Mains Marathon

Compilation

14th to 19th November, 2022

Mains Marathon Compilation for the Month of November, (Third Week) 2022

1. Do you think that the private sector can find solutions to climate change by funding the trillions needed for a global transition to clean energy?
2. Provide a general account of groundwater usage in India. What measures are required to conserve groundwater?

3. Considering the present circumstances, discuss the significance of the Bali G-20 summit.
4. What is India's long-term strategy to transition to a low-emission pathway to become carbon-neutral by 2070?

5. As the world shrinks with technological and communication changes, terrorists, criminals, weapons, and funds are also able to move across national boundaries easily. In light of the statement, highlight the efforts made by India to tackle these challenges.
6. Health must be turned into a feature and eventually a function of air pollution policy. Discuss.

7. Many state governments are switching back to Old Pension Scheme (OPS). Do you think that OPS is bad for economics? Give reasons in support of your argument.
8. Rethinking cities to make them more liveable, inclusive, and integrated is a key component in promoting smart cities. Elaborate.

9. FDA has recently approved lab-grown meat for human consumption in the US. How is lab-grown meat developed, and how is it different from real meat?
10. Women have been allowed in combat in the Air Force, but we are yet to see women in combat roles in the army and navy. In the light of the statement, highlight the hurdles in the effective implementation of the grant of the Permanent Commission to women in the armed forces.

11. Industrial policy needs to be strengthened to make it more aligned to tackle India's present challenges. Comment.
12. Highlight the economic and environmental significance of Mangroves. What are the threats facing Mangroves in India?

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Q.1) Do you think that the private sector can find solutions to climate change by funding the trillions needed for a global transition to clean energy?
The Hindu

> **Introduction:** Contextual introduction.
> **Body:** Explain how the private sector can find solutions to climate change by funding the trillions needed for a global transition to clean energy. Also write some concerns.
> **Conclusion**: Write a way forward.

Recently the **UNFCCC Standing Committee on Finance (SCF)** released a report on the progress made by developed countries towards achieving the goal of mobilizing $100 billion per year. Climate finance is money used by countries to drive down greenhouse gas emissions and adapt to the effects of climate change.

Private sector can find solutions to climate change:
- No government in the world has **enough money to solve the climate crisis** or complete the energy transition, and that private investment in clean energy technology is therefore critical to combating climate change.
- Private sector breakthroughs in areas such as ba**ttery storage, green hydrogen and direct air carbon capture** could be "game changers" for reaching net-zero emissions.
- Private sector is increasingly disclosing climate-related risks and opportunities, as well as reassessing investments that previously didn't consider climate risk.
- Transitioning to greater **use of solar, hydropower, wind, geothermal, and biomass power** in the developing world will require vast investment.

Concerns:
- **Lack of transparency** of information on mobilized private finance.
- The private sector is especially **weak in the poorest countries**, when compared to many middle-income countries. This limits the opportunities to mobilise finance from local companies.
- The concern is that, unless efforts are made to steer private finance in an equitable manner, it would **mostly benefit a handful of developing countries,** but bypass the poorest ones, where the needs are greatest.
- Based on the experience of multilateral development banks (MDBs) in development and the private sector, concerns have also been raised that the private sector would mostly **benefit multinational companies from major economies**, instead of developing countries' local companies.
- Private sector investments in developing countries have **concentrated on energy and transport**, whereas little attention has been paid to water infrastructure.

Way Forward:
- Develop a **common methodology** to record and track private finance to ensure an equitable distribution of the scarce climate finance available.
- Mobilization of private finance as a means of achieving the $**100 billion goal**, should not come at the expense of, or involve a trade-off in addressing the needs of developing countries.

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Q.2) Provide a general account of groundwater usage in India. What measures are required to conserve groundwater?
The Hindu

> **Introduction:** Contextual introduction.
> **Body:** Write about groundwater usage in India. Also write some measures required to conserve groundwater.
> **Conclusion:** Write a way forward.

India is the **largest user of Groundwater** (GW) and 87% of GW is used for Irrigation. Recently the Ministry of Jal Shakti released the "**Dynamic Ground Water Resource Assessment Report**" for the entire country for the year 2022. The assessment was carried out **jointly by Central Ground Water Board (CGWB) and States/UTs.**

Groundwater usage in India:

- The 2022 assessment suggests that groundwater extraction (239.16 bcm) is the **lowest since 2004**. A **decrease in groundwater extraction** may indicate better water management
- **Improvement in groundwater conditions** in 909 assessment units in the country compared with 2017 assessment data.
- The total annual groundwater recharge for the entire country is 437.60 billion cubic meters (BCM).
- The groundwater extraction is **very high** in the states of Haryana, Punjab, Rajasthan, Dadra & Nagar Haveli and Daman & Diu where it is more than 100%.
- The groundwater extraction is between 60-100% in the states of Delhi, Tamil Nadu, Uttar Pradesh, Karnataka and UTs of Chandigarh, Lakshadweep and Puducherry.
- In the rest of the states, the groundwater extraction is below 60%.

Measures to conserve groundwater:

- **Dedicated law:** There is no central law governing the use of groundwater and various States have their own laws on regulating its extraction that are deployed in a perfunctory manner.
- A draft **National Water Policy** has recommended a shift in usage from water-guzzling crops and prioritising recycled over freshwater for industrial purposes.
- To improve the water table in those areas where it is being overused, on-farm water management techniques and **improved irrigation methods** should be adopted. E.g. Methods for artificial recharge of groundwater.
- **Traditional methods of water conservation** should be encouraged to minimize the depletion of water resources. E.g water from house run off is an excellent source of irrigation.
- The **agricultural power-pricing structure** needs to be revamped as the flat rate of electricity adversely affects the use of groundwater.
- There should be a policy in place to monitor the excessive exploitation of groundwater resources to ensure long-term sustainability. E.g. **Water meters** could be installed to monitor overuse.

Groundwater depletion is becoming an alarming issue day by day. Leveraging **schemes like Atal Bhujal Yojana** which seeks to strengthen the institutional framework and bring about behavioural changes at the community level for sustainable groundwater resource management is vital.

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Q.3) Considering the present circumstances, discuss the significance of the Bali G-20 summit.
The Hindu

> **Introduction:** Contextual introduction.
> **Body:** Explain significance of the Bali G-20 summit.
> **Conclusion**: Write a way forward.

G20 members currently account for nearly **80% of world GDP, 75% of global trade, and 60% of the global population.** The Presidency, aided by the countries holding the Presidency before and after it (**Troika**), is responsible for setting the agenda of each year's Summit. Next year the "Troika" of G-20 will be made up of emerging economies for the first time with India, Indonesia and Brazil. The motto for the Bali G-20 summit is **Recover Together, Recover Stronger.**

Significance of the Bali G-20 summit:

- While the focus will be on **post-pandemic recovery** and dealing with energy and food security impacted by the Russian war in Ukraine, much interest will be around which leaders choose to hold **bilateral summits** on the sidelines.
- The leaders will engage in discussions over three sessions: **on Food and Energy security, Health Partnership for Global Infrastructure and Investment, and Digital Transformation**.
- India will focus on the **Global South** and the problems it is facing due to **geopolitical tensions**, food and fuel shortages.
- Efforts will be made to build **global consensus over issues** that have clearly divided the world.
- A range of **bilateral talks** will take place against the backdrop of ongoing tensions around the world, including those caused by the invasion of Ukraine and the ensuing economic and environmental consequences, the **climate crisis**, North Korea's simmering nuclear programme, and China's expanding global aspirations.
- Extensive discussions will be held on a number of **contemporary burning topics**, including the state of the world economy, issues pertaining energy, environment, agriculture, health, and digital transformation.

G20 has to include objectives, vision and mission statements, a permanent secretariat, and staff to oversee commitments and ensure continuity in the agenda. The G20, instead of international commitments, can focus on domestic commitments and start implementing them.

Q.4) What is India's long-term strategy to transition to a low-emission pathway to become carbon-neutral by 2070?
The Hindu

> **Introduction:** Contextual introduction.
> **Body:** Explain India's long-term strategy to transition to a low-emission pathway to become carbon-neutral by 2070.
> **Conclusion**: Write a way forward.

India submitted its **Long-Term Low Emission Development Strategy (LT-LEDS)** to the United Nations Framework Convention on Climate Change (UNFCCC), during the 27th Conference of Parties (COP27) at Egypt. The LT-LEDS has been prepared in the framework of India's right to an equitable and fair share of the global carbon budget. The strategy emphasises energy security, energy access, and employment, while keeping focus on our vision of Atmanirbhar Bharat.

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Long-Term Low Emission Development Strategy:

- **Improve energy efficiency:** Promotion of energy efficient/low carbon technologies, digitization of processes, and creation of trading schemes and other market-based enablers to achieve these goals will be pursued where relevant.
- **Process and fuel switching, and electrification in manufacturing**: These will be pursued, as relevant, based upon availability and access to technology and the provision of climate finance.
- **Enhance material efficiency and recycling:** Sector-specific material efficiency technologies and strategies will be enhanced through value chains, as material-demand trends shift.
- **Promote green hydrogen technology and infrastructure**: R&D in technology and infrastructure for green hydrogen will be given a boost, ramping up electrolyser manufacturing capacity.
- **Explore low carbon options in hard-to-abate sectors:** Best available technologies in the steel and cement sectors will be pursued.
- **Low-carbon and Sustainable development of MSMEs:** Strengthen financial support, knowledge sharing, and awareness of low carbon options and sustainable technologies.
- **Increased use of biofuels**, especially ethanol blending in petrol, the drive to increase electric vehicle penetration are expected to drive the low carbon development of the transport sector. India aspires to maximise the use of electric vehicles, ethanol blending to reach 20% by 2025, and a strong modal shift to public transport for passenger and freight.
- The LT-LEDS is also informed by the **vision of LiFE, Lifestyle for the Environment** that calls for a world-wide paradigm shift from mindless and destructive consumption to mindful and deliberate utilization.

LT-LEDS is the practical implementation of India's call for "**climate justice."** This is essential to ensure that there are no constraints on realizing India's vision of rapid growth and economic transformation, while protecting the environment.

Q.5) As the world shrinks with technological and communication changes, terrorists, criminals, weapons, and funds are also able to move across national boundaries easily. In light of the statement, highlight the efforts made by India to tackle these challenges.
Indian Express

> **Introduction:** Contextual introduction.
> **Body:** Write some efforts made by India to tackle the challenges of terrorism with the change in technology and communication.
> **Conclusion**: Write a way forward.

Terrorism is the illegitimate use of force to provide injury to common people for political and ideological gains. Terrorists violate law, threaten common people and directly challenge the state. India is increasingly playing a leading role in curbing the terrorism and terror financing. The following efforts are made by India to tackle the challenges due to terrorism:

- In 2009, the **National Investigation Agency** was established to deal with terrorist crimes.
- To gather information related to security, the **National Intelligence Grid (NATGRID)** has been established.
- An operational hub has been created for the **National Security Guard** to ensure a rapid response to terrorist attacks.
- Strengthening the provisions in the **Unlawful Activities (Prevention) Act, 1967** to combat terror financing by criminalizing the circulation of high quality counterfeit Indian

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currency as a terrorist act and enlarge the scope of proceeds of terrorism to include any property intended to be used for terrorism.

- **A Terror Funding and Fake Currency (TFFC) Cell** has been constituted in National Investigation Agency (NIA) to conduct focused investigation of terror funding and fake currency cases.
- **Training programmes** are regularly conducted for the State Police personnel on issues relating to combating terrorist financing.
- Fake Indian Currency Notes (FICN) network is one of the channels of terror financing in India. **FICN Coordination Group (FCORD)** has been formed by the Ministry of Home Affairs to share intelligence/information among the security agencies of the states/centre to counter the problem of circulation of fake currency notes.
- Security at the international borders has been strengthened by using **new surveillance technology,** deploying additional manpower for **round the clock surveillance**, establishing observation posts along the international border, erection of **border fencing** and intensive patrolling.

Strengthening national coordination mechanisms to promote inter-agency participation and information exchange, facilitating joint monitoring, threat assessment are very essential to combat these challenges.

Q.6) Health must be turned into a feature and eventually a function of air pollution policy. Discuss.
The Hindu

> **Introduction:** Contextual introduction.
> **Body:** Explain Present status of health in India's pollution policy-making. Also explain why health in India's pollution policy-making is essential.
> **Conclusion**: Write a way forward.

Air pollution is the degradation of air quality due to the contamination of pollutants. Industries (51%), Vehicles (27%), and Crop burning (17%) are the largest contributor to Air pollution. No city in India met the updated WHO safety standards of 5 micrograms of PM 2.5 per cubic metre of air. Nearly half surpassed this limit by more than 10 times.

Present status of health in India's pollution policy-making:
- India's environmental regulators, expert groups and decision-making entities **do not have any health expertise.**
- The recently constituted Commission for Air Quality Management also lacks any health representation.
- Recent papers published by the Centre for Policy Research revealed that health sector representatives comprise less than 5% of the membership of State Pollution Control Boards.
- Whether it is stubble burning or thermal power plant emissions, **decisions are made without any consideration** of their potential effects on health.

Why health in India's pollution policy-making is essential?
- The primacy of protecting public health is clearly laid out in the statement of objects and reasons of **India's key environmental laws.**
- According to the Lancet, in India, in 2019, 17.8% of all deaths and 11.5% of **respiratory, cardiovascular and other related diseases** are attributable to high exposure to pollution.
- The effects of exposure to bad air are felt most deeply by **vulnerables in society** — children, the elderly, pregnant women, and those with pre-existing health conditions.

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- Understanding the effect of pollutants on human health is key to developing policies for **environmentally friendly growth** in the transportation sector.
- Besides endangering health and shortening lifespan, air pollution adversely affects economic growth through reduced productivity and **decreased labour supply, and via health-care expenditures and lost welfare**.

Air pollution is a risk for all-cause mortality as well as specific diseases. To tackle air pollution as well as its consequences, India should centre science and health to permanently fix the problem of air pollution.

Q.7) Many state governments are switching back to Old Pension Scheme (OPS). Do you think that OPS is bad for economics? Give reasons in support of your argument.
Indian Express

> **Introduction:** Contextual introduction.
> **Body:** Write significance of Old Pension Scheme with respect to economics. Also explain why it is bad for economics.
> **Conclusion**: Write a way forward.

The Old Pension Scheme (OPS) offers **inflation- and pay commission-indexed pension payments** to retired government employees and their spouses (after the employees' death) without any contribution from the employees. Under Old Pension Scheme, employees are not required to contribute to their pensions and pension was guaranteed.

Economic significance of Old Pension Scheme:
- **Short-term gains by Government**: They save money since they will not have to put the 10 per cent matching contribution towards employee pension funds.
- **Advantage for employees:** It will result in higher take-home salaries, since they too will not set aside 10 percent of their basic pay and dearness allowance towards pension funds.
- The pension drawn in New Pension Scheme (NPS) is lower than the OPS.
- NPS is dependent on the market prices of equity/bonds in which the amount is invested. Therefore, a crash in the markets can affect the pensioners.
- OPS is a fixed government expenditure irrespective of an economic slowdown or a stock market crash. This makes it useful in counter-cyclical policy measure during a crisis.

Bad for economics:
- **Pension Liability Remained Unfunded:** There is no corpus specifically for pension, which would grow continuously and fund for pension.
- **Inter-Generational Equity Issues:** Current generation of taxpayers are paying for pension bill of those who joined government service before 2004 but are contributing to the 10 percent contribution the state governments have been making for those who joined from January 1, 2004.
- **Unsustainable:** Pension liabilities would keep hiking since pensioners' benefits increased every year; like salaries of existing employees, pensioners gained from indexation.
- **Burden on Exchequer:** Over the last three decades, pension liabilities for the Centre and states have jumped manifold. It accounts for 25% of the States' budget.

The pension scheme needs to be reformulated in a way that it provides benefits to employees without putting an onerous burden on the employers.

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Q.8) Rethinking cities to make them more liveable, inclusive, and integrated is a key component in promoting smart cities. Elaborate.
Business Standard

> **Introduction:** Contextual introduction.
> **Body:** Explain the need of rethinking cities to make them more liveable, inclusive, and integrated in promoting smart cities. Also write some suggestions.
> **Conclusion**: Write a way forward.

Currently, 54 percent of the world's population lives in cities, and it is predicted to rise to 66 percent by 2050. India is the **second largest urban system** in the world with almost 11% of the total global urban population living in Indian cities. India's urban population is expected to cross 50% of total population within next two decades.
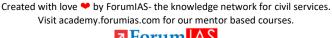
According to the **World Bank**, smart cities make the process of urbanization more inclusive through the **integration of migrants**, bringing together the formal and informal sectors, and providing services for both the rich and the poor. Also it will be helpful in solving following issues:

- **No framework for development**: A sustainable blueprint for governance for smart cities is necessary. There is lack of a city development model and adequate standards for promoting smart cities, including for housing, water, sanitation, health, and environmental sustainability.
- **Multiplicity of projects:** There are multiple infrastructure projects like expansion of city roads and highways, water reservoir and storage-related development which are mostly undertaken by development authorities or the State governments.
- **Decreased role of local governments**: This leads to poor governance of the projects and lack of coordination.
- The present urban chaos in India is mainly the result of **ineffective and inefficient urban management**, **inadequate revenue base**, **lack of coordination between various municipal agencies**, and the non-participatory attitude of stakeholders.

What can be done?

- **Urban design**: A proper urban designing or urban planning is needed to make cities smart and sustainable. It should provide **socio-economic opportunities** for its expanding labour force and a **safer and more secure environment**. It should also provide a unique identity for each city along with **greater adaptability to changing climatic, economic, and social factors**.
- **Use of ICT:** with numerous physical devices linked to an Internet of Things (IoT) network that provides **effectiveness in local operations and services**. It also helps municipalities to engage with people, keep an eye on the happenings of the city, improve the quality of services and improve **citizen-government interaction.**
- **Gathering data:** It is beneficial for a smart city to gather data and information that could be further used to **improve the processes, operations and governance systems** of the city like monitoring and managing power plants, water supply, etc.

Smart cities need to be sustainable smart cities with environmental, social, economic, and cultural dimensions. It must also integrate the newest technology with governance and enhance innovative socio-technical, socio-economic, and socio-cultural aspects of growth.

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Q.9) FDA has recently approved lab-grown meat for human consumption in the US. How is lab-grown meat developed, and how is it different from real meat?
Business Standard , **Source 2**

> **Introduction:** Contextual introduction.
> **Body:** Explain how lab-grown meat is developed. Also explain how it is different from real meat.
> **Conclusion**: Write a way forward.

70 billion land animals, and possibly trillions of marine animals, are killed for human consumption each year. Recently, the US Food & Drug Administration has for the first time given the green light to meat grown from cells. **Singapore** is the only country so far to have approved the **sale of cultivated meat products.**
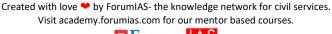
How is lab-grown meat developed?

- The process of making lab-grown meat starts with the **careful removal of a small number of muscle cells** from a living animal or from the ovaries of a newly slaughtered animal.
- Then, a lab technician places the **harvested cells in bioreactors** before adding serum containing amino acids, sugars and other nutrients needed for cells to grow.
- The cells grow and multiply, producing real muscle tissue, which scientists then shape into edible scaffoldings.
- Using these scaffoldings, they can transform lab-grown cells into steak, chicken nuggets, hamburger patties, or salmon sashimi. The final product is a real cut of meat.

Difference from real meat:

- Lab-grown comes **from cells harvested** from a living animal, while conventional meat comes from an animal that's raised and killed for human consumption.
- It often does not contain the same **growth hormones and saturated fats** associated with conventional meat.
- Due to its high cholesterol and saturated fat content, meat consumption can lead to chronic disease. When growing meat in a lab, food scientists can actually **control the quantities of harmful cholesterol and saturated fat** in each cut.
- Lab-grown meat can also address the growing threat of antibiotic resistance. Factory farms administer high amounts of antibiotics to animals in order to keep them alive in filthy conditions.
- While it **doesn't contain harmful antibiotics** of traditional meat, lab-grown meat does contain the same amount of protein that is crucial to the health and proper functioning of our bodies.

Considering the amount of meat consumed globally, companies will need to invest in a lot of land and resources to be able to cater to the mammoth task of feeding all non-vegetarians. Cultured or lab-grown meat is a solution to save the planet from climate change and improve the health of people across the world.

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Q.10) Women have been allowed in combat in the Air Force, but we are yet to see women in combat roles in the army and navy. In the light of the statement, highlight the hurdles in the effective implementation of the grant of the Permanent Commission to women in the armed forces.

Indian Express

Introduction: Contextual introduction.
Body: Write some hurdles in the effective implementation of the grant of the Permanent Commission to women in the armed forces.
Conclusion: Write a way forward.

Recently, the Supreme Court directed the Centre and the IAF to consider granting permanent commission to 32 retired women Short Service Commission (SSC) officers based on their suitability with the purpose of giving them pensionary benefits.

There are following hurdles in the effective implementation of the grant of the Permanent Commission to women in the armed forces:

- The government had resisted granting permanent commission to women officers, citing **bizarre reasons** like poor hygiene in forward areas, leading a life of isolation and troops from rural backgrounds not accepting women officers as commanders.
- The arguments are presented on the basis that a role in combat would require **tough training**, whereas the current training for women is different and at a much lower level than that of their male counterparts.
- The composition of rank and file being male, predominantly drawn from rural background with prevailing societal norms, the **troops are not yet mentally schooled to accept** women officers in command.
- **Domestic obligations** towards their children and families, prolonged absence during pregnancy and motherhood have a major bearing on the employment of women officers in the army.
- Male and female officers cannot be treated equally because of their **'different physical standards'**.
- The government has argued that if a woman is taken captive by insurgents/terrorists or as a Prisoner of War (PoW) by an enemy state, then it would become an international and deeply emotive issue which could have an impact on the society.

In countries like **United States and Israel,** women are allowed in active combat. India's Air Force and Navy give women both permanent commissions and select combat roles. To usher in a change in a regressive mindset prevalent in the society, a lot more must be done on gender sensitisation.

Q.11) Industrial policy needs to be strengthened to make it more aligned to tackle India's present challenges. Comment.

Indian Express

Introduction: Contextual introduction.
Body: Explain some challenges with industrial policy. Also explain what can be done to strengthen the industrial policy.
Conclusion: Write a way forward.

Industrial Policy is defined as the strategic effort by the state to encourage economic transformation, i.e. the shift from lower to higher productivity activities, between or within sectors. India aims to grow its manufacturing gross value added (GVA) by about 3 times to reach **$1 trillion by 2025-26.**

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Present challenges:

- **Lack of Efficient Infrastructure and Manpower:** High technology based Infrastructure and **skilled manpower** are crucial for enhancing manufacturing competitiveness in the globalized economy. E.g. overburdened rail transport.
- The **MSME sector** seems to be relatively **less favourably** placed in terms of credit availability and credit cost of working capital as compared to the medium and large scale industrial and services sectors.
- India is still **dependent on foreign imports** for transport equipment, machinery (electrical and non-electrical), chemicals and fertilizers, plastic material etc.
- **Industrial locations** were established **without reference to cost-effective points** and are often politically motivated.
- Even 30 years after the liberalization of the private sector, the government is again **handing out subsidies and licenses** while putting up tariff walls.
- Due to ineffective policy implementation characterized by **red-tape** and strained labour-management relations most of these public sector enterprises are **running in loss**.

What can be done?

- **Job creation**: Many of the industries currently chosen to be under PLI are highly **capital and skill intensive**. Goal of job creation for our massive numbers of **unskilled workers** should be considered and unnecessary subsidies should be avoided.
- **Discipline the firms**: We have to be strict with non-performing firms. If necessary, we can withdraw support from them. It requires extra efforts that **go beyond the traditional culture of bureaucracy** in India.
- **Soft industrial policies:** like encouraging research and development, extension services, vocational training, improving regulations and infrastructure are needed to improve **productivity**. These policies need to be customised to **local decentralised contexts**, to help small and medium sized firms.
- **Focus on green products**: for job-creation. E.g. renewable energy generation and storage, bioplastics, technologies of drip irrigation and rainfall harvesting, the reinforcement of sea walls, green energy-powered three-wheeler public transportation etc.

The industrial policy should involve creating industry that is equipped with innovation, technology, financially viable and environment friendly and whose benefits are shared by all sections of the society.

Q.12) Highlight the economic and environmental significance of Mangroves. What are the threats facing Mangroves in India?
Times of India

> **Introduction:** Contextual introduction.
> **Body:** Explain some economic and environmental significance of Mangroves. Also write some threats faced by Mangroves in India.
> **Conclusion**: Write a way forward.

Mangroves are salt-tolerant vegetation that grows in intertidal regions of rivers and estuaries. They are referred to as **'tidal forests'** and belong to the category of **'tropical wetland rainforest ecosystem'**. India has a total mangrove cover of 4,992 sq km. **West Bengal** has 42.45% of India's mangrove cover.

Economic significance:

- Mangroves are among the most **productive terrestrial ecosystems** and are a natural, renewable resource. For instance, Sundarbans in the Gangetic delta supports around 30 plant species of mangroves.

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- Mangroves provide **ecological niches** for a wide variety of organisms. They serve as breeding, feeding and nursery grounds for fisheries and provide timber and wood for fuel.
- They provide **numerous employment opportunities** to local communities and augment their livelihoods.

Environmental significance:

- The mangroves show edge effect, which means that they have large **species diversity** in comparison to marine or terrestrial ecosystem.
- Mangrove forests act as **water filters and purifiers** as well. Hence protecting the coastal ecology including coral reefs. They supply timber, fire wood, medicinal plants and edible plants to local people.
- Mangroves act as **shock absorbers**. They reduce high tides and waves and protect shorelines from erosion and also minimise disasters due to cyclones and tsunami.

Threats facing Mangroves in India:

- **Sea level rise and coastal erosion:** Due to global warming, the sea levels are continuously rising. The rising sea levels have flooded large areas of mangrove forests. This has resulted in their depletion.
- **Invasion by alien species:** This has led to imbalance in ecological structure, resulting in their depletion.
- **Clearing:** Large tracts of mangrove forests have been cleared to make room for agricultural land, human settlements, industrial areas, shrimp aquaculture etc.
- **Damming of rivers:** Dams built over the river courses **reduce the amount of water** and sediments reaching mangrove forests, altering their salinity level.
- **Pollution:** Mangroves also face severe threats due to fertilisers, pesticides, discharge of domestic sewage and industrial effluents carried down by the river systems.
- **Climate change:** Unusually low rainfall and very high sea surface and air temperatures caused severe threats to the survival of mangrove forests.

Systematic and periodic environmental monitoring of existing mangroves is need of the hour.
Community participation for conservation and management should be promoted.

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