

**1. Examine the issue of marine pollution with special focus on plastics. How does plastic waste threaten the oceans? Discuss.**

**Approach-** Candidate can define the marine pollution and focussing on the role of plastics in causing the same. With the help of data and citing important conventions in this regard, a way forward can be given to tackle this menace.

**Introduction**

Marine pollution is a combination of chemicals and trash, most of which comes from land sources and is washed or blown into the ocean. This pollution results in damage to the environment, to the health of all organisms, and to economic structures worldwide.

**Body**

Marine pollution and plastics

- Over 300 million tons of plastic are produced every year for use in a wide variety of applications.
- At least 8 million tons of plastic end up in our oceans every year, and make up 80% of all marine debris from surface waters to deep-sea sediments. Marine species ingest or are entangled by plastic debris, which causes severe injuries and deaths.
- Floating plastic debris are currently the most abundant items of marine litter. Plastic has been detected on shorelines of all the continents, with more plastic materials found near popular tourist destinations and densely populated areas.

How does plastic threaten the oceans?

- The most visible and disturbing impacts of marine plastics are the ingestion, suffocation and entanglement of hundreds of marine species. Marine wildlife such as seabirds, whales, fishes and turtles, mistake plastic waste for prey, and most die of starvation as their stomachs are filled with plastic debris. They also suffer from lacerations, infections, reduced ability to swim, and internal injuries.
- Invisible plastic has been identified in tap water, beer, salt and are present in all samples collected in the world's oceans, including the Arctic. Several chemicals used in the production of plastic materials are known to be carcinogenic and to interfere with the body's endocrine system, causing developmental, reproductive, neurological, and immune disorders in both humans and wildlife.
- Toxic contaminants also accumulate on the surface of plastic materials as a result of prolonged exposure to seawater. When marine organisms ingest plastic debris, these contaminants enter their digestive systems, and overtime accumulate in the food web. The transfer of contaminants between marine

species and humans through consumption of seafood has been identified as a health hazard, but has not yet been adequately researched.

- Plastic, which is a petroleum product, also contributes to global warming. If plastic waste is incinerated, it releases carbon dioxide into the atmosphere, thereby increasing carbon emissions.

What can be done?

- Recycling and reuse of plastic materials are the most effective actions available to reduce the environmental impacts of open landfills and open-air burning that are often practiced to manage domestic waste.
- Governments, research institutions and industries also need to work collaboratively redesigning products, and rethink their usage and disposal, in order to reduce microplastics waste from pellets, synthetic textiles and tyres. This will require solutions which go beyond waste management, to consider the whole lifecycle of plastic products, from product design to infrastructure and household use.
- Legal efforts like 1972 Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter (or the London Convention), the 1996 Protocol to the London Convention (the London Protocol), and the 1978 Protocol to the International Convention for the Prevention of Pollution from Ships (MARPOL) have been made but there is little compliance due to limited financial resources to enforce them.
- The United Nations Environment Program (UNEP) considers plastic marine debris and its ability to transport harmful substances as one of the main emerging issues affecting the environment. At the 2015 G7 summit in Bavaria, Germany, the risks of microplastics were acknowledged in the Leaders' Declaration.

### **Conclusion**

The world's oceans – their temperature, chemistry, currents and life - drive global systems that make the Earth habitable for humankind. Over three billion people depend on marine and coastal biodiversity for their livelihoods. We must treat plastic pollution as serious threat to humanity, ocean health must be treated as a global issue and all nations should act in concert to implement Sustainable Development Goal: 14 i.e. To conserve and sustainably use the oceans, seas and marine resources for sustainable development.

## **2. What are the major anthropogenic threats to the Western Ghats? What measures have been taken to protect the ecology of Western Ghats? Discuss.**

### **Approach**

Since the question is asking you to discuss so it necessitates a debate where reasoning is backed up with evidence to make a case for and against an argument and finally arriving at a conclusion.

### **Introduction**

Running parallel to the West coast of India from the river Tapi in the north to Kanyakumari in the south and covering a total area of 160,000 square kms and traverses through six States viz. Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu, The Western Ghats, also known as 'Sahyadri', constitute a 1600 km long mountain chain along the west coast of India.

### **Body**

#### **MAJOR ANTHROPOGENIC THREATS TO THE WESTERN GHATS**

The Western Ghats of India is facing severe threats to its ecosystem. In the period between 1920 to 1990, 40 percent of its natural vegetation was depleted. This is coupled with dangers arising from encroachments. The major anthropogenic threats include:

- Large dam projects in Western Ghats have resulted in environmental and social disruption despite cost benefit analyses and environmental impact assessments being done by the government and companies.
- The rise in human settlements has led to the over-exploitation of forest products through activities such as livestock grazing.
- Livestock grazing within and bordering protected areas by high densities of livestock (cattle and goats) is a serious problem causing habitat degradation across the Western Ghats.
- The mining establishments, especially iron-ore mining, have greatly contributed to damaging the ecological balance, by destroying farms, polluting rivers and damaging the top soil.
- Diversion of forests for agriculture, mining and industrial projects, road construction etc over the past few decades have resulted in the state of Kerala losing 9064 sq kms between 1973 and 2016 and Karnataka losing 200 sq km of forest land in the Western Ghats between 2001 and 2017.
- Given that the Western Ghats exists within an intensely human-dominated landscape, human-wildlife conflicts are a common phenomenon.
- Pollution is also playing its part, with high mercury levels in the water, and agrochemicals from tea and coffee plantations going unchecked.



- Plantations owned by private individuals and corporate sector continue to grow in the Western Ghats and constitute an important source of fragmentation of natural habitat.
- The other culprit for loss of native flora in the Western Ghats is the plantation of alien species such as Eucalyptus, Pinus by the British which can be seen across the upper slopes of the Nilgiris interspersed with Lantana Camara. They create a mat-like structure leading to degradation of the land and destruction of the native biodiversity.

#### **MEASURES TO PROTECT THE ECOLOGY OF WESTERN GHATS**

- The government has taken initiative to demarcate Ecologically Sensitive Areas (ESA.) These areas are not just about regulation of development but are also intimately linked to positive promotion of environment-friendly and socially inclusive development.
- Gadgil committee report recommended declaring the entire WG landscape as Ecologically Sensitive Area (ESA), divided under three sub-zones, with ban on mining, thermal power plants, polluting industries and large dams, and inclusion of local communities in biodiversity conservation and promoting eco-friendly activities.
- Kasturirangan committee recommended to incentivize green growth that promotes sustainable and equitable development bringing only around 37 per cent Ghats area under the ESA out of the entire 1,64,000 sq km.
- The Central Government tried to bring in three draft notifications for declaring this as Western Ghats Ecologically Sensitive Area (WGESA). However, none of the six state governments have shown any support for this notification.
- Government has taken measures to conserve the fast-declining biological diversity with the establishment of Protected Area network, tiger reserves and biosphere reserves. Nearly 10 per cent of the total area of Western Ghats is currently covered under protected areas.

#### **Conclusion**

The Western Ghats, a UNESCO World Heritage Site, which is one of the eight hot-spots of biological diversity in world, hosts a large proportion of the country's flora and fauna and largely impacts climatic conditions and rainfall patterns in the peninsula. It's our responsibility to protect them from destruction. If we could not do anything for the conservation of Western Ghats right now, then it will be too late to save amazing flora and fauna from the old mountain range.

**3. Why is India home to cities having dangerous air pollution levels? What urgent measures would you recommend to address this problem?****Approach:**

Question is very straight forward in its approach students are expected to write about role of social media platforms in changing societal norms and values and explanation with appropriate use of examples as demanded by the question explicitly.

**Introduction:**

Twenty-one of the world's 30 cities with the worst levels of air pollution are in India, according to data compiled in IQAir AirVisual's 2019 World Air Quality Report; six Indian cities are in the top ten. Indeed, air pollution is pervasive in many parts of India, causing massive public health and environmental crises. The economic cost of fossil fuel air pollution alone is estimated at INR 10,700 billion, or 5.4 percent of the country's annual GDP. An estimated one million deaths each year, and 980,000 pre-term births, are attributed to air pollution from fossil fuel in India.

**Body:**

India has been particularly vulnerable to air pollution over the last two decades, owing to population growth, increasing numbers of vehicles, use of fuels, inefficient transportation systems, poor land use patterns, industrialisation, and ineffective environmental regulations. Among Indian cities, the capital, New Delhi, is one of the worst-affected. New Delhi has the highest ambient particulate matter pollution exposure in the country. As of 2019, the average annual PM 2.5 concentration across India was 58.1 micrograms per cubic meter; Delhi's average PM 2.5 concentration for the year 2019 was 98.6 micrograms per cubic meter. The startling aspect of that statistic is that the recorded level is not just the highest for any capital city in India, but for any capital city in the world.

**Reasons for Air Pollution:****Crop Burning**

The national capital territory of Delhi is landlocked between the states of Haryana, Rajasthan and Uttar Pradesh, and the Himalayas in the north. Much of the air pollution in Delhi is blamed on crop-burning—especially in the states of Punjab and Haryana, where rice and wheat are widely grown. Burning typically peaks during the first week of November, a time when many farmers set fire to leftover rice stalks and straw after harvest, a practice known as stubble or paddy burning, a cost-effective measure for clearing out fields.

**Industrial Pollution**

Delhi has the highest cluster of small-scale industries in India. Assessments made by the Central Pollution Control Board (CPCB) show that the national capital is home to and surrounded by highly pollutive industrial clusters that do not meet limits on air,

water or soil emissions. Even the other major cities especially in the Northern India suffer from high Industrial Pollution.

#### Vehicular Emissions

The transport sector is the main source of PM<sub>2.5</sub> emissions in North Indian cities (28 percent of all PM<sub>2.5</sub> emissions). Vehicular contribution also makes up 80 percent of nitrogen oxides and carbon monoxide in Indian cities' air. Data on vehicular pollution in these cities shows the following: trucks and tractors generate 9 percent of emissions; 7 percent from two-wheelers; 5 percent from three-wheelers; 3 percent each from cars and buses; and 1 percent from light commercial vehicles. In all, these vehicles are responsible for 41 percent of the total pollution load in these major metropolitan cities.

Also, a lot of the smaller cities have poor waste management, there is a lot of burning, solid fuel use, they are moving from non-motorised to motorised transport. Chulhas [cookstoves], we know, contribute to 25 percent outdoor pollution in India." These stoves also cause pollution indoors, which is especially dangerous for children, according to the WHO.

#### Steps to Address the Pollution

Control of ambient particulate matter pollution requires action in several sectors and the linkage of these actions for greatest impact. Various studies have estimated the contribution of different sources to PM pollution in Delhi, which can be useful in informing the efforts that are needed to address these sources. Various government initiatives have been launched in the past few years to reduce air pollution.

#### Capacity Building

Public and media discussions on air pollution largely focus on the high ambient PM levels in north India in the winter season and the impacts on people's health. Similar discussions are needed for the longer-term adverse health effects of chronically high pollution levels throughout the year.

More awareness needs to be created among policymakers and the general public about the slow but substantial impact of ambient particulate matter and household air pollution. Government initiatives to reduce solid fuel use for tackling household air pollution include a scheme initiated by the prime minister in May 2016—the Pradhan Mantri Ujjwala Yojana, which aims to provide clean and safe cooking fuel (liquefied petroleum gas) to 50 million low-income households by March 2019. It targeted the addition of 10,000 distributors, increasing access, and covering nearly all the upfront costs of switching for low-income households.

Another imperative is a viable public transport system strategy. While the Metro has provided massive relief to Delhi's commuters, it is not viable for all economic classes. Therefore, Delhi needs an active bus service that runs on electricity. Regardless of the high initial cost, such vehicles offer other advantages like low maintenance cost,

longer service life and lower operational costs per kilometre. More importantly, they reduce pollution levels.

Electric mobility is a definitive way towards cleaner air, without compromising functionality. Continuing with the ICE (internal combustion engine) vehicles in the same way as in the past would make it difficult to see a satisfactory AQI in Delhi. A shift to electric mobility is long-overdue in Delhi.

### **Conclusion:**

The restrictions on non-essential movement in the first few months of the COVID-19 pandemic led to a significant decline in air pollution levels across India. It helped achieve 95 percent of National Clean Air Program targets for 2024 in just 74 days in Delhi, Mumbai, Kolkata and Chennai, as emissions from the transport, construction and industrial sectors almost stopped and those from power plants reduced significantly. Air pollution, however, is not a one-time, short-term crisis; it is a recurring problem that requires long-term, holistic solutions. If the lockdown showed anything, it is that air pollution levels can be brought down dramatically if India focuses its energy towards a green recovery model that is less emissions-intensive.

In the post-COVID-19 era, the urgency of reviving the economy must not sideline the implementation of NCAP. The key mitigation measures will reduce greenhouse gas emissions and thereby provide opportunities for climate co-benefits. These include transitioning to cleaner fuel for household use that would eradicate household emissions, switching to Bharat Stage VI vehicles and fuels, strict compliance for industrial, power plant and brick kiln emissions, and a sustained programme to stop open crop-waste burning. In the long term, NCAP also needs to be scaled-up in a significant manner to ensure that rapid economic growth and meeting National Ambient Air Quality Standards (NAAQS) are aligned



**4. How does mining affect the local ecology? Illustrate. Discuss various sustainable methods of mining.**

**Approach**

The candidate needs to illustrate upon how mining affects the local ecology in the first part of the answer while in the second part, discussing various sustainable methods of mining is the demand.

**Introduction**

Mining is considered as one of the necessary evils of the modern world, which provides the materials required to sustain quality of life. While improving the quality of life and giving an impetus to economic development, it has also brought in its wake, a notable impact on the environment as well as socio-economic conditions of local people.

**Body**

Mining is the extraction of valuable minerals or other geological materials from the earth, from an ore body, vein or seam. Developing regions with large mineral deposits confront a challenge in striking the right balance between exploiting the mineral resources for economic prosperity and safeguarding environmental stability. In this regard, effects of mining on the local ecology include –

- By nature, mining involves the production of large quantities of waste, in some cases contributing significantly to a nation's total waste output. The amount of waste produced depends on the type of mineral extracted, as well as the size of the mine.
- Erosion from waste rock piles or runoff after heavy rainfall often increases the sediment load of nearby water bodies. In addition, mining may modify stream morphology by disrupting a channel, diverting stream flows, and changing the slope or bank stability of a stream channel which can reduce water quality.
- Acid drainage is one of the most serious environmental impacts associated with mining. Acidic water may subsequently leach other metals in the rock, resulting in the contamination of surface and groundwater.
- The release of metals into the environment due to mining has its ill effects. While small amounts of heavy metals are considered essential for the survival of many organisms, large quantities are toxic.
- Habitat fragmentation occurs when large areas of land are broken up into smaller and smaller patches, making dispersal by native species from one patch to another difficult or impossible, and cutting off migratory routes.
- The most obvious impact to biodiversity from mining is the removal of vegetation, which in turn alters the availability of food and shelter for wildlife. At a broader scale, mining may impact biodiversity by changing species composition and structure.



India had a vision to incorporate sustainability in this sector at least almost a decade ago, even before the 2015 United Nations Sustainable Development Goals (SDGs). Sustainable mining activities are integral to many of the SDGs. Here, various sustainable methods of mining are –

- **Reduce resources inputs for effective mining practices:** Becoming more environmentally sustainable is to reduce the input of the mine. By diverting surface water and pumping groundwater, mines can reduce both the quantity and quality of water available downstream.
- **Improving the efficiency of mining processes:** Companies can improve its efficiency where its lacking in terms of sustainability and green mining initiatives, improving the efficiency of this process can help trim down environmental impact.
- **Reusing Mining Waste:** Mining naturally produces significant amounts of waste — such as tailings, rocks and wastewater. In many cases, businesses leave waste behind when mining operations cease. But for almost every category of mining waste, there are at least one or two ways to reuse that waste on- or off-site.
- **Eco-friendly Equipment:** Battery-driven mining equipment is often powerful enough to replace diesel-driven options. Replacing diesel engines with electric engines where possible can significantly reduce the amount of CO2 produced by mining operations.
- **Rehabilitating Mining Sites:** Many former mine sites are left unproductive, unusable by landowners and, in some cases, almost entirely inhospitable to plant and animal life. However, this damage isn't guaranteed to be permanent. Companies can use many land rehabilitation techniques to make mined land productive again or speed up the land's natural recovery process.

The National Mineral Policy 2019 emphasised that environmental, economic and social considerations must be taken into account as early as possible in the decision-making process so that mining is financially viable, socially responsible, environmentally, technically and scientifically sound, uses mineral resources optimally and ensures sustainable post-closure land uses.

### **Conclusion**

Despite recent strides and new technology, the mining industry remains unsustainable in many areas. Not all of the technologies are economical yet. However, the mining industry as a whole does seem to be moving in the direction of sustainability where future seems promising.

**5. Discuss the key principles of environmental impact assessment (EIA)? Is it impractical to adhere to these principles in real life? Critically examine.**

**Approach:**

Candidates are expected to write about Environment impact assessment, also critically examine whether it is impractical to adhere to these principles in real life.

**Introduction**

UNEP defines Environmental Impact Assessment (EIA) as a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers.

**Body**

Importance of principles of the EIA:

- EIA links environment with development for environmentally safe and sustainable development. EIA provides a cost effective method to eliminate or minimize the adverse impact of developmental projects.
- EIA enables the decision makers to analyse the effect of developmental activities on the environment well before the developmental project is implemented. EIA encourages the adaptation of mitigation strategies in the developmental plan.
- EIA makes sure that the developmental plan is environmentally sound and within the limits of the capacity of assimilation and regeneration of the ecosystem.
- Positive and negative, reversible and irreversible and temporary and permanent impacts are predicted which presupposes a good understanding of the project by the assessment agency.
- Environment Impact Assessment Notification of 2006 has decentralized the environmental clearance projects by categorizing the developmental projects in two categories, i.e., Category A (national level appraisal) and Category B (state level appraisal).

Difficulty and shortcomings in adherence to the principles in reality:

- Lack of awareness among the local people about the process of EIA, its significance for them, their own rights and responsibilities. Most of the time EIA reports are unavailable in local languages, thus local people are unable to decipher the reports, and are misled by the proponents.
- It has been found that the team formed for conducting EIA studies is lacking the expertise in various fields such as environmentalists, wildlife experts, Anthropologists and Social Scientists.

- The Draft Environmental Impact Assessment Notification 2020 has inverted the logic of 'precautionary principle' which forms the bedrock of India's environmental outlook. It seeks to create a permanent setup to regularise industrial processes that have evaded environmental clearance and curtail public hearings for many industries.
- The new notification comes in the wake of recent attempts to dilute environmental safeguards and follows from a tradition to widen the escape route for violators or environmental regulations.
- Lack of Credibility: There are so many cases of fraudulent EIA studies where erroneous data has been used, same facts used for two totally different places etc. Often, and more so for strategic industries such as nuclear energy projects, the EMPs are kept confidential for political and administrative reasons.
- Public hearing: Public comments are not considered at an early stage, which often leads to conflict at a later stage of project clearance. A number of projects with significant environmental and social impacts have been excluded from the mandatory public hearing process. The data collectors do not pay respect to the indigenous knowledge of local people.
- Non transparency: Details regarding the effectiveness and implementation of mitigation measures are often not provided. Emergency preparedness plans are not discussed in sufficient details and the information not disseminated to the communities.
- Applicability: There are several projects with significant environmental impacts that are exempted from the notification either because they are not listed in schedule I, or their investments are less than what is provided for in the notification.

**Wayforward:**

- Independent EIA Authority, Sector wide EIAs needed and Creation of a centralized baseline data bank.
- Dissemination of all information related to projects from notification to clearance to local communities and the general public.
- The present executive committees should be replaced by expert people from various stakeholder groups, who are reputed in environmental and other relevant fields.

**Conclusion**

An EIA should not be used just as a means for obtaining an environmental clearance; rather, project proponents should use it as a management tool to assess the soundness of a project plan. The focus of EIA needs to shift from utilisation and exploitation of natural resources to conservation of natural resources.