **Chairman** (Chief Secretary will be the chairman if the minister's post is vacant).

Duties

- Advise the State Government in
 - ✓ **selection and administration of areas to be declared as Sanctuaries, National Parks, Closed Areas;**
 - ✓ formulation of the policy of protection and conservation of Wildlife and specified plants;
 - ✓ measures to be taken for harmonizing the needs of the tribals and other forest dwellers with the protection and conservation of wildlife; and
 - ✓ any matter that may be referred to it by the State Government.

{Envi – Pollution – 201/01} Green Tax

[TH](#) | **Prelims + Mains** | GS3 > Environmental Pollution and Degradation

- **Context:** Recently, Government proposes '**green tax**' for **15-year-old petrol, diesel vehicles**.
- Based on the principle of "**polluters must pay**", this charge would be levied when commercial vehicles go for obtaining fresh fitness certificate and private vehicles for seeking renewal of registration.
- **State governments** would be allowed to levy this tax over and above the regular road taxes.
- Currently, similar taxes are levied in Andhra Pradesh, Maharashtra Karnataka, Telangana, UP & Jharkhand.
- Transport vehicles such as city buses would attract less green tax.
- **Vehicles used for farming such as tractors and combined harvesters could be exempted.**
- **Vehicles running on clean fuel such as CNG, LPG, ethanol & strong hybrid would also be exempted.**

{Envi – Pollution – 2021/01} Endosulfan

[TH](#) | **Prelims + Mains** | GS3 > Environmental Pollution & Degradation > Persistent Organic Pollutants

- **Context:** Spraying of Endosulfan on cashew plantations in Kasaragod, Kerala has caused disorders in many.

What is Endosulfan?

- Endosulfan is an **organochlorine** insecticide — a **Persistent Organic Pollutant**.
- It is primarily used as an **insecticide** in agriculture & it is also used as a **wood preservative**.

Ban on Endosulfan

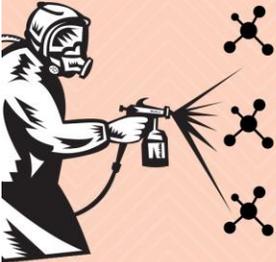
- India was one of the biggest producers & consumers of endosulfan.
- After the toxicity of the pesticide came into limelight in 2001 in Kasargod District, Kerala banned it.
- **In 2011, SC banned the production, distribution & use of endosulfan in India.**

- SC also directed Kerala government to pay Rs 500 crores as compensation to over 5,000 victims.
- **Globally, use of endosulfan is banned under Stockholm Convention on Persistent Organic Pollutants.**
- Under pressure from pesticide firms **India sought remission on the ban for 10 years.**
- **India has agreed to phase out use of endosulfan by 2017.**



Endosulphan

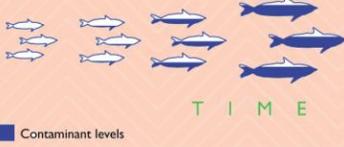
What is Endosulphan?



- It is an **organochlorine insecticide** – a **Persistent Organic Pollutant**.
- It is used in **Cashewnut, Coconut, Rubber Plantation**
Bioaccumulation
- It is an **Bioaccumulant**.







T I M E

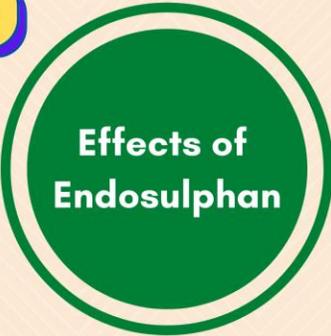
■ Contaminant levels

Effects of Endosulphan

Neurotoxic

Destroys the integrity of the nerve cells





Endocrine Disruptor

- Delayed reproductive development 
- Late sexual maturity
- Autism 

Ban on Endosulphan

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Globally, use of endosulfan is banned under **Stockholm Convention on Persistent Organic Pollutants**

In **2011, SC banned** the production, distribution and use of endosulfan in India.



India has agreed to **phase out use of endosulfan by 2017**

- It is **highly toxic** & has a large **potential for bioaccumulation (substance does not leave body)**.
- It has hazardous effects on **human genetic & endocrine systems**.
- **Endocrine disruptor: enhances the effect of estrogens causing reproductive & developmental damage** in both animals & humans.
 - ✓ Delayed reproductive development
 - ✓ Late sexual maturity
 - ✓ Autism
- **Neurotoxic:** endosulfan destroys the integrity of the nerve cells.

About Persistent Organic Pollutants (POPs)

- POPs are defined as “chemical substances that persist in the environment, [bioaccumulate](#) through the [food web](#), & pose a risk of causing adverse effects to human health & the environment”.
- Persistent organic pollutants (POPs) are chemicals of global concern due to their potential for:
 - ✓ **long-range transport,**
 - ✓ **persistence in the environment,**
 - ✓ **ability to [bio-magnify & bio-accumulate](#) in ecosystems,**
 - ✓ **Have significant negative effects on human health & the environment.**
- The most commonly encountered POPs are **organochlorine pesticides**, such as
 - ✓ **Dichlorodiphenyltrichloroethane (DDT),**
 - ✓ **Endosulfan,**
 - ✓ **Polychlorinated biphenyls (PCB: resistant to extreme temperature & pressure.** PCBs were used widely in **electrical equipment** like capacitors & transformers),
 - ✓ **Dioxins (toxic by-products produced when organic matter is burned), etc.**
- DDT was widely used a few decades ago as an effective pesticide & insecticide.
- It was later identified as POP, & its usage was phased out in almost all developed countries.
- **DDT is banned for agricultural use in India;** however, it continues to be used for **fumigation against mosquitoes (disease vector control)** in several places in India In India.

Stockholm Convention on Persistent Organic Pollutants

- It is an international environmental treaty.
- It came into effective in 2004.
- It aims to **eliminate or restrict the production & use of persistent organic pollutants (POPs)**.



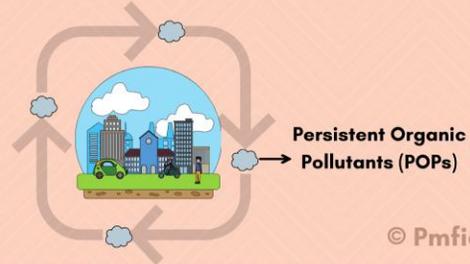
PERSISTENT ORGANIC POLLUTANTS (POPS)

Persistent organic pollutants (POPs) are chemicals of global concern

1) Long-Range Transport

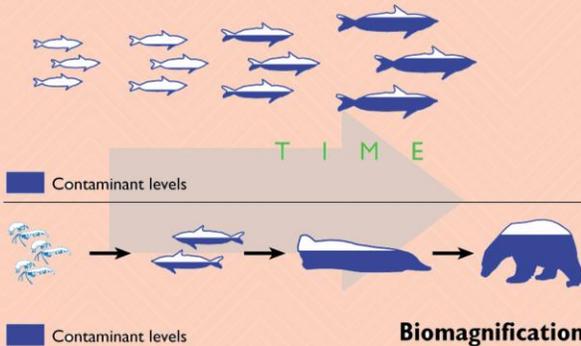


2) Persistence in the Environment

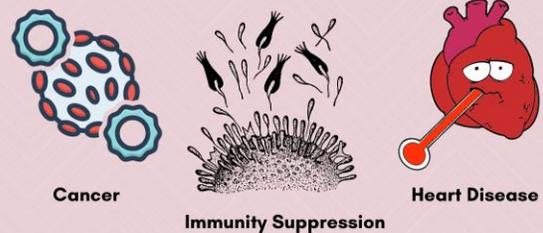


3) Bio-magnify & Bio-accumulate

Bioaccumulation



4) Have significant negative effects on human health & the environment.



STOCKHOLM CONVENTION

The environmental treaty that aims to eliminate POPs.

POP EXAMPLES

Dichlorodiphenyltrichloroethane (DDT): insecticide

- DDT is banned for agricultural use in India
- It continues to be used for fumigation against mosquitoes

Endosulfan: insecticide

Polychlorinated biphenyls: resistant to extreme temperature; used widely in electrical equipment

Dioxins: toxic by-products produced when organic matter is burned

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Chlorinated Hydrocarbons (Organochlorides)

- CHCs are hydrocarbons in which **one or more hydrogen atoms have been replaced by chlorine** E.g., **DDT (dichlorodiphenyltrichloroethane), endosulfan, chloroform, carbon tetrachloride**, etc.

Applications of Chlorinated Hydrocarbons (CHC)

- CHCs are used in the production of **polyvinyl chloride** (a synthetic plastic polymer used to make PVC pipes).
- Chloroform, dichloromethane, dichloroethane, & trichloroethane are useful **solvents**.
- These solvents are immiscible with water (not forming a homogeneous mixture when mixed with water) & effective in cleaning applications such as **degreasing & dry cleaning**.
- DDT, heptachlor & endosulfan** are were widely used as **pesticides**.

Effects of Chlorinated Hydrocarbons (CHC)

CHLORINATED HYDROCARBONS (ORGANOCHLORIDES)

What are Organochlorides

CHCs are hydrocarbons in which one or more hydrogen atoms have been replaced by chlorine.

E.g., **DDT (dichlorodiphenyltrichloroethane), endosulfan, chloroform, carbon tetrachloride**, etc.

DDT
Dichlorodiphenyl trichloroethane

ClC1=CC=C(C(C1)(Cl)Cl)C2=CC=C(Cl)C=C2

Applications of Organochlorides

Used in the production of **polyvinyl chloride** (a synthetic plastic polymer used to make PVC pipes).

Some are **useful solvents** in cleaning applications such as degreasing and dry cleaning.

DDT, heptachlor and endosulfan are were widely used as **pesticides**.

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- DDT accumulated in food chains & caused **eggshell thinning in certain bird species**.
- In India, traces of DDT spray used three decades ago can still be found on the walls of homes.
- DDT residues continue to be found in mammals across the planet.
- In Arctic areas, particularly high levels are found in marine mammals.

- The traces of persistent organic pollutant are found in breast milk of several mammals.
- In females the concentration is lower due to transfer of the compounds to their offspring through lactation.

Pesticide Regulatory Regime in India

- India currently has a registered list of 295 pesticides & 746 approved formulations.
- These pesticides are registered by the **Registration Committee (RC)**.
- The **Central Insecticides Board (CIB)** acts as an **advisory body**.
- The two regulatory bodies are governed by the **Insecticides Act, 1968** & the **Insecticides Rules, 1971**.
- The Act & Rules intend to “regulate the import, manufacture, sale, transport, distribution & use of insecticides with a view to prevent risk to human beings or animals”.
- Since its inception, the **CIBRC (as they are together called) registers pesticides** upon receiving applications along with efficacy, toxicity, & safety data from the company.
- The **Ministry of Agriculture** has the authority to cancel registrations & allow continued use or in some cases even ban the pesticides **upon the recommendation of the RC**.

There is a near total collapse of pesticide regulation mechanism in India

2020 Notification on Draft ban order

- In May 2020, a notification consisting of a draft ban order was released by **the Ministry of Agriculture & Farmers’ Welfare**, proposing a ban on the manufacture, sales, & imports of 27 pesticides in India.
- Several are **WHO Class I pesticides** (‘extremely hazardous’ & ‘highly hazardous’), some are classified as probable **human carcinogens**, some documented for their toxicity on bees, fish, earthworms, etc.
- Several are implicated in fatal pesticide poisonings whether it is occupational, or accidental.
- 24 of the 27 pesticides are banned in other countries.
- Many of these have been part of 2015 **Anupam Verma Committee** reviewed 66 “bannable” pesticides.
- At the behest of the industry, the **Department of Chemicals & Petrochemicals** cited Covid-19 pandemic situation as an excuse in proceeding with the draft ban order.

Notable pesticides in the list of 27 proposed-to-be-banned pesticides

- ✓ **Carcinogenic: Oxyflourfen, Pendimethalin (causes Thyroid follicular cell adenoma)**
- ✓ **Endocrine disruption: Dicofol, Carbofuran, Oxyflourfen**
- ✓ **Eco-toxic: Carbofuran, Monocrotophos, Carbofuran, Oxyflourfen**

Deemed to be Registered Pesticides or DRPs

- DRPs are pesticides that **were in use before the Insecticides Act of 1968** & could be used on the assumption that they would be registration once the mandatory data on efficacy & toxicity is generated.
- There are at least 51 such DRPs.
- Six of these have been withdrawn, eight have been banned & five are to be phased out by the end of 2020.
- The list of DRPs is not readily available on any government website (lack of transparency).
- Importantly, **17 of the 27 proposed-to-be-banned pesticides are DRPs.**
- These biosafety (safety to human health & environment) of these DRPs was never assessed.
- Bio-safety data submitted & review committee reports are shrouded in secrecy.
- They have been turned down even under RTI.
- They all are being considered registered, irrespective of the data submitted.
- No other nation is known to be following such an arbitrary, risky, & unscientific regulatory practice.
- Many of the DRPs have been banned in various countries, even decades ago.

{Envi – Pollution – 2021/01} Nitrous oxide emissions due to farming

[TH](#) | Prelims + Mains | GS3 > E-technology in the aid of farmers.

- **Context:** Indian biotechnologists have found a way to reduce the wastage of nitrogenous (N) fertilisers.
- **Agriculture accounts for over 70% of all nitrous oxide emissions** in the Indian environment, of which 77% is contributed by fertilisers, mostly urea.
- Nitrogen deficiency often leads to the plants having spindly stems and stunted growth.

{Envi – Pollution – 2021/01} Polluters Pay Principle

[IE](#) | Prelims + Mains | GS3 > Environmental Pollution & Degradation

Present situation of Air pollution

- The global death rate attributable to air pollution exposure is **86 deaths per 100,000 people.**
- **92%** of the population lives in places where air pollution levels are above the WHO guideline for healthy air.
- Of all the deaths caused by ischemic heart disease (the biggest killer), 20% are caused by air pollution.
- Of all the deaths caused by lung cancer (deadliest of all cancers), 19 per cent are due to air pollution.

What is the Polluter Pays Principle?

- The 'polluter pays' principle is the commonly accepted practice that **those who produce pollution should bear the costs** of managing it to prevent damage to human health or the environment.

- For instance, a factory that produces a potentially poisonous substance as a by-product of its activities is usually held responsible for its safe disposal.
- The polluter pays principle is part of a set of broader principles to guide sustainable development worldwide (formally known as the [1992 Rio Declaration](#)).
- When the pollution cost from the release of GHGs is not imposed on emitters, these costs are thus '**externalised**' to society, representing '**market failure**'.
- Society bears these costs as GHGs are emitted into the atmosphere, which is described a '**global commons**' as everyone shares & has the right to use.

{Envi Mapping – TR – 2021/01} Bandipur Tiger Reserve

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- **Context:** A stranded wild elephant was rescued close to Bandipur Tiger Reserve in Karnataka.
- Together with the adjoining **Nagarhole National Park**, **Mudumalai National Park** (Tamil Nadu) and **Wayanad Wildlife Sanctuary** (Kerala), it is part of the **Nilgiri Biosphere Reserve**.
- The **Kabini river** (a tributary of **Cauvery River**) separates **Bandipur NP** from **Nagarhole NP**.
- Bandipur NP is contiguous with the **Mudumalai NP** (Tamil Nadu) and **Wayanad WLS (Kerala)**.
- Vegetation: dry deciduous forest, moist deciduous forests and shrublands.
- Major Flora: teak, rosewood, **sandalwood** (Veerappan's favourite), clumping bamboo, etc.
- Major Fauna: **Indian elephants**, gaurs, tigers, sloth bears, four-horned antelopes, dholes, chital, sambar, gray langurs, Indian giant squirrels.
- Threats: speeding vehicles, cattle grazing & transmission of diseases, habitat fragmentation, and invasive species such as **Lantana** (bush is thorny and is not eaten by any herbivores) and **Parthenium**.
- There is a ban on traffic from 9 pm to 6 am of dusk to dawn to help bring down the death rate of wildlife.

{Envi Mapping – TR – 2021/01} Mudumalai Tiger Reserve

[TH](#) | Prelims | Mapping > Tiger Reserves

- It lies on the north-western side of the **Nilgiri Hills (Blue Mountains)**, in Nilgiri District.
- It shares its boundaries with the states of **Karnataka & Kerala**.
- Vegetation: tropical moist deciduous, tropical dry deciduous forest, tropical dry thorn forests are in the east.
- Major Fauna: **Indian elephant**, **Bengal tiger**, **gaur**, golden jackal, bonnet macaque, sambar deer, Indian muntjac, Indian giant squirrel, red giant flying squirrel, etc.
- Major Avian Fauna: **Indian white-rumped vulture (CR)** & **Indian Vulture (CR)**.

- Threats: Tourism & invasive species such as lantana.

