



INSIGHTSIAS

SIMPLIFYING IAS EXAM PREPARATION

INSTA MINDMAPS



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JANUARY 2023

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General Studies – 1

Topic: Population and associated issues

1. Decline in Working-age Population

Introduction

- According to the UN's World Population Prospects 2022 (WPP2022) report, the global fertility rate, which stood at 2.3 overall in 2021, will hit the demographic tipping point of 2.1 by 2050, owing to a globally synchronized decline in birth rates, including in Africa and Latin America.

Decline in fertility rate across the world

- Since 2011, sales of adult diapers in Japan have outpaced those for infants, reflecting a decline in the country's fertility rate.
- Fertility rates have also dropped below the replacement level in all eurozone countries.
- South Korea and Hong Kong's 2021 fertility rates are among the lowest in the world.
- China is likely to record an absolute decline in its population in 2023.
- The US fertility rate has more than halved over since 1960.
- Even India is experiencing a population decline.

Consequences

- Declining fertility rates have shifted the age distribution of the population upward in many economies.
- According to the WPP2022, "Worldwide, persons aged 65 or over outnumbered children under five for the first time in 2018.
- The consequences will be immense, particularly in high-income economies.
- In addition to straining pension and health-care systems, low fertility rates will reduce the working-age population, in turn lowering household consumption and economic growth.

International migration

- Throughout modern history, international migration from low-income, high-fertility countries to those with higher average incomes and lower birth rates has helped shield the latter from demographic headwinds.
- According to the WPP2022, high-income countries' population growth between 2000 and 2020 was driven primarily by international migration.
- International migration is set to become the sole driver of population growth in these economies in the coming decades.
- International migration has helped high-income countries sustain economic growth and ease the burden of supporting their growing elderly populations.

Concerns / Challenges

- The coming decades will become very challenging for the work- age population who will not have the numbers to support the increasing economically inactive people.
- If global fertility does fall below the replacement rate within the next 30 years, the consequences for the entire planet may be dire.
- Our children may be the future, but they will be growing up in a geriatric world.

Way Forward

- At a time of heightened geopolitical tensions, it is important to recognize the mutually beneficial relationship that exists between low- and high-fertility countries.
- The appropriate solution is through a policy of maintaining the optimal rate of world population growth which is consistent with changing social trends and technological advances.

- Need for improved technologies, biotechnological revolution, wider range of food sources, more land made available for production, and more production in the regions where it is needed.
- Much will depend on political wisdom, will, and resolutions made by the global community.

Topic: Social Empowerment

2. Geriatric Care in India

Introduction

- Currently, India's population is among the youngest in an ageing world.
- However, a major proportion of India's population will be aged by 2050.
- This calls for more forward-looking policies incorporating population dynamics, healthcare and most importantly geriatric care.

Social Security

- **Social security is the concurrent responsibility of the central and state governments** as, mandated under Indian constitution.
- Well-being of senior citizens – **Article 41 in particular and 46 in general of Indian constitution.**
- **In this regard, National Policy on Senior Citizen, 2011 was framed.**

Demographic transition in India

- **NFHS-5 places the total fertility rate (TFR) at 2.0. known as replacement level of fertility.** This decline is spread evenly across the country.
- With falling fertility (currently 2.0), the median age of India has risen from 24 years in 2011 to 29 years now and is expected to be 36 years by 2036.
- With a falling dependency ratio, India is in the middle of a demographic transition.

Issues associated with elderly population in India

- **Feminisation of ageing:**
 - The sex ratio of the elderly has increased from **938 women to 1,000 men in 1971 to 1,033 in 2011** and is projected to increase to 1,060 by 2026.
- **Financial issues:**
 - Retirement and dependence of elderly on their child for basic necessity.
 - Sudden increase in out-of-pocket expenses on treatment.
 - Migration of young working-age persons from rural area have negative impacts on the elderly, living alone or with only the spouse usually poverty and distress.
- **Health:**
 - Health issues like blindness, locomotor disabilities and deafness are most prevalent.
 - Mental illness arising from senility and neurosis.
 - Absence of geriatric care facilities at hospitals in rural area.
- **Social issues:**
 - Indian society is undergoing rapid transformation under the impact of urbanization, technical & technological change, education and globalization.
 - Consequently, the traditional values and institutions are in the process of erosion and adaptation, resulting in the weakening of intergenerational ties.
 - Feeling of powerlessness, loneliness, uselessness and isolation in elderly.
 - Generational gap.

Way Forward

- Increasing the monthly pension of elderly.
- Under **Pradhan Mantri Awas Yojana**, Housing for the aged, particularly the aged poor, must be a priority.
- We need to accelerate implementation of programmes such as the **National Programme for Health Care of the Elderly (NPHCE).**

- The **National Digital Health Mission** has tremendous potential to expand medical consultations into the interiors of the country. However, this requires a digital literacy campaign for senior citizens.
- Assisted living facilities for indigent elderly, particularly those with age-related issues like dementia, needs policy focus.
- More tax benefits, or at least removing tax on deposit interest for seniors.
- Enhancing the geriatric care health infrastructure especially in rural area.
- Allocation of special budget for elderly population at both levels.
- Providing entertainment facilities like libraries and clubs at panchayat level.
- Appreciations for the contributions of elderlies at village level.

Conclusion

- For the welfare and care for the older persons, we must focus on the protection of already existing social support systems such as family and kinship, neighbourhood bonding, community bonding.

General Studies – 2

Topic: Structure, organization and functioning of the Executive and the Judiciary

3. Artificial Intelligence in Justice Delivery

Introduction

- **Artificial Intelligence (AI) and Machine Learning (ML) have a multiplier effect on increasing the efficiency of any system or industry.**
- If used effectively, it can bring about incremental changes and transform the ecosystem of several sectors.
- However, before applying such technology, it is important to identify the problems and the challenges and develop the modalities on how the AI architecture will have the highest impact.

AI in justice delivery system

- In the justice delivery system, there are multiple spaces where the AI application can have a deep impact.
- It has the capacity to **reduce the pendency and incrementally increase the processes.**
- **The pendency takes a toll on the efficiency of the judiciary**, and ultimately reduces peoples' access to justice.
- The use of AI in the justice system depends on first identifying various legal processes where the application of this technology can reduce pendency and increase efficiency.
- For example, to extract facts from a legal document, the programme should be able to understand the document and what it entails.
- Over time, the machine can learn from experience.
- Additionally, there is a need of constantly nurturing to reduce any bias, and increase learning.

Benefits of AI in Justice Delivery

- AI and related technologies will be able to automate and complement several tasks performed by legal professionals.
- It will allow them to invest more energy in creatively solving legal issues.
- It has the possibility of **helping judges conduct trials faster and more effectively thereby reducing the pendency of cases.**
- It will assist legal professionals in devoting more time in developing better legal reasoning, legal discussion and interpretation of laws.

SUPACE (Supreme Court Portal for Assistance in Court Efficiency)

- SUPACE is an AI system that was recently launched by the Supreme Court of India.

- Designed to first understand judicial processes that require automation, it then assists the Court in improving efficiency and reducing pendency.
- It can assist in the translation of judgments into regional languages.
- The technology, when applied in the long run, will reduce the time taken to file a case and assist the court in becoming an independent, quick, and efficient system.
- Through these steps, the Supreme Court has become the global frontrunner in application of AI and Machine Learning into processes of the justice system.

Concerns / Challenges

- The integration of these technologies will be a challenging task as the legal architecture is highly complex and technologies can only be auxiliary means to achieve legal justice.
- As AI technology grows, **concerns about data protection, privacy, human rights and ethics** will pose fresh challenges.

Way Forward

- It requires great self-regulation by developers of these technologies.
- It will also require external regulation by the legislature through statute, rules, regulation and by judiciary through judicial review.
- With increasing adoption of the technology, there will be more debates and conversations on the problems as well as their potential solutions.
- In the long-run it would help in reducing the pendency of cases and improving overall efficiency of justice system.

Topic: Functions and responsibilities of the Union and the States, issues and challenges pertaining to the federal structure

4. Local Self Governance

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Introduction

- **The 73rd and 74th constitutional amendments instituted panchayats and municipalities, respectively.**
- These amendments mandated that State governments constitute panchayats and municipalities in every region.
- **A third-tier of governance was instituted through the devolution of functions, funds, and functionaries to local governments.**

Constitutional Reforms

- Since local governments seldom derive their authority directly from the Constitution, India's constitutional reforms for decentralisation are exceptional.
- But municipal governments are often seen to be ineffective in addressing even the most basic needs of citizens, such as reliable water supply and walkable footpaths.
- Urban residents tend to blame "corrupt" local politicians for these civic woes.

Local self-governance

- Local self-governance is linked to the idea of subsidiarity and is typically grounded on two broad arguments.
- First, it provides for efficient provision of public goods since governments with smaller jurisdictions can provide services as per the preferences of their residents.
- Second, it promotes deeper democracy since governments that are closer to the people allow citizens to engage with public affairs more easily.
- The 73rd and 74th amendments require States to vest panchayats and municipalities with the authority "to enable them to function as institutions of self-government".
- **The core values that the amendments sought to entrench are that of deepening local democracy and meeting the ends of economic development and social justice.**

- They also mandate the regular conduct of local elections, provide for the reservation of seats for SCs, STs and women in local councils, and institute gram sabhas in panchayats and ward committees in municipal corporations.

Concerns / Challenges

- Local governments, especially municipalities, operate with **limited autonomy and authority**.
- This may be attributed to the limitations of the 74th amendment and the failure of State governments and courts to implement the amendment in letter and spirit.
- **Limitations include the discretion given to the States regarding devolution of powers and levying of local taxes.**
- State governments are reluctant to implement the 74th amendment as cities are economic powerhouses and controlling urban land is important for financing State governments.

Recent Incident

- The Patna High Court recently declared some provisions of the Bihar Municipal (Amendment) Act, 2021 as unconstitutional is path-breaking.
- The 2021 amendment had transferred the powers of appointment of Grade C and D employees of municipalities from the Empowered Standing Committee of the municipality to the State government-controlled Directorate of Municipal Administration.
- The court held that these provisions violate the 74th Amendment.

Local governments and federalism

- As India is undergoing a centralising shift in its economy and culture, there's also been a renewed assertion of federalism.
- **Local governments are, normatively and structurally, an integral part of the federal framework of the Constitution.**
- Hence, debates on federalism should include larger discussions on how power should be divided and shared between governments at the Union, State, and local level.

Topic: Issues relating to development and management of Social Sector/Services relating to Health, Education, Human Resources.

5. Family Planning Services

Introduction

- India's family planning programme has improved access to contraceptives.
- This has led to a **reduction in the Total Fertility Rate from 3.4 in 1990-92 to 2.0 in 2019-21.**

Government Interventions

- In India, frontline health workers have contributed significantly in implementing Mission Parivar Vikas.
- **Mission Parivar Vikas** aims to accelerate access to high-quality family planning choices and to increase the modern Contraceptive Prevalence Rate (mCPR).
- Frontline health workers have achieved this by delivering contraceptives at homes and offering a wider basket of alternatives such as injectable contraceptives.

Concerns / Challenges

- According to NFHS-5 and the 2022 report by the United Nations Population Fund, there is a rise in adolescent childbearing in some States.
- The COVID-19 had its impact on the sexual and reproductive health of women and the youth.
- There are still many districts in India that have **low modern Contraceptive Prevalence Rate (mCPR)**, with a large proportion of them being the youth.

Focusing on Youth

- Family planning interventions need to be tailored around the health needs, and populations for whom the intervention is to be implemented.
- **Holistic health awareness programmes** on the right age of marriage, safe sexual behavior, contraception, reproductive health, and diet diversity are paramount.
- India needs to develop an equitable model that meets the needs of the youth and adolescents.
- In several districts, more than one-fifth of the population in the adolescent age group are now entering the reproductive age group.

Prompting male engagement

- Men are not involved as much as we can in the family planning programme.
- Certain gender transformative approaches have shown promising results.
- The **Men in Maternity (MiM)** study conducted in Delhi demonstrated the effectiveness of teaching young couples about contraceptives and promoting joint decision-making in choosing family planning methods.
- Several other examples include the PRACHAR project in Bihar, the Yaari Dosti programme in Mumbai, and the GEMS project in Goa.

Way Forward

- To meet the **Sustainable Development Goal of Family Planning by 2030**, India needs to focus on improving access to family planning services for not just the adult population, but also the youth.
- Need to strengthen the capacity of health workers in using the **Family Planning Logistics Management Information System**.
- Family Planning Logistics Management Information System is a dedicated software to ensure procurement and distribution of family planning commodities across all the levels of health facilities.
- The **private sector** can offer innovative solutions in family planning, thereby improving the community's access to services.
- **Building capacity** among health workers, engaging men in the discourse of family planning, and drafting innovative solutions through public and private partnerships can greatly improve access to family planning services.

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6. Foreign Universities in India

Introduction

- **The 2020 National Education Policy (NEP) envisions a complete overhaul and re-energising of the higher education system.**
- **It says "India will be promoted as a global study destination providing premium education at affordable costs, thereby helping to restore its role as a Vishwa Guru".**
- Recently the University Grants Commission (UGC) announced draft norms for facilitating foreign universities and educational institutions to set up campuses in India.
- This has re-ignited debates on the internationalisation of Indian higher education.

Internationalisation of higher education

- Over the last three decades, two major factors have influenced the internationalisation of higher education.
- First, the **prohibitive costs of higher education, especially in developed countries.**
 - Tuition fees alone would be about 15 times more expensive than Indian private universities and over a hundred times more costly than most Indian public universities.
 - Prohibitive costs will preclude education in any foreign university campus for most aspirants.
- **The landscape of global higher education has dramatically changed post-Covid.**
 - The idea of brick-and-mortar international campuses has given way to building solid partnerships, student and faculty mobility, joint teaching and research opportunities and the development of online degree programmes.

India becoming a global higher education destination

- Instead of enabling the creation of international campuses of universities from developed countries, **India need to focus on becoming a global higher education destination.**
- India must assume the leadership role we had over 2,000 years ago when Nalanda, Takshashila, Vallabhi and Vikramshila attracted faculty and students from around the world.
- India can produce high-quality research at a relatively lower cost. Indian scientists made a successful mission to Mars with a modest budget.

Concerns / Challenges

- Indian universities, both public and private, are generally highly regulated and poorly governed.
- Institutions of Eminence (IoE) has not been adequately implemented to achieve its objectives.
- India's Gross Enrolment Ratio (GER) is uneven.
- Indian universities face acute resource scarcity.
- Regulatory obstacles have not allowed private higher education institutions to function autonomously and independently on equal terms with public institutions.
- **The vision of India becoming a Vishwaguru cannot be achieved by outsourcing Indian higher education to international universities.**

Way Forward

- Provide greater autonomy to Indian universities, including the **Institutions of Eminence (IoE)**.
- The government must pay greater attention to the IoEs and expand their scope and scale so that they become natural destinations for international students.
- Establish global universities in India led by the public and the private sector to cater to the needs and aspirations of international students.
- All states must create **Special Education Zones (SEZs)** and host universities that are global in their orientation and outlook.
- Provide more resources to Indian universities and not focus only on select centrally established institutions.
- Government must encourage CSR and philanthropic initiatives with more tax incentives to enable private sector contributions to public and private universities.
- Establish a liberal and progressive regulatory ecosystem for Indian universities to attract international students.
- Government must reform its visa processes and the Foreign Regional Registration Offices (FRRO) registration procedures.
- Forms of university towns and education cities can create a comprehensive ecosystem that will enable students and faculty to study, work and live in these communities.

7. Promoting Dietary Diversity during Adolescence

Introduction

- Multiple studies show that **adolescence is a nutritionally demanding phase of life.**
- **Promoting dietary diversity is crucial** during adolescence, especially among girls, who face more physiological demands.
- Adolescence is the **window of opportunity** where practices of dietary diversity can be built to correct nutritional deficiencies.

Need and Importance

- Susceptibility of adolescent girls to anaemia is 40% compared to boys at 18%.
- Evidence shows that behaviour imbibed during adolescence has a higher chance of being continued in adult life.
- Ensuring appropriate nutrition for adolescent girls is paramount considering the inter-generational impact it has on combating malnutrition.

Present Status

- The **National Family Health Survey (NFHS)-5** data show an increase in anaemia among adolescent girls by 5% when compared to NFHS-4.
- The **Comprehensive National Nutrition Survey 2019** shows that even before the pandemic, consumption of diverse food groups among adolescents was low.
- The fallout of COVID-19 has further worsened dietary diversity, especially of women, adolescents and children.
- The lockdowns also led to the loss of mid-day meals and interruptions in **Weekly Iron Folic Acid Supplementation (WIFS)** in schools for adolescent girls.

Concerns / Challenges

- Challenges in providing nutrition services to out-of-school adolescent girls.
- The adolescent's nutritional status is related to the burden of multiple micro nutrient deficiencies.
- Currently, 80% of adolescents suffer 'hidden hunger' due to micro nutrient deficiencies.
- Over 10% of adolescents are overweight in 12 States of India.

Way Forward

- Government's health and nutrition policies need to emphasise on strong compliance to **diverse diets and physical activities**.
 - This includes locally sourced fruits and vegetables, seasonal diets, and the inclusion of millets.
 - Strengthening **nutrition counselling** for adolescent girls through community workers' home visits.
 - Promote good nutrition among adolescents through **Nutri-Smart schools** (building kitchen gardens in schools).
 - Virtual counselling, and comprehensive nutrition counselling through community-based events.
- We need to also think beyond schools, as the diverse plates are first set at home.
 - Young girls need to be equipped with accurate information about appropriate diets so that they can act as change agents for their families, community, and peer groups.
- Need to strengthen our policy initiatives to address deficiencies of not just iron and folic acid, but also **vitamin B12, vitamin D, and zinc**.
- The design of **Mission POSHAN 2.0** needs to be inclusive of the growing risk of non-communicable diseases and obesity among adolescents.
- Strict action plans need to be devised against the sale and advertisement of unhealthy foods and beverages.

Topic: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

8. Preventing Delay in the Census of India

Introduction

- In India, historical tradition of conducting a Census has been maintained in spite of several adversities like wars, epidemics, natural calamities, political unrest etc.
- Very few countries in the world can boast of such a distinction.
- India appears to be on the verge of losing that distinction now.

Importance of Census

- **The census is the foundational database for official statistics and policymaking in a modern economy.**
- Fertility rates, migration, schools, urban policy, urban housing, migration all are decided by Census.
- Outdated census data makes block and district-level planning particularly difficult.
- Survey estimates for a region or community are scaled up based on population estimates provided by the census.
- The lack of reliable population figures has created a huge challenge for statisticians across the country.

Delay in Census

- The uninterrupted run of the Indian census was broken when the 2021 census got derailed.
- The pandemic is being cited as the official reason for the delay.
- **Delaying the exercise further will derail several welfare programmes, policies and resource allocations, which are based upon population data.**

International practice

- Countries across the world have conducting their decennial censuses, since the Covid pandemic.
- In Asia alone, 12 countries, including Nepal and Bangladesh, have conducted censuses in the 2021-22 period.
- In almost all G20 economies, it is the respective national statistical office that handles census operations.
- In most of them, there are well-institutionalized mechanisms to insulate statistical offices from the politics of the day.

Institutional structure governing census operations

- **The Registrar General of India (RGI), who heads census operations, reports to the home ministry.**
- The ministry of statistics and programme implementation (Mospi) has very little role in the census operations.
- An attempt was made by the National Statistical Commission (NSC) in 2011 to bring both Mospi and RGI under the umbrella of an independent statistical authority, accountable to Indian Parliament.
- However, it faced stiff opposition from the RGI and the home ministry.

Way Forward

- Madhava Menon's report must be revived if the Census of India is to be saved from needless disruptions and inexplicable delays.
- To uphold the integrity of the census data, it has to be insulated from day to day politics.
- The world's largest democracy deserves clean and honest data.

Topic: Important aspects of governance, transparency and accountability

9. Reducing India's Prison Footprint

Introduction

- **At the Constitution Day celebrations, the President Droupadi Murmu highlighted that prisoners were often unaware of their fundamental rights and had been incarcerated for prolonged periods for minor offences, while their families were unable to bail them out.**
- President Murmu emphasised how the judiciary, executive, and legislature must work together to help them.

Recent Issue

- Delhi Development Authority (DDA) is constructing a district prison complex in Narela.
- The prison administration has incorporated stringent security measures in the design.
- French philosopher Michel Foucault has extensively written about how the architecture of prisons is often used as a tool to torture, and break the souls of inmates.
- Delhi prison administration is essentially creating solitary confinement which will have a severe detrimental effect on prisoners' mental health.

Need for Prison Reforms

- **Prison reform is necessary to ensure that human rights of prisoners are protected and their prospects for social reintegration are increased.**
- Prisons are not isolated from the society and prison health is public health. It is important to provide adequate health facilities.
- For protecting the rights of inmates with mental health-care needs.

Prisons Governance in India

- Prisons in India, and their administration, is a state subject covered by item 4 under the State List in the Seventh Schedule of the Constitution of India.
- Prisons in India are governed by the Prisons Act, 1894, a colonial legislation that treats prisoners as sub-par citizens and provides punishment to be retributive, rather than rehabilitative.
- These laws are also highly casteist and remain largely unchanged since they were drafted by the British.
- For example, some jail manuals continue to focus on purity as prescribed by the caste system and assign work in prison based on the prisoner's caste identity.

Present Status

- Dalits and Adivasis are over-represented in Indian prisons.
- Legislations such as the Habitual Offenders Act and Beggary Laws allow the police to target them for reported crimes.
- The primary reason why prisons are overcrowded is that India has not done enough to truly prevent crime.
- Prisoners' health conditions deteriorate in prisons which are overcrowded, where nutrition is poor, sanitation inadequate and access to fresh air and exercise often unavailable.
- Imprisonment disproportionately affects individuals and families living in poverty.
- When released, often with no prospects for employment, former prisoners are generally subject to socio-economic exclusion.

Way Forward

- **In the words of Nelson Mandela, “a nation should not be judged by how it treats its highest citizens, but its lowest ones”.**
- Progress is antithetical to setting up prisons, and we must address congestion in prisons in non-carceral ways.
- These could include releasing unwell or old inmates, reducing penalties, allowing bail at affordable costs, employing anti-carceral ways of holding people accountable for their crimes, and expediting trials.
- **Our approach to crime should be preventive, rather than reactive.**
- Instead of investing thousands of crores in finding “state-of-the-art” ways to cage and harm people, the state should reflect on the soul of India's Constitution which imposes welfare obligations on the state.
- **Prisons should have reformatory approach rather than retributive one.** Basic human rights of the prisoner should be protected and be given another chance to live a meaningful life.
- Inculcation of scientific method of investigation in Police force and curtailing the practice of third-degree torture.

Topic: Development processes and the development industry- the role of NGOs, SHGs, various groups and associations, donors, charities, institutional and other stakeholders.

10. Restoring the Credibility of Civil Society Organisations

Introduction

- All over the world, the influence of civil society organisations, popularly known as NGOs, is increasing.
- However, their credibility seems to be going south.

India's Role

- India's presidency of C20 (Civil Society 20)—an engagement group of the G20—provides us with an opportunity to influence global discourse around civil societies.
- India hosting C20 is also important because the authentic civil society concept in India is intertwined with the spirit of voluntarism.
- In India, collective action has always been the key to emancipation.

- Our basic philosophical approaches have always struck a fine balance between individualism and collective spirit.
- It is because of this that Indian civil societies traditionally aspire to become movements—of the people, by the people, for the people.
- Voluntary work, as envisioned by the Indian philosophy, is inspired by a sense of indebtedness towards society at large.
- Our ancient scriptures like the Upanishads also explain the importance of daan as duty and as part of repaying societal debt.
- Our scriptures also refer to shram-daan, anna-daan, vastra-daan and gyan-daan.
- During freedom struggle, Tilak, Gandhi, Ambedkar and Savarkar established organisations for nationalistic education, public awakening and popular mobilisation.

Recent Study

- Civil society organisations are self-appointed rather than elected, and thus do not represent the popular will.
- Civil society organisations receiving foreign funding are accountable to external rather than domestic constituencies and advance foreign rather than local agendas.
- Civil society groups are elite actors who are not representative of the people they claim to represent.
- Concerns about the very credibility of civil society and NGOs are a universal phenomenon.

Civil society organisations in the development sector

- Civil society organisations in the development sector gained prominence when the implementation of the ideal welfare state under a democratic government continued to be challenging.
- Wherever and whenever government organisations failed, NGOs made an entry.

Way Forward

- Issues like human rights, sustainability, gender justice, etc. are universally important.
- Civil society must find solutions to all of them.
- A self-regulatory mechanism that defines a healthy relationship between civil society and the government and laying down clearly stated dos and don'ts, thereby setting high standards of functioning and accountability, could be a way to go.
- To start with, C20 can come out with a 'Universal Charter of Reforms' for itself.

General Studies - 3

Topic: Infrastructure: Energy, Ports, Roads, Airports, Railways etc.

11. Offshore Wind Energy

Introduction

- Offshore wind energy refers to the **deployment of wind farms inside the water bodies**. They utilise the sea winds to generate electricity.
- Offshore wind turbines produce electricity which is returned to shore through cables buried in the ocean floor.

India's Potential

- **India can generate 127 GW of offshore wind energy with its 7,600 km of coastline**, according to the MNRE.
- The total wind energy potential is 302 GW at a 100-meter hub height, according to the National Institute of Wind Energy (NIWE).
- 36 GW of offshore wind energy potential exists off the coast of Gujarat and nearly 35 GW exists off the Tamil Nadu coast.

- Its vast potential remains untapped, six years since India created a National Offshore Wind Energy policy.

Why offshore wind energy is important for India

- India's energy demand is set to grow by 3% per year up to 2040.
- India announced a new climate pledge of meeting 50% of its energy requirements with renewable energy by 2030.
- Offshore wind energy will help achieve this target.

Offshore Wind Energy: Benefits

- In India, where land is limited and the population is increasing, large wind farms positioned over water bodies will be vital.
- It is proven that **offshore wind turbines are more efficient** compared to onshore ones.
- **Wind speed over water bodies is high** and is consistent in direction. As a result, offshore wind farms generate more electricity per installed capacity.
- **Fewer offshore turbines are required** to produce the same capacity of energy as compared to onshore ones.
- As the **offshore wind is stronger during the daytime**, it ensures a more consistent and efficient electricity generation when consumer demand is at its highest.
- Offshore wind farms have a **higher capacity utilisation factor (CUF)** than onshore wind farms. Therefore, offshore wind power allows for longer operating hours.
- The advantages of offshore wind farms and the abundance of offshore wind potential in India enable them to play a huge role in achieving the desired **climate commitment and energy security goals**.

Challenges of offshore wind energy

- Local substructure manufacturers, installations vessels and trained workers are lacking in India.
- Offshore wind turbines require stronger structures and foundations than onshore wind farms. This can cause **higher installation costs**.
- Distribution companies (DISCOMS) in India are loss-making and unable to build infrastructure to help transition to renewable energy sources.
- The action of waves and even high winds, particularly during **storms or hurricanes, can damage wind turbines**.
- Offshore wind farms require **maintenance** that is more costly and difficult to perform.

Way Forward

- Ministry of New and Renewable Energy can set specific wind **Renewable purchase obligation (RPO)** targets for each state just like it does for solar.
- If excise duties and GST could be waived for wind farm components, early project development will be more affordable.
- Discoms can adopt **feed-in tariff (FiT) regulations** and make offshore wind power procurement mandatory.
- A feed-in tariff is a policy tool designed to promote investment in renewable energy sources.
- FiT can be used to promote offshore wind power in the early stages of development until it becomes economically viable.
- A **long-term contract and price guarantee** reduces the inherent risk in renewable energy production, encouraging investment and development.
- Discoms can ensure **priority payments for offshore wind projects**.
- The underwater power evacuation and subsea substations could be developed by the Power Grid Corporation of India Ltd. This would reduce the risk faced by offshore wind farm developers.

Topic: Conservation, environmental pollution and degradation

12. Path to Decarbonisation

Introduction

- The energy market has fragmented and energy nationalism is the driving force behind policy.
- Against this international backdrop, India must pivot the needle of its energy compass towards short-term energy security and long-term decarbonisation.

Coal Ecosystem

- **Coal will remain the bulwark of India's energy system for decades.**
- Hundreds of thousands depend on the coal ecosystem for their livelihood.
- The option of phasing out coal whilst environmentally compelling is not yet a macroeconomic or social possibility.
- In the interim, the government has to find an energy transition route that balances livelihoods and pushes forward the green agenda.
- Some small feasible steps in that direction would include
 - increased R&D expenditure for coal gasification and carbon capture and sequestration technologies;
 - setting a carbon tax;
 - the establishment of regulatory and monitoring mechanisms for measuring carbon emissions from industry;
 - the closure of inefficient and old plants and a decision not to approve any new ones.
- Niti Aayog could pull together a group of economists and energy experts to determine the competitiveness of coal versus solar on a full-cost basis.

Demand conservation

- Energy security cannot be achieved by focusing only on the supply and distribution side.
- **The demand conservation and efficiency side is equally important.**
- Europe will save 10 bcm of gas annually by simply adjusting their thermostats downwards by 1-degree centigrade.
- The government has conceptualised several demand management measures, but these have not been rigorously implemented.
- So a priority for 2023 should be to fill this lacuna.

Energy Security

- The government must increase the productivity of our existing Oil producing fields.
- Additional resources should be allocated for accessing relevant enhanced oil recovery technologies.
- India should enhance the strategic petroleum reserves to cover at least 30 days of consumption.
- The construction of a pan-India national gas pipeline grid should be expedited.

Policy Measures

- The underlying structural issues currently impeding the scaling up of renewables must be addressed. These include
 - repair of the balance sheets of state distribution companies (discoms),
 - easing the procedures for the acquisition of land and
 - removal of regulatory and contract uncertainties.
- It will take decades to harness our indigenous resources for the build up a domestic chip industry.
- In the interim, diplomats should secure diversified sources of supply to reduce the country's vulnerability.
- Creation of an enabling ecosystem for developing and commercialising third-generation clean energy technologies like hydrogen, biofuels and modular nuclear reactors.

Decarbonisation

- India is not responsible for global warming, but it will be amongst the worst affected.
- The livelihoods of those who live around the coastline will be undermined by rising sea levels.
- Millions will also be affected by melting glaciers and extremes of temperatures.
- So irrespective of who is to blame, India has to stay on the path of decarbonisation.

13. Decarbonisation

Introduction

- India's per capita emissions are relatively low, but we are still the world's third-largest single emitter.
- India has pledged to get to net zero by 2070.
- **Reaching net-zero could benefit India through lower-cost energy, greater energy security and the growth of futuristic industries.**

Decarbonisation drive

- On its current trajectory, India's emissions are set to grow from 2.9 GtCO₂e a year to 11.8 GtCO₂e in 2070.
- According to a recent McKinsey report, effective decarbonisation, down to 1.9 GtCO₂e by 2070, would require India to spend a total of \$7.2 trillion on green initiatives by 2050.
- Deeper decarbonisation — an “accelerated scenario” that would reduce emissions to just 0.4 GtCO₂e by 2050, or close to net zero — would require \$12 trillion in total green investments by 2050.
- Under this scenario, India could create 287 gigatonnes (GT) of carbon space for the world, almost half of the global carbon budget.

Benefits of Decarbonisation

- Decarbonisation will drive many changes,
 - from how we source energy to how we manufacture materials;
 - from how we grow food to how we move around;
 - from how we treat waste to how we use our land.
- If India shifted to a predominantly renewable based energy and materials system, it could save as much as \$3 trillion in foreign exchange by 2070

Advantages for India

- India's high taxation on automotive fuels translates to an imputed carbon tax of \$140 to \$240 per tonne of carbon dioxide.
- **This makes electric vehicles competitive against petrol or diesel ones.**

Concerns / Challenges

- **India risks being land-short for its dual goals of growth and decarbonisation.**
- Recent distress due to coal shortages as demand bounced back after the pandemic.

Decarbonisation plans for India

- Set out five-year, 10-year, and 25-year national decarbonisation plans.
- **A national decarbonisation plan would enable timely investment decisions.**
- India would need to **maximise the use of barren land for renewable power, urbanise vertically, improve agricultural productivity, and increase forest density.**
- Establish a national authority, in consultation with the states, to set land-use guidelines.
- **Pricing carbon** creates demand signals that accelerate emissions reductions, especially in hard-to-abate sectors.
- For example, With a price on carbon emissions, more expensive green steel becomes competitive against high-emission steel.
- **Futuristic investment will need India to take urgent actions on regulation, technology development, and technology adoption — to make the right investments.**

- Companies can invest in opportunities like recycling, hydrogen, biomass, electrolyzers, rare earths, battery materials and battery making.
- Companies could invest in opportunities opened up by decarbonisation of other countries, such as exporting green hydrogen derivatives like ammonia.

Conclusion

- **To embark on an orderly path to net zero, India needs imagination, realism, determination — and a sense of urgency.**
- We must take steps this decade to set things up, to establish momentum, and to build India right for generations to come.

14. Saving Urban Ecology

Introduction

- In 2019, a group of 15 people came together to save nearly 1,000 banyan trees, many a century old, slated to be felled for a highway widening project.
- These banyans are habitat to birds of prey and other wildlife.

Striking at the root

- **Across urban India, civil society groups are bravely rising to protect their city's treescape.**
- They use every tool at their disposal: protests, petitions, judicial activism, social media campaigns, and the Right to Information Act.
- In 2018, when Karnataka proposed an amendment to the Karnataka Preservation of Trees Act of 1976, adding to the list 50 more species of trees that could be felled without permission— a group called Heritage Beku organised a 'pre-emptive strike'.
- It was a greatly successful programme because it prevented a disastrous thing from happening.

Mumbai's Case

- **'Save Aarey' campaign**, comprising thousands of people are pushing back on a proposed Metro Rail car depot project that is going to cost scores of trees in the 3,000-acre Aarey forest in the middle of the city.
- Over the past 20 years, Aarey has lost more than 100 hectares of vegetation.

The capital's canopy

- Since 2018, in Delhi, hundreds of citizens have been fighting to save 16,000 trees set to be axed for the General Pool Residential Accommodation, a redevelopment project that aims to upgrade housing for government officials.
- The High Court judgment went in favour of the project, with modifications to save a few trees.
- Three trees are felled every hour in Delhi, with due permission of the Delhi government.

Protecting urban ecology

- **Some of the civil society-led movements to protect urban ecology have been documented in a 2022 report, 'Regulating Urban Trees in India'.**
- The report looks at tree laws implemented in several States and how they are often not equipped to deal with the intense pressure on urban ecology from real estate and infrastructure growth.
- The offset measures often promised to make up for tree loss, such as compensatory afforestation and tree transplantation, are based on a flawed developmentalist notion.
- For instance, last year, the Ministry of Environment, Forest and Climate Change granted Stage 1 clearance to divert 130 sq.km. of rainforest in the Great Nicobar Island that includes an airport and a township.
- Compensatory afforestation will be carried out miles away in the mainland, in Haryana.
- Great Nicobar Island is a hugely diverse and rich landscape and also geologically volatile and vulnerable.

- How can tree planting in a semi-arid zone, in Haryana, really compensate for the loss of tropical forest in an island system?

Way Forward

- **We should work on collecting data, influencing policy and convincing the government that there should be a moratorium on tree-felling until we get to an air quality index [AQI] 50.**
- Urban forests such as Aarey or the Delhi ridge are crucial for the health of city-dwellers.
- This is crucial for citizens' health and wildlife, but also for the urban poor who depend on them for livelihood, collecting leaves, seasonal fruits, firewood, flowers for their own use and sale.
- **Formulating an urban tree preservation act and formation of a committee towards the protection of mature trees across public spaces.**

15. India's Marine Litter Problem

Introduction

- India generates 55 million tonnes of municipal waste annually, of which only 37 per cent is treated, according to the Central Pollution Control Board.
- From the deepest parts of the ocean to the most remote oceanic islands, plastics and microplastics are all-pervasive.

Municipal solid waste

- Growing population, rapid urbanisation, shifting consumption pattern and changing lifestyles have resulted in the mismanagement of plastic waste, leading to the accumulation of municipal solid waste.
- Most of these items, especially plastic items, contribute significantly to the growing burden of marine debris.
- Land-based sources account for most of the plastic in the water.
- Unaccounted waste from urban agglomerations is carried by river systems to oceans for final dumping.
- Many states claim Single Use Plastic above 50 microns is banned, but on the ground, the ban is not effective.

Marine Debris

- India's coastline contributes to its ecological richness, biodiversity and economy.
- Every year, thousands of tonnes of garbage, composed of plastics, glass, metals, sanitary products, clothes, etc., are dumped into it.
- Plastics contribute a major portion of about 60 per cent of the total marine debris that reaches the oceans.
- Waste management in this intensely populated region is a meticulous task.
- Only 60 per cent of the total collected plastic waste is recycled.
- India is reeling under the marine debris crisis, which poses serious threats to its particularly rich marine biodiversity.
- Marine litter is spread along the entire water column.
- High quantities of sediments are noticed during monsoon due to their spread into coastal water through creeks/rivers/estuaries.
- Extreme weather events such as heavy rainfall and cyclones may be transporting a significant amount of plastic litter into the sea, according to a new study.

Government Initiatives

- **The Ministry of Earth Sciences, through its attached office National Centre for Coastal Research (NCCR), has undertaken beach clean-up initiatives, awareness programmes and beach litter quantification studies at regular intervals.**

- Many studies have been conducted across coastal states and Union Territories Puducherry, Andaman and Nicobar and Lakshadweep.
- NCCR has initiated monitoring of the temporal and spatial distribution of marine litter along the Indian coasts and adjacent seas.

Way Forward

- The **National Marine Litter Policy of India**, announced in 2018, should be formulated.
- Understanding the source and distribution of plastics can help target priority areas to implement mitigation policies.
- A **forum of coastal cities** should be created to build a synergetic association of urban local bodies and local administration located on the coast.
- Initiatives like a **multi-stakeholder approach** that will recognise knowledge, expertise, technology, research and capacity building to safeguard life below water can be beneficial.
- **Regular beach clean-up and awareness programmes should be conducted instead of annual ones.**
- **Steps should be taken to execute the ban of single use plastics.**

16. Coral reefs Ecosystem

Introduction

- As many as 10 per cent of coral reefs have degraded; another 30 per cent are likely to disappear within next 20 years across the globe.
- If proper conservation and management measures are not taken, all coral reefs of the Indo-Malayan region may disappear in the next 40 years.

Coral reefs

- Coral reefs are unique and the most diverse marine ecosystems on Earth.
- Corals are composed of hundreds of thousands of individual animals known as polyps.
- Most corals feed on microscopic animals during the night time.

Benefits

- **Corals play a crucial role in supporting the flora and fauna in the marine ecosystem.**
- They have provided pleasure and protection from storm and other natural calamities.
- **They are also described as ‘underwater tropical rainforest, biologist’s paradise, magnificent repository of resources, genetic garden, submerged meadows and treasure house of wealth’.**
- They act as barrier against waves and thus prevent coastal erosion.
- Mangroves and the sea grass beds, which act as breeding ground of various marine faunal species, are protected by coral reefs.
- Coral reefs act as breeding, spawning, nesting and feeding areas for many fishes and other marine organisms.
- They provide revenue and employment through tourism and recreation.
- They provide habitats for fishes, starfish and sea anemones.
- It has been assessed that one square kilometre of coral reef produces 20-35 mega tonnes of fishes sufficient to feed about 600 people annually.
- They are used in jewellery and as curios.
- The lime supplied by corals is used in cement industries.

Global Distribution

- Indonesia has the largest coral reef area in the world.
- India, Maldives, Sri Lanka and Chagos have the maximum coral reefs in South Asia.
- The Great Barrier Reef of the Queensland coast of Australia is the largest aggregation of coral reefs.
- India has four coral reef areas: Gulf of Mannar, Andaman and Nicobar Islands, Lakshadweep islands and the Gulf of Kutch.

The threats

- Coral reefs face threats due to **anthropogenic activities** such as coastal development, destructive fishing methods and pollution from domestic and industrial sewage.
- They have been deteriorating at a faster rate due to **increased sedimentation, over-exploitation and recurring cyclones**.
- Dynamite and cyanide fishing cause serious threat to coral reefs and their biodiversity.
- Domestic wastes, industrial wastes, fertilisers and other toxic chemicals when let into the oceans cause serious damage to coral reefs.
- When the ocean water becomes too warm, the corals bleach as the symbiotic algae (Zooxanthallae) leave them.

Way Forward

- An **integrated coastal management plan** is the need of the hour for effective management of coral reefs.
- An act to protect them from man-made activities has to be brought in.
- Over-exploitation of the coral reefs should be brought under control.
- Fishing by using dynamite, cyanide and explosives in the areas where coral reefs are found should be banned.
- Pollution caused by domestic sewage, industrial wastes, chemicals and fertilisers should be restricted.
- Anchoring of boats in the areas where coral reef areas are present should be banned.
- Planting of mangrove species in reef areas can be undertaken with the involvement and support of the local community.
- **The Union Ministry of Environment, Forest and Climate Change and the state governments concerned should take speedy action to conserve the coral reefs which are being pushed towards the verge of extinction.**

Topic: Science and Technology- developments and their applications and effects in everyday life.

17. Voice biometrics technology

Introduction

- Bank and cyber frauds in India are on the rise.
- **One way to reduce losses is by adopting Voice Technology (VT), which encompasses voice biometrics or voice/speech recognition technology.**
- The voice biometrics industry is growing exponentially now.

Bank and cyber frauds

- According to data by the Reserve Bank of India, frauds have cost the country an estimated ₹100 crore a day over the last seven years.
- The frauds reported in 2021-22 were 23.69% higher than in the previous year.
- The main reasons for the rise in fraud include greater use of digital payments, telephone banking, and online banking services.
- Growing fraud also means rising losses for financial institutions and increasing cases for law enforcement to solve.
- Although banks have traditionally relied on the use of passwords, passwords are the weakest link in security.

Voice Technology (VT)

- The global adoption of smartphones has led to a dramatic increase in biometrics for security.
- However, these methods are cumbersome, not entirely secure, and vulnerable to deep fakes.
- **One of the best ways to reduce fraud is through the use of voice biometrics.**
- In February 2019, HSBC became the first bank to take the revolutionary leap in introducing voice recognition for mobile banking customers — telephone banking fraud cases fell by over 50%.

Benefits

- Voice authentication can significantly **improve security over knowledge-based authentication methods, which fraudsters have exploited to scam people.**
- Compared to other biometrics, **voice use is the cheapest technology**, and does not require a reader or special device.
- Unlike a password, a customer's voice is impossible to spoof or copy, and is far more challenging to hack.
- VT verifies a caller swiftly in seconds by analysing the caller's voice and flags suspicious calls.
- VT **allows privacy** because it does not require users to reveal personal information.
- Voice biometrics can **help financial institutions to ensure higher levels of protection** for customers and employees.

Growing applications

- VT is an essential tool for **forensics and law enforcement.**
- The police can leverage voice to improve investigation efficiency, identify criminals, track criminals, and better respond to and prevent crimes.
- Voice is finding use from criminal background checks to airport security.
- Voice has a much lower error rate, and requires no eye contact.
- VT has the advantage of reducing call handle times and call centre costs, besides ensuring high-accuracy authentication in seconds.
- Voice could be an excellent tool for the Government to disburse money for various schemes and verify the proof of life of pensioners from their homes.

Concerns / Challenges

- The technology may not be 100% fool proof, may give false positives, and has an accuracy between 90% and 99%.

Way Forward

- In the context of fraud, the Government needs to develop a mechanism for proper coordination between financial institutions and the police to investigate and prosecute fraudsters and to maintain an extensive database of such criminals.
- Voice biometrics tech is making waves in the world of fraud protection by providing an extra layer of protection for data.
- Although the technology is not yet perfect, the potential benefits are significant.
- Once it is in place, user establishments can reap the benefits from a substantial reduction in fraud, making the technology an essential feature in the security toolkit of the future.

Topic: Awareness in the fields of IT, Space, Computers, robotics, Nano-technology, bio-technology and issues relating to intellectual property rights.

18. Applications of Biotechnology

Introduction

- **United Nation Convention on Biological Diversity**, defines **Biotechnology** as “any technological application that uses biological systems to make or modify products or processes for specific use”.
- Biotechnological innovations are already part of our daily lives and we find them in pharmacies and supermarkets, among many other places.

Biotechnology to fight diseases

- Techniques like **gene therapy, recombinant DNA technology and polymerase chain reaction** can diagnose diseases and insert new and healthy genes in the body which replace the damaged cells.
- Genetic modification in mosquitoes can **solve the problems of epidemic diseases** such as dengue and malaria
- **Artificial insemination** is used extensively in breeding animals, such as sheep and cattle.

- **Stem cell therapy** has the potential to dramatically change the treatment of human disease. Eg: Bone marrow transplants that are used to treat leukaemia.

Biotechnology in Agriculture and fight hunger

- Biotechnology has played major role in agriculture by **altering genes, studying and cloning various crops to provide better quality products of foods.**
- **Hybrid Seeds, Photosynthesis improver, Stress resistant crops and plants, Bio-fertilisers, Bio-pesticides** are some of the potential applications.
- Wide range of agricultural applications are in areas such as **livestock management**, sustaining crop yields, and reducing the use of fertilizers, herbicides and pesticides.
- Biotechnology offers a very promising **alternative to synthetic foods** and an improvement on conventional plant-breeding technologies.
- It helps in improving the edibility, texture, and storage of the food; in preventing the attack of the food, mainly dairy, by the virus like bacteriophage.
- Biotechnology also has applications in the **detection of mutagens** (substances that cause genetic mutations) in individual food products.
- **Fortification of major staples** with micro nutrients like vitamin A, zinc and iron can be game changers for hunger problem in India.

Biotechnology in Environment

- Biotechnology can **address environmental problems**, such as genetic rescue of a species, the removal of pollution, renewable energy generation or biomass production.
- The benefit of **environmental biotechnology** helps us to avoid the use of hazardous pollutants and wastes that affect the natural resources and the environment.
- Through **bioremediation** processes, very useful for ecological recovery, the catabolic properties of microorganisms, fungi, plants and enzymes are used to restore contaminated ecosystems.

Concerns / Challenges

- The **proliferation of laboratory foods** could end crop diversity. It may also affect the balance of ecosystems.
- The risks include unforeseen allergies, poisoning of living organisms and modified bacteria escaping from a laboratory.
- Cloning, the modification of the human genome and assisted reproduction are matters of ethical debate and social controversy.

Conclusion

- Every new drug discovery or drug approval adds value to biotechnology companies.
- India with its young workforce and a potential market for the end-products is a bright future for the biotechnology sector.

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