

## Environment and Disaster Management

**Notebook:** First Notebook

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**Location:** New Delhi, Delhi, India

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### 1. Antarctic and Arctic ice cover melting

- Larsen C shelf calved. Iceberg separated
- Project MIDAS studying Antarctica
- Caused by natural reasons
- But this can accelerate glacier melt as there is no iceberg to hold back b the ice
- Biodiversity can be attracted. Eg emperor penguins need I've cover for breeding. Polar bear in the Arctic
- Ice melting also due to strong winds from the east that being warm waters to the western coast of Antarctica

#### Way forward

- Leave the areas alone but intensify scientific research

#### India's attempts at increasing Arctic research

- NCAOR renamed as National Centre for Polar and Oceanic Research
- Talks with Canada and Russia to establish new observatories
- More expeditions to North Pole
- India has observer status with Arctic Council
- Set up IndARC underground observatory in Kongsfjorden fjord

### 2. Coral bleaching

- Northernmost coral bleached in Japan
- Recently, great barrier reef witnessed bleaching got 2nd consecutive time
- Result of algae thrown out of coral polyps due to warming seas
- Can recover from mild bleaching
- NOAA: bleaching events likely decreasing as not occurring in all ocean basins

#### importance of corals

- Flood damage may double from \$4 billion to \$8 billion due to absence of corals. *Nature Communications*

### 3. Problems with groundwater

- Primary source of domestic use and irrigation but media and govt still focus on surface water
- Falling tables
- Due to legislative framework, built around 19th century. Landowners given power over groundwater in their own lands. But since aquifer us common across lands, this led to over exploitation
- Ownership of groundwater also a source of power and privilege, as it can be sold
- Introduction of mechanized pumps led to further exploitation
- Quality of groundwater also falling
- Model bill introduced in 1970s. Very few states took it up. But failed to address problem

#### Reasons for groundwater exploitation in agri

- Water use efficiency in agri just 55%, compared with 77% in Israel
- Huge electricity subsidies
- Unregulated GW market

#### Problems in urban areas

- Inadequate, old and dilapidated distribution networks, inadequate metering and billing
- Poor governance
- Not treating wastewater and recycling it
- Under-pricing of water
- Access to tap water only to 62% of urban HHS- Census 2011. Leads to buying water at exorbitant rates from water tankers

#### Way Forward

- Financing capital infrastructure of urban water supply- using PPPs, rationalising user charges- water use can be **priced progressively, like electricity**. And **differential pricing and cross subsidise** those HHS with low per capita water use- Need effective water metering
- Mobilise more supply from basic natural resources
- Getting rid of encroachments on water bodies
- Increasing water-use efficiency in agri
- Treating and recycling municipal waste water. Set up **urban water planing and mgmt boards** to regulate supply, demand and maintenance of water structures.
- Centre, states and LGs need to take coordinated actions
- Learn from cities like Cape Town through concepts like **Day Zero**

#### How waste water recycling can be done

- Many IT companies use waste water recycling using their own STPs, and use that for non-consumptive purposes like gardeing and flushing toilets
- RO based tertiary treatment plants
- Conjunctive use of fresh water mixed with treated sewage water.

## Groundwater Bill 2017

- Recognizes unitary nature of water
- Need to conserve at the aquifer level
- Decentralization to give more power to gram sabhas
- Introduces protection principles including precautionary principles
- Planning
- Fundamental right to water

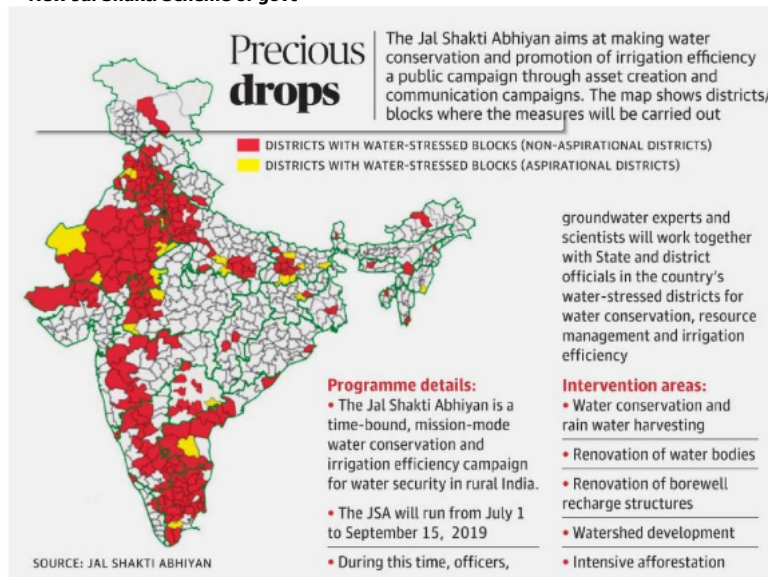
## Importance of groundwater in coastal areas

- Groundwater carries pollutants and minerals to seas and oceans
- Affects ocean temperature near the coast. GW usually cooler, and cools the ocean water
- GW can carry nutrients especially nitrates- that promote algal blooms - and high concentrations of mercury
- Heavy extraction of GW, especially in dry areas, leads to salt water ingress from the oceans. Thus, fresh GW discharge is the first line of defense against saltwater ingress

## New GW map created near oceans

- Nearly 50% of fresh submarine GW flows into oceans in tropics
- Regions near active faultlines send greater volumes into oceans than those tectonically stable
- Dry humid areas- Little GW discharge. So, saltwater ingress takes place.

## New Jal Shakti Scheme of govt



## Water Crisis in India

<https://www.livemint.com/news/india/a-wish-list-on-water-from-parched-india-1560265588046.html> (READ)

- Not only farmers, urban dwellers in cities and towns across India are also staring at a never seen before drinking water scarcity.
- Providing water for drinking and irrigation is the responsibility of the state, so unless water becomes a union subject, these plans will remain mere plans.
- "Governments should work not to interlink the rivers, but to link the hearts and minds of the people with the rivers".- Rajendra Singh, Waterman of India
- Krishna, which runs dry in her delta region for most parts of the year. Even Godavari is sans water post-monsoon for most of the year—a recurring feature for decades now.
- The groundwater and sand extraction from most river beds and basins has turned unsustainable
- Tanks and ponds are encroached upon. And dug-wells and borewells are constructed with alarming impunity to slide deeper and deeper
- It's also the reason why water conflicts between urban and rural masses, regions and states, districts and blocks, and sectors are getting fiercer along with worsening imbalances in water access
- Marathwada: faces massive water shortage, fodder crops getting scarcer and horticulture crops wilting. But sugarcane acreage and production rising- so water diverted disproportionately
- In Bengaluru: Centre for Science and Environment (CSE) ahead of World Water Day in 2017, the water table in the southern metropolis has sunk from 10-12 metres below the surface to 76-91 metres in a mere two decades.
- Village after village along the dry Godavari throw up soulless hamlets of fishing communities, the Kolis and the Bhois, who have migrated in search of tanks and ponds and rivers where they can fish and make a living. They don't figure at all in any drought relief plan.
- With little or no water released from the upstream Sardar Sarovar dam, the perennial river that once had an expanse of 300m is now reduced to a 20-foot stream.
- there is fluoride, arsenic, mercury, even uranium in our groundwater.
- A recent Water Resources Institute (WRI) report indicated that "water shortages are hurting India's ability to produce power" and that "40% of the country's thermal power plants are located in areas facing high water stress.

## Steps taken

- Jal Shakti Mantralaya (a new nomenclature that clubs Water Resources, River Development and Ganga Rejuvenation) promised that it would ensure potable, piped drinking water to every home by 2024.
- Mihir Shah report
- 'Jal-Yukta Shivar' - MH
- Maharashtra Integrated State Water Plan (IWSP)—a first of its kind integrated plan ratified by the state water council in 2018. This plan calls for a river basin approach to water management; auditing and accounting of available water; and planning and management of all available resources by integrating legal and statutory provisions
- **Bundelkhand: Kuan Talab Jiao Abhiyan-** to revive and restore existing ponds and wells, **Apna Talab ABhiyan:** farmers receive partial funding from govt to conserve their own wells. The movement has become a Jan Andolan, with rich peasants and city-dwellers donating

## Way Forward

- Utilising **floodplains** based on 'conserve and use': use as much water as it's recharged by rain, not more, to keep groundwater table higher than the river.
- Utilising **forested hills** like Arravalli for natural mineral water replenishment instead of mineral water from Himalayas. **Tapping forest catchment potential** : As is done in Mullaperiyar dam and Shimla
- Govt working on **National Aquifer Management Policy** to map all the aquifers and send it to states
- India's priority must be: 1) to make our irrigation and water (physical /engineering) systems amenable to modern concepts; 2) to complete irrigation and water sector reforms and 3) to implement improved water management, governance and regulation practices
- Need to update water cycle diagrams in textbooks to include human interference. Otherwise, a false sense of security about future availability of this scarce resources prevails

## 4. Examples

- Air pollution biggest killer in India (WHO) . Can lead to cancer, stroke, heart disease and asthma.
- Groundwater fell in 61% of Wells in 2017 compared to 2016. Largest fall in TN. Least Goa
- India loses \$220 billion every year due to air pollution (UNEP "towards a pollution-free planet")
- Rajasthan to set up first BioGas Plant in cow shelters
- Particles from burning carbon could cool sea surface resulting in lower monsoon
- **Integrated Mountain Initiative (IMI)** and **Zero Waste Himalayas**: collecting as much waste as possible in a single day in Himalayan foothills and analysing trash.
- Costa Rica ran on RE for 300 days in a year. Plans to achieve 100% RE by 2020.
- First inter-state tiger relocation between MP and Odisha took place (June 2018).
- NDMA conducted earthquake drills in Tripura, Nagaland, Mizoram in may 2018
- WB Report: Top 2 hotspots in India: Chhattisgarh and MP, as avg annual temp will rise by 1 to 2 degrees by 2050 even if INDCs implemented
- 12-part **Climatrix Symphony by leading artists (Planet Symphony Orchestra)** to raise awareness on World Environment Day

## 5. Problems with NITI National Energy Policy

1. Over emphasis on coal but no focus on public health from air pollution
2. No mention of Health in All Policies (HiAP) of WHO which health ministry has also adopted

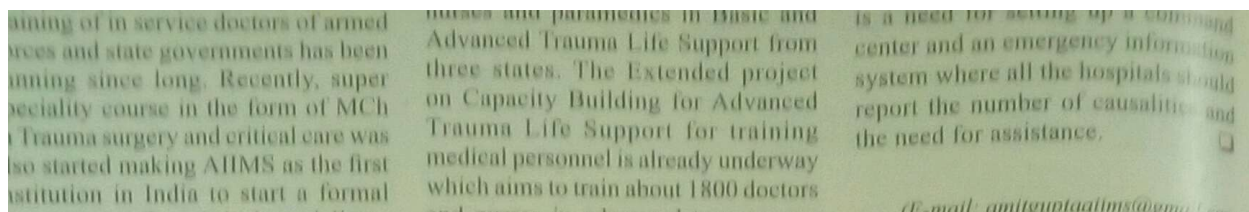
## Way Forward

- Need health impact assessment of power projects

## 6. Sustainable development

- Definition coined by Brundtland Commission
- Need to account for **natural capital** in national income and business accounting
- Development needs to be **climate smart**.
- **Climate Smart Agriculture:** "National Innovations on Climate Resilient Agriculture" (NICRA)
- **Soil Organic Carbon:** can sequester a lot of carbon through soils. Focus on reducing soil erosion, no-till farming, use of cover crops, nutrient management, manure and Sludge, organic farming, agroforestry
- Indian states should develop capacities for better utilisation of funds. India received 745 million since 2013, one of the largest.
- Prepare for forced **internal migration due to climate change** by investing in health, education, skill, infrastructure and protecting ecosystem services in peri-urban areas
- Need to include **culture in environment protection**- Cultural wisdom evolves according to environmental conditions of the area. Need to factor that in.- **Hindu concept of Rta dharma** states that the moral duty of communities is through karma towards sustaining and maintaining Rta (cosmic natural order). **chipko movement, prakriti panchayats, sacred groves.**

## 7. UNDAC





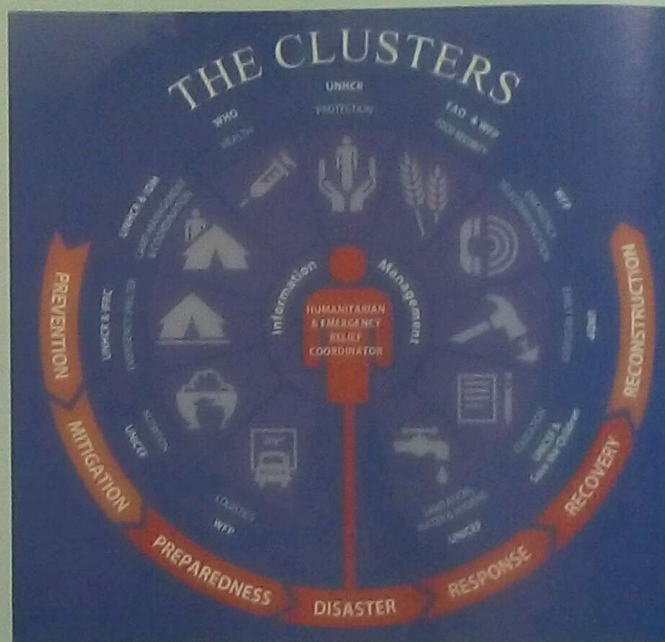
## DO YOU KNOW?

### UNITED NATIONS DISASTER ASSESSMENT AND COORDINATION (UNDAC)

The United Nations Disaster Assessment and Coordination (UNDAC) is part of the international emergency response system for sudden-onset emergencies. The office for the Coordination of Humanitarian Affairs (OCHA) at the request of the government affected by a disaster dispatches a UNDAC team to the country within 12 to 48 hours anywhere in the world. After a sudden-onset disaster, UNDAC team provides technical services, principally in tasks such as damage, assessment, and on-site coordination and information management.

UNDAC was created in 1993 with the aim to facilitate close links between country-level, regional and international response efforts. When deemed appropriate, the United Nations also sets-up an On-site Operations Coordination Centre (OSOCC) to help local authorities in a disaster-affected country to coordinate international relief. UNDAC consists of more than 70 members and participating countries, together with staff from OCHA and 16 international and regional organizations including UN agencies.

In addition, OCHA has established a structure of clusters as a way for UN agencies to work together with non-UN agencies like NGOs to deliver humanitarian assistance in a coordinated fashion. There are eleven different clusters, each one focussing on a specific set of tasks or functions. Each cluster is headed by one or two UN organizations or agencies. Both the UNDAC team and the OCHA clusters coordinate their efforts with the UN Resident Coordinator and the UN Humanitarian Coordinator in the country affected by the disaster.



While most clusters operate during the response phase, the United Nations Development Programme (UNDP) has established the Early Recovery Cluster that focuses on the more long-term needs related to recovery. Through this cluster, UNDP links humanitarian efforts with development work. The aim of this cluster is to gradually turn the dividends of humanitarian action into sustainable crisis recovery, resilience building and development opportunities. □

#### 8. Asian Ministerial Conference on Disaster risk reduction

- Held in Delhi last year
- New Delhi Declaration: political declaration by leaders on DRR



- Asian Regional Plan: on how to achieve the Sendai goals and SDGs

## 9. Delhi Smog ( true for 98% cities in middle and low income countries)

- Stubble burning in Punjab and Haryana due to a) use of mechanised harvesters and b) very little time in between paddy and wheat to dispose off the stubble.
- Unpaved surfaces
- Construction dust
- Exhaust from industry and vehicles
- Geographical limitations. Low breeze as not near the sea, **atmospheric winter temperature inversion**.
- Open air burning of municipal solid waste
- In summers, due to heating of land, western disturbances and anti-cyclonic winds pushing local air down and preventing outside air from entering the region. Haze due to soil particles, dust and pollen. But also takes in pollutants from cars, industries, construction etc which contains heavy metals like lead, Cr, Ni.

### Way Forward

- Greening Delhi, similar to **AU led Great Green Wall for Sahara and Sahel Initiative**
- Incentives to farmers to dispose off stubble
- Paving surface
- **EPCA guidelines (check) Graded Response Plan**
- Learn from Mexico City
- Issue health alerts
- Stringent measures on industries
- Rationing of cars and incentivising public transport
- Electric cars
- Use Turbo Happy Seeder that cuts and lifts the standing stubble and then drills wheat seeds into the soil
- Improving efficiency of engines and switching to BS VI standards.
- Introduce **Transit Oriented Development Scheme** and **Green Urban Mobility Scheme**.
- Engage with health sector to identify vulnerable populations.
- Mobilise individuals and raise awareness.
- Carbon tax. But it is regressive. So, introduce in-kind transfers like free electricity to poor households along with the tax.
- Delhiites should segregate garbage into biodegradable and non biodegradable at home itself
- **National Clean Air Programme** (Setting up 1000 manual air-quality monitoring stations + 268 automatic stations+ pollution monitoring in rural areas)  
Read: <https://indianexpress.com/article/explained/clean-air-programme-how-centre-plans-to-wage-a-war-against-pollution-5536671/>
- Set up an **Air Quality Manager** who is accountable and has all the powers to maintain air quality in a city
- Change in **perspective**: Clean air programmes provide significant business opportunities, like electric vehicles

### How to reduce stubble burning

- Diversify towards less water-intensive crops
- Provide price-deficiency system or Telangana model of income support
- Substitute labour shortage by machines by providing capital and financial support
- Turbo Happy Seeder is expensive for small farmers- Rs. 1 lakh. Instead- set up custom hiring centres or inviting companies to make investments for rental purposes. App-based support system also possible.
- Effective use of paddy straw- biomass power plants, paper and cardboard mills. Use geospatial techniques to identify places where stubble burning is severe and locate biomass plants nearby

## 10. Turtle conservation in India

- Lots of turtle killed by fishing nets, as by-catch
- Loss of turtles leads to loss of food for animals dependent on turtles in beaches

### Way Forward

- Turtle Excluder Devices (TED) fitted to nets
- Ban Mechanised trawl boats from fishing near the coast

## 11. Electric vehicles

- Target of 30% EVs by 2030. Proposal is to make all 150 cc 2-wheelers, 3-wheelers EVs by 2025, as they are most polluting, as per WB, CSE and TERI studies
- Already Tata and Mahindra getting contacts to manufacture 10000 EVs. Will be bought by EESL for govt fleet
- FAME scheme under National Electric Mobility Mission Plan: tech development, pilot project, charging infra and demand creation

### Problems

- Lack of charging infrastructure
- DC chargers are faster but country installing AC chargers
- EV taxed at 12% but hybrid vehicles taxed at 28%, same as petrol vehicles. But people are first likely to buy hybrid vehicles. (**Update**: tax rate down to 12%, July 2018)
- Traditional MSME suppliers of automobile parts will be disrupted. They need to upgrade to latest tech and start producing EV parts
- Increased dependence on lithium imports

### Problems likely to be faced by manufacturers

- Already heavy investments done in BS VI. This will further increase costs as batteries are expensive and not made in India
- Already auto industry seeing a downturn
- Start ups with lower overhead costs are leading the way forward in creating battery and charging tech
- Honda wants a shift towards hybrid vehicles first, and then towards EVs

### Way Forward

- Monetary incentives. eg: Subsidies, tax breaks to OEM of batteries and other tech, FAME scheme
- Creation of charging infrastructure. Can follow Chinese or Norwegian models where local bodies and power discoms involved in PPP for building infra
- Disincentives to petrol vehicles. eg: higher taxes, congestion charges etc
- Enforce OEMs to produce at least 10% of production to be electric vehicles like in EU
- Encourage startups to take the lead in EV innovation

## 12. India's poor ranking in Environment Performance Index

- We have set ambitious targets but still ranked 177 out of 180 countries. Ranking slipped many places from 141
- Reason: diluting many laws, poor implementation of laws

## 13. 4 steps in controlling forest fires

- Technological: using choppers etc
- Contain fire in natural compartments separated by streams or ridges
- Set a counter fire
- Have local people with leafy green boughs beat the fire out

### Problems

- Very few forest personnel to man the forests
- Lack of funds
- Foul play by miscreants
- Climate change and heat waves

### Way Forward

- Local participation with coordination by NGOs, outside agencies
- Equip firefighters with water bottles, food, rechargeable torches etc
- Pay forest personnel better
- Seasonal labour contracted during fire season
- Increase research

### Recent steps taken in Bandipur fire (March 2019)

- Help of local tribals
- Use of drones and satellite imagery
- Creating a bald patch of land to starve off approaching fire
- IAF MI-17 choppers used

## 14. Problems of fracking

- Consumes large amounts of water, affecting local irrigation
- Chemicals used in fracking can end up in groundwater contaminating it
- Increased seismic activity and air pollution
- Germany and France have banned it

### Way Forward

- As per the model Groundwater bill 2016, water use priority: drinking, food security, agriculture, sustainable livelihoods, eco system needs. Only after satisfying this should water be used for fracking
- Right to clean environment part of art 21.

## 15 Ways to decongest our cities

- Encouraging public transport, including bus systems, metro and cabs
- Congestion tax
- Building more roads and parking spaces, more infrastructure.
- Encourage app-based services as they provide users the comfort of private vehicles at lower costs and last mile connectivity. But present regulations in MVA not in favour of app-based mini-services as they are neither stage carriages or contract carriages. Also, they are not registered as employers. So, no protection to employees.

## 16 New NITI Composite Water Index

- Indicators: Groundwater restoration, irrigation, on-farm water use, drinking water supply, water policy
- GJ, MP, AP doing well, while ML, NL, UK doing poorly
- Delhi, Bengaluru, Chennai and Hyd will run of groundwater by 2020. 6% loss in GDP by 2050
- Implications for food security as UP, Odisha, Chhattisgarh doing badly and make up 30% of agri output.
- Demand> Supply for potable water by 2030.
- NE and Himlayan states grouped separately because of their different hydrology.

### Way Forward

- Augmentation of water-shed to store water.
- Pollution control management
- Implement Mihir Shah comm recommendation on user-centric approach to water management.
- Decentralisation of irrigation commands with states awarded from National Irrigation Management Fund.
- Resolve inter-state water disputes like Cauvery
- Robust data collection, especially groundwater use in urban areas
- Deal with increasing urbanisation and its water use.
- Need revamped national and state institutions, eg: CPCB, NIH, NWC, etc
- "augmentation of supply with little attention paid to demand side management": Need demand side management: Raise water use efficiency, increase awareness on water use, ban or impose penalties on applications that use a lot of water.
- Desalination of saline water and other innovations

## 17 Dealing with Lightning

- Extremely local phenomenon, making it difficult to predict and beyond the range of most weather radars
- 25% of deaths due to natural causes from lightning- NCRB 2015
- SDMA and DDMA to issue advisories on certain precautionary measures
- Refrain from using mobile phones or handling electrical equipment plugged to sockets
- greatest risk to the poor, those working in open fields, poorly built houses with less electrical insulation

## 18 Human Impact on Himalayas

- Deforestation and encroachment on forest lands
- Climate change leading to melting of glaciers
- Large hydel and other projects affecting local ecology
- Tourism and increasing wastes, especially in Mt. Everest. Leads to pollution of water bodies, groundwater and affects local ecology
- Poaching and killing of wildlife and trafficking

### Way Forward

- Govt. schemes like: NMSHE, Himansh, ICIMOD, SECURE Himalaya, NAPCC, World Heritage Sites Biosphere Reserves, NMCG, Himalayan Higher Studies
- IMI and Zero-waste Himalayas.

## 19 Zero Budget Natural Farming

- 4 aspects: seeds treated with cow dung and urine (*Beejamrita*), soil rejuvenation with cow dung and local nutrients to increase microbes (*Jeevamrutha*), cover crops to retain soil organic moisture and build humus, soil aeration
- Use natural insect management methods
- It involves no use of pesticides or fertilisers and relies completely on naturally available materials like cow dung, etc. Hence input costs are zero: Zero Budget
- Discourages intensive irrigation and deep ploughing
- Against vermicomposting as the common composting worm absorbs toxic metals and poisons groundwater
- Developed by Subhas Palekar
- Andhra Pradesh first state to implement ZBNF policy

### Advantages

- Yields higher by 11% over non-ZBNF plots
- Input costs near 0. So, profits higher
- Able to withstand droughts and flooding
- Reduced use of water and electricity, improving farmer health
- Flourishing biodiversity, local ecosystems and no toxic chemical residues
- Better than organic farming as OF involves use of large amount of manure, vermicomposts which are expensive for small farms
- SDG: improvement in soil, biodiversity, livelihoods, water, climate resilience and women's empowerment

### Concerns

- Research on efficacy not yet convincing
- Experts warn against wholesale move away from current models, as example of Sikkim shows- there has been fall in productivity after going 100% organic.

### Way Forward

- Need to incorporate ZBNF in Paramparagat Krishi Vikas Yojana and RKVY

## 20 Problem of plastics

- Plastics are organic polymers of high molecular mass. Usually synthetic and derived from petrochemicals
- Non-biodegradable and sometimes polluting
- 50% of plastic single use- disposable
- 13 million tonnes in oceans annually, Ganga's contribution one of the highest
- Loss of marine ecosystems and tourism
- World Environment Day: Beat Plastic Pollution. India global host. PM pledged to make India single-use plastic free by 2022
- States not complying with Plastic Waste Management Rules 2016. Eg: Although complete ban in some districts of Assam, import of 'substandard plastic carry bags' allowed. Delhi, which produces largest plastic waste has not provided any information on plastic control management initiatives
- Extended Producer Responsibility not taken off in most cities, although compulsory.
- Acc to recent study: people could be consuming about 5 g of microplastics per week, equivalent to size of a credit card, mostly from tap and bottled water.

### Plastic Waste Mgmt Rules 2016

- **Extended Producer Responsibility:** plastic manufacturers and retailers legally bound to introduce system of collecting plastic waste back
- Collect plastic waste fee through pre-registration of manufacturers and importers.
- Use of waste in road construction, energy, waste to oil
- Increase in thickness from 40 to 50 micron
- Local bodies and panchayat responsible for waste mgmt system
- Automated registration system, centralised to promote EODB, to be developed by CPCB

### Maharashtra Plastic Ban- Potential Problems

- Plastic bag manufacturing units owe 11000 cr to banks. Can lead to NPAs
- Apparel trade relies on polypropylene: Can affect 30 lakh jobs.

### Problems with using plastic as a fuel

- By burning plastic, you destroy them. So, new fossil fuel needed to make plastics
- Burning plastics without emissions is tough
- To create the fuel, plants must segregate the waste. This adds to cost, making it unattractive compared to coke.

### Steps taken by cities

- Those with poor waste collection put them in landfills
- Cities that segregate: Use them as fuel in cement kilns or turn them into Refuse Derived Fuel (RDF).



## Possible solutions

- Invest in jute, paper bags industries. They are also more labour-intensive
- Invest in plastic exports (which are exempted). Target of reaching 10.6 billion plastic exports by India by 2019 (3% of global exports)
- Make segregation at source mandatory
- Urban Development Secretary can head a monitoring committee to look at how much plastic waste collected monthly. Under plastic waste rules 201
- Generate awareness against plastic use, like Sikkim
- Invest in innovative alternatives. BMC planning an exhibition on the same.

## Way Forward

- Govt. should restrict plastic production and encourage recycling. Implement 'Plastic Waste Management Rules 2016'
- HH-wise waste segregation
- Making use of waste-pickers and kabaddiwallahs
- Shopkeepers to encourage biodegradable packaging packing materials, while shoppers should use cloth bags
- Generate awareness
- Provide scientific and financial support to eco-friendly substitutes. eg: Jute, cloth, areca leaves etc
- Charges for plastic use and deposit-refund for plastic bottles.
- Integrate with other schemes like SBM
- CCEA mandate on Jute Packaging to foodgrains and sugar also right step
- G20 countries led by Japan to adopt life-cycle approach to reduce plastic litter discharge into oceans

## 21 Saving Delhi's trees

- Many of the 14000 trees proposed to be felled are mature, fruit-bearing, local trees that provide clean air, shade and water recharge, homes to many birds. 'lungs' of the city. These have not been taken into consideration
- Projects approved by Ministry of Housing and Urban Affairs as smart and green, but no look at ecological impacts (high water usage and tree loss)
- Large constructions systematically excluded from environmental norms, like schools, colleges, hostels for edu institutions.
- Construction projects contribute to pollution, compensatory afforestation inadequate due to poor survival rate of saplings
- Lack of access to information +multiple agencies in Delhi: compound the problem
- Countries like Brazil and Turkey saving trees during construction. Also, trees play important role in Indian history: Buddha sitting under Peepal tree
- Urban infrastructure can lead to improved quality of life and source of employment. But need to involve all stakeholders. Can go underground or elevated Metro line

## Why trees important

- Stabilise soil
- Recycle nutrients
- Cooling air
- Modifying wind turbulence
- intercepting rain
- absorbing toxins
- neutralising sewage
- increasing property values, promoting tourism, recreation
- personal health
- providing food, medicine and shelter to other living beings

100 trees remove 53 tonnes of CO<sub>2</sub> and 430 pounds of other pollutants per year: US EPA

## Forest

A land area of at least 0.5 hectares covered by at least 10% tree cover, without any agricultural activity or human settlement: FAO

## Afforestation attempts in India

- Tree plantations by forest departments
- Private groups: Guru Nanak Sacred Forest in Ludhiana, Afforest group of Shubhendu Sharma, Jadav Payeng of Assam
- Philippines has increased its forest cover from 21 to 26% in 23 years. **Mandatory for elementary, high school and college student to plant 10 trees before graduating.**

## 22 Improving urban water and sewage systems

- Replace old pipes with sensor fitted new pipes that can monitor leakages by fall in pressure
- Reform systems, processes and interactions by Urban Authorities with the local govt. Provide state-of-the-art training to staff to learn to use smart-water technologies
- Rationalising water tariffs, and reducing cross-subsidy
- Complete computerisation of user-database, and enable monthly payment of bills using internet
- Citizens'grievance redressal system
- Organise slum-residents into Community-based organisations to reduce per-head water bill and timely payment of bills. Also, breaks monopoly of private water-suppliers
- **Capturing methane** by efficiency improvements in STPs and landfills- public health and climate benefits
- India can learn from Dhaka

## 23 CBD hampering biodiversity research

### Way Forward

- Seed Treaty or International Treaty on Plant Genetic Resources for Food and Agriculture: Allows international public accessibility of genetic resources of essential food and fodder. Can be used as model for exchange of genetic material for non-commercial research
- Add an explicit protocol or annex to the CBD to facilitate biodiversity research and international collaboration

## 24 Problems with National Policy on Biofuels 2018

- Sourcing untested tech like production of 2G ethanol, instead of 1G. Policy proposes VGF of rs. 5 k crore for 2G ethanol producing refineries. But only the biorefinery in Bathinda, Punjab is under construction.
- Policy silent on octane: Petrol blended with cancer-causing aromatics to boost octane rating
- Issues of vehicular emission, fuel octane efficiency, rising fuel prices and air pollution remain unaddressed.

## Way Forward

- Import ethanol to create consistent ethanol supply. At present, ethanol blending rate is 2-4% even after govt. mandated 5%. Odisha has no blending.

## 25 Need to focus on 'alternative cereals'

- Maize, sorghum and millets
- Reduce irrigation demand by 33%
- Increase nutritional availability for proteins, iron and zinc

## 26 Why data important in disaster management

- Identify vulnerable communities
- Identify gaps in resource allocation to mitigate risks
- Data captured by satellites, drones, social media can be analysed about impacts of disasters
- Monitor recovery
- Early warning
- Assessing resilience
- Understand how economy is interconnected
- UNDP setting up National Disaster Loss and Damages databases in 16 countries for 'risk informed development'

## 27 How to popularise Biogas and PNG

- Adopting service-based enterprise model, such plant in Hoshiarpur, Punjab
- Provide financial support
- Capacity building to promote community-level plants
- Increase penetration of LNG, PNG (piped natural gas) in urban areas (Tier I,II cities)
- Provide DBT instead of consumption based subsidies.
- Make citizens aware of the options available

## 28 New Meghalayan Age

- 4200 years ago: mega-drought and cooling around the globe
- Based on sediments in stalactite and stalagmites collected in Meghalaya caves
- 200 year event, affected civilizations in Indus, Mesopotamia, China
- Two other ages: Middle Holocene Northgrippian Age and Early Holocene Greenland Age
- 3 ages comprise the Holocene Epoch
- Units of Geologic Time Scale based on sedimentary strata containing isotopes, chemicals, fossils etc that record biological and geological events

## 29 Problems with livestock

- Emit 14.5% of all GHG emissions
- Emits methane which is 28 times more potent than CO<sub>2</sub>

### Steps being undertaken

- Breeding animals that burp less methane
- Planting trees around pastures
- NDDB uses software to assess feed that reduces methane production by 12-15%

## 30 Pharmaceutical and Personal Care Products (PPCP) issues

- Disrupt endocrine systems of plants and animals
- Increase resistance of certain microbes
- Even be carcinogenic
- Oestrogen from birth control pills have led to feminisation of aquatic animals in rivers
- India has no protocol to deal with these PPCPs

PPCP: Any product used by individuals for personal health or cosmetic reasons or used by agribusiness to enhance growth or health of livestock

**LOTUS-HR:** Joint effort by Indian and Dutch institutes to test technologies that target conventional contaminants and PPCPs in Barrapullah drain. Lab has 6 sets of biochemical filters, water passing through sponges, algae and anaerobic microbes

## 31 Sustainable Development Goals



### Why South Asia needs to cooperate for SDGs

- 25% of world population but per capita GDP 9.64% of world average
- Accounts for more than 30% of world's poor
- Share common developmental challenges
- Many are transnational in character- climate, biodiversity, infrastructure
- Only Bhutan and SL in top 100 in SDG Index
- 3C: Cooperation, collaboration and convergence

Need to leverage: BIMSTEC, BBIN, SAARC

### 32 Sub-surface water found on Mars poles

- A 20 km lake, a kilometer and a half under the southern polar ice cap of Mars
- Atmospheric pressure on the Martian surface is almost a hundred times less than on Earth, ensuring that water will not be in liquid form, but rather as ice or vapour
- Presence of water is much beneath the surface
- It is possible that water is mixed with other compounds including salt, which reduces the temperature and helps it retain liquid form

### 33 Educating People about climate change

- UN Sustainable Goal Report/2018 notes that climate change one of the key factors in rising hunger & human displacement
- WHO estimate: Climate change cause an additional 2,50,000 deaths per year between 2030-2050 due to malnutrition, malaria, diarrhea, heat stress
- Much of the loss will be accounted for by Lower Income Groups in developing countries including India
- WB projects climate change could cost India 2.8% of GDP, diminish living standards for nearly 1/2 of population in the next 30 yrs.
- In 1991, SC directed the central govt and all state govts to provide compulsory environmental education to all school and college students
- This directive reiterated in 2003 (MC Mehta v. UOI)
- Corporate organisations, research and education institutes, NGOs and foundations committed to educating people about climate change
- These initiatives target urban & rural populations including school-going children.
- Thrust ranges from inculcating concept of environmental sustainability to driving home the impact of climate change on food, water, nutrition and health
- Most of country's plans for vulnerable populations are directed towards poverty alleviation, improving living standard, enhancing access to education, sanitation, healthcare and ensuring human rights
- Climate change little mention
- Climate change does not find specific mention in schedule VII of Companies Act, 2013.
- To be articulated and specified as an activity for CSR rather than be implied in the umbrella term of environmental sustainability
- Scaling up current initiatives of the corporate and social sectors to regional and national levels would be an early and challenging solution.
- Film industry could consider ways to incorporate key aspects of climate change in films
- Writers could introduce climate change in adult and children's literature
- Gaming companies could develop games on this theme

### 34 Steps taken by India to deal with climate change

- **NAPCC**
- **Climate Change Action Programme:** objective of building and supporting capacity at central & state levels, strengthening scientific & analytical capacity for climate change assessment, establishing appropriate institutional framework and implementing climate related actions
- **National Adaptation Fund on Climate Change** established in 2015 to support concrete adaptation activities which are not covered under on-going activities through the schemes of State and Central Government
- **Tree cover** has increased
- Moving towards **RE- INDCs**
- **PMKSY:** water use efficiency
- **PMFBY:** crop insurance against climate change
- Second Phase of **Science Express Climate Action Special train**
- **ZED**
- **NMCG:** To clean Ganga
- **Bharat QR, UPI, BHIM** to facilitate cashless and sustainable payments



- SEBI has allowed listing of **green bonds and Green Debt Securities**

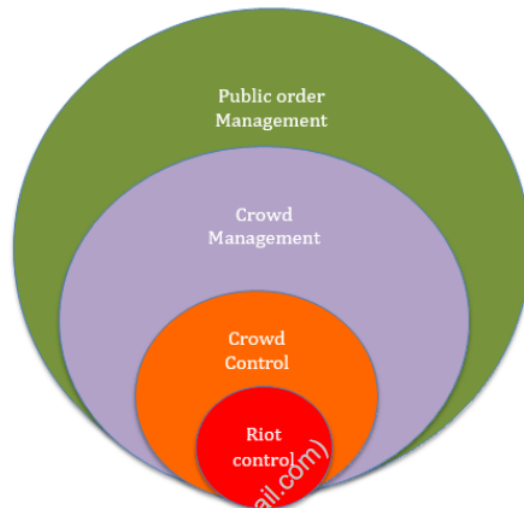
The **Global Climate Risk Index 2018** has put India amongst the six most vulnerable countries in the world.

### 35 ELEPHANT CORRIDOR

- Fragmentation of forests makes it important to preserve migratory corridors
- Movement of elephants is essential to ensure that their populations are genetically viable
- This movement help regenerate forests on which other species like tigers depend
- Animals should not be forced to seek alternative routes that bring them into conflict with humans
- Wildlife Trust of India jointly with Environment ministry's Project Elephant last year indicates that 101 such identified pathways and 70% of this used regularly
- 3/4th of the corridors are divided among southern, central and northeastern forests
- Mushrooming of home-stay structures
- To expand elephant corridors, acquisition of land using pvt funds and their transfer to govt
- 2 issues need quick remedies: i) 40% of elephant reserves are vulnerable (not within protected parks) ii) corridors have no specific legal protection

### 36 Crowd Management

- **Free movement:** The first step is to regulate traffic in areas surrounding the pandals and Dussehra grounds.
  - ✓ For pedestrians, route maps for reaching the venue and emergency exit route should be put up at strategic points.
  - ✓ Barricading to ensure the movement of people in a queue is key to control a burgeoning crowd.
  - ✓ Unauthorised parking and makeshift stalls eating into pedestrian space also need to be taken care of.
- **Monitoring:** CCTV cameras to monitor movement and police presence to reduce the risk of snatching and other petty crimes should also be on the organisers' agenda.
- Medical emergencies can occur in claustrophobic spaces. An ambulance and health care professionals on stand-by can save lives in exigencies.
- **For participants:**
  - ✓ Familiarizing with exit routes, staying calm and following instructions will help prevent stampede-like situations.
  - ✓ In case a stampede breaks out, protect chest by placing your hands like a boxer and keep moving in the direction of the crowd.
  - ✓ Stay alert to open spaces and move sideways wherever the crowd gets thinner. Stay away from walls, barricades or bottlenecks such as doorways.



- ✓ Stay on your feet and get up quickly if you fall. If you can't get up, use your arms to cover your head and curl up like a foetus so that your exposure area is reduced.

- **Fire related:** Unplanned and unauthorised electrical wiring at pandals, LPG cylinders at food stalls and crackers hidden in the Ravana effigies pose the danger of a fire breaking out.
  - ✓ Organisers should ensure authorised use of electricity, fire safety extinguishers and other arrangements meeting safety guidelines. A list of neighbourhood hospitals would come in handy.

### South Asia Disaster Knowledge Network (SADKN)

- In pursuance with 1st point of Hon'ble Prime Minister's 10 point agenda on Disaster Risk Reduction, National Disaster Management Authority (NDMA) in collaboration with United Nations Office for Disaster Risk Reduction (UNISDR), organized first of its kind International Workshop on Disaster Resilient Infrastructure (IWDR) on 15-16 January, 2018 in New Delhi.
- BIMSTEC DMEx
- AMCDRR
- SAADMEX

the Building Materials & Technology Promotion Council (BMTPC) has undertaken projects for retrofitting of life-line structures

### 37 Solar powered ships

- Auriga Leader-used solar power to reduce generator load in lighting
- India's first solar passenger ferry, Aditya, undergoing trials in backwaters of Kerala
- IWAI has launched pilot e-solar passenger boats along the Ganga at Benaras.
- R&D wing of Indian Register of Ships (IRS) asked by Directorate of Shipping to study technical feasibility and financial viability of such ships

#### Advantages

- Low operational costs over life cycle
- Meeting Paris INDCs

- Applications in leisure, small passenger boats, fishing vessels, small tugs, sea-going ferries in inter-land transport
- Boost eco-tourism in Dal Lake, Chilika Lake, Sunderbans

### 38 Green cracker

- Does not contain elements such as lithium, antimony, lead, mercury and some others, which cause environmental and personal health issues
- Also should not have high power explosives like perchlorate, periodate, and barium
- SC order based on recommendation by PESO
- But green crackers are not in the market, according to TANFAMA.
- TANFAMA claims that they do not use Barium or perchlorates, but Chinese imported products do have them. Noise level is 125 db, below the 131 db European standard limit

### 39 Problems with hazardous Waste management

- Multiple sets of rules- domestic hazardous wastes come under SWM Rules, 2016, industrial hazardous wastes under Hazardous Waste Rules, 2016, bio-medical wastes under Bio-MEDical Wastes Rules, 2016, e-waste rules, etc
- Weak capacity for enforcement
- Low awareness among those who generate and those who dispose
- Although municipal authorities responsible for collection, storage and disposal, but absence of deposit centres acts as a hurdle
- Need to move to the **3-bin solution**: household needs to segregate waste into dry, wet and hazardous (detergents, pesticides, sanitary pads, etc)

### 40 Issues in COP24 Katowice

- Finalising Paris rulebook - monitoring, reporting and verification (MRV) systems
- Special report of IPCC on the pathways to 1.5 degrees celsius to be discussed.
- Talanoa Dialogue and its 473 inputs to be discussed
- Finance- As per Standing Committee of the UNFCCC, only \$38 billion finance flows in 2016, while the pledge is of \$100 billion. Estimate requirement is \$4.4 trillion

#### New Agreements at COP24

- **Katowice Commitment**- 5 Europe based multinational banks to use their funds to nudge clients away from polluting businesses
- **Electromobility Partnership**- Poland and UK jointly promoted push towards zero-emissions and electromobility transport.

#### What is in the rulebook?

- What actions can be included, how and when to submit them
- Specifies which gases to measure, methodologies and standards
- Climate finance- what kind of financial flows to be called climate finance, how they should be accounted, kind of information to be submitted

#### Stalemate at COP24

- As there is no demand for carbon credits under Kyoto Protocol (Doha Round), countries like Brazil, India and China have accumulated huge amounts of carbon credits.
- These countries wanted these credits to be considered in the new market mechanism that was being created- but developed countries opposed due to weak verification and double-counting of carbon credits. So, this has been postponed for future.
- No roadmap adopted for mobilization of funds till 2020

### 2 important issues for India

- India will have to get its emissions data of 2022 ready by 2024 to report them to the UNFCCC.
- Retaining the flexibility to report emissions data till a proper national inventory management system is built up.

#### How rich got their way

- Developed countries allowed to make voluntary commitments on par with developing countries
- Uniform MRV standards for all countries
- Reporting being expressed in percentage terms. So, developed countries with a large base wcan still emit more
- Use of fossil fuels still increasing among OECD countries. No steps taken to mitigate that
- Climate finance includes all sources: public and private. Private sector flows like loans can increase indebtedness among countries.
- Active backing and instigation of US
- India's quest for the need for equity and climate justice failed to obtain operationalisation

### 41 Why people believe climate change is a myth?

- Failure to distinguish between climate and weather
- Even the climatic zones taught in school geography -5 zones in India- get embedded in people's minds. So, they are unable to comprehend changes in climate currently going on.
- UN SDGs included in school textbooks but presence is merely nominal in most countries. Prioritise economic growth.
- In the context of hyperglobalisation, most countries propagate competitive nationalism.
- Those who espouse environmental cause are seen as romantics while those who espouse fast economic growth through rapid industrialisation are seen as practical realists.

### 42 The new CRZ guidelines

<https://www.thehindu.com/opinion/op-ed/all-along-the-coastline/article25892904.ece>

#### Problems

- Introduced without public consultations. Limited to govt departments
- CRZ 2018 maintains a uniform CRZ of 500m from the high tide line- gets rid of the hazard line altogether
- State govts responsible for regulating CRZ-II and III (urban and rural coastal areas resp), Centre now regulating only CRZ-I and IV- most ecologically sensitive areas and water areas respectively
- Relaxes permits for construction in urban CRZ. Greatest relaxations accorded to hotels, resorts and tourism sector- detrimental to local economy
- Weather-related coastal vulnerabilities omitted. Added only as an optional appendage under disaster management
- Trims the list of restricted activities under CRZ I and erases baselines

- CRZ 2018 appears to be a rejection of IPCC's Special Report on 1.5 degrees celsius.

#### 43 Household Air Pollution (HAP)

- 11 lakh deaths due to Ambient Air Pollution (AAP) in 2015, 2.6 lakh due to HAP
- As per ICMR's "India; Health of the Nation's States": 5 leading causes of mortality and morbidity in India: ischemic heart disease, chronic obstructive pulmonary disorder, diarrhoeal diseases, lower respiratory infection and stroke- above 4 due to HAP
- While Ujjwala a good initiative, it's not enough- need demand-side interventions to encourage people to switch to cleaner options, addressing behavioural and cultural factors.

#### 44 Why Commons are important

- 33% of global population depends on commons for their survival
- 65% of global land area under commons. They house carbon that is 33 times the global energy emissions in 2017
- Contribute about \$5 billion a year as incomes to poor in india
- Declining at rate of 1.9% every five years as per NSSO. Aggravating food, fodder and water crisis.
- Major provider of livelihood to urban and peri-urban populations as well

#### Way Forward

- Put these resources in the management of people
- Re-introduce governance of commons in decision making
- Re-look at Ostrom's ways of dealing with commons.

#### 45 Green New Deal

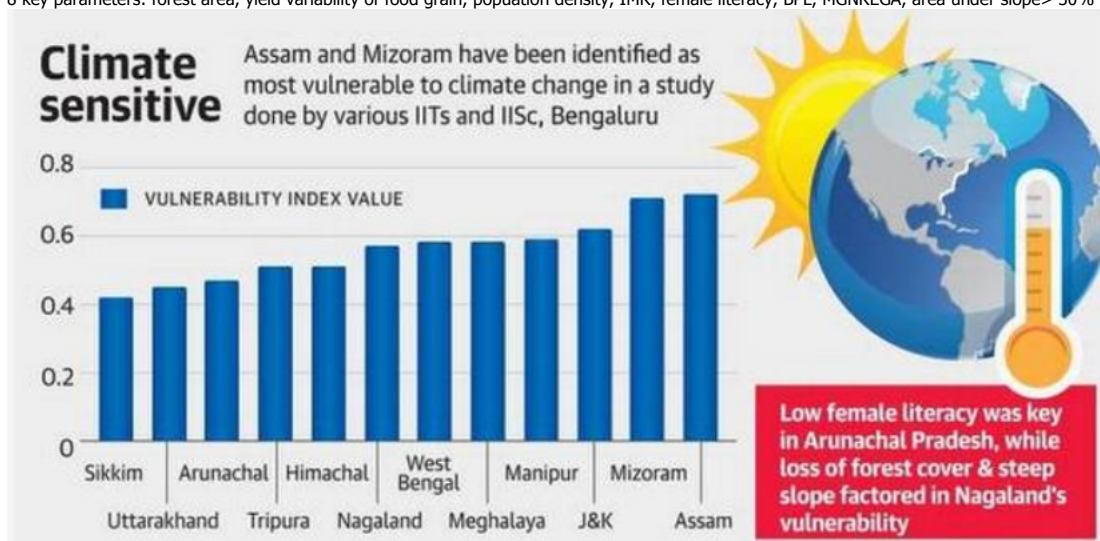
- Package programme in US, modelled along Roosevelt's New Deal
- Aspires to make sweeping changes to the environment and economy and meet all of US's power demand from clean, renewable, zero emission energy sources by 2030
- Also, address racial and economic justice.
- Acknowledgement by politicians that economic growth, environment and social well-being go together

#### 46 Climate smart agriculture

- Dryland farming
- Accurate weather forecasting, along with possibilities of crop pests and epidemics
- Adoption of drought-tolerant breeds
- Changing planting dates, particularly for wheat
- Compensatory afforestation
- Revamping IFS- training of its personnel, tourism and protection for new recruits
- Wildlife heritage towns- Sawai Madhopur, Jabalpur
- Van Dhan Yojana in Rajasthan can be scaled up towards building a green mission
- Pairing India's emerging smart cities with green cities in the West

#### 47 Climate vulnerability index for Himalayan states

- 8 key parameters: forest area, yield variability of food grain, population density, IMR, female literacy, BPL, MGNREGA, area under slope > 30%



#### 48 Global Environment Outlook- Healthy Planet, Healthy People

- Poor environment causes 25% of global disease and mortality
- South Asia has highest number of deaths due to air pollution

#### Some steps

- Food waste can be slashed, as it accounts for 9% of GHG emissions
- Aggressive monitoring of air quality
- Old coal-based power plants to conform to emission norms
- Green mobility
- Recovery and reuse of used water



## DO YOU KNOW?



# World Environment Day June 5, 2019



World Environment Day (WED) is celebrated on the 5th of June every year. WED was established in 1972 during the United Nations Conference on the Human Environment, which led to the creation of the **United Nations Environment Programme (UNEP)**. Its aim is “encouraging worldwide awareness and action for the protection of our environment”. World Environment Day is the ‘people’s day’ for doing something to take care of the Earth.

Each World Environment Day is organized around a theme that focuses attention on a particularly pressing environmental concern. Every World Environment Day has a different global host country, where the official celebrations take place.

In 2018, India was the host for World Environment Day and the theme was focussed on **Plastic Pollution**, which is one of the most challenging environmental concerns today.

In 2019, China is the host for World Environment Day celebrations on the theme, ‘**Air Pollution**’.

According to a new UN report, millions of lives could be saved and one billion people living in Asia could be breathing clean air by 2030 if 25 simple and cost-effective measures are implemented. Currently, about 4 billion people – 92 per cent of Asia and the Pacific’s population – are exposed to levels of air pollution that pose a significant risk to their health.

The report, **Air Pollution in Asia and the Pacific: Science-based Solutions**, is the first comprehensive scientific assessment of the air pollution outlook in Asia and the Pacific. It details 25 policy and technological measures that will deliver benefits across sectors. These are as follows-

### 25 CLEAN AIR MEASURES

#### 1. Strengthen emission standards for road vehicles

- Strengthen all vehicle emissions standards with a special focus on regulation of light and heavy-duty diesel vehicles. This will require collaboration between environmental agencies, transport agencies, oil companies and vehicle manufacturers, among others.

#### 2. Regularly maintain and inspect vehicles

- Introduce legislation and enforcement of regular mandatory emission checks and maintenance. This includes random tests to prevent extended use of vehicles with failed emissions abatement systems.
- Centralize inspection and maintenance systems and establish self-funding mechanisms for regular audits at test centres.

#### 3. Mainstream electric vehicles

- Develop fiscal and non-fiscal policies to promote electric mobility.
- Invest in required infrastructure to encourage quicker uptake of electric vehicles

#### 4. Provide better mobility options

- Improve public transport system to encourage shift from private passenger vehicles to public transport and integrate with sustainable urban planning.
- Invest in walking and cycling infrastructure (sidewalk and bike-paths, sufficient lighting, bike sharing options, etc.)

#### 5. Control dust from construction and roads

- Suppress construction and road dust through dust control measures including road washing and cleaning, road paving, water spraying, installation of barrier protection, avoiding dust-

generating work during windy days, etc.

- Increase green spaces and areas especially in cities. This includes public parks, gardens, etc.

#### 6. Reduce emissions from international shipping

- Require low-sulphur fuels and control of particulate emissions.
- Collaborate with the International Maritime Organization to widen the ratification and implementation of International Convention for the Prevention of Pollution from Ships.

#### 7. Improve post-combustion control

- Introduce state-of-the-art end-of-pipe measures to reduce sulphur dioxide, nitrogen oxides and particulate emissions at power stations and in large-scale industry.
- Examples include flue gas desulphurization for sulphur dioxide, selective catalytic reduction for nitrogen oxides, and high efficiency particulate matter controls like fabric filters, multistage electrostatic precipitators.

#### 8. Strengthen industrial process emissions standards

- Introduce advanced emissions standards in industries, e.g. iron and steel, cement, glass production, chemicals, etc.
- Strengthen production, performance and emission standards to control end-of-pipe emissions and fugitive emissions. This will stimulate investment in pollution control and/or cleaner technologies.

#### 9. Introduce efficient brick kiln technology

- Improve efficiency and introduce emissions standards to stimulate shift to more efficient brick kiln technologies (such as zig-zag, vertical shaft brick kiln or tunnel

kilns). This requires collaboration among kiln owners, technical experts, and government to demonstrate benefits of cleaner kiln technology.

**10. Control methane from oil and gas production**

- a. Encourage recovery of oil production and associated petroleum gas.
- b. Stop routine flaring and either utilize or convert to liquids that can be sold at higher value.
- c. Improve leakage controls in gas production and distribution networks.

**11. Improve solvent use and refinery controls**

- a. Introduce low-solvent paints for industrial and do-it-yourself applications.
- b. Improve solvents recovery in industry. If not feasible, incinerate flue gas rich in hydrocarbons.
- c. Establish leak detection and repair programs at refineries. Install double seal systems, vapour recovery unit, fixed covers and monitoring at refineries and fuel depots.

**12. Use environmentally-friendly refrigerants**

- a. Ensure full compliance with Kigali Amendment to phase-down hydrofluorocarbons which are commonly used in air conditioning, refrigeration and a host of industrial products.
- b. Establish regulations to support shift to low- global warming potential cooling agents.

**13. Provide clean cooking and heating options**

- a. Use clean fuels – electricity, natural gas, liquefied petroleum gas in cities, and liquefied petroleum gas and advanced biomass cooking and heating stoves in rural areas.
- b. Substitute coal with briquettes for cooking and heating.

**14. Strictly enforce bans on household waste burning**

- a. Strictly enforce bans on open burning of household waste. Burning ban needs to be complemented

with comprehensive solid waste management plan including proper waste collection system, recycling, waste treatment, and awareness raising.

**15. Provide incentives for improved energy efficiency in households**

- a. Provide incentives to improve energy efficiency of household appliances, buildings, lighting, heating and cooling.
- b. Encourage rooftop solar installations.

**16. Increase renewable electricity generation**

- a. Establish renewable energy targets and supporting policies to achieve target. This includes providing incentives to foster extended use of wind, solar and hydro power for electricity generation and phase out least efficient plants.
- b. Leverage public pressure to switch from fossil fuels to renewables.



**Beat Air Pollution**

**17. Improve energy efficiency for industry**

- a. Introduce ambitious energy efficiency standards for industry.
- b. Include energy efficiency targets for industry in national development plans.

**18. Recover coal mining gas**

- a. Encourage pre-mining recovery of coal mine methane gas.
- b. Provide fiscal incentives, well-defined gas property rights and unsubsidized free gas market.

**19. Improve livestock manure management**

- a. Introduce covered storage (floating or permanent covers) and efficient application of manure (when plants need fertilizers, rapidly incorporate manure in soil or as narrow bands in canopy or grassland).
- b. Consider low emission options for new animal housing: regular floor scraping, air ventilation cleaning, closed storage tanks.

**20. Strengthen management of nitrogen fertilizer application**

- a. Establish efficient nitrogen fertilizer application (right timing and amount). Substitute urea and ammonium bicarbonate with e.g. ammonium nitrate fertilizer.
- b. Promote alternative formulations, e.g., neem coated urea, or use of urease inhibitors, where available and affordable.

**21. Better management of agricultural crop residues**

- a. Manage agricultural crop residues, including strict enforcement of bans on open burning. Complement burning ban with measures that use the residues. This includes alternative off-site use, technologies that plough residue into fields, no-till agricultural practice, or using residues as bedding for livestock or biogas digesters.

**22. Prevent forest and peatland fires**

- a. Improve and enforce forest, land and water management and fire prevention strategies. This includes fire spread protection zones, fire alarm and brigade system, prohibit access to forests during droughts, and ban on land clearing.

**23. Promote more efficient rice production practices**

- a. Encourage intermittent aeration of continuously flooded rice paddies (e.g. alternative wetting and drying – practice of allowing the water table to drop below the soil surface at one or multiple points during a growing season).

**24. Stop biogas leakage from wastewater treatment**

- a. Introduce well-managed two-stage treatment with biogas recovery.
- b. Promote decentralized wastewater treatment units.

**25. Improve solid waste management**

- a. Encourage centralized waste collection with source separation and treatment, including gas utilization.

Sources- United Nations Environment Programme & Climate and Clean Air Coalition (CCAC)

**49 Problems with Protected Areas (across the world)**

- Shortage of funds and staff
- Only 4-9% of species found within adequately resourced PAs

**50 Addidas to make polyester filament yarn from PET bottles to reduce virgin plastic use**





Technology developed by an Indian firm- Polygenta

### 52 Why Cyclone Vayu is important

- Will hit the coast of Guj around 12 June
- In process, it will suck a lot of moisture from the moisture-containing monsoon winds. This will reduce monsoon or delay the onset in the East and interior parts that are yet to receive monsoon

#### Explaining Delayed and slow arrival of monsoon this year

- Presence of western cyclonic disturbances over the southern latitudes
- Cyclone Vayu
- Effects of Arctic burst over northern hemisphere still left- Some extra-tropical cyclones over NW India still keeping the region cooler.

India is currently going through a **low monsoon epoch** of roughly 30 years- so monsoon rains likely to be negative of LPA

#### Monsoon forecasting

- Till 2015, statistical methods used by IMD- measuring temperature changes across the Eastern and Western Pacific, IOR etc to forecast monsoons. But they made major errors. Failed to forecast major droughts- 2002, 2004, 2006
- Start a dynamical system, by using simulators and solving physics equations

### 53 Geo-Thermal and Ocean Energy

- **Ocean Energy:** Energy harnessed from ocean waves, tidal range, temperature and salinity gradients.
- **Leading Countries:** UK, USA, Sweden, France, SK
- **India's potential:** Gulf of Khambat, Gulf of Kutch, Sunderbans, Western Ghats. Around 20000 MW
- **Bottlenecks:** High upfront capital cost.
- **Types:** Tidal energy, wave energy, current, Ocean Thermal Energy Conversion (OTEC)

#### Geothermal energy

- **Leading countries:** USA, Phillipines, Indonesia, Iceland, NZ
- **Bottlenecks:** site specific nature, absence of power evacuation facilities nearby, high risk/uncertainty, high capital cost.
- **India's potential:** GSI with CSIR National Geophysical Research Institute undertakes assessment: Puga Valley in JK, Cambay in GJ, Tattapani in CH, Ratnagiri in MH. Direct heat use: Rajgir in BH, Manikaran in HP, Tapoban in UK
- **Types:** Power generation, Direct heating using geothermal heat pump

### 54 Biogas

#### Importance

- Responsible waste management, reduction in carbon emissions and pollution
- Revenue source for farmer
- Boost to entrepreneurship, rural economy and emp
- Support to INDCs
- Reduction in import of natural gas and crude
- Buffer against oil price fluctuations

#### Uses of Biogas

- Waste to Energy Plants from urban, industrial and agri wastes
- Fuel for transport

#### Govt steps

- Gobar Dhan
- SATAT
- Cogeneration plants

### 55 Continental axis hypothesis

<https://www.thehindu.com/opinion/op-ed/what-is-continental-axis-hypothesis-in-geography/article28117980.ece>

### 56 Steps towards sustainable industrial decarbonisation

- Create **voluntary coalition of industries** willing to adopt zero carbon technologies across sectors using life-cycle approach
- Create **coalition of countries** promoting decreased carbon intensity through sector-specific schemes, like PAT in India

### 57 Explaining the recent heatwave in Europe

- Result of warm air masses from Africa
- Follows extreme heat episodes in Indian subcontinent
- WMO says it is too early to ascribe it to climate change. But likelihood of heat wave rising due o climate change

#### Classifying heat wave in India

- Max temp must cross 40 degrees in plains and 30 degrees in hills
- When normal max temp is 40 or less, heat wave declared if departure is 5-6 above normal. Severe heat wave if 7 or more
- Where normal max is more than 40, then departure values are 4-5 and 6 for severe

Where max temp crosses 45, heat wave declared irrespective of normal

### 58 How Global Warming could affect jobs

- Report by ILO- India could 4-5% of productivity due to heat stress
- Could trigger migration, water crisis leading to loss of man hours
- Worst affected to be agriculture and construction sector

### 59 Desalination

- Use RO technology to remove TDS and salts and make it compatible
- Then re-mineralised by applying CO2 and lime to make it fit for consumption
- Currently, two plants operational in Chennai.

#### Problems

- Increases brine concentration in adjacent coastal areas
- RO pumps suck in fish and marine creatures
- The RO pumps require groundwater, which has sucked out. So, current GW is salt water and unfit for human consumption
- High electricity costs of operating the plant. Takes Rs 3 to produce 100 litres of potable water

#### Way Forward

- Use low-temp-thermal desalination (LTTD) that uses temperature differences of wtaer at the surface and below to carry out RO. Operational in Kavaratti, Lakshadweep
- Chennai also planning to introduce a OTEC based desalination plant.

### 60 Blue flag certification

- Done by FEE\_ Foundation for Environmental Education
- 33 criteria must be met- water quality, waste disposal facilities, disabled friendly, first aid
- Some criteria voluntary
- If approved, certification given for a year. Must be renewed to keep the blue flag flying

Recognise highest standards of beach mgmt- infrastructure, cleanliness, safety and security  
MoEFCC has chosen 12 beaches for Blu Flag- eg: Miramar in Goa

### 61 KUSUM Scheme

- Farmers to be given solar pumps
- Excess solar energy can be sold to DISCOMS
- Obective of energy sufficiency and irrigation sustainability

#### Ways to improve it (can also be points for problems)

- REduce existing disparity of states with regards to solar pump availability. CH and RJ account for 50% of the total solar pumps deployed in the country
- Address inequity within state. 90% of Bihar's farmers small and marginal, but they received only 50% of solar pumps
- Provide greater financial assistance to small and marginal farmers
- Solarising existing grid connected pumps need to be looked into. Most pumps are inefficient and will require larger solar panels

### 62 Progress in MDGs

India has witnessed significant progress towards the MDGs, with some targets having been met ahead of the 2015 deadline, however progress has been inconsistent. For instance, while India, according to official national estimates, has achieved the target for reducing poverty by half, it is falling short of achieving the target for reducing hunger. The country has achieved gender parity in primary school enrolment yet it is lagging behind on targets for primary school enrolment and completion. India has made progress in providing clean drinking water however; access to sanitation facilities remains inadequate.



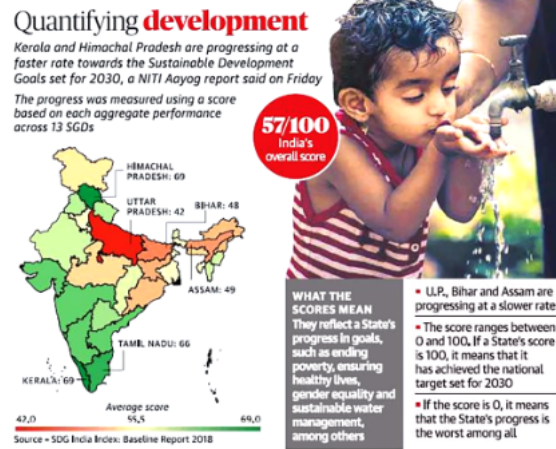
### SDGs and India's Commitment

- Clean Fuel
  - India introduces BS-VI petrol and diesel.
  - Delhi will be the first city to leapfrog from BS-IV to BS-VI.
  - 13 major cities like Mumbai, Chennai, Bengaluru, etc. will make the shift from 1st Jan 2019.
  - The rest of the country will make the change from April 2020 next year.
- No Plastics
  - India has pledged to eliminate all single-use plastic in the country by 2022.
- International Solar Alliance (ISA)
  - ISA is a group of 121 solar rich countries which are situated either on or between the tropics.
  - Aims to deploy over 1000 GW of solar energy and mobilize more than \$1000 billion into solar power by 2030.
- Climate Change
  - To reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level.
  - To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030, with the help of transfer of technology and low-cost international finance, including from Green Climate Fund.
  - To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030.

### Progress on SDGs

## Key Findings

- **Himachal Pradesh, Kerala and Tamil Nadu** have emerged as the **front runners** in the race to achieve key sustainable development goals (SDGs) in a ranking of states released by NITI Aayog.
- **Kerala's** top rank is attributed to its superior performance in providing **good health, reducing hunger, achieving gender equality and providing quality education**.
- **Himachal Pradesh** ranks high on providing **clean water and sanitation, in reducing inequalities and preserving mountain ecosystem**.
- The toppers in **gender equality, Sikkim and Union territories Andaman and Nicobar islands and Chandigarh** have crossed the halfway mark in reaching the goals.
- **Jharkhand, Odisha and Nagaland** are among the states that have a lot more **ground to cover** in the overall rankings.



### 63 How to respond to medical/biological emergency

- Set up a Group- comprising representatives from health ministry, doctors, police personnel, revenue headed by a dedicated administrative officer
- Group will come into action within 24 hours of declaration of medical emergency
- Will have full control, autonomy and defined financial powers
- Release timely information
- Group will conduct periodic mock drills, especially in vulnerable areas
- Field visits to see preparation
- Private medical centres can be roped in- with advanced medical capacities, recognised and co-opted under Ayushman Bharat. These units can be commandeered to attend to emergency
- Contractual appointment of doctors and para medical staff from amongst retired personnel- civil and military

### 64 BS VI

- Expected to reduce sulphur content from 50 mg/kg to 10. This enables better catalytic converters to be equipped
- Reduce NOx and hydrocarbons through SCR
- Reduce PM through Diesel Particulate Filter (DPF)

#### Concerns

- Prices are the biggest concern- significant rise in costs
- OMCs saying retail prices for BS VI fuel to rise by Rs 2 per litre
- Most firms like Hyundai, M&M, Maruti Suzuki are BS VI ready

#### What happens to BS IV already made?

- Spike in sales expected in the festive season when buyer sentiment is positive
- Higher financing through banks after bank recapitalisation
- Higher liquidity to NBFCs can boost sales

### 65 Tiger Census 2019

- Number of tigers increased by 33% to almost 3000
- Global Tiger Forum- seeks to double wild tiger count by 2022- we are well on our way
- Biggest increase in MP. Only CH has fall in numbers
- No tiger in Dama, Buxa and Palamau

#### What explains the increase

- Success in conservation
- Destruction of poaching rackets
- Rehab of villages to outside core areas
- Estimation exercises increasingly more reliant- pug marks, scat marks, camera traps, prey base, GIS
- Healthy increase in one area lead to migration to other areas+ breeding

### 66 Setbacks on renewable energy capacity

- Unable to reap benefits of cheap tech due to imposition of safeguard duty and ongoing depreciation of Indian rupee
- India's coal demand rose by 9% to nearly 1 billion tonnes. Coal is top 5 imports of India
- MMDR Act 2015 and Coal Mines (special Provision) Act 2015 worsened pollution
- Most lending went to coal-fired plants
- New RE plants need more financial assistance.



## **67 Resource Efficiency**

Resource efficiency is a strategy to achieve the maximum possible benefit with least possible resource input.

Such judicious resource use brings about multiple benefits along the three dimensions of sustainable development - economic, social and environmental.

### **RE Strategy 2017-25**

<https://pib.gov.in/newsite/PrintRelease.aspx?relid=174039>

<https://www.gktoday.in/gk/indian-resource-panel-inrp/>

[https://www.eea.europa.eu/themes/waste/resource-efficiency/why-is-resource-efficiency-important#targetText=Resource%20efficiency%20isn't%20only,essential%20for%20sustained%20economic%20growth.&targetText=Moreover%2C%20promoting%20resource%](https://www.eea.europa.eu/themes/waste/resource-efficiency/why-is-resource-efficiency-important#targetText=Resource%20efficiency%20isn't%20only,essential%20for%20sustained%20economic%20growth.&targetText=Moreover%2C%20promoting%20resource%20)