



INSIGHTSIAS

SIMPLIFYING IAS EXAM PREPARATION

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Environment

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Conservation

1. Global Tiger Conservation

- Tiger conservation involves attempts to **prevent the animal from becoming extinct and preserving its natural habitat.**
- **International Efforts**
 - At the **St. Petersburg Tiger Summit in 2010**, leaders of 13 tiger range countries resolved to double its number in the wild, with a popular slogan '**T X 2**'.
 - The **Global Tiger Initiative (GTI)** program of the World Bank brought global partners together to strengthen the tiger agenda.
 - Over the years, the initiative has institutionalised as a separate entity in the form of the **Global Tiger Initiative Council (GTIC)** with **Global Tiger Forum** as one of its arm.
 - The Global Tiger Forum (GTF), is the only inter-governmental platform of tiger range countries since 1993, consolidating Tiger Action Plans of the range countries.
 - GTF has forged viable partnerships with several like-minded organizations in India and abroad — IUCN, WWF, WCT, WII, IIFM, IFAW, WTI, WCS, USAID, World Bank, Clemson University.
 - All tiger range countries have a tiger agenda based on a **National Action Plan.**
 - Curbing wildlife trade through international agreements like **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).**
 - NGO such as **Trade Records Analysis of Flora and Fauna in Commerce (TRAFFIC)** assist member states with the implementation of CITES.
 - A special High-Altitude project is ongoing with the IUCN's support for appraisal of tiger status in High Altitude Ecosystems of South Asia.
- **India's Efforts**
 - India has more than 70% of the world's wild tigers.
 - India is in a leadership position on the tiger front globally.
 - The **Project Tiger**, launched in 1973, has grown to more than 50 reserves amounting to almost 2.2% of the country's geographical area.
 - A few months ago, the first successful inter-state translocation of a pair of tigers was carried out from tiger reserves in Madhya Pradesh to Satkosia in Odisha.
 - The **2018 All India Tiger Estimation** is currently underway and is said to be the world's largest wildlife survey in terms of "coverage, intensity of sampling and quantum of camera trapping."
 - Modern protocol for field monitoring: **Monitoring System for Tigers - Intensive Protection and Ecological Status (M-STrIPES).**
- We are a long way from achieving the ambitious target set in 2010 of doubling the global tiger numbers by 2022.
- There is a 29% frontline staff vacancy against sanctioned posts in the tiger reserves of India.
- A right balance between conservation and development can secure its future.

- The Key Performance Indicators of the ongoing **Global Tiger Recovery Program** need adequate resources and more commitment.
- Our planet needs '**Tiger Champions**' and it is the right time to look forward on the occasion of Global Tiger Day.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2018/08/Global-Tiger-Conservation.pdf>

2. Is planting saplings a solution to the felling of trees?

- In recent months, the idea of **Compensatory Afforestation (CA)** or plantations has sparked a huge debate.
- The debate is around, can we continue to lose the large number of trees being cut for the Goa airport, housing complexes in Delhi, highways, and the bullet train, and expect the damage to be offset through plantations.
- In India the urban population contributes over 60% to the GDP and is projected to contribute around 75% in the next few years.
- Indian cities are estimated to add 300 million new urban residents by 2050.
- Delhi is projected to become the most populous city in the world by 2028, according to the United Nations.
- With the inevitability of migration to urban areas, the **share of agriculture and allied services in GDP has shrunk to around 15%** even as the sector continues to engage around 70% of our working age population.
- Environmental pollution caused by daily hour-long traffic jams on a 10-km stretch causes more harm to the environment.
- Urban trees reduce air pollution, cool cities, and increase ground water infiltration.
- Research shows that in Bengaluru the street trees reduce PM10 levels by 75%, reduce atmospheric temperature by 3-5°C and road asphalt temperatures by 23-25°C.
- Using the route of compensatory Afforestation, there is loss of an average of 35,000 hectares of forests annually to development projects.
- Forest and tree conservation laws have fuelled more ecological loss and destruction by relying on compensatory Afforestation.
- The Afforestation overdrive by government departments is done in floodplains, grasslands and other ecosystems that are often not suitable for tree cover.
- Many popular fast-growing species used for urban Afforestation, such as Eucalyptus and Acacia auriculiformis, deplete groundwater and affect soil quality.
- They cannot replace the environmental services provided by a giant native peepal, mango or tamarind.
- We have to work hard to ensure that our urban infrastructure causes least harm to the environment and has a net positive impact on our quality of life.
- Whether it is metros or elevated corridors, a **net environment impact assessment** must be conducted to justify the felling of trees and harm to water bodies.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2018/07/Is-planting-saplings-a-solution-to-the-felling-of-trees.pdf>

3. Protecting India's Forests

- India is one of the **mega diversity countries** in the world with different types of forests.
- **Key findings of ISFR 2017:**
 - India's tree and forest cover has registered an increase of 1% or 8,021 sq. km in two years since 2015 according to **India State of Forest Report (ISFR) 2017**.
 - According to the report, the total forest cover is 21.54% of the total geographical area of the country. Forest and tree cover combined is 24.39% of the total geographical area.
 - India ranks among the top 10 countries of the world in terms of forest area.
 - **Water bodies** inside forest cover have **increased by 2,647 sq km** during the last decade.
 - **Mangrove forests have expanded by 181 sq km.**
 - 15 states/ UTs have above 33% of the geographical area under forest cover.
- The **National Forest Policy (1988)** aims to increase the forest cover to one third.
- The Union Ministry of Environment, Forest and Climate Change as well as all State Forest Departments are guided by the National Forest Policy, 1988.
- The National Forest Policy must be refreshed as it contains concepts that have been long discarded.
- **According to Rabindranath Tagore, life in forest is the highest form of cultural evolution.**
- Protection of forests is done through implementation of **Forest Conservation Act (1980)** and through establishment of **protected areas**.
- The **International Day of Forests** is observed every year on March 21 to celebrate and raise awareness on the importance of forests and trees.
- **Measures taken by government for forest cover growth:**
 - National policies like Green India Mission, National Agro-Forestry policy (NAP), REDD plus policy, Joint Forest Management (JFM), National Afforestation Programme and funds under Compensatory Afforestation to states.
 - **Green India Mission** is aimed at protecting; restoring and enhancing India's diminishing forest cover and responding to climate change by a combination of adaptation and mitigation measures.
 - **Green Highways (Plantations & Maintenance) Policy** to develop a 1,40,000 km-long treeline with plantation along both sides of national highways.
- Reference: <http://www.insightsonindia.com/2018/02/22/insights-editorial-woods-trees/>

4. India's forest cover: What data shows

- **India's diverse forests** support the livelihoods of 250 million people, providing them firewood, fodder, bamboo, beedi leaves and many other products.
- Official data suggests that India has been able to increase green cover since the turn of the century.

- While alternative estimates provided by **Global Forest Watch, (GFW)** —a collaborative project of the University of Maryland, Google, USGS, and NASA— suggests that **green cover has declined sharply in the country.**
- The main reason for the stark difference in the two estimates seems to lie in the **definition of forest cover used by Forest Survey of India.**
- **Cumulative loss of tree cover between 2001 – 2017:**
 - The tree cover loss for Indian states shows an accelerating trend in recent years, with the heavily forested **north-eastern states, Odisha, and Kerala showing the greatest amount of tree cover loss in the period 2001-2017.**
 - **India ranks 14th among all countries in tree cover loss in the decade 2000-2010.**
 - “India is ranked 10th in the world, with **24.4% of land area under forest and tree cover**, even though it accounts for 2.4% of the world surface area and sustains the needs of 17% of human and 18% livestock population.”
- **Reference:** <http://www.insightsonindia.com/2018/07/09/insights-into-editorial-indias-forest-cover-what-data-shows/>

5. Natural Capital and its Preservation

- Natural capital represents the **combined value of all biodiversity — life-forms, flora and fauna.**
- It provides services such as water purification and supply, waste assimilation and the cleaning of air and water, regulation of pests and diseases, and soil nutrient cycling and fertility.
- India, one of the 17 mega-diverse countries, is rich in biodiversity.
- **Natural capital valued in financial terms:**
 - There have been many studies that have calculated natural capital's value in financial terms.
 - The financial value of India's forests, for example, timber and fuel wood, and ecological services such as carbon sequestration, is estimated to be \$1.7 trillion.
 - Street trees in California provide \$1 billion per year in ecosystem services, through atmospheric regulation and flood prevention.
 - Mexico's mangrove forests provide an annual \$70 billion to the economy through storm protection, fisheries support, and ecotourism.
- **'Earth Overshoot Day'**, a date when humanity's annual resource consumption for the year overshoots the earth's capacity to regenerate it, has advanced every year at an alarming rate. This year it was observed on August 1.
- A recent study shows that **India will become water scarce by 2025.**
- Within a century, our **food production could see a loss of 10-40%** if these trends continue.
- **Crossing the limits of Natural Capital Stocks:**
 - Scientists have identified **nine earth system processes** which mark the safe zones, beyond which there is a risk of 'irreversible environmental change'.
 - **Four of these boundaries have now been crossed**
 - Climate change.

- Loss of biosphere integrity.
- Land system change.
- Altered biogeochemical cycles, such as phosphorus and nitrogen cycles.
- This means that **human activity has altered the balance of a few delicate equilibriums.**
- The effects are: changing weather patterns, accelerated extinction events for both flora and fauna, and global warming.
- **Ecological collapse** can soon come, examples being the **Darfur region in Sudan and countries in the Horn of Africa.** All were subject to **rapid socio-economic decline.**
- Integrating natural capital assessment and valuation into our economic system is critical to usher in a truly sustainable future for India.
- India should seek to **publish “green GDP” figures** that take into account depreciation of natural capital stock due to economic exploitation and environmental degradation. This can follow the template provided by the **UN’s System of Environmental-Economic Accounting.**
- Reference: <http://www.insightsonindia.com/wp-content/uploads/2017/09/Natural-Capital-and-its-Preservation.pdf>

6. Fighting Forest Fires

- The wildfire tragedy in Theni in Tamil Nadu, in which 20 trekkers lost their lives, once again brings into focus forest fires in India.
- **National Green Tribunal** has directed the Ministry of Environment, Forests and Climate Change to finalise the **National Policy on Forest Fire.**
- According to **Global Forest Watch**, India has witnessed a **125% spike in forest fires** between 2015 and 2017.
- About 70% forest fires in India occur in the tropical dry forests encompassing scrub, savannah grassland, and dry and moist deciduous forests.
- Forest fires are caused by **Natural causes** as well as **Man-made** or anthropogenic causes.
- Human-made forest fires in the Himalayan states of Uttarakhand and Himachal Pradesh have been a regular and historic feature.
- The Himalayan forests, particularly, Garhwal Himalayas witness major fire incidents.
- Forests with **chir pine** are very prone to fire as they easily catch fire.
- In 2017, **23 out of 33 states and union territories** reported an increase in forest fires with maximum number of forest fires were reported in Madhya Pradesh followed by Odisha and Chhattisgarh.
- When a fire is detected by **NASA’s MODIS (Moderate Resolution Imaging Spectroradiometer)** and **VIIRS (Visible Infrared Imaging Radiometer Suite) satellites**, the Forest Survey of India (FSI) analyses the data by overlaying the digitised boundaries of forest areas to pinpoint the location to the exact forest compartment.
- The FSI relays news of the fire to the concerned State, so that the Divisional Forest Officer (DFO) in charge of the forest where the fire is raging is informed.
- Fires are a major cause of **forest degradation** and have wide ranging adverse

ecological, economic and social impacts.

- Forest fires are usually seasonal. They usually start in the dry season and can be prevented by adequate precautions.
- Government Programmes for Forest Fire Management:
 - **National Plan for forest fire management**
 - **Forest Fire Prevention & Management Scheme (FFPMS)**
- **Reference:** <http://www.insightsonindia.com/2018/04/03/insights-into-editorial-fighting-forest-fires/>

7. Uranium Contamination in Ground Water

- There are reports of **widespread uranium contamination in groundwater across India** that demands an urgent response.
- Scientists have found widespread uranium contamination in groundwater from aquifers across 16 states in India, much above the WHO provisional standard for the country.
- A study has found over 30 micrograms per litre (mcg/l) of the heavy metal are found in parts of north-western, southern and southeastern India.
- Drinking such water can damage one's kidneys, and the World Health Organization prescribes 30 mcg/l as an upper limit.
- A 2015 Bangalore study, for example, found uranium levels of over 2000 mcg/l in the southern part of the city.
- Other studies found levels of over 500 mcg/l in Andhra Pradesh and Telangana.
- More recently, parts of Gujarat and Rajasthan recorded undesirable uranium levels in their waters.
- **Excessive withdrawal of groundwater across India** is lowering the water table, and also contaminating water with uranium.
- As the **Bureau of Indian Standards** does not specify a norm for uranium level, water is not tested regularly for it.
- The chronic effects of uranium consumption are still unknown.
- We need **comprehensive systematic studies** to establish the chronic health effects of uranium exposure.
- Include a **uranium standard in the Bureau of Indian Standards' Drinking Water Specification**.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2018/06/Uranium-Contamination-in-Ground-Water.pdf>

8. Water Crisis in India

- The **NITI Aayog report on Composite Water Management Index** said that India is facing its '**worst**' water crisis in history.
- **Key Findings in the Study:**
 - About **60% of the States** were marked as "**low performers**" and this was cause for "alarm".
 - The report has predicted that by 2030, the country's water demand is projected to be twice the available supply, implying severe water scarcity.
 - Nearly 600 million Indians faced high to **extreme water stress**.
 - About 2,00,000 people died every year due to inadequate access to safe

water.

- 52% of India's agricultural area remains dependent on rainfall so the future expansion of irrigation needs to be focused on **last mile efficiency**.
 - The data published by the **Central Water Commission** indicate that **agriculture** alone accounts for **about 85 per cent** of all water use, mostly drawn from groundwater.
 - Twenty-one cities, including Delhi, Bengaluru, Chennai and Hyderabad will run out of groundwater by 2020, affecting 100 million people.
 - Critical groundwater resources, which accounted for 40% of India's water supply, are being depleted at "unsustainable" rates and up to 70% of India's water supply is "contaminated".
 - **If the present situation continues, there will be a 6% loss in the country's GDP by 2050.**
 - The combination of rapidly declining groundwater levels and limited policy action is likely to be a significant food security risk for the country.
- Recently, **Central Water Commission** report highlighted that **42 rivers in India** have at least **two toxic heavy metals** in quantities beyond the permissible limit.
 - **World Bank** indicates that by 2030, India's per capita water availability may shrink to half, which will push the country into '**water scarce**' category from the existing '**water stress**' category.
 - With nearly **70% of water being contaminated**, India is placed at 120th amongst 122 countries in the **water quality index**.
 - Taps in Shimla went dry this summer, posing an unprecedented water crisis in the hill town.
 - Policies like giving free electricity to farmers or financial support for groundwater extraction results in uncontrolled exploitation and wastage of resource.
 - **Poor water management techniques** are the important reason attributed for prevalence of water crisis in India.
 - Inter-Governmental Panel on Climate Change (IPCC) in 2014 warned **that approximately 80% of the world's population suffers a severe threat to its water security**.
 - Although India receives an average rainfall of 1,170 mm per year, it is estimated that **only 6-7% of rainwater is stored**.
 - **Primarily water is not valued in India. "People think it is free."**
 - Groundwater extraction patterns need to be better understood through **robust data collection**.
 - A **legal mandate** will work better than just competition and cooperation; it would make governments accountable.
 - Proper enforcement of **Bureau of Indian Standards (BIS)** and **Indian Council of Medical Research (ICMR) drinking water standards** for trace and toxic metals for humans as well as for livestock and irrigation use in India.
 - Implementing **Dr. M.S. Swaminathan Report** on "More Crop and Income Per Drop Of Water".
 - **Reviving ancient systems of water harvesting techniques:**

- The Indus Valley Civilization had a **well-managed canal system**, while **Chanakya's Arthashastra** also talks of irrigation.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2018/06/Water-Crisis-in-India.pdf>
- <http://www.insightsonindia.com/2018/06/23/insights-into-editorial-parched-or-polluted-on-indias-water-crisis/>

9. India's Groundwater Management

- **Fundamental right to water** has been evolved by the Supreme Court and various High Courts as part of **'Right to Life' under Article 21** of the Constitution.
- The **Sustainable Development Goal 6** talks about providing universal access to safe and affordable drinking water for all by 2030.
- **National Water Policy (2012)** advocates conservation, promotion and protection of water and highlights the need for augmenting the availability of water through rain water harvesting, direct use of rainfall and other management measures.
- India is the world's largest user of groundwater.
- Groundwater in India provides for about **60 percent of the country's irrigation needs, 85 percent of rural drinking water requirements and 50 percent of urban water needs.**
- As per 2016 data, around 5 percent of groundwater assessment units in the country are in a critical state and 12 percent in a semi-critical state due to over-exploitation and contamination.
- Over the past three decades, India has been grappling with intense and rapid depletion of groundwater.
- **Present Crisis:**
 - According to the assessment of the **Central Ground Water Board (CGWB)**, total 1,034 out of 6,584 assessed blocks in the country are over-exploited.
 - Groundwater in India is severely **contaminated with uranium higher than the WHO standard.**
 - Uranium has yet not been included in the list of contaminants monitored under the **Bureau of Indian Standards'** Drinking Water Specifications.
 - Consumption of drinking water contaminated with uranium can cause chronic kidney disease, deformity of bones and liver.
 - High salinity, fluoride, and nitrate make them unsuitable for human consumption.
- **Green Revolution caused over use of ground water.**
- Cities like Bengaluru are losing its capacity to recharge groundwater as the number of water bodies like lakes has reduced by 79%.
- Existing rules on groundwater access give landowners the right to pump on their land.
- **India's Ground Water Board** lacks the power to restrict the landowner's rate of extraction.

- The World Bank predicts that by 2032, around 60 per cent of aquifers in the country will be in a critical state.
- The severity of the problem is acute in the northwest.
- Most of Punjab and Haryana, northern areas of Rajasthan and Gujarat, and parts of Uttar Pradesh face continued groundwater level declines.
- There is almost no data on the number of perennial springs in India that supply fresh groundwater, and very little done to preserve them.
- **Managing water resources is the key to create a water-secure future.**
- The low stress levels in West Bengal display the importance of state legislation to address groundwater depletion.
- A report submitted by a committee led by Mihir Shah titled **A 21st Century Institutional Architecture for India's Water Reforms** is a clear call for a paradigm shift in water resource management.
- **National Water Policy 2012**, stated that the over-withdrawal of groundwater should be minimized by **regulating the use of electricity for its extraction.**
- A **multifaceted approach**, by reducing the demand for groundwater in agriculture and addressing supply-side issues through aquifer replenishment, wastewater treatment and diversifying water resources, is critical for sustaining India's groundwater and avoiding a worsening water crisis.
- **Atal Bhujal Yojana (ABHY):**
 - ABHY is a Central Sector Scheme with a total outlay of Rs. 6,000 Crore and implemented with World Bank assistance.
 - It aims to improve ground water management in priority areas in the country through community participation over a period of five years from 2018-19 to 2022-23.
- Reference: <http://www.insightsonindia.com/wp-content/uploads/2018/06/Indias-Groundwater-Management.pdf>

10. Awash in Water Crises

- Recently released **United Nations World Water Development Report, 2018** stressed upon Nature based solutions to address many of the world's water challenges.
- These solutions are also aligned with the aims of the **2030 Agenda for Sustainable Development.**
- Report also says that Business-as-usual approaches to water security are no longer viable.
- The Report examines the ways that the world's water resources are being managed and the varied water problems that different regions of the world are experiencing.
- The topic of this year's report is "**Nature-based Solutions for Water**".
- **The world's water: challenges**
 - The world's population is expected to increase to nearly 10 billion people by 2050, with two-thirds of them living in cities.
 - The global demand for water has been increasing at a rate of about 1% per year over the past decades.
 - An estimated 80% of industrial and municipal wastewater is released without any prior treatment, with harmful impacts on human health

and ecosystems.

- The **International Water Management Institute** estimates that total demand could increase from 680 billion cubic metres (BCM) to 833 BCM by 2025 and to 900 BCM by 2050.
- A Central Pollution Control Board report indicates that almost half of India's inter-State rivers are polluted.
- Goal 6 of the 2030 Agenda for Sustainable Development recognises the importance of sustainable management of water and sanitation.
- Nature-based solutions are essential to meet this goal. **NBS are supported by nature and use natural processes to contribute to the improved management of water.**
- **Reducing Emissions from Deforestation and Forest Degradation (REDD+)** is the application of a nature-based approach for managing the global climate.
- Natural methods like reforestation and forest conservation, reconnecting rivers to flood plains, wetland restoration and water harvesting will regulate the water supply.
- **Reference:** <http://www.insightsonindia.com/2018/03/31/insights-into-editorial-awash-in-water-crises/>

11. Cross-border Environmentalism

- **Ecological ruin is at fastest pace across South Asia**, affecting the life and livelihood of nearly a quarter of the world's population.
- The emerging environmental concerns make cross-border environmentalism crucial for South Asia.
- **Threats:**
 - On water, the subcontinent is running out of the resource due to the demands of **industrialisation and urbanisation**.
 - Ganga in Uttarakhand and the Teesta of Sikkim has been converted into dry boulder tracts by 'cascades' of run-of-river hydroelectric schemes.
 - Rivers carry hundreds of tonnes of plastics daily into the Bay of Bengal and the Arabian Sea.
- The task of preserving the forests and landscapes are mostly taken up by the indigenous communities.
- The Adivasi communities organising to save ancestral forests, and the Lepcha fighting to protect the upper reaches of the Teesta.
- The urban middle class is not visible in environmentalism, other than in 'beautification projects'.
- India does not take the lead on cross-border environmentalism.
- The destruction of Siwalik range of Nepal for the construction industry's demand for boulders and conglomerate, leads to greater floods, desertification and aquifer depletion.
- Air pollution is high in Lahore, New Delhi, Kathmandu and Dhaka, but there is no collaboration.
- The environment ministry is the least empowered in the major countries of South Asia and unable to coordinate the ecological response.
- The climate change discourse has not evolved enough to address the '**climate refugees**' who move to national boundaries in the search for survival.

- Eg: Farakka Barrage affected the livelihoods in downstream Bangladesh, causing the flood of 'undocumented aliens' in India.
- **India was the host country for 2018 World Environment Day**; it is time for New Delhi to rise to connect the dots between representative democracy and ecological sanity.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2018/06/Cross-border-Environmentalism.pdf>

12. Trophy Hunting

- Trophy hunting is the selective hunting of wild game for human recreation and involves payment for the hunting.
- The trophy is the animal or part of the animal kept, and usually displayed, to represent the success of the hunt.
- **Trophy Hunting in Africa**
 - It takes place over a large area in Sub-Saharan Africa.
 - Hunting is carried out in about 1.4 million sq km in Africa which is more than 22% of area covered by national parks in Africa.
 - Experts claim that compared to ecotourism, high-value trophy hunting has a lower ecological footprint.
 - The trophy hunting of black rhino and white rhino in Namibia and South Africa is legal and is regulated by CITES. In Kenya and Botswana it is banned.
- **Opposition to Trophy Hunting**
 - Some fear that trophy hunting can **endanger lion populations**.
 - Lack of proper hunting regulations, rent-seeking and corruption.
 - Removing even 5% of high quality male animals' risks wiping out the entire population.
 - In past human hunting has led to extinction of many animals such as Zebra like Quagga which was once common in Southern Africa.
 - It also led to **extinction of Tasmanian tiger**.
 - Since hunters are allowed to keep the parts of animals as their trophies, it might result in illegal trade of ivory, skin, horns, etc.
- **Why trophy hunting should not be banned?**
 - The most fundamental benefit of trophy hunting to lion conservation is that it provides a **financial incentive** to maintain lion habitat.
 - In Kenya and India, where hunting is banned, wildlife populations do not seem to fare better than in countries where hunting is ongoing.
 - In South Africa and Namibia where trophy hunting is allowed, the wildlife populations seem to be doing better.
 - Trophy hunting has implicated in the recovery of black rhino and the straight-horned markhor.
 - According to IUCN, trophy hunting when well managed can be sustainable and **generate economic incentives** for conservation of species and its habitats.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2017/12/Trophy-Hunting.pdf>

13.A Turtle Recovery Plan

- Every year, thousands of sea turtles are accidentally captured, injured or killed by mechanised boats, trawl nets and gill nets operated and used by commercial fishermen.
- **Five species of sea turtles** are known to inhabit Indian coastal waters and islands.
- These are the **Olive Ridley, Green, Hawksbill, Loggerhead and the Leatherback turtles**. Except the Loggerhead, the remaining four species nest along the Indian coast.
- In India, though sea turtles are protected under the **Indian Wildlife Protection Act of 1972**, under the **Schedule I Part II**, they face grave threats.
- The coastal state of **Odisha** on the eastern coast of India experiences one of the **world's largest mass nesting or arribada of the Olive Ridley turtle** during the months of October to April.
- They play a vital role in **transportation of nutrients** from the highly productive marine habitats such as sea-grass beds to energy-poor habitats like sandy beaches.
- As turtle populations in general decline, so does their ability to play a **vital role in maintaining the health of the world's oceans**.
- **Integrated conservation measures** are needed to rebuild their populations to healthy levels so that they can carry out the full extent of their key roles in ocean ecosystems.
- **Reference:** <http://www.insightsonindia.com/2018/01/29/insights-editorial-turtle-recovery-plan/>

14. Bamboo not a Tree

- Recently, The **Indian Forest (Amendment) Bill** was passed by Parliament amending the **Indian Forest Act (IFA) 1972**, to exempt bamboo grown in non-forest areas from the definition of trees.
- The Bill permits felling and transit of bamboo grown in non-forest areas. However, bamboo grown on forest lands would continue to be classified as a tree.
- It would benefit the tribals, forest dweller and farmers as their income would increase.
- It will create a viable option for **cultivation in 12.6 million hectares of cultivable waste land by removing the legal and regulatory hardships** being faced by farmers and private individuals.
- It will help to fulfil domestic demand and reduce the imports.
- India is the world's second largest bamboo producer.
- Though India has 19% share of world's area under bamboo cultivation, its market share in the sector is only 6%.
- In 2015, India imported about 18.01 million cubic meters of timber and allied products worth Rs 43000 crores.

15. The Bonn Challenge: A Global Effort to Improve Ecology

- In 2015, India made a **Bonn Challenge commitment** to place into restoration 13 million hectares (Mha) of degraded land by 2020 and an additional 8 Mha by

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2030 which will have potential climate benefit of 2 GtCO₂ sequestered.

- India's **Nationally Determined Contributions (NDCs)** have also pledged to sequester 2.5 to 3 billion tonnes of CO₂ equivalent additionally by 2030 through enhanced tree cover.
- *The Bonn Challenge* is a global effort to bring 150 million hectares of deforested and degraded land into restoration by 2020 and 350 million hectares by 2030.
- Underlying the Bonn Challenge is the **forest landscape restoration (FLR) approach**, which aims to restore ecological integrity at the same time as improving human well-being through multifunctional landscapes.
- The Bonn Challenge is not a new global commitment but rather a practical means of realizing many existing international commitments, including the CBD Aichi Target 15, the UNFCCC REDD+ goal, and the Rio+20 land degradation neutrality goal.
- **What is FLR?**
 - Forest landscape restoration (FLR) is the on-going process of regaining ecological functionality and enhancing human well-being across deforested or degraded forest landscapes.
 - FLR is more than just planting trees – it is **restoring a whole landscape to meet present and future needs.**
- **India needs to design its tree-based programmes better to meet climate goals.**
 - **Agroforestry:** The nation practises at least 35 types of agroforestry models that combine different trees that provide timber, fruits, fodder, fuel and fertilizers with food crops.
- **Farmer Managed Natural Regeneration(FMNR):**
 - A simple, income generating and self-promoting reforestation system called Farmer Managed Natural Regeneration (FMNR) has been developed at Maradi, Niger.
 - It is a low-cost land restoration technique used to **combat poverty and hunger amongst poor subsistence farmers** by increasing food and timber production and resilience to climate extremes.
 - In Niger, West Africa, farmers operating on 5 Mha of land added roughly 200 million on-farm trees using FMNR in the past 30 years. This has sequestered 25-30 million tonnes of carbon and increased annual agricultural production by about 500,000 tonnes.
- In India, the National Bank for Agriculture and Rural Development's **(NABARD's) 'Wadi' model** and the Foundation for Ecological Security's **re-greening of village commons project** are good examples of tree-based interventions which are proving to have great value in terms of cost-effectiveness as well as the range of benefits they deliver to communities.
- **Restoration Opportunities Assessment Methodology (ROAM)**
 - It is critical to use **scientific evidence-based methodology** with a participatory approach to **determine the right type of tree-based interventions** most suitable to a certain land use.
 - The Restoration Opportunities Assessment Methodology (ROAM) Tool is being used in 40 countries to **find the best methods for landscape restoration.**
 - The tool includes rigorous analysis of spatial, legal and socio-economic

data and draws on consultations with key stakeholders to determine the right type of interventions.

- In India, this tool is being piloted in Uttarakhand and Madhya Pradesh.
- **Reference:** <http://www.insightsonindia.com/2017/11/13/insights-editorial-wider-cover-meeting-climate-goals/>

NOTES

Environmental Pollution

1. Plastic Pollution

- The **theme for the World Environment Day 2018 - "Beat Plastic Pollution"**.
- The theme invites everyone to make changes in their everyday lives to reduce the burden of plastic pollution on our natural places, our wildlife - and their own health.
- Most plastics are actually downcycled which means recycled plastics are not at par with virgin plastic and are instead transformed to a much lower quality.
- According to a report, by 2050 oceans are expected to contain more plastics than fish (by weight), and the entire plastics industry will consume 20% of total oil production, and 15% of the annual carbon budget.
- There are reports of **nano-plastic particles** present in water bottles posing serious threats to consumer health.
- Current standard water treatment systems do not filter out all of the microplastics.
- Humans have produced 8.3bn tonnes of plastic since the 1950s with the majority ending up in landfill or polluting the world's continents and oceans.
- About 25,000 tonnes of plastic waste is generated every year in India, of which only 60 per cent is recycled.
- The recycling efforts are failing to keep pace with production, which is expected to quadruple by 2050.
- **Delhi tops the chart of plastic waste** followed by Chennai, Mumbai, Bengaluru and Hyderabad.
- Indian waste management Industry has a potential of \$15 billion with promising growth prospects.
- **Great Pacific Garbage Patch:**
 - The enormous collection of detritus that floats in the Pacific Ocean, halfway between Hawaii and California is known as **Great Pacific Garbage Patch (GPGP)**.
- **International Efforts:**
 - International Convention for the Prevention of Pollution from Ships, later modified as **MARPOL**, is an international agreement that addresses plastic pollution.
 - In 2011, the National Oceanic and Atmospheric Administration (NOAA) in the United States and UNEP created **the Honolulu Strategy**—a planning tool to reduce plastic pollution and its impacts.
 - In February 2017, **UNEP announced the Clean Seas campaign**, asking for individuals, industries, and member states to voluntarily commit to an action of their choice to reduce plastic pollution.
 - Recently, at the **United Nations Environment Assembly in Nairobi**, more than 193 nations passed a resolution to eliminate plastic pollution in our seas.
- **International Examples:**
 - The **European Union** proposed ban on single-use plastics while urging the collection of most plastic drinks bottles by 2025.
 - **Kenya** has banned throwaway plastic bags, and the result is that its

- national parks are even more attractive and city drains are less blocked, helping reduce flooding.
- **Rwanda** has done it too, making **Kigali one of the world's cleanest cities**.
 - **U.S., Canada and the Netherlands** have regulations to stop the use of microbeads in personal-care products.
 - In **Germany**, consumers get a small refund when returning a plastic bottle. More than 98% of plastic bottles are returned.
 - **China's Tackling on Pollution:**
 - China is putting pollution high in its **domestic policy agenda**, and people look forward to see how the country moves forward on this.
 - China want to take on a leadership role by **implementing policies domestically** that address plastic pollution upstream.
 - **'Zero-effect, zero-defect' khadi product** is a major agent in humanity's fight against plastic.
 - For more than 60 years, khadi has been linked with India's fight for freedom and today it has emerged as one of the most eco-friendly products.
 - We can provide the best Indian practices to the world and can bring best practices from the world to India.
 - **Bioplastics** (plastics made from materials such as corn starch and vegetable fats and oil) are "**innovative solutions**" that could be part of a long-term solution.
 - It is time for the World Health Organization to **introduce universal benchmarks for microplastic content in water**, similar to those for lead.
 - UN and the governments must consider **bringing conventions for beating plastic pollution** at the global level like Montreal protocol for CFC.
 - As the **European Union's vision 2030** document on creating a **circular plastic economy** explains, the answer lies in changing the very nature of plastics, from cheap and disposable to durable, reusable and fully recyclable.
 - **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2018/06/Plastic-Pollution.pdf>
 - <http://www.insightsonindia.com/wp-content/uploads/2017/09/Plastic-Pollution.pdf>

2. A Plastic Charter

- **Plastic pollution** has become **an epidemic**.
- **Environment Ministry notifies Plastic Waste Management (amendment) rules in 2016**.
- **More than 20 Indian States** have announced a ban on plastic bags.
- The CPCB report says that as mentioned in the **Solid Waste Management Rules 2016**, waste has to be **segregated separately at source**.
- **Geographically divide a region** into zones and handle the waste generated in their designated zones.
- This strategy was **used in Switzerland to recycle thermocol** used for insulation of buildings. This also reduces collection, transportation and recycling costs.
- In India, some companies have helped **empower the informal recycling sector**, giving waste pickers dignity and steady incomes.
- For example, a **Canadian company monetises plastic waste** in novel ways. It

has one of the largest chains of waste plastic collection centres, where waste can be exchanged for anything (from cash to medical insurance to cooking fuel).

- India generates an estimated **16 lakh tonnes of plastic waste annually**. If sold at the global average rate of 50 cents a kg, it can generate a **revenue of ₹5,600 crore a year**.
- **Countries should come together** to establish measurable reduction targets for plastic waste.
- Countries should end fossil fuel subsidies. Annually, **4–8% of oil is used to produce raw plastic**.
- Enforcing the Solid Waste Management Rules, 2016, which require **segregation of waste will retrieve materials** and greatly reduce the burden on the environment.
- The **best way to reduce plastic pollution is to reduce and phase out its consumption**.

3. Delhi Air Pollution

- Delhi has registered its worst air quality in recent times.
- If serious steps are not taken, Delhi may soon face an "**air pollution disaster**" which London saw 65 years ago.
- Among megacities Delhi has the worst air quality, according to the WHO report.
- The **air quality index (AQI)** is in the severe category with the warning that healthy people are also affected.
- The level of the harmful PM2.5 was several times over the standard of 60 micrograms per cubic metre.
- Doctors have termed the situation a "**public health emergency**".
- When pollution levels rise, the condition of those suffering from Chronic Obstructive Pulmonary Disease (COPD) or asthma worsens.
- Even though farmers in the neighbouring states are aware that the burning of straw is harmful to health, they do not have alternatives for utilising them effectively.
- The WHO says that breathing Delhi air for a day is equal to smoking 20 cigarettes.
- As per estimates, air pollution is costing India around three per cent of the GDP in terms of health costs.
- Need for implementing long-term measures as the use of nasal filters or air purifiers can provide short-term relief only.
- There is great potential for making investments in paddy straw-based power plants which can help avoid stubble burning and create employment opportunities.
- The efforts of the MoEFCC, ministry of power, MNRE, MoRTH, MoHUA, MOHFW and a variety of non-governmental partners must come together for dealing with air pollution.
- There must be political will for political parties and governments to firstly acknowledge the scale of this health emergency and then work together.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2017/11/Delhi-Air-Pollution.pdf>

4. Ocean Acidification

- Ocean acidification is an emerging global problem.
- Around a third to a half of the CO₂ released by human activities is absorbed into the oceans which has a direct, chemical effect on seawater, which we call ocean acidification.
- Ocean acidification is progressing rapidly around the world, new research has found.
- Plastic pollution, overfishing, global warming and increased acidification from burning fossil fuels means oceans are increasingly hostile to marine life.
- **Ocean acidification has the potential to affect food security.** By 2100, the global annual costs of mollusc loss from ocean acidification could be over US\$100.
- Ocean acidification is affecting the coastal estuaries and waterways.
- Acidification could damage the Arctic tourism economy and affect the way of life of indigenous peoples.
- The capacity of the ocean to absorb CO₂ decreases as ocean acidification increases.
- The Arabian Sea is witnessing acidification of its surface waters, a consequence of excessive carbon dioxide in the atmosphere.
- Study shows rapidly decreasing presence of marine phytoplankton in the western Indian Ocean.
- A report warns that the Indian Ocean may be reduced to an ecological desert, given the levels of ocean warming.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2017/10/Ocean-Acidification.pdf>

5. Pesticides Tragedy

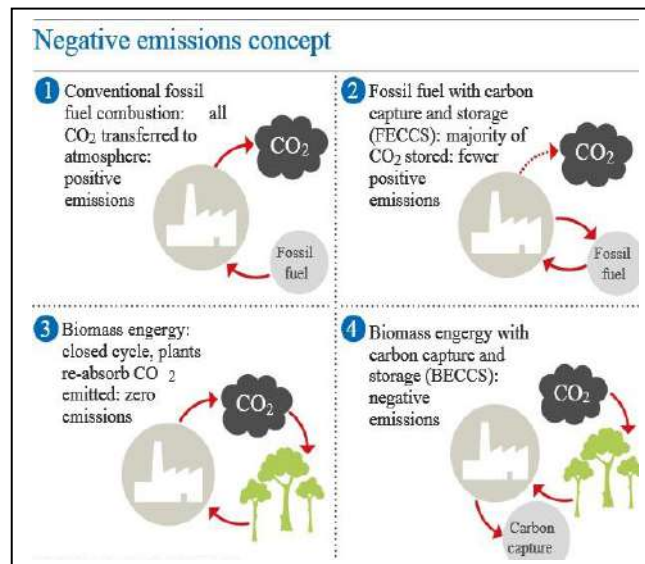
- Pesticides are potentially hazardous chemicals and have significant bearing on human and environmental health.
- More than 30 farmers had died after spraying 'Profex Super' insecticide on their Bt cotton plantations in Yavatmal district of Maharashtra.
- Experts say this is a result of faulty application or intake of the insecticide.
- In many villages the krishi sahayaks (agricultural assistants), whose duty is to advise farmers on the use of fertilizers and pesticides are either absent from duty or their posts are lying vacant.
- About 30-35% of the annual crop yield in India gets wasted because of pests.
- Nematodes, consisting of roundworms, threadworms and eelworms, are causing loss of crops to the tune of almost 60 million tonnes.
- **The Yavatmal farmers' deaths should be an eye-opener for the government.**
- Need to provide **education or awareness** about the precautions to be taken while spraying toxic pesticides.
- The corporates can use their **CSR spending in educating the farmers** about the right usage of pesticides.
- Union Agriculture Ministry must launch an **awareness campaign** about the **harmful effects of pesticides** across the country.
- **Knowledge about the science of the soil will help the sons of the soil.**
- There is a need to improve upon application of pesticides. Use of pesticides per

hectare of net sown area in Japan is 10 times of what it is in India. But the pesticide residue on food is not beyond the permissible limits.

- The government must constitute **pesticides development and regulation authority** for regulation of the pesticide sector as recommended by **Parliamentary Standing Committee on Agriculture**.
- Developing resistant varieties, use of bio pesticides and integrated pest management.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2017/10/Pesticides-Tragedy-1.pdf>

6. Bio-energy with Carbon Capture and Sequestration (BECCS)

- BECCS is a **future greenhouse gas mitigation technology**.
- This technology achieves **negative emissions, i.e. net removal of carbon dioxide from the atmosphere**.
- Negative CO₂ emissions are generated by combining bio energy (energy from biomass) use with geologic carbon capture and storage.
- A project that would inject millions of tons of carbon dioxide into the basalt of the Pacific Northwest is already underway.
- Study shows that to limit global warming, the CO₂ concentration must be reduced from the current annual average of 400ppm (parts per million) to 1980s levels of 350ppm.
- Many climate scientists believe that 2°C or 1.5°C limits will be possible with negative emissions.
- The most promising negative emissions technology is BECCS.
- **How Negative Emission works?**



- It involves growing crops which are then burnt in power stations to generate electricity.
- The carbon dioxide produced is captured from the power station chimneys, compressed, and piped deep down into the Earth's crust where it will be stored for many thousands of years.
- This scheme would allow us to both **generate electricity and reduce the amount of CO₂ in the Earth's atmosphere**.
- Other negative emissions approaches involve fertilising the ocean to increase photosynthesis, or direct air capture which sucks CO₂ out of the air.

- **Advantages:**

- In the **IPCC Fourth Assessment Report**, BECCS was indicated as a key technology for reaching low carbon dioxide atmospheric concentration

targets.

- Through BECCS technology, carbon dioxide is trapped in geologic formations for very long periods of time say 1000 years. While other types of carbon sinks such as the ocean, trees and soil may involve the risk of negative feedback loops.
- Technological and institutional challenges exist relating to the large-scale deployment of BECCS.
- If they fail then large amounts of CO₂ could be released very rapidly with disastrous consequences.
- By delaying significant carbon emission reductions we risk handing financial and technological burden to future generations.
- Thus innovative solutions like BECCS should be implemented to avoid further damage.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2017/08/Bio-energy-with-Carbon-Capture-and-Sequestration-BECCS.pdf>

7. The Much-Neglected Pollutant

- A much-neglected pollutant in discussions about pollution is **surface ozone (O₃)**.
- A recent study shows that O₃ levels will continue to rise drastically, particularly in north India.
- An analysis report, “**Impact of regional climate change and future emission scenarios on surface O₃ and PM_{2.5} over India**”, on prevalence of O₃ was recently published.
- **Good Ozone**
 - Called **stratospheric ozone**, good ozone occurs naturally in the upper atmosphere, where it forms a protective layer that shields us from the sun’s harmful ultraviolet rays.
- **Bad Ozone**
 - **Tropospheric, or ground level ozone**, is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NO_x) and volatile organic compounds (VOC).
- **Ground-Level Ozone**
 - Ozone (O₃) is a colourless, reactive oxidant gas that is a major constituent of atmospheric smog.
 - Ground level ozone is formed by the reaction of NO_x and VOCs under the influence of sunlight hundreds of kilometres from the source of emissions.
 - Long-term measurements of surface ozone across India—measured on the ground or by aircraft—are not available, making it difficult to get a clear picture of how levels of the pollutant have changed.
 - But satellite-based studies show ozone has increased in the last two decades.
 - The **Centre for Science and Environment (CSE)** noted that due to high pollution levels and growing heat stress owing to climate change, the ozone level is frequently exceeding the standards and rising to poor and very poor levels — as classified by the **National Air Quality Index**

(NAQI).

- Reference: <http://www.insightsonindia.com/2018/01/15/insights-editorial-much-neglected-pollutant/>

8. Nitrogen Overload

- During the past century, the global consumption of nitrogen has seen a steady increase.
- **India is the second-highest consumer of nitrogen in the world after China.**
- The use of urea in the country has increased by more than 50% since 2000.
- **The increasing rate of nitrogen use by humans has led to an imbalance in the nitrogen content in the environment.**
- According to “Our Nutrient World”, a 2013 report of the United Nations Environment Programme (UNEP), human-induced nitrogen inputs or fertilisers and associated emissions from agriculture, fossil fuel burning, sewage and industrial waste have directly or indirectly far surpassed natural emissions, causing **nitrogen pollution** that has reached alarming levels.
- Another study shows that the annual economic loss in the US due to energy wastage and damages to the environment and human health from nitrogen pollution is \$210 billion.
- “Our Nutrient World” estimated that the global cost of damage from nitrogen could go up to US \$2,000 billion.
- According to the **World Health Organization**, nitrate-contaminated drinking water can cause reduced blood function, cancer and endemic goiters.
- Surplus inputs of nitrogen compounds have been found to cause **soil acidification**.
- **Nitrogen pollution has a significant impact on the environment:**
 - It creates of harmful **algal blooms** and **dead zones** in our waterways and oceans.
 - **Contamination of drinking water.** 10 million people in Europe are potentially exposed to drinking water with nitrate concentrations above recommended levels.
 - Excessive nitrogen fertiliser application contributes to **soil nutrient depletion**. As the world needs to feed an ever growing population loss of arable land is major global problem.
- We cannot produce enough food to feed the nation without nitrogen, but at the same time we cannot keep introducing higher quantities of nitrogen because of its polluting effects.
- A 20% **increase in the rate of efficiency** would save an estimated 20 million tonnes of reactive nitrogen by 2020, which equates to an improvement in human health, biodiversity and climate worth US \$170 billion.
- Reference: <http://www.insightsonindia.com/2017/08/07/insights-editorial-nitrogen-overload/>

9. E-Waste Management

- **E-waste** describes discarded electrical or **electronic devices**.
- Recently, Ministry of Environment, Forest and Climate Change (MoEF&CC) amended the earlier E-Waste Management Rules, 2016.
- E-Waste (Management) Amendment Rules, 2018 aims to **formalise the e-waste**

recycling sector by channelizing the E-waste generated towards authorized dismantlers and recyclers.

- E-waste has **increased by 8% from 2014 to 2016** and expected to rise again by 17% by 2021.
- A mere **5 per cent of India's total e-waste gets recycled** due to poor infrastructure.
- The main sources of electronic waste in India are the government, public and private (industrial) sectors, which account for almost 71% of total waste generation.
- Over 95% of e-waste generated is managed by the unorganised sector and scrap dealers who dismantle the disposed products instead of recycling it.
- **E-waste and SDG** are closely associated due to its impact on environmental protection.
- According to ASSOCHAM, US & China account for 70% of India's e-waste imports in 2016.
- Countries should promote the **Reduce, Reuse and Recycle strategy**.
- The value of recoverable precious materials from e-waste like gold, silver, copper, platinum and palladium was \$55 billion in 2016.

Renewable Energy

1. Biofuel Development Programme in India

- Biofuels are liquid or gaseous fuels produced from biomass resources and used in place of, or in addition to, diesel, petrol or other fossil fuels for transport, stationary, portable and other applications.
- The Union Cabinet approved **National Policy on Biofuels – 2018** in order to promote biofuels in the country.
- It augers well with ongoing initiatives of Government such as Make in India, Skill Development and Swachh Bharat Abhiyan.
- Using advance technologies, the waste in municipal solid waste (MSW) can be converted to biofuels. This helps in reduction of 62 million metric tonnes of MSW generated in the country.
- Fuel blending with ethanol varies from 85 per cent (E85) in Australia to vehicles run on 100 per cent (E100) ethanol in Brazil, where the ethanol blending mandate is 27 per cent (E27).
- India has an abysmal 2-4 per cent blending rate.
- **National Biofuel Policy, 2018 is silent about octane**, which has direct consequences of air quality and pollution — octane assists in proper combustion of fuels and thereby impacts vehicular emissions.
- Petrol is blended with cancer-causing imported aromatics to boost octane rating, with negative consequences on health and emissions.
- There is a huge potential for farmers to grow feedstock yielding biofuels in the periphery of their farms and thereby have a secondary source of income.
- It will be important to **create sustainable support mechanisms for investors in feedstock development**, as the US, the European Union, China and Brazil have shown.
- **Expected Benefits of National Policy on Biofuels:**
 - Supply of around 150 crore litres of ethanol will result in savings of over **4000 crore of forex**.
 - There will be lesser emissions of CO₂ to the tune of 30 lakh ton.
 - It is estimated that, **annually 62 MMT of Municipal Solid Waste** gets generated in India. One ton of such waste has the **potential to provide around 20% of drop in fuels**.
 - One 100klpd 2G bio refinery can contribute 1200 jobs in Plant Operations, Village Level Entrepreneurs and Supply Chain Management.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2018/08/Biofuel-Development-Programme-in-India.pdf>
- <http://www.insightsonindia.com/2018/06/06/insights-into-editorial-policy-on-biofuels-green-push/>

2. Green Energy in India

- **India launched the world's largest renewable energy expansion programme and aims to achieve 175 GW capacity of renewable energy by 2022.**
- Renewable energy offers an opportunity to build a new **low-carbon energy world**.
- Over 300,000 Indians could find jobs in the wind and solar industry over the

next five years if the country works towards its 2022 target.

- Rooftop solar industry is most labour-intensive.
- Renewable energy is the only way to meet energy demand of 1.32 billion people in the country.
- Energy consumption results in 77 percent of India's greenhouse gas emissions.
- **Concerns / Challenges**
 - The U.S. withdrawal from the Paris Agreement and refusal to contribute to the Green Climate Fund threatens low-cost financing.
 - India has fallen from second to fourth position on the **Renewable Energy Country Attractiveness Index (RECAI)** compiled by global consultancy firm EY.
 - Land availability, power evacuation infrastructure, and Renewable Purchase Obligation (RPO) compliance are other major challenges in meeting solar targets.
 - In 2016, local solar cells and modules manufacturers struggled in the face of cheap imports.
 - Falling tariffs affect the cost competitiveness of pre-existing Renewable Energy projects according to rating agency ICRA.
- Along with the capacity addition, the country needed to build smarter grids for integrating renewables.
- The Indian government should continue developing and integrating renewable capacity with its neighbours.
- **Rooftop solar power** growth has demonstrated an overall positive trend in the recent quarters.
- International examples show that **effective net-metering implementation** can increase rooftop solar adoption by as much as 50%.
- Bring **offshore wind energy** and **large hydro-electricity projects under the ambit of renewable energy**, which will scale up the target of 175 gigawatts of green power capacity by 2022.
- India will need financial and technological support from the world to achieve its target and do more.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2017/10/Green-Energy-in-India.pdf>

Climate Change

1. A Climate for Green Funds

- According to NASA, **Climate Change** is a broad range of global phenomena created predominantly **by burning fossil fuels**, which add heat-trapping gases to Earth's atmosphere.
- According to **World Meteorological Organisation's (WMO) State of Global Climate Report 2017**, **2017 was 2nd warmest year** on record after 2016, and **the warmest non-EL Nino year**.
- According to **IPCC (International Panel on Climate Change)** India is most vulnerable to the impact of climate change adversely impacting the health, economic development and food security.
- India has been ranked **14th in Climate Change Performance Index (CCPI) out of 56 countries in 2017**.
- Between 2030 and 2050, the World Health Organisation expects **250,000 additional deaths a year** due to climate change.
- **HSBC Global Research** new analysis covers **67 countries** accounting for **80 per cent of the world's population** and **94 per cent of global GDP**.
- Analysis by HSBC finds that **India, followed by Pakistan and the Philippines**, are the **most vulnerable countries** to changes in climate.
- The government **aims to source 175 GW of power from renewables by 2022** and for **nearly 57 per cent of total electricity capacity** to come from **non-fossil fuels by 2027**.
- It has been estimated that approximately **\$100 trillion of additional investment** will be required **between 2016 and 2030** to sync the imperatives of global development with that of addressing the challenge of climate change.
- **Concept of Green Financing in India:**
 - In India the concept of **green financing is nascent**.
 - **Green bond** issuance in India rose sharply last year — to **more than \$4 billion from \$1.3 billion in 2016**, according to data provider Dealogic.
 - Measures to **encourage green-bonds** could help raise finances needed to **"green" India's economy**.
- **Measures and Policies for Tackling Climate Change: Government Initiatives:**
 - "In the pre-2020 period, India announced its **voluntary goal to reduce the emission intensity of its GDP by 20-25 per cent from 2005 levels by 2020**.
 - According to **Biennial Update Report** submitted by Government of India to **UNFCCC in 2016**, India has achieved **12% reduction in emission intensity** between 2005 and 2010 and is on course **to achieve the voluntary goal by 2020**.
 - Under the Paris Agreement, India has submitted its **Nationally Determined Contribution (NDC)** to the UNFCCC outlining eight (8) targets for 2021-2030.
 - **To achieve the goals**, Government of India is implementing the **National Action Plan on Climate Change (NAPCC)** which includes **eight national missions** being implemented by various Ministries.
 - Government of India is also implementing a **dedicated National**

Adaptation Fund to implement adaptation actions in vulnerable sectors across the country.

- Reference: <http://www.insightsonindia.com/2018/08/14/insights-into-editorial-a-climate-for-green-funds/>

2. Building India's Green Finance Ecosystem

- According to the **World Bank**, **70% of the global greenhouse gas emissions** comes from infrastructure development, construction, power plants and transport system operations.
- The **World Health Organization** projects that the number of deaths attributable to the harmful effects of emissions from key infrastructure industries will rise from the current **150,000 per year to 250,000 by 2030**.
- According to the **International Energy Association**, to limit climate change to 2 degrees, **CO2 emissions must fall by 70% in aggregate by 2050 in Asia**. For this to fructify, **emissions from the power industry**, for example, should **reduce by 85%**.
- **Green bonds help companies** tap money from specialized funds focused on climate change.
- India's green bonds market is still nascent. The **country's first green bonds** were issued as recently as 2015. Cumulatively, India has raised over \$6 billion via green bonds, of which one third were issued in 2017.
- **China was the top green bonds issuer in 2017** with a 22% share, followed by the US (13%) in the \$120 billion global market.
- Reference: <http://www.insightsonindia.com/2018/06/28/insights-into-editorial-building-indias-green-finance-ecosystem/>

3. Environmental Performance Index (EPI)

- India ranks low in the Environmental Performance Index (EPI) 2018, slipping from rank 141 in 2016, to 177 in 2018.
- The Environmental Performance Index (EPI) is a method of **quantifying and numerically marking the environmental performance of a state's policies**.
- Of the emerging economies, China and India rank 120 and 177 respectively, reflecting the strain population pressures and rapid economic growth impose on the environment.
- The report said deaths attributed to ultra-fine PM2.5 pollutants have risen over the past decade and are estimated at 1,640,113 annually in India.
- A drop in an index ranking environmental performance should be cause for concern and used as a context to examine our policy measures.
- **Environmental degradation costs India \$80 billion a year: World Bank**.
- Also according to another WHO survey across G-20 economies, 13 of the 20 most polluted cities were in India.
- Reference: <http://www.insightsonindia.com/2018/01/30/insights-editorial-red-alert-green-index/>

4. A New Weapon in the Carbon Fight

- There has been a renewed interest in understanding how **soils can serve as a sink for carbon dioxide** since atmospheric concentrations of carbon dioxide have crossed 410 parts per million and oceans are already turning acidic.

- Increasing soil carbon offers a range of co-benefits and this would buy us time before other technologies can help us transition to a zero-carbon lifestyle.
- Storing the carbon contained in organic matter within the soil is seen as one way to mitigate climate change by reducing greenhouse gas emissions (in this case carbon dioxide).
- **What is soil organic carbon?**
 - Soil organic carbon (SOC) comes from plants, animals, microbes, leaves and wood, mostly found in the first metre or so.
 - In the presence of climate change, land degradation and biodiversity loss, soils have become one of the most vulnerable resources in the world.
 - Soils are a major carbon reservoir containing more carbon than the atmosphere and terrestrial vegetation combined.
 - The Intergovernmental Panel on Climate Change (IPCC) provides guidelines for measuring, reporting and verifying national SOC stock inventories.
- As an indicator for soil health, SOC is important for its contributions to food production, mitigation and adaptation to climate change.
- Maintaining SOC storage at equilibrium or increasing SOC content towards the optimal level for the local environment can contribute to achieving the SDGs.
- If managed wisely, they have the potential to sequester large amounts of carbon in their soils, thus contributing to climate change mitigation and adaptation.
- **Reference:** <http://www.insightsonindia.com/2018/01/16/insights-editorial-new-weapon-carbon-fight/>

5. UNFCCC Climate Change Conference (COP23)

- The UNFCCC Climate Change Conference (COP23) was held in Bonn, Germany.
- It was presided over by Government of Fiji.
- ‘**Talanoa Dialogue**’, a year-long process to assess countries’ progress on climate actions was concluded.
- The Conference also made progress on framing **rules for implementing 2015 Paris Agreement on climate change** and brought rich nations on board on their **pre-2020 commitments** as demanded by developing nations.
 - **Pre-2020 Actions** refer to existing obligations of small group rich and developed nations to take mitigation actions **under Kyoto Protocol**.
- A decision was taken to deal with climate actions in agriculture.
- The first ever **Gender Action Plan to the UNFCCC** was adopted at COP23.
- **Local communities and indigenous people’s platform** to include indigenous people’s voices in the implementation of the Paris Agreement.

Disaster Management

1. Disaster Risk Situation in India

- According to an **UN Office for Disaster Risk Reduction (UNISDR)** report, India has been ranked as the world's most disaster-prone country for displacement of residents.
- **India** has also been among the **top four countries** in the world with the **highest number of disasters** with **at least 167 disasters striking** India between 2005 and 2014.
- According to **National Disaster Risk Index**, Maharashtra is the most vulnerable state while Delhi is most at risk among Union territories (UTs).
- **Steps taken to improve Disaster Management:**
 - National Disaster Management Act, 2005.
 - National Policy on Disaster Management (NPDM), 2009.
 - Indian Tsunami Early Warning System (ITEWS).
 - Earth System Science Organization (ESSO) under Ministry of Earth Sciences (MoES).
 - National Disaster Management Plan, 2016.
 - Regional Integrated Multi-Hazard Early Warning System (RIMES).
 - National Cyclone Risk Mitigation Project (NCRMP).
- According to **World Meteorological Organisation**, for Indian Subcontinent, 2017 was the most expensive year on record for severe weather and climate events.
- **Sendai Framework for Disaster Risk Reduction (2015-2030)** calls for reducing direct disaster economic loss in relation to GDP by 2030.
 - Sendai Framework identifies investing in **Disaster Risk Reduction (DRR)** for resilience and to “build back better” in reconstruction as priorities.

2. Kerala Floods

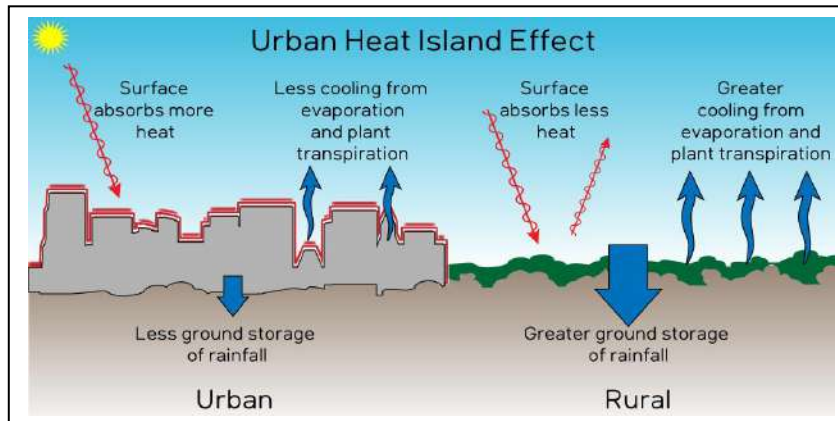
- Kerala faced the brunt of an unprecedented flood, which almost brought the state to a standstill.
- This is the worst flood Kerala has witnessed in nearly a century.
- **Reasons:**
 - The Kerala disaster essentially has been caused by **extreme rainfall** since June 1 (42.17% excess in the state, 83.59% excess in Idukki).
 - **Geography** (10 per cent of the land in the state lies below sea level).
 - **High population density** compared to the all-India density.
 - The state does not have a single battalion of the **state disaster response force (SDRF)**, which is mandatory as per the rules to tackle natural calamities.
- Several of India's floods, such as Bihar in 2016 and Surat in 2006, were exacerbated by poor dam management.
- In the **2015 Chennai floods**, **violation of dam safety norms** were a critical factor, a **CAG report** found.
- The floods in Kerala have brought the focus back on **2011 report on the Western Ghats** that had made recommendations for preserving the ecology and biodiversity of the fragile region.

- **Madhav Gadgil** has argued that had the report's suggestions been implemented, the scale of disaster in Kerala would not have been as huge as it is.
- **The Madhav Gadgil Report and The Sendai Framework for disaster risk reduction (2015-2030)** must be considered while planning and implementing and adopting integrated and inclusive institutional measures.
- **Instances of Extreme Weather:**
 - According to the data base compiled by the **Centre for Research on the Epidemiology of Disasters**, the instances of extreme weather have gone up from 71 in the 1970s to about 224 in the 1990s and 350 in the first decade of the millennium.
 - Since the Uttarakhand flooding, such extreme rainfall events have led to disaster-like situation in India every year.
 - The recent disaster that hit Kashmir when the Jhelum River overflowed.
 - Odisha bore the brunt of the cyclonic storm Phailin, the worst since 1999.
 - In 2010 there was a cloudburst in Leh.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2018/08/Kerala-Floods.pdf>

Miscellaneous

1. The Urban Heat Island Effect

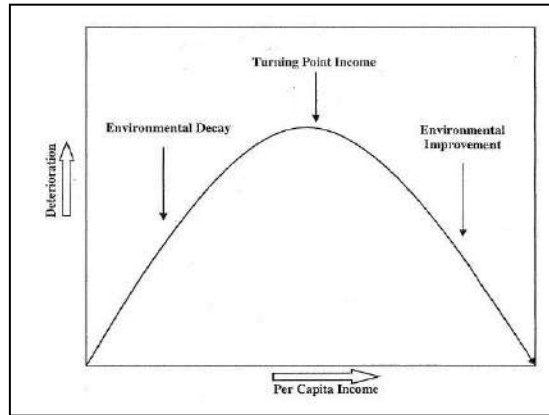
- **Urban heat island (UHI)** means urban areas getting significantly warmer compared with the surrounding areas.
- UHIs are formed as **vegetation is replaced by asphalt and concrete** for roads, buildings and other structures to meet the growing population.
- UHI is most noticeable during the summer and winter.
- Most cities in India and in the world are warmer than surrounding non-urban areas due to the urban heat island effect.
- Delhi is 4-12°C warmer due to the urban heat island effect.
- Research shows that urban heat island effect **contributes to climate warming** by about 30%.
- The **increase in water temperature** affects aquatic life, especially the metabolism and reproduction of aquatic species.
- Setting up a kitchen garden and using high solar reflective index paint helps in reducing the Urban Heat Island Effect.
- The policy makers should strike a balance by providing equal opportunities at village & town levels thereby checking migration & concentration of population at urban areas.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2018/01/The-Urban-Heat-Island-Effect.pdf>



2. Economic Growth and its Impact on Environment

- Economic growth has positive impacts like increase in wealth/reduction in poverty, improved standards of living, health, education and infrastructure and technology.
- However there are negative effects like health challenges, increase in income inequality, increased pollution and a depletion of natural resources.
- Economists concerned about sustainable development advocate low levels of economic growth since large expansions in national income may have negative environmental consequences such as pollution.
- Large economic growth adversely affects the environmental quality and economic welfare of individuals and households.
- **Environmental Kuznets Curve (EKC):**

- The EKC hypothesis is shown in an inverted U-shaped curve depicting the relationship between per capita income and environmental deterioration.
- In reality, the EKC is a near myth since an increase in per capita income does not bring desirable levels of improvement to the environment.
- Empirical evidence across countries reveals that various attempts to increase per capita income cause more environmental deterioration.



- A 2013 World Bank study highlighted that in India, a higher level of economic growth maintained in the past imposed ₹3.75 trillion worth of environmental damage cost.
- Another study by the World Bank has found that India's air pollution alone caused welfare loss equivalent to 7.69% of its GDP in 2013.
- Development policies give more priority to income and employment generation, implementation of pollution control policies is very poor.
- Ex: pollution control measures implemented in the bleaching and dying units in Tiruppur, Tamil Nadu, for more than 25 years did not achieve any pollution reduction.
- Increased output and demand increases the value of GDP, but the corresponding environmental damage cost is not adjusted in the GDP estimation.
- **Our policy should not be based on the "pollute-first; clean-up-later" approach.**
- A large number of poor people are dependent on the environment for their day-to-day activities and therefore more focus on improved environmental quality can push income growth on a sustainable basis.
- The future "wars" to protect our environment require a new **"coalition of the willing"** as the problem we face is as much local as it is global.
- The time has indeed come to add "swachh paani" and "hawa" to "roti-kapada-makaan-aur-bijli", to begin our journey towards sustainable growth.
- **Reference:** <http://www.insightsonindia.com/wp-content/uploads/2017/10/Economic-Growth-and-its-Impact-on-Environment.pdf>