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GIST OF DOWN TO EARTH MAGAZINE

MARCH 2022 EDITION

PART-II

Important Articles Simplified!

Overexploitation Of Groundwater in the Country

The 6th Mass Extinction!

Plastic Endgame

Urgency Of Climate Justice

The Anthropocene Epoch

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1. "Overexploitation Of Groundwater in the Country"

Relevance

GS 3: Conservation, Water Resources, Irrigation

Introduction

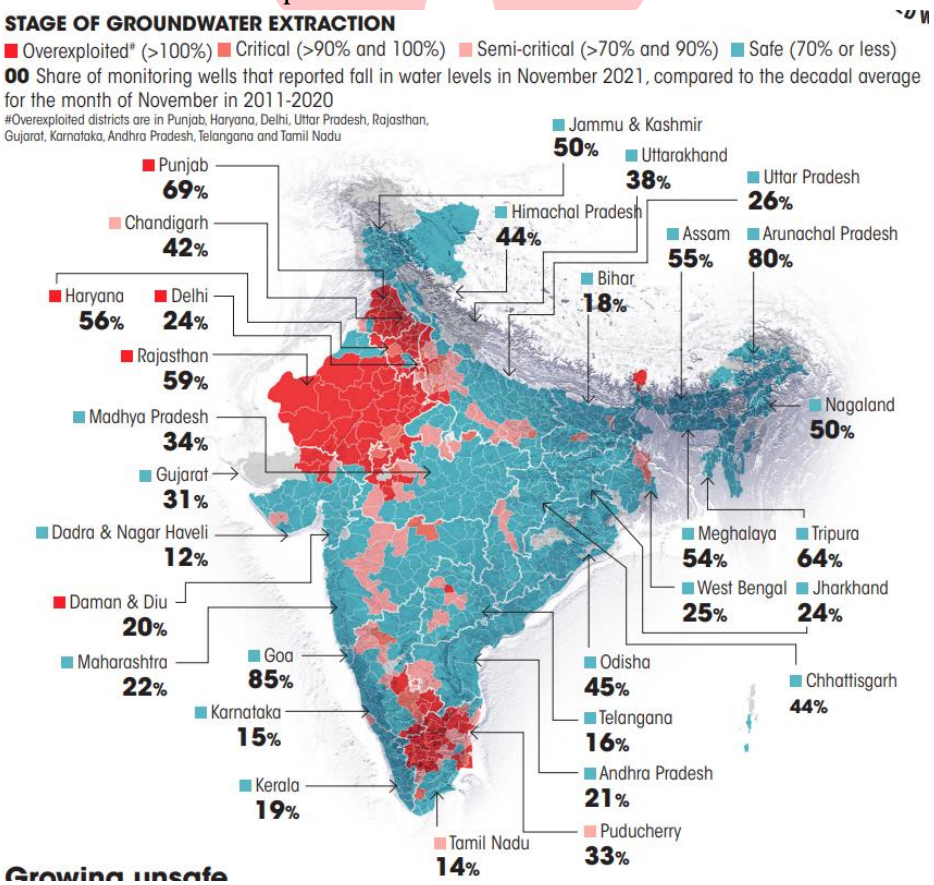
- Three of the world's top five groundwater-extracting countries are in **Asia,** with India leading the list.
- At least **10 states** in the country have districts that overexploit groundwater.
- As per the **Jal Shakti ministry's assessment,** the annual groundwater extraction in the country for all uses is 249 billion cubic metres, out of which 89 per cent is utilised for irrigation and the remaining 11 per cent for industrial and domestic use.

Countries with the highest groundwater abstraction

India - 251 km^3/year
China - 112 km^3/year
US - 111.7 km^3/year
Pakistan - 64.8 km^3/year

Countrywide Situation

- The over-exploitation of groundwater resources is the highest in **Punjab** among all other states in the country.
- Punjab is followed by **Delhi with 65 per cent and Rajasthan with 63 per cent.** In **Haryana, 61 per cent** of the assessment units were being over-exploited.
- While over-exploitation of groundwater is the highest in some regions, there are many states and union territories where there is no over-exploitation.



- The Central Groundwater Board of India estimates that about 17% of groundwater blocks are overexploited (meaning the rate at which water is extracted exceeds the rate at which the aquifer is able to recharge) while 5% and 14%, respectively, are at critical and semi-critical stages.
- India is home to 16% of the world's population, but only holds 4% of the world's freshwater resources.

What GOI is doing?

- The government of India regulates groundwater exploitation in water-stressed states through "notification" of highly overexploited blocks that restrict the development of new groundwater structures (except those for drinking water). However, only about 14% of the overexploited blocks in the country are currently notified.
- Though there is no proposal to restrict the use of groundwater in the agriculture sector, central and state authorities are regulating groundwater use by industries and mining projects.

Jal Shakti Abhiyan (JSA)

- The government of India launched **Jal Shakti Abhiyan (JSA) in 2019,** a time-bound campaign with a mission mode approach intended to improve water availability including groundwater conditions in the water-stressed blocks of 256 districts in India.
- Further, Ministry launched **'JSA-II-Catch the Rain' on 21 December 2020** for awareness generation among people.

Atal Bhujal Yojana (Atal Jal)

- The government of India is implementing the **Atal Bhujal Yojana (Atal Jal),** a Central Sector Scheme, for sustainable management of groundwater resources with community participation.
- Atal Jal is being implemented in 80 water-stressed districts of seven States viz. **Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh.**

What States are doing?

- Water being a State subject, initiatives on water management including conservation and water harvesting in the Country is primarily States' responsibility.
- A number of States have done notable work in the field of water management/conservation.
- Of these, mention can be made of **'Mukhya Mantri Jal Swavlamban Abhiyan' in Rajasthan, 'Sujalam Sufalam Abhiyan' in Gujarat, 'Mission Kakatiya' in Telangana, 'Neeru Chettu' in Andhra Pradesh, 'Paani Bachao, Paisa Kamao' in Punjab and 'Jal Hi Jeevan' in Haryana** among others.

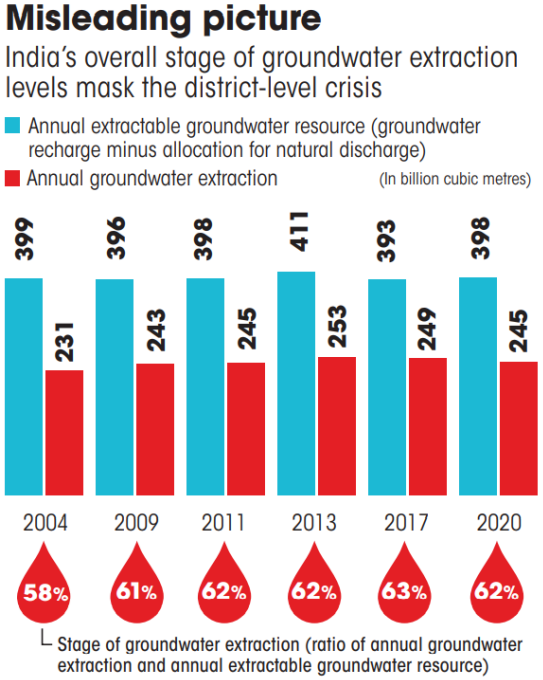
About Central Ground Water Authority

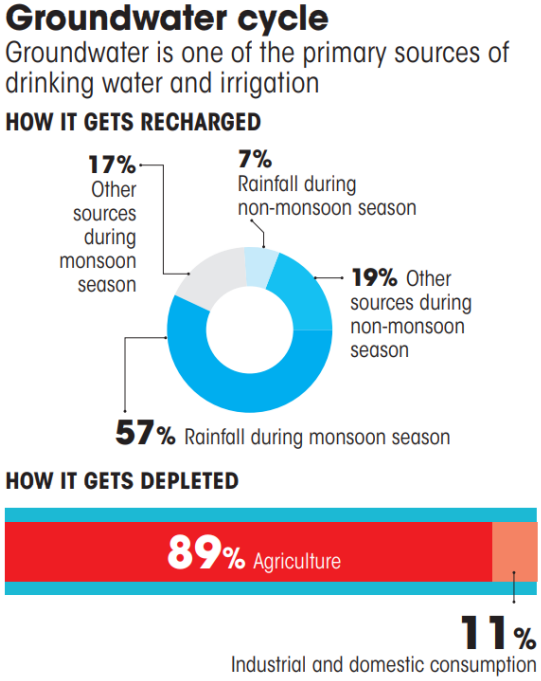
- **Central Ground Water Authority (CGWA)** has been constituted under **Section 3 (3)** of the **"Environment (Protection) Act, 1986"** for the purpose of regulation and control of groundwater development and management in the Country.
- CGWA grants No Objection Certificates (NOCs) for ground water abstraction to Industries, Infrastructure units and Mining projects in feasible areas in certain States/UTs where regulation is not being done by the respective State/UTs

What should be done?

- Measures such as surface water harvesting through **farm ponds and check-dams, the installation of water-efficient irrigation systems (e.g. more efficient drips and sprinklers)** and growing less water-intensive crops, need to be integrated on the demand side for improved management and reduced depletion.

- Local-level regulatory action in all threatened blocks before they reach the "overexploited" stage is vital to avert depletion.





- The **participatory Groundwater Management approach (PGM)** should be adopted countrywide as it empowers communities in a defined aquifer area by providing governance rights, community awareness, capacity development, and knowledge and motivation for social regulation and the implementation of coordinated actions.
- The key institutional challenge for groundwater governance is **strengthening local institutions** and helping the informal groups to remain viable during the post-project phase.

Conclusion

Groundwater extraction has allowed rural families to reduce short-term vulnerability but may incur trade-offs and increase the risk of depletion and ultimately increase vulnerability in the long term. So, we need to move back to traditional scientific methods of storage and use.

2. "The 6th Mass Extinction!"

Relevance

GS 3: Environmental Pollution & Degradation, Conservation

Context

- Earth is losing species at an unprecedented rate, which, many believe, is the planet's **sixth mass extinction.**
- Since the biodiversity loss this time is the doing of humans, the event also marks the beginning of the **Anthropocene Epoch.**
- The **"Living Planet Report 2020"** points out five major reasons behind the biodiversity loss across the planet: **changes in land and sea use(habitat loss and degradation), overexploitation of species, invasive species and disease, pollution and climate change.**

History Of Mass Extinctions

1st Extinction

The Ordovician Era.

443 million years ago 85% of all species went extinct

Reasons: An "ice age" followed by a rapid warming.

2nd Extinction

The Devonian Age.

374 million years ago 75% of all species went extinct.

Reasons: Fluctuating sea levels, altering global cooling and warming, drop in CO2 concentration and periods of low oxygen.

3rd Extinction

The Permian Age.

250 million years ago 95% of all species went extinct

Reasons: An asteroid hit the planet, filling the air with pulverised particles, leading to inhabitable climate conditions.

4th Extinction

- **The Late Triassic Age.**
- 200 million years ago 80% of all species went extinct
- Reasons: Some colossal geological activity in today's the Atlantic Ocean that resulted in high CO2, global warming and acidified oceans.

5th Extinction

- **Cretaceous Period.**
- 65 million years ago 76% of all species went extinct.
- Reasons: Meteor crash in the Yucatan peninsula in Mexico, high volcanic activity.

6th Extinction

- **The Holocene Epoch.**
- About 99% of the planet's species have been lost in the previous five mass extinctions Ongoing.
- Reasons: Anthropogenic factors like climate change and the introduction of invasive plant species.

What Worldwide Research Hints?

- The **Global Assessment Report on Biodiversity and Ecosystem Services,** the first such by the **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)** released in 2019, shows that the current rate and scale of extinction is unprecedented and is being caused majorly by humans.
- The **IUCN Red List** now includes 142,577 species of which 40,084 (or 28 per cent) are under threat of extinction.
- The **IPBES** assessment says that 1 million animal and plant species face extinction and thousands of these would become extinct. Within decades about 40 per cent of the planet's amphibian species are threatened with extinction. Since 1900, the number of native species in most land-based habitats has declined by 20 per cent.
- Since the year 1500, Earth could already have lost between 7.5 and 13% of the two million known species on Earth—a staggering 150,000 to 260,000 species.

The situation in Indo-Pacific Region

- Reports show the loss of vertebrate population was the highest in the **Caribbean and Latin America (94 per cent), followed by Africa (65 per cent), with Europe and Central Asia showing the least loss (24 per cent).**

Asia Pacific

- The **World Wildlife Fund's (WWF's) "Living Planet Report 2020"** says the Asia Pacific region lost 45 per cent of its vertebrate population in four-and-half decades, while the average global loss is **68 per cent.**
- In the Asia Pacific region, including India that is experiencing loss of species higher than the global average, habitat degradation is the biggest trigger, followed by species overexploitation and invasive species and disease.
- The role of pollution and climate change was proportionately higher at **16 per cent.**
- Loss of species afflicts all ecosystems—from land to oceans, from the sea surface to the yet-to-be-fully explored seafloors, from forests to desert, and from swamps to rivers.

India

- The loss could be higher than the global average in India, which has lost 12 per cent of its wild mammals, 19 per cent of its amphibians and 3 per cent of its birds over the past five decades.
- Of about 0.1 million animal species, as recorded in the country till **December 2019, about 6,800 are vertebrates.**
- Among these, nearly 550 fall in the critically endangered, endangered and vulnerable categories, according to the **Zoological Survey of India,** the country's premier organisation in zoological research and studies under the Union Ministry of Environment, Forest and Climate Change.

Immediate danger

Dragonflies

- An assessment by the **International Union for Conservation of Nature (IUCN)** on dragonflies and damselflies revealed that 16% out of 6,016 species are at risk of extinction.
- The existential threat faced by dragonfly is a cause of concern for all of the planet's **8.1 million species.**
- With this assessment of the extinction of dragonflies, IUCN said, "the number of species at risk of extinction on the **Red List has exceeded 40,000 for the first time.**

Freshwater Biodiversity

- The fact that freshwater biodiversity is declining at twice the rate of that of terrestrial or marine species, is not just an alarming statistic for the environment, it is also highly concerning for people's health and job security.
- Populations of migratory freshwater fish have fallen by **76 per cent since 1970** and large freshwater species, such as the catfish, by a catastrophic **94 per cent.** Losing species at such an alarming rate has far-reaching consequences on the landmass.

Trees & Crops

- Over 70 wild relatives of some of the world's most important crops are threatened with extinction.
- 35 per cent of wild species are on extinction mode.
- Without these trees, we will lose biodiversity altogether disabling us from evolving food crops varieties.
- Last year the Botanic Gardens Conservation International, a charity based in London, published its five-year assessment called **"State of the World's Trees".**
- The assessment evaluated 60,000 tree species and found that 30 per cent are at risk of extinction. Extinction in the plant kingdom is twice the number of threatened tree species globally than threatened mammals, birds, amphibians and reptiles combined.
- Over 440 tree species are on the brink of extinction, meaning they have fewer than 50 individuals remaining in the wild, the report reveals.

Forests

- In just the last three centuries, global forests areas have shrunk by **40 per cent.**
- Every year, to meet the timber needs from natural sources, the Earth is stripped of **100 million trees.**
- They store **50 per cent** of the world's terrestrial carbon and provide a buffer from extreme weather, such as hurricanes and tsunamis.

3. "Plastic Endgame"

Relevance

GS 3: Environmental Pollution & Degradation

Introduction

- Recently, the world passed **14 resolutions** at the resumed session of the **fifth United Nations Environment Assembly (UNEA),** held in **Nairobi, Kenya**, between **February 28 and March 2, 2022.**
- The most crucial of these was the decision to establish an **intergovernmental negotiating committee** that will forge a legally binding agreement to end **plastic pollution.**

What is the Plan?

- World leaders plan to start negotiations on this resolution in **June.**
- If the timeline is kept, this will be the second-fastest environmental agreement to move from the adoption stage into negotiations.
- This highlights the urgency of the problem and the global commitment to address it.
- The proposed committee has the ambitious task of drafting an agreement on plastics by the end of **2024** when the leaders plan to meet for the sixth Assembly.

Why is it a Difficult Task?

- The treaty on ending plastic pollution, which includes microplastics and marine litter, will have both binding and voluntary approaches.
- The resolution indicates that the committee has to include provisions promoting national and international cooperative measures and **national action plans** to work towards the prevention, reduction and elimination of plastic pollution.
- It will also specify arrangements for **capacity building, technical assistance, technology transfer and financial assistance.**
- The resolution indicates the possibility of a global fund and invites governments and other stakeholders to provide budgetary resources.
- The fund will ensure countries and economies in transition that deal with a large fraction of plastic waste, especially in the global south, are supported by nations whose plastic production and waste generation are high.

What are the Limitations?

- While the resolution calls for strict action to curb the entire life cycle of plastics, it is silent on whether the agreement will look at the oil, gas or coal sectors that are responsible for the raw materials used to make plastics.
- Currently, 99 per cent of plastics are produced from **petrochemical**s and experts expect fierce resistance from the **petrochemical industry**, which is not happy with the resolution.
- In India, the share price of **Reliance Industries** fell as the news of the global plastic treaty spread across the country. The company holds a 42 per cent stake in the Indian plastic ecosystem.
- Since the agreement invites all relevant stakeholders, including the industries, there will be attempts to insert half-baked solutions like chemical recycling (plastic to fuel) and incineration (including co-incineration) in the final text.

What GOI is doing?

- In January, India released new guidelines under its **extended producer responsibility (EPR)** norms that introduced the concept of plastic credits for the industry.
- Under this, companies have a liability to collect plastic waste equivalent to the amount they generate in a year.
- Further, if a company collects plastic waste in addition to what it generates, it can sell the extra as credit to companies that are not collecting enough plastic waste.
- The policy has piqued the interest of consumer goods companies who are using it to greenwash their brands and avoid accountability.
- **Dabur,** one of India's largest consumer goods companies, in February started claiming it was plastic neutral just by fulfiling its EPR liability.

4. "Urgency Of Climate Justice"

Relevance

GS 3: Environmental Pollution & Degradation

Context

- The **Intergovernmental Panel on Climate Change (IPCC)** has so far published two instalments of its **Sixth Assessment Report (AR6).**
- While the first report, "**The Physical Science Basis" released in September 2021,** unequivocally attributed extreme weather events to climate change.
- The latest report released on February 28 this year, lays bare that inequality makes certain communities and countries more vulnerable to climate change impacts. In this report, IPCC for the first time authoritatively states that climate justice now needs to be at the centre of global policy-making.

About IPCC

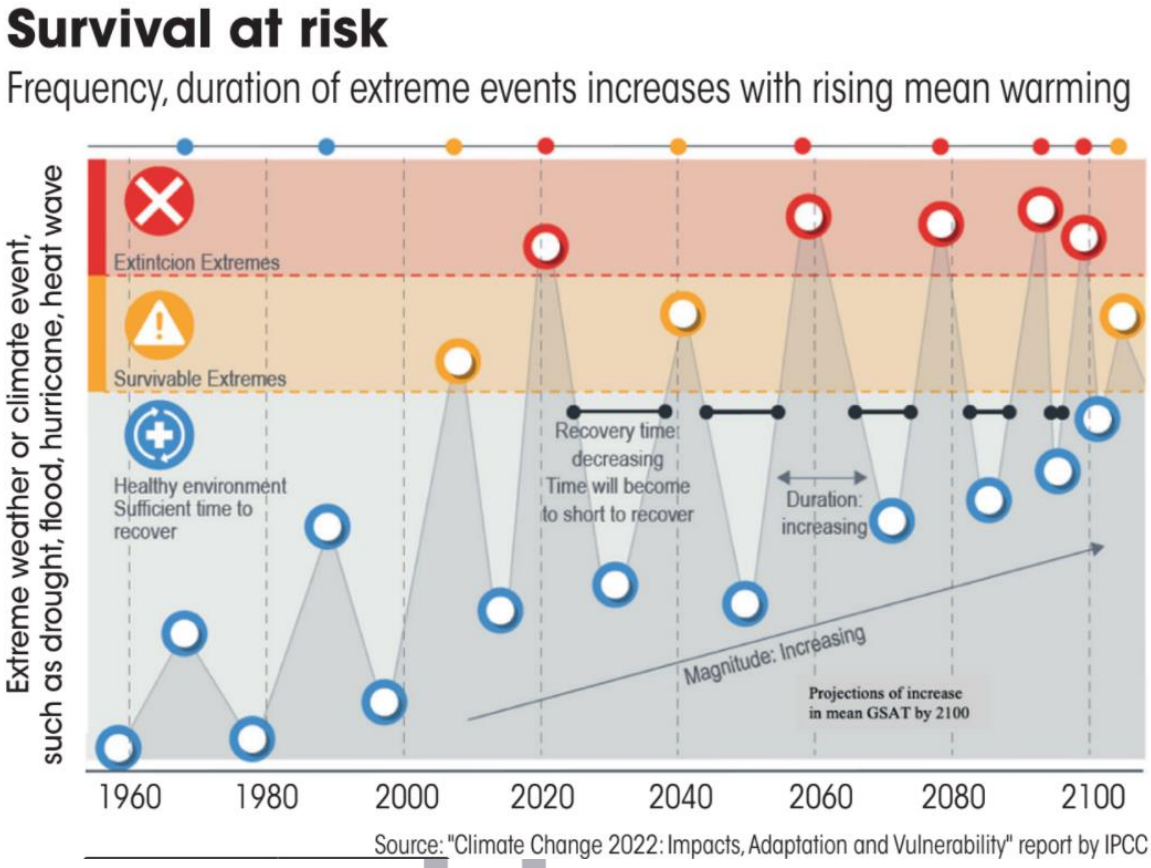
- Created in **1988 by the World Meteorological Organization (WMO)** and the **United Nations Environment Programme (UNEP)**, the objective of the IPCC is to provide governments at all levels with scientific information that they can use to develop climate policies.
- IPCC reports are also a key input into international climate change negotiations.
- The IPCC is an organization of governments that are members of the United Nations or WMO. The IPCC currently has **195 members.**

Key Findings From IPCC's Latest Report

- The report, **"Climate Change 2022: Impacts, Adaptation and Vulnerability",** compiled by **270 authors from 67 countries,** incorporating research from over 34,000 scientific papers, identifies 127 risks to natural and human systems.
- It notes that nearly half the global population now lives in settings that are **"highly vulnerable to climate change."**
- Climate change disproportionately affects marginalised groups, amplifying inequalities and undermining sustainable development across all regions, it states with **"high confidence".**
- The poor typically have low carbon footprints but are disproportionately affected by adverse consequences of climate change," it states, adding that they lack access to adaptation options.
- The report identifies that the most vulnerable regions are located in **Global South—East, Central and West Africa, South Asia, Micronesia and in Central America.**
- These regions already reel from the compound challenges of high levels of poverty, inadequate ac- cess to basic services like water and sanitation, gender inequalities and poor governance.
- Providing the evidence base for the vulnerability of the Global South, the report states that observed average mortality from floods, drought and storms is 15 times higher for countries ranked as **"very high" vulnerable, such as Mozambique, Somalia, Nigeria, Afghanistan and Haiti compared to "very low" vulnerable ones, such as the UK, Australia, Canada and Sweden in the last decade.**
- Over 3.3 billion people live in countries classified as very highly or highly vulnerable, while 1.8 billion are in countries with low or very low vulnerability. Worse, the population in most vulnerable countries is projected to increase significantly by 2050 and 2100.

The future can be disastrous due to climate change

- While climate change is already causing more frequent and severe floods, heatwaves, wildfires and habitat destruction, the biggest impact will be on agricultural systems.
- Yields of major cereal crops in climate-affected areas are already significantly lower than they were, due to today's current 1.1°C increase in global temperature averages above pre-industrial levels.



- If that number reaches 1.5°C, the target set out by the IPCC in an earlier report as the highest we can go before a total climate disaster, about 8 per cent of the world's farmland would become unsuitable for agriculture.
- An increase of 2°C, or more, could be catastrophic, said Debra Roberts, one of the report's co-chairs, in a press conference.

How Will Climate Change Impact the World?

- Without strong adaptation measures, losses and damages will likely be concentrated among the poorest vulnerable populations.
- Though the impact of crop failure will be felt worldwide, this will be particularly acute in **Africa, Asia, Central and South America, on small island nations and in the Arctic.**
- At **2°C of warming, people in sub-Saharan Africa, South Asia and Small Island Developing States** will face severe food shortages and malnutrition.
- Even with moderate climate change, people in vulnerable regions will experience a further erosion of livelihood security that can interact with humanitarian crises, such as displacement and forced migration and violent conflict.
- Climate change is likely to force economic transitions among the poorest groups, accelerating the switch from agriculture to other forms of wage labour.
- The projected number of people living in extreme poverty may increase by **122 million by 2030.**
- Climate change risks also carry the risk of amplifying or aggravating existing tensions within and between communities and countries.

What Should be Done?

- To deal with the impacts of climate change, farmers and agricultural systems will have to adapt, from adjusting growing seasons to switching crops or installing water-saving irrigation systems.
- Vulnerability reduction and adaptation to climate change have also to be seen as an issue of **climate justice and climate-just development.**
- Climate justice requires consideration of the **legal, institutional and governance frameworks** that significantly determine whether adaptation is successful in addressing the needs of the poor.

5. "The Anthropocene Epoch"

Relevance

GS 3: Disaster Management, Environmental Pollution & Degradation, Environmental Impact Assessment (EIA)

Introduction

- Soon **Anthropocene Working Group (AWG)** will declare us the first Homo sapiens to witness the Earth entering into a new geological epoch that is named after us.
- This is a call of urgent attention to our irreversible impacts on the planet's ecosystems.

What is Holocene Epoch?

- This is the **current geological Epoch.**
- At the start of the Holocene, the planet had a new geography, demography and ecosystem as the **Paleolithic Ice Age** came to an end and a warm-season set in.
- Glaciers melted, new forests came up in vast areas, **mammoths and woolly rhinoceros** succumbed to the warm climate and humans decided to quit food gathering and hunting for more settled lives. This also led to more growth in the human population.

What is Anthropocene Epoch?

- The Anthropocene is a strange phase in the geological scale where the **dominant species fundamentally alters the ecosystem,** and its biggest preoccupation now would be to look for ways to fix it as well.
- Here comes the **tussle between Homo sapiens and the rest of the species on the planet.**
- Scientists argue that the Anthropocene started to set in with the advent of the **industrial revolution** that led to industrial production, the **discovery of chemicals and their cascading effects on the natural systems.**

What work has been done on declaring Anthropocene Epoch?

- In **2016,** for the first time, the **International Geological Congress** held in Cape Town, South Africa, informally voted to declare the arrival of the Anthropocene.
- In **May 2019,** a **34-member panel** of scientists called the **Anthropocene Working Group (AWG)**—set up by the Subcommission on Quaternary Stratigraphy, part of the International Commission on Stratigraphy that oversees the geologic time chart—voted to declare the descent of the new epoch.
- AWG will soon put forth a formal proposal for this to its parent body. This will mark the end of the current epoch called the Holocene, which started approximately **11,700 years ago.**
- This age, retrospectively designated by contemporary scientists, tentatively coincides with humans adopting settled agriculture after a change in the planet's climate.
- In terms of the Anthropocene, **29 of the 34 members of AWG** have supported the proposal to declare the mid-20th century as the beginning of this epoch.
- Scientists are already scoping for sites to look for evidence of such human intervention in our ecosystems.
- In particular, they are looking at radionuclides (atoms that emit radiation as they undergo radioactive decay) released during the first nuclear weapons tests in **1945 in the US.**
- These particles have scattered across the globe and become a part of the Earth's soil, water, plants and glaciers, leaving permanent human imprints on the planet.
- **Plastic**—an all-pervasive human invention—is being proposed as another marker of the Anthropocene.

How do human impacts cause nature to fail?

- Scientists have identified **18 categories of contributions—cleaning air and water, sequestering carbon, pollinating crops**—that nature makes to ensure the quality of life for humans.
- In the last **50 years,** nature is not able to fulfil its role in **80 per cent** of these categories.
- Biodiversity and nature's contributions to people are our common heritage and humanity's most important life-supporting **'safety net'.** But our safety net is stretched almost to breaking point.
- The diversity within species, between species and of ecosystems, as well as many fundamental contributions we derive from nature, are declining fast, although we still have the means to ensure a sustainable future for people and the planet.

Signs Of Extinction Phase

- There are two signs that occur before an extinction phase sets in a loss in population and shrinking of its distribution areas.
- These two signs are quite evident among all species, except humans, right now.
- Since the year **1500, some 900 species** have gone extinct, according to **IUCN.**
- Since the **16th century, 680 vertebrate** species have been pushed into extinction; 9 per cent of all domesticated breeds of mammals used for food and agriculture went extinct by 2016.
- In addition, some **1,000** more such domesticated breeds are under threat of extinction.
- Almost **33 per cent of reef-forming corals** and more than a third of all **marine mammals** are threatened.
- Ecosystems, species, wild populations, local varieties and breeds of domesticated plants and animals are shrinking, deteriorating or vanishing.
- The essential, interconnected web of life on Earth is getting smaller and increasingly frayed.

Who is responsible?

- This loss is a direct result of human activity and constitutes a direct threat to human well-being in all regions of the world.
- **Three-quarters** of the land-based environment and about **two-thirds of the marine environment** have been significantly altered by human actions.
- **Nearly 75 per cent** of all freshwater resources are now used for crop and livestock rearing activities.
- The impacts are scary. For example, productivity in 23 per cent of global land has reduced due to land degradation.
- Up to **US $577** billion in annual global crops are at risk from pollinator loss and **100-300 million people** are at increased risk of floods and hurricanes because of the loss of coastal habitats and protection.

Future of SDGs?

- The world may miss the **UN Sustainable Development Goals (SDG)** targets by a wide margin if the human civilisation does not pull up its socks and promptly acts to protect the natural order.
- Close to **80 per cent (35 of 44)** assessed targets under the goals will remain unmet. Biodiversity loss will impact the **SDGs related to poverty, hunger, health, water, cities, climate, oceans and land.**
- The current trajectories used for conserving nature and achieving sustainability, such as those embodied in the **Aichi Biodiversity Targets** and the **2030 Agenda for Sustainable Development,** cannot be met.

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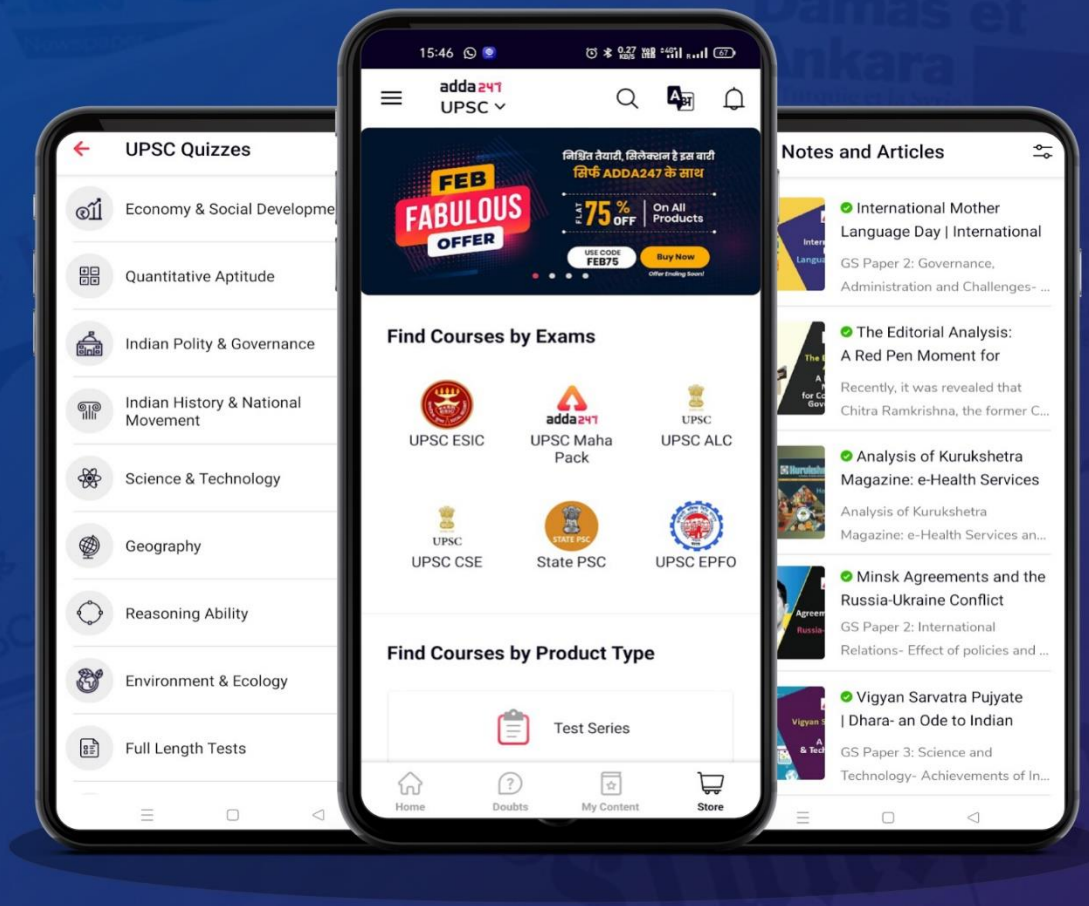

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