

CLIMATE CHANGE**1. Global Scenario****1.1.1 IPCC 6th Assessment report**

IPCC – Intergovernmental – 1988 – by **WMO & UNEP** – Scientific Info – Climate Policies - UN Body (Climate Change)

195M – no Scientific Research – Nobel Peace Prize(2007)

Sectoral Share – **34% Energy Supply – 24% Industry – 22% Agriculture & Forestry**
LDCs & SIDS(Low per capita emissions)

1.1.2 Methane Emission

Methane – CH₄ - colourless – odourless – found in Natural Gas – Lifespan (20) – GWPotential(80times more than CO₂ – India top 5 emitter – 25% Global Warming (GW) – 50% growth in Tropospheric Ozone



Global Methane Assessment Report by CCAC (Climate and Clean Air Coalition and UNEP

CCAC meet at 27th CoP of UNFCCC

Global methane Pledge – by COP26 – to reduce CH₄ emissions – India not member(trade concerns)

International Methane Emissions Observatory - UNEP Initiative – 2021 – implementing partner of **Global Methane Pledge** – cutting methane emissions is fastest way to tackle climate change in short term
NASA's EMIT Mission (Earth Surface Mineral Dust Source Investigation) - Identifies Super Emitters (that emit at high rate)

1.1.3 Ocean Acidification(OA) and Arctic Ice

OA – reduction in pH of ocean – due to uptake of CO₂ from atmosphere – harmful to marine life

GOA – ON = Global Ocean Acidification Observing Network – to understand drivers of OA

Arctic Region = 66.5 North of Equator (Arctic Circle) = barometer(Atm Pressure) of Climate Change

Rise in CO₂ > Ice Melt > Economic Exploration > new Sea Trade Routes > Circulate World's Ocean Currents

India in Arctic = 2007 – Observer in Arctic Council - **Himadri at Norway(2008)**

Arctic Amplification (AA) = enhancement of near surface air temperature change over Arctic Relative to lower attitudes- due to GW – Ice albedo Feedback etc
Zombie Ice(doomed ice)-attached to glacier but not fed anymore

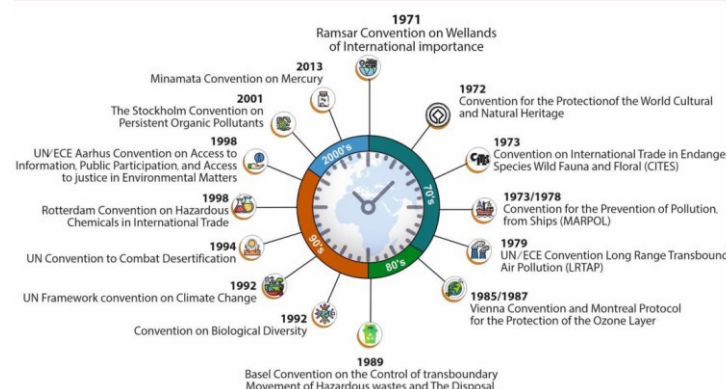
Arctic Report Card 2022 by USNOAA

1.2 International Conferences, Conventions and Initiatives**1.2.2 50yrs of Stockholm Conference**

1968 First meet on CC(Climate Change) by UNGA

Stockholm Conference – 1st major conference on Int. Env issue – 1972 – coordinate global efforts – 122 adopted Stockholm declaration - est. UNEP
1992 UN Conference on Env & Devp – Earth Summit – Rio de Janeiro(Brazil) – defined Sustainable Devp

Precautionary Principle – 1985 – Vienna Convention for Ozone Layer – first MEA
Polluter Pay Principle(PPP)

Multilateral Environment Agreements (MEAs) under UNEP**1.2.1 27th COP (Conference of Parties) at Egypt**

Aim – build on previous success – higher ambition on mitigation, adaptation and climate finance

Also had CMP17 and CMA 4

Released Sharm el-Sheikh Implementation Plan

COP26 Outcomes – Glasgow(Scotland) Climate Pact – explicit target action on fossil fuels (**Phase down and phase out**) – also Bonn Climate Change Conference on **Global Stocktake** & Global Goal on Adaptation – also finalized Int Carbon Markets

The Santiago Network will connect vulnerable developing countries with providers of technical assistance, knowledge, resources they need to address climate risks comprehensively in the context of averting, minimizing and addressing loss **and damage**.

The **Koronivia Joint Work on Agriculture** (KJWA) is a special decision under the United Nations Framework Convention on Climate Change (UNFCCC) that aims to recognize the unique potential of the agriculture sector in addressing the climate change

First COP cover decision to mention food, rivers, nature-based solutions, tipping points and the right to a healthy environment.

First Movers Coalition – by US & WEF at COP26 – India joined – to decarbonize 7 hard to abate industrial sectors – commercialize zero – carbon tech

Breakthrough Agenda set Priorities – framework – decarbonisation – CoP26 – India signed – 45 Members

Indonesia Just Energy Transition Partnership (JETP) – \$20B - to early retire- high emission infrastructure

UNFCCC – Intergovernmental Treaty – 1994 – HQ Bonn– to stabilizer GHG, eco devp in sustained manner - 198M(M=Members) – India Joined – Kyoto Protocol – Paris Climate Agreement

COP – Conference of Parties (supreme decision making)

CMP – Meet of Parties to Kyoto Protocol

CMA – Meet of Parties to Paris Agreement

India's LT-LEDs (Long Term Low Emission Strategy) – steps to achieve Net Zero by 2070

Under Article 4.19 of Paris Agreement – not mandatory – Considers CBDR – broader than NDC

In Our LiFEtime Campaign – by NMNH(National Museum of Natural History), MoEFCC & UNDP – encourage youth for sustainable lifestyle

1.2.3 Montreal Protocol 1987

16th Sept – Int Day of Preservation of Ozone Layer

Protocol of Vienna Convention 1985 – cut out 99% of ODS – all 198 UN M – India Joined in 1992 – Approved Kigali Amendment in 2021

Kigali Amendment 2016-2019 – 80% reduction in HFCs consumption by 2047

Ozone Layer – Stratosphere – Ozone Hole over Antarctic in 1985

ODS – CFC(Aerosols, Refrigerants, Solvents), HCFC(Aerosols, Aerosols, Refrigerants, Solvents), Halons(Fire Extinguishers), Methyl Bromide(Pesticides) = Refrigerators, AC, Fire Ext, Foams

Impact – Cancer, Cataracts, Biogeochemical cycles

Ozone Depleting Gas Index – by USNOAA – tracks overall stratospheric Conc. Of ODS and Bromine – ODC back to 1980 level

Dobson Unit – measure Ozone Concentration

1.2.4 2nd UN Ocean Conference (UNOC)

by **Kenya & Portugal at Lisbon** – Lisbon Declaration – First UNOC 2017 at NY

India committed – Coastal Clean Seas Campaign, ban on Single Use Plastics

SDG14 – Life Below Water

in line with UN Decade of Ocean Science for Sust. Devp (2021-2030)

Voluntary Commitments

UNESCO Launched State of Ocean Report

1.2.5 IRMIB – Innovation Roadmap of the Mission Integrated Biorefineries

By India at Global Clean Energy Action Forum

Biorefineries are processing facilities that convert biomass into value-added products such as biofuels, biochemicals, bioenergy/biopower, and other biomaterials

Aim – fill void – identify gaps in biorefining value chains

MIB- Mission Integrated Biorefineries – 2022 – greater int. collaboration – Co led by India and Netherlands – to develop and demonstrate innovative solutions

MI – Mission Innovation – global Initiative – catalyze action and investment – 22M & EU – India also – 1st phase in 2015 – 2nd phase In 2021

National Funding Opportunity on Sustainable Aviation Fuels

Hydrogen Valley Platform – global initiative – optimize hydrogen demand

1.2.6 Mission LIFE (Lifestyle for Environment)

Launched at Kevadia – Statue of Unity – Gujarat – protect env – India led Global mass movement – Nudge Individual and Collective Action- by PM at Cop26

Glasgow - Mobilize 1B Indians and global citizens – 5yr pgm - 3 core shifts - by NITI Aayog and MoEFCC - to live in tune with life on planet – listed 75 lifestyle practices

P3 Lifestyle, Pro Planet People - at WEF Davos Agenda 2022

1.2.7 CBAM – Carbon Border Adjustment Mechanism

Opposed by India – proposed at Cop27 by EU – to tax carbon intensive products from 2026 –

CBT – Carbon Border tax – tax on Carbon emissions imposed on imported goods from countries with less strict climate policies – to eliminate Carbon Leakage = undermining of global climate efforts due to relocation of production

1.2.8 ISA – International Solar Alliance

Approved Solar Facility – payment guarantee mechanism – 2 Financial Components (Solar Payment Guarantee Fund & Solar Insurance Fund) – to attract private capital

Also re-elected India & France as President and Co-president

ISA – intergovernmental org by Indo-France at CoP 21 in 2015 – cooperation in solar resource – 92 nations ratified - ISA Observer status at UNGA since 2021 – ISA Assembly, open for all member states

Initiatives

- ISTARC – ISA Solar Tech and Application resource Centre – capacity building
- ISA Solar Fellowship for Mid Career Professionals
- OSOWOG – by ISA and WB

MOU b/w ISA and ICAO(Int. Civil Aviation Org) – check growth of CO₂ – 2015, Cochin Int Airport, world's first fully Solar Power Airport

ICAO – under Chicago Convention – reduce Carbon emissions in aviation sector – HQ, Montreal – 193M

1.2.9 Global Environment Facility Council (GEF)

62nd Meeting will be Final Council of GEF Trust Fund (GEF-7)

GEF – 1992 Rio Earth Summit – only Multilateral Fund on Env Health – support Developing Countries – 185M – India also – Financial Mechanism for CBD, UNCCD, UNFCCC, Minamata Convention(Mercury) & Stockholm Convention on POPs Funds – SCCF & LDCF

Supports – Montreal Protocol, Global Ship Ballast Water Treaty, UNCLOS, MARPOL treaty for Shipping

GEF Council – governing body – members rotate – Meets twice annually – decisions by consensus

SCCF – 2001 – open to vulnerable developing countries - supports adaptation needs of SIDS (Small Island Developing States)

LDCF – 2001 – Least Developed Countries Fund – only Fund for NAPAs(national adaptation programs of Action)

GEF – Small Grants Programme (SGP) – by MoEFCC & TERI – financial & tech support to Local Civil Society

1.2.10 Other Initiatives in NEWs

MEF(Major Economies Forum) on Climate and Energy – 2009 by US – facilitate dialogue on major emitting nations – recent meet – strengthen climate action – urgent concerns from Russia-Ukraine War

New Initiatives Announced

- Global Methane Pledge Energy Pathway
- Collective 2030 Zero Emission Vehicle Goal and Green Shipping Challenge
- Clean Energy Tech Demonstration Challenge

WGES – World Green Economy Summit – by UAE – action for Sustainable future – world class experts – critical sectors - global green economy

CEM – Clean Energy Ministerial – by Ind – 29M – Policies and Pgms for Clean Energy

GCEAF – Global Clean Energy Action Forum – Join Convention of CEM13 & MI-7

SBTi – Science Based Targets initiative – drive climate action in Pvt Sector – partnership of CDP+UNGC WRI +WWF

ZEVC – Zero Emission Vehicle Transition Council – 2020 – accelerate pace of global transition to zero emission vehicles

LCCM – Leaders in Climate Change Management – by NIUA + WRI - learning program – build capacity among urban professionals – ATI, Mysuru 1st delivery partner

GET – Green Events Tool – GORD+UNFCCC+UNEP – facilitate eco friendly events – reduce negative impact of events

GCOS – Global Climate Observing System – by WMO – assess status of global climate observations of atmosphere, land and ocean

Global Alliance for Industry decarbonization – by IRENA + Many More - under Bali Declaration – Accelerate net Zero Ambitions and Decarbonization

1.3 CLIMATE MITIGATION and ADAPTATION

1.3.1 India's Updated NDCs

NDCs – each 5yrs submission – Glasgow Climate Pact(revisit targets) – actions to reduce GHG – build resilience to adapt

Ratcheting Mechanism – Paris Agreement – countries must revisit pledges

India's NDCs – first in 2015 – updated 2/3 quantitative targets of 2015

Panchamrita Commitments at Cop26

- Net Zero by 2070
- 50GW Non-Fossil Energy by 2030
- 50% energy from renewables by 2030
- Reduce Carbon emissions by One Billion Tonnes till 2030
- Reduce Carbon intensity in Economy upto 45% by 2030

Updated NDCs

No.1 – reduce emission intensity of GDP from 33-35% to 45%

No.2 – Cumulative Electric Power from Installed capacity from 40% to 50 %

1.3.2 Adaptation Gap Report 2022

One National Adaption Instrument(85% parties) - \$17B Short of \$100B

UNEP – intergovernmental – 1972 – set global Environmental agenda – 193M – works under umbrella of UN 2030 Agenda for Sust. Devp – 95% income Voluntary – secretariat to many MEAs – Global Env Outlook Rpt – Triple Emergency Rpt – Cooling Estimation and Policy Synthesis Rpt – Emission Gap Rpt

Agreements Administered – CITES(1973) – CMS or Bonn Convention(1979) – Vienna Convention(1985) – Basel Convention(1989) – CBD 1992 – Rotterdam Convention 1998 – Stockholm Convention 2001 – Minamata Convention 2013

Emission Gap Report 2022

GHG Emitter = China>USA>Ind

1.3.3 Carbon Capture Utilization and Storage (CCUS)

By NITI – explore tech to reduce emission

CCUS – use tech – remove CO₂ – recycle CO₂ – utilize – safe storage
CCUS Initiatives

- Two - National Centre of Excellence
- Mission Innovation Challenge on CCUS
- ACT – Accelerate CCS Tech

Chemical Solvent = gas streams lean in CO₂. Low Pressure

Physical Solvent = gas stream with high CO₂. High Pressure

Adsorption = gas streams with moderate to high pressure

Cryogenic Separation = low temp – cost of power is low

1.3.4 Uniform Carbon Trading Market

Shift from Voluntary Carbon Trade Market to Cap and Trade Scheme

Cap & Trade – idea from Kyoto Protocol

2021 – China – World's Largest Carbon Emission Market

Paris Agreement 2 Market Approaches

- ITMO (Internationally Transferred Mitigation Outcomes)
- SDM (Sustainable Development Mechanism)

Existing Mechanisms in India

- REC (Renewable Energy Certificate)
- ESCerts (Energy Saving Certificates under PAT Scheme (Perform, Trade and Achieve)

D-MRV – Digital Monitoring, Reporting and Verification

1.4 Other Climate Related News and Concepts

First **Carbon Neutral Panchayat** – Palli – Jammu

Climate tipping Points – small change leads to abrupt or irreversible change – 9 tipping points

- Amazon Rainforest - Arctic Sea Ice - Atlantic Circulations - Boreal Forest
- Coral Reef - Greenland Ice Sheet – Permafrost - West Antarctic Ice Sheet
- Wilkes Basin

Greenwashing – misleading public practice – doing more than they actually are

Keeling Curve – Longest Uninterrupted instrumental record of atmospheric CO₂ - levels comparable to 4mya

MLABO – site for daily record of global atmospheric CO₂ - Mauna Loa Volcano

1.5 Reports and Indices

State of Global Climate Report 2021 - details of climate indicators - By WMO
WMO – intergovernmental – 1950 – Geneva – 193M (India) – special agency of UN

Global Ocean Observing System Report (GOOS) 2022 – by WMO with UNESCO – details marine and ocean data

Greenhouse Gas Bulletin 2022 – by WMO

Climate Investment Opportunities in India's Cooling Sector – by World Bank

Climate and Development : An Agenda for Action – by World Bank

NDCs Synthesis Report – by UNFCCC

Investing in Carbon Neutrality – by FAO + EBRD

State of Climate Action 2022 – by Climate Action Tracker – details global gap in climate action

Climate Transparency Report – by Climate Transparency – 6 G20 Member not signed methane pledge

Global Carbon Budget 2022 – by Global Carbon Budget – details complete picture of global carbon cycle

Climate Change Performance Index 2023 – by Germanwatch – details GHG emissions – track Paris Agreement

Carbon pricing Leadership Report 2021-22 – by CPLC – carbon pricing

World heritage Glaciers Report – BY UNESCO + IUCN

Finance for Climate Action – by Independent Group

2.1.1 New Targets for NCAP (National Clean Air Programme) – Reduce 40% Air Pollution by 2026

NCAP - 2019 – for Mitigation Action - 2017 base year – City specific Plans

132 Cities

- 123 Non Attainment Cities (no conforming NAAQS)
- 8 Million Plus Cities by 15th FC – performance based

Portal – PRANA – monitoring

Swachh Yavu Sarvekshan

MoEFCC – under NCAP - Rank 131 cities – Reduce 40% - Population based City

Categorization – annual self assessment

2.1.2 Norms for Thermal Power Plants (TPPS)

2 yr Extension – SO₂ – MoEFCC

Coal TPP – 50% SO₂ – 30% NO_x – 20%PM

Same deadline of NO_x and PM

FGD – Fuel Gas Desulphurisation – remove SO₂ from Source of Emissions

New Deadline

- Within 10Km - NCR – By 2024
- Within 10Km - Non attainment Cities – by 2025
- Others – 2026





2.1.3 Commission for Air Quality Management (CAQM)

Ban Coal Use – NCR - Jan 2023 – Exemption Low Sulphur Coal (TPPs)

CAQM – statutory – CAQM in NCR and Adjoining Areas Act 2021 – CP, 15yrs exp –

Appeal to NGT – Monitor, Plan, Execute

GRAP – Graded Response Action Plan – Address Air Pollution in NCR – 4 stages

Graded Response Action Plan (GRAP)	
Air Quality (AQ)	Prescribed Measures
 Stage I - 'Poor' (201-300)	<ul style="list-style-type: none">Prohibition on construction and demolition activities at plots equal to or more than 500 sqm.Spreading public awareness for reporting air pollution incidents etc.
 Stage II - 'Very poor' (301-400)	<ul style="list-style-type: none">Ensuring uninterrupted power supply to discourage use of generator sets.Ban on use of diesel generator sets except for emergent and essential services including railway etc.
 Stage III - 'Severe' (401-450)	<ul style="list-style-type: none">Closure of brick kilns and hot mix plants not operating on fuels approved by CAQM.
 Stage IV - 'Severe+'	<ul style="list-style-type: none">Four-wheeler diesel light motor vehicles will not be allowed.Closure of all industries in NCR not running on fuels approved by CAQM. *

Bio Decomposer Capsule – by IARI – Accelerate Decomposition – microbes

2.1.4 WHO Air Quality Database

2022 Update – good practices of mgmt – assist Govt – both outdoor/indoor – not legally binding

mu (μ) = i.e., 10⁻⁶ or one millionth - The concentration of an air pollutant (eg. ozone) is given in micrograms (one-millionth of a gram) per cubic meter air or μg/m³

Pollutant	Averaging time	2005 AQGs	2021AQG level
PM _{2.5} μg/m ³	Annual	10	5
	24-hour	25	15
Pm ₁₀ μg/m ³	Annual	20	15
	24-hour	50	45
O ₃ μg/m ³	Annual	-	60
	Peak season	100	100
NO ₂ μg/m ³	Annual	40	10
	24-hour	-	25
SO ₂ μg/m ³	24-hour	20	40
CO μg/m ³	24-hour	-	4

NARFI – National Air Quality Resource Framework of India – info mechanism – ny

NIAS – all-inclusive guide

2.1.5 Other Initiatives to Tackle Air Pollution

Bharat Stage (BS)6 = Banned BS3 & BS4 – Regulate Air Pollution from ICE – mandatory since April 2020 – EU emission standards based – CPCB standards

Trem Stage-IV Emission Norms = Tractors(>50HP) = <50HP for Trem3 – Trem5 from 2024

Palletisation and Torrefaction – mix with Coal in TPP – reduce emissions

Palletisation = shred>dry>grind>pellet



Torrefaction = slow heat biomass – O₂ deficit Env - ↑ Energy Density

Green Crackers = 30% less Pollution – by CSIR – Certified by PESO(Min of Commerce)

Old cracker – Barium Nitrate - Hazardous

- SWAS – Safe Water Releaser
- STAR – Safe Thermite Cracker
- SAFAL – Safe Minimal Aluminium

Breathelife Campaign – 2016 – Global – Mobilize Cities and Individuals - safe air levels by 2030 – by WHO, UNEP, - Connect, Monitor, accelerate

2.2 Water Pollution and Conservation

2.2.1 UN Water Summit on Groundwater (GW) 2022

at Paris – by UN Water, UNESCO & IGRAC – Baseline is UN World Water Report 2022

GW – 99% of Liquid Freshwater on earth

UN Water – inter agency coordination mechanism

IGRAC – UNESCO Centre under WMO – regional and transboundary assessment –

Finance by Netherlands – Flagship GIS, Global GW Info System

2022 Report – Dynamic GW Assessment – Min of Jal Shakti – States + CGWBoard

- India, largest GW user (25% of global)
- Rain gives 61% GW
- 87% GW – Irrigation
- Haryana> Punjab>Raj>Dadra & Daman
- 14% assessment units 'Overexploited' & 4% are 'Critical'

2.2.2 Water Convention

30yrs of UNECE -1947 by UN ECOSOC – pan European Economic Integration – 56 M EU, America, Asia - all UN M may work - other 5 commission for Pacific, Asia etc

World Water Forum – global water challenges -

Water Convention 1992 – int. legal instrument- intergovernmental forum – globally open in 2016 – ensure sustainable water use – SDG6

2.2.3 Unconventional Water Resources

Book by UNU-INWEH

Unconventional Water – inferior or marginal quality – complex mgmt practices

Grey Water – 100% saturation – Pappankuzhi Village, TN

2.2.4 Heavy Metal Contamination

75% Monitoring Stations reported

Heavy Metal – natural – High at. Wght – 5time water density

Arsenic – Black Foot Disease

Fluoride – Fluorosis

Manganese – intellectual impairment

Uranium – kidney damage, cancer

Nitrate – Blue Baby Syndrome(methemoglobinemia) – neural tube, thyroid

Lead Poisoning – report NITI + CSIR - India highest – in Earth Crust - Mining, Smelting, Refining, - Cosmetics, Ayurveda Medicines – PCBs, Batteris

2.2.5 PFAS – Per and Polyfluoroalkyl Substances

Rainwater Contamination

Found – Non stick Cookware, upholstery, food packet

PFAS – chemicals – fluorinated carbon chains - forever chemicals – tough degrade, capture, destroy

Restricted by Stockholm Convention on POP

- PFOS Perfluorooctne Sulfonic Acid
- PFOA Perfluorooctanoic Acid

In blood (humans + Animals)

Dispose – Filtration, Incineration

Other Pollutants

NP – Nonylphenol = to produce NPEs Nonylphenol Ethoxylates(detergents, dispersant) – endocrine disruptor(glands & organs) – global concern by UNEP – No standards in India

Endosulfan – organochlorine biocide – pest control – on cotton, cashew – banned by SC in 2011(POP Convention) – 2020 also banned Alachlor, Dichlovos, Trichlorfon, Phosphamidon, Methyl Parathion, Phorate and Triazophos

Chlorpyrifos, Fipronil, Atrazine and Paraquat – used in Excess (by Central Insecticides Board and Registration Committee)

Chlorpyrifos – Foliage and Soil Borne Insect Pests

Fipronil – ants, beetles, cockroaches

Atrazine – control annual grasses, broadleaf weeds

Paraquat – herbicide

Microplastic(less than 5mm) – IISc study – Cauvery River – harm fish

Raman Spectroscopy – non destructive chemical analysis technique

Cyclohexyl Group Chemicals – Agriculture, Pharma Industry

Nanoplastics – smaller than 1000Nanometre) – 1nm = 1 billionth of metre

New fingerbased method to detect and measure

2.2.6 Arth Ganga

Create economic Livelihoods under Namami Gange Programme – 3% of GDP from Ganga Basin

- Jalaj – small shops – livelihood on banks
- MoU (NMCG + Sahakar Bharti) 75 villages – natural farming – brand Ganga
- ImAvatar – tourism portal – sustainable ghats

DGCs – District Ganga Committees – Min for Jal Shakti – people participation - Utilization – monitor – connect - DC is CP(ChairPerson)

Stocholm World Water Week 2022

Annual event by Stockholm International Water Institute (SIWI) – global water issue

2.2.7 Other Initiatives for Water Conservation

Bharat Tap – by MoHUA – under AMRUT & SBM -- provide low-flow, sanitary-ware at scale – reduce water consumption at source

Nirmal Jal Prayas – by MoHUA – NAREDCO Mahi– Map Ground Water – advocacy, awareness, amplification

NAREDCO – autonomous – self regulatory – 1998 – MoHUA – share real estate Mahi – NAREDCO's Women Wing

4th NWA – National Water Awards – MoJal Shakti – Rashtriya Puraskar Portal – sensitize public – Vision 'Jal Samridh Bharat'

JALDOOT app - MoRD – identify GW in selected Villages

GRS – Gram Rojgar Sahayak – measure twice annually - utilised by GPDP (gram Panchayat devp plan)

Swachh Sujal Pradesh = Andaman & Nicobar – 1st – by MoJS

- Safe Drinking Water
- ODF
- Cross-cutting Interventions

Pey Jal Survekshan(PJS) =Monitoring Tool – instill competition - MoHUA under AMRUT - survey by 3rd party IPSOS(pvt firm)

2.3 Land Degradation

2.3.1 COP15 of UNCCD

UNCCD – 1994 – sole legally binding int agreement – Env+Land – 197 M(Members) One of 3 Rio Conventions(others CBD & UNFCCC)- MoEFCC Nodal

Major Initiatives under UNCCD

- LDN (Land Degradation Neutrality) – target set –
- LDN Fund – CoP13 – leverage Public money
- Land For Life Pgm – address land challenges

COP – since 2001 -2019 (India Host)

COP15 Outcomes

- New Target – Restore 1BnH by 2030 – address sand and dust storms – synergize 3 Rio Conventions
- New Declarations – Abidjan Call(boost long term env sustainability) – Abidjan Declaration(Gender Equality for land restoration) - CoP15 Land, Life and Legacy Declaration
- Others – Drought in Number 2022 Report – Business for land Initiative – Sahel Sourcing Challenge(Great Green Wall) – Droughtland

2.4 Light Pollution

2022 Int. Dark Sky Week – by Int Dark Sky Association(IDSA)

Light Pollution – artificial light(Glare, Skyglow, Light Trespass, Clutter)

2.5 Waste Management

2.5.2 E Waste(Management) Rules 2022

By MoEFCC under EPA 1986

- Defined E Waste – Coverage - Registration Compulsion(CPCB) – EPR Certificates – random Sampling – Environmental Compensation

Responsibilities

- End product recyclable – EPR Targets slots – regulatory standards – records maintenance – Space by State Gov

Status

- China>USA>India
- 70% from Computer Devices
- Only 1.5% generated is recycled
- UP>UK>TN>Hary.

2.7 Reports and Indices

State of Global Water Resources (SGWR) 2021 – by WMO

World Water development Report 2022 – by UNESCO

Global Land Outlook 2 : Land Restoration for Recovery and resilience – by UNCCD

2.5.1 Ban on Single Use Plastic(SUP)

SUP – low utility, high littering potential – under PWM Amendment Rules 2021 – No ban on Compostable SUP

Penalties under EPA 1986 (5yr Jail, 1 lakh or both)

Ex- Plastic Sticks – Packaging Films, Cutlery, PVC Banners

PWM Rules 2021

- SUP as intended to be used at once
- Thickness of carry bag – 50microns to 75 microns from 30th Sept 2021 and 120 microns from 31st Sept 2022
- Complete ban – sachet
- EPR legal force (for waste not under identified SUP)

Steps for Ban

- **PRAKRITI Mascot**
- National Dashboard
- EPR Portal by CPCB

Top Waste Producers by CPCB (Mah>TN>Guj)

- India 5th Globally
- Plastic waste doubled since 2016

Puneet Sagar Abhiyan (PSA) – UNEP MoU with NCC

Global Plastics Outlook : Policies Scenarios to 2060 report by OECD

2.6 International Conventions and Treaties

2.6.1 Stockholm Convention

2001(2004) – global – binding – 186(EU) – India 2006) – non ratifying(US, Israel, Malaysia)

MoEFCC – 2018 - Regulation of POP Rules – under EPA 1986

Annex A – Eliminate

Annex B - Restriction

Annex C – Unintentional Production

POP – Persistent Organic Pollutants – long period – bio accumulate

18th Meet – 5 Chemicals under consideration

Dechlorane Plus(flame Retardant) – UV-328(stabilizer) – Medium Chain

Chlorinated Paraffins(Flame Retardant) – Long Chain Perfluorocarboxylic Acids – Chlorpyrifos(Pesticide)

2.6.2 Rotterdam Convention

1998(2004) – legally Binding – for trade in Hazardous Chemicals - 165

Parties(India also) - covers pesticides, industrial chemicals – info exchange – subsidiary body Chemical Review Committee(CRC)

PIC – Prior Informed Consent – mechanism – obtaining and disseminating the decisions of importing parties on their willingness to receive future shipments of hazardous chemicals

CRC -International trade of 2 hazardous pesticides was recommended for 'prior informed consent' (PIC).

- Iprodione – Fungicide on vines, fruits, trees
- Terbufos - soil insecticide

Permitted in India by 2015 Anupam Verma Committee–Ind Largest Exporter(Terbufos)

3-BIODIVERSITY – Int. Treaties and Conventions –

3.1.1 COP15 to UNCBD

UNCBD - 1992 –HQ Montreal- Rio Earth Summit – Sustainable use of BioDiver. – Equitable Sharing of Benefits – 196M – CoP Governing Body(2yrs) – CoP10 2011-2020 Aichi Biodiversity targets – 3 supplementary Agreements (Cartagena Protocol on Biosafety-Nagoya Protocol on Access and benefit Sharing-Kuala Lumpur Protocol on Liability)

2011-2020 also UN Decade on Biodiversity

CoP15 – Chair China – Host Canada – adopt Kunming-MontrealGBF to replace Aichi targets – GBF not binding – 4 Long term goals – 23 action oriented targets – adopted Gender Plan of Action

DSI – **Digital Sequencing Information** – data from genetic resources

India and CBD (1994) – BD act 2002 – part of HAC High Ambition Coalition – Support 30x30(2019)

HAC for nature and People - Int Gov Group – Costa Rica+France+UK

3.1.1.1 World Restoration Flagships(WRF)

First 10(23 nations) World Restoration Flagships (at CoP15)

WRF – honour – best example – ecosystem restoration – **eligible for funding by UN**

Criteria – identifiable geographically – part of nominated area – well defined ecological, cultural goals

UN Decade – 2021to 2030 – Economic Restoration – by UNGA – led by UNEP+FAO
10 WRFs

Trinational Atlantic Forest Pact	Argentina, Brazil, Paraguay	
Abu Dhabi Marine Restoration	UAE	
Great Green Wall	Burkina Faso, Djibouti, Eritrea etc	Read in Detail
Namami Gange	India	By NMCG, WB, Japann & Geermany
Multi-Country Mountain Flagship	DRC, Krgyzstan, Rwanda, Serbia, Uganda	
SIDS	Vanuatu, Comoros, Saint Lucia	
Atlyn Dala Conservation	Kazakhstan	
Central American Dry Corridor	Costa Rica, El Salvador, Nicaragua, Panama	
Building with Nature	Indonesia	
Shan Shui	China	

3.1.1.2 Restoration Barometer Report 2022

1st report – by **IUCN** – at CoP15

Launched 2016 – as Bonn Challenge Barometer – restoration progress – 22 countries

Goals – **Bonn Challenge** – GBF 30x30 – Paris agreement – LDN – 1 Trillion trees




3.1.1.3 Updated List of Threatened Species by IUCN at CoP15

Dugong – Sea Cow – only herbivorous marine mammals – order Sirenia – Group – Surface to breathe – shallow coastal waters - Gulf of Mannar, Palk Bay, Gulf of Kutch and AnN Islands – State Animal of AnN – 1st Conservation Reserve by TN in Palk Bay - Globally = VulneraIndia = Vulnerable- WPA Sch 1 & 4

Pillar Coral – Vu to CE – Caribbean from Yucatan Peninsula

Abalone – Shellfish – Threatened with Extinction

India – 239 new Species – 29 Threatened

Species	Description
White-cheeked Dancing Frog (<i>Micrixalus candidus</i>) 	<ul style="list-style-type: none"> Only known from a small range with an extent of occurrence of 167 square kilometers (km²) in the Western Ghats of Karnataka, a biodiversity hotspot. Threats: Loss of their habitat, pollution, changes in temperature, diseases, pests, invasive species.
Andaman Smoothhound shark (<i>Mustelus andamanensis</i>) 	<ul style="list-style-type: none"> Shark is found in the Andaman Sea in the Eastern Indian Ocean off the coast of Myanmar, Thailand, and the Andaman and Nicobar Islands. Threats: Subject to fishing pressure including trawl, longline, and gillnet.
Yellow Himalayan Fritillary (<i>Fritillaria cirrhosa</i>) 	<ul style="list-style-type: none"> Mostly found in the Himalayas, it occurs in Bhutan, China, India, Myanmar, Nepal and Pakistan. Species is threatened due to unorganised harvest, over-extraction, unsustainable and premature harvesting of bulbs, coupled with illegal hidden markets. Medicinal uses: This is supposedly antiasthmatic, antirheumatic, febrifuge, galactagogue, haemostatic, ophthalmic and oxytotic.

3.1.2 ITPGRFA (Int. Treaty on Plant Genetic Resources for Food and Agriculture)

GB9 (Governing Body) India Host 9th

ITPGRFA – binding – 2001 (at FAO session) – recognize farmers contri – acces plant genetics – share benefits from genetics – 150M (India also) – as **seed treaty also – legal framework to Svalbard Vault**

BSF – Benefit Sharing Fund – developing countries specific

MLS – Multilateral System of Access and Benefit Sharing – exchange genetic material – benefit sharing (financial and non financial)

PGRFA – Plant Genetic Resources for Food and Agriculture – any plant material – develop new varieties

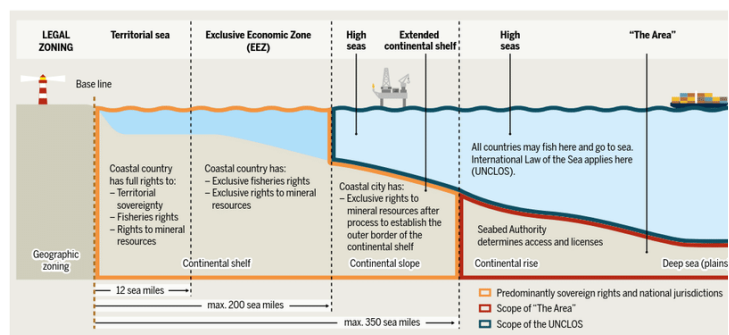
NBPGR - National Bureau of Plant Genetic Resources – 1976 – India Nodal – all plant activities

Technique for protecting plant varieties		
Technique	Benefits of the technique	Issues with the technique
Field gene bank	<ul style="list-style-type: none"> Simple and traditional preservation strategy Direct evaluation and characterisation Seasonal accessibility and availability Natural selection pressure 	<ul style="list-style-type: none"> Accumulation of mutations and endo organisms Exposure of adverse weather conditions Exposure to pathogens and insects Plant ageing; Handling errors
In vitro gene bank	<ul style="list-style-type: none"> Virus elimination Immediate accessibility Immediate availability High multiplication rate Low space requirements Precise environment modulation Medium term storage, < 2 years 	<ul style="list-style-type: none"> Plant ageing Handling errors Soma clonal variations Specific protocol development Infestation of insects (mites, thrips, arthropods) Contamination with fungi, bacteria & endo organism
Cryo bank	<ul style="list-style-type: none"> Minimum space requirements Low long-term costs High genetic stability Long-term storage, >100 years 	<ul style="list-style-type: none"> Restricted availability Restricted accessibility Access to liquid nitrogen Specific protocol development High initial workload to cryopreserve clonal

3.1.3 BBNJ – Biodiversity beyond National Jurisdiction(Treaty of High Seas)

Treaty – **conserve – biodiversity – beyond national jurisdiction**(95% Ocean)

UNCLOS – comprehensive regime of law – world oceans – rules



3.1.4 CITES

Convention on Int Trade in End Species of Wild Fauna and Flora

19th Meet – CoP19 – **World Wildlife Conference** – Panama

Shisham Added in Appendix II(regulate trade)

Shisham – Dalbergia Sissoo – deciduous – 25-30m – India and Iran – **Punjab State tree**

Int. Ivory trade banned in 1989

CITES – 1963 at IUCN Meet – HQ Geneva – 184M – Legally Binding – not replace national laws

India and CITES

- MIKE pgm – elephant mortality – 10 sites in India
- Act regulating Int Trade – WPA 1972, EXIM Policy, Foreign Trade Act, Customs Act 1962
- CITES Mgmt Auth – Director Wildlife Preservation
- 5 Scientific Authorities – Zoological Survey – Botanical Survey - Central marine Fisheries research Institute - Wildlife institute – Inst. Of Forest Genetics and tree breeding

3.2 WILDLIFE Conservation

3.2.1 WPA (amendment) Act 2002

WPA 1972 – states declare protected areas – NPs, WLS, Com Reserve, Con Reserve – 6 Schedules

Bodies under WPA 1972

- NBW **National Board of Wildlife**
- NTCA **National Tiger Conservation Authority**
- CZA **Central Zoo Authority**

Key Amendments

1. New Chapter VB for CITES – Mgmt Auth. – Scientific Auth.
2. Schedules rationalized to 4 from 6
 - a. Sch 1 – Animals High Prot.
 - b. Sch 2 – Animals Less Prot.
 - c. Sch 3 – Plant Species
 - d. Sch 4 – Specimen from CITES
3. Sanctuaries Control – **Chief Wildlife Warden** – in case of Forest Rights consult Gram Sabha
4. Increase Penalties
5. **Exemption of Live Elephant** – allowed for religious or other purpose
6. New Section – Surrender of Captive Animals – no compensation
7. No arms renewal within 10km range



3.2.2 Cheetah Reintroduction

From Namibia to Kuno NP – World's First Intercontinental Large Wild Carnivore Translocation

Funding – **Project Tiger + CAMPA**

Extinct since 1952 – **NTCA Nodal** – Knowledge from WII

Cheetah in cave paintings – Neolithic Age – Guj & MP

	African Cheetah	Asiatic Cheetah
Pictorial Representation		
IUCN Status	Vulnerable	Critically Endangered
CITES Status	Appendix I	Appendix I
Distribution	Africa (Northwest Africa, East Africa, and Southern Africa)	Only few left in Iran
Physical Characteristics	Bigger in size as compared to Asiatic Cheetah, slightly bigger build and sturdy legs and neck.	Slightly smaller and slender than the African Cheetah. Their neck is much smaller and slender. Also, their legs are slender.
Food Intake	Diverse diet due to bigger habitat	Limited source especially medium sized prey like Chinkara, Gazelle etc.

Cheetah – Fastest Mammal – Diurnal - 93 Days Gestation – Female Nomadic - Males Sedentary

Kuno NP – NW of MP – **Vindhyan Hills** - contiguous Panna TR – connected to **Ranthambhore NP** and **Kailadevi WLS** – only site complete incentivized voluntary relocation of villages - Perennial Kuno river – Tropical Dry Deciduous
Flora – Kardhai, Salai, Khair
Fauna – Sambhar – Nilgai – Wild Pig – Chinkara – Blackbuck – Leopard – sloth bear

3.2.3 Project Tiger

50yrs – 1973 – Centrally Sponsored Scheme – MoEFCC – NTCA under WPA (amend) 2006 – 53TRs – Core Areas free of Human – NTCA Banned new Core Areas

ITHCP – Integrated Tiger Habitat Conservation Programme – Germany – 2014 – also as Tiger Programme – invest in Asia

Tiger – IUCN EN – WPA Sch 1 – flagship, Umbrella & Keystone Species – National Animal – Bangladesh, Nepal, Bhutan, China and Myanmar – 70% in India – 35% outside TRs – max in MP>Ktk>UK

Recent TRs

Ramgarh Vishdhar TR – Rajasthan 4th - corridor b/w Ranthambore TR and Mukundra TR – Mez River(Chambal Trib) – Dry Deciduous – Golden Jackal, Chinkara, Antelope, Chital, Sambar, Nilgai

Ranipur TR – UP 4th – Chitrakoot – Tropical Dry Deciduous

3.2.4 Great Indian Bustards (GIB)

SC – Power Cable - IUCN Critical End – WPA Sch 1 – Under Species Recovery Pgm

GIB – Son Chirya in MP – Godawan in Raj – Maldhok in Mah

Other Bustard – Lesser **Florian** – **Bengal Florian**

Habitat – arid, semi-arid – max in Raj – Desert NP(raj) – Naliya (Guj) – Warora (Mah) – Bellary (Ktk)

3.2.5 India's 33rd Elephant Reserve

IUCN End – WPA Sch 1

Nod to Terai Elephant Reserve (Dudhwa+Pilibhit+Kishanpur WLS+Katarniaghat WLS) – 4 Wildlife species = tiger, Asian Elephant, Swamp Deer, One Horned Rhinoceros

Recently Notified = Lemru in Chhattisgarh & Agasthyamalai in TN = total 33 ERs

Highest ERs in **TN & Assam (5 each)** > Kerala(4) > Odisha (3)

Indian Elephant – intelligent – family bonds – oldest female 'matriarch' – longest mammals gestation (18-22 months)

Habitat – WG, NE India – Highest **Ktk>Assam>Kerala**

Project elephant 1992 = MIKE Monitoring the Illegal Killing of Elephants

3.2.6 Invasive Species (IS)

18 IS in Kaziranga NP

Herbivores avoid ISS

Experiment Culling Permit – WPA 1972

Parthenium (wheat import US 1950s) – Lantana (by British from S America)

Kaziranga NP = North Brahmaputra, South Karbi Anglong Hills - UNESCO WHS & TR – Largest One-Horned Rhino

River – Brahmaputra, Diphlu, Mora Diphlu and Mora Dhansiri

Tropical Moist Broadleaf Forests

3.2.6.1

Vilayati Kikar	Native of S & C America (by Britishers) – fuel	
American Bullfrog and Brown Tree Snake	Crop Damage	
Senna Spectabilis	Mudumalai TR – bright yellow Flowers – S&C America	
Red-eared Slider Turtle	Native to SEastern USA and Mexico – Least Concern(IUCN)	

3.2.7 Eco Sensitive Zones (ESZ)

SC – Mandatory 1km ESZ, NP, WLS

No New Structure within NP – No Mining – Ongoing Activity Allowed

ESZ as per EPA 1986 - notified by C Govt – Shock Absorber – regulate activities not prohibit

Western Ghats Conservation Background – Gadgil(2011) tagging 64% og WG as ESA – but Kasturirangan Committee(2013) 37%

3.2.8 Biodiversity Heritage Sites (BHSs)

First in TN – Arittapatti and Meenakshipuram

BHSs – by state gov – consult local bodies – as per BD Act 2002 – rules by State Gov + Central Gov – no restriction on prevailing activities

Presently 35BHS are in India – 1st Nallur Tamarind Grove (Ktk 2007)

Arirtapatti BHS – Anaikondan Tank - Pandiya Kings – megalithic, Rock Cut, Tamil Brahmi Inscriptions, Jain beads = Laggar Falcon, Shaheen Falcon and Bonelli's Eagle

Other Types of Protected Areas in India

1. **National Park – WPA 1972** – notified both C & S Gov – more protected than WLS - no human activity (Except Chief warden permit) – Highest in MP
2. **Wildlife Sanctuary – WPA 1972** – by S Gov - some activities restricted – Max WLS in A&N
3. **Community Reserve or Conservation Reserve - WPA (Amendment) 2002** – by S Gov – typically a buffer zone
4. **Tiger Reserve - WPA** – admin by NTCA
5. **Critical Tiger Habitat – WPA** – by S Gov – core of Tiger reserve – Largest Nagarjunsagar Srisaillam TR
6. Marine Protected Areas – human activities strictly regulated - special protection
7. Biosphere Reserve – designation by UNESCO – terrestrial, marine and coastal – **Core Buffer and Transition Zone** - 18BR India(13 part of World Network of BR, on MAB pgm)
8. Bird Sanctuary – 70+ in India
9. IBAs – Imp Bird Areas – under IBA pgm & **Birdlife International** – monitor, protect – Criteria = 1 or more global threatened species – restricted range species – large migratory birds = 554 IBAs by Bombay Natural History Society
10. Natural WHS – 7 in India – Remember all on Map

3.3.3 Other Forest Related News

Trees Outside Forests in India Initiative – by MoEFCC+USAID – carbon sequestration – local support – 7 states

TCW – Tree City of the World Tag – Mumbai + Hyderabad recognized TCW – by UNFAO – urban forestry

Nagar Van Scheme – 2020 – 200 Nagar Vatika till 2024 – min 20 hectare forest – maintained by State Gov – Fund by CAMPA 2016

Miyawaki Method – technique – urban forestation – micro forest over small plots of land – 10times growth – Japanese botanist Akira Miyawaki 1980s

Vanikaran Project – by Kerala – afforestation project – root out Invasive plants – Wayanad WLS(Nilgiri Biosphere Reserve)

3.4 Wetlands, Coastlands and Oceans

3.4.1 New Ramsar Sites

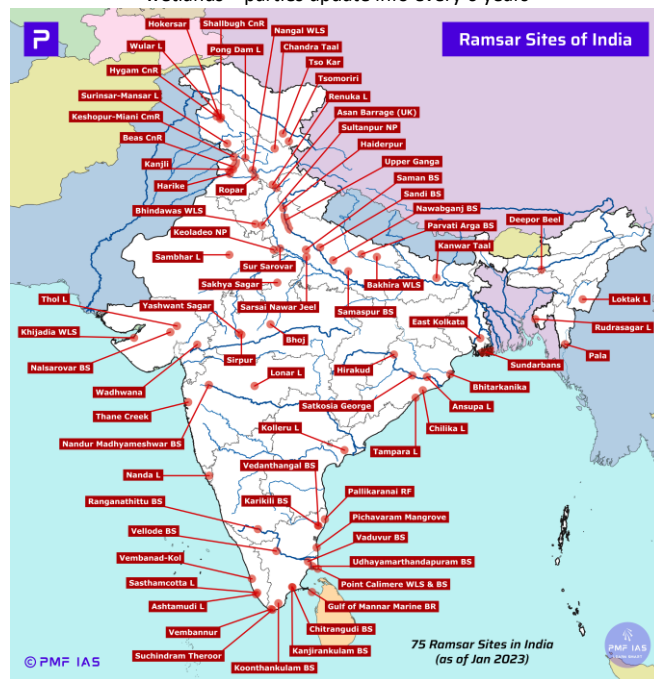
Ramsar Convention – treaty – 1971(1975) – wise use of wetlands – 172M(India) – 6 Partners; Birdlife International, IUCN; IWMI; Wetlands Int; WWF Int; Wildfowl & Wetlands Trust (WWT)

Montreux Record – register (sites at risk)

Wetlands – marsh, fen, peatland – India has 7L wetlands – Natural 2times than Manmade

Criteria – rare, unique, endangered species, 20,000 or more waterbirds, 1% of one species of waterbird, indigenous fish species – 1% of one species of nonavian animal species

Wuhan Declaration adopted – CoP14 of Ramsar Convention – conserve, promote wetlands – parties update info every 6 years



3.2.9 & 3.2.10 directly from PT365

3.3 Forests

3.3.1 Forest (Conservation) Rules, 2022

By MoEFCC – under Forest (Conservation) Act, 1980 – replace 2003 rules 1980 Act – address deforestation – 2 major amendments 1988 & 1996

Project Screening Committees – by State or UT – meet twice a month

Regional Empowered Committee – by C Gov – meet as above

Advisory Committee – by C Govt – every month meet

Time Frame – Non Mining(60days) – Mining(75 Days) – both 5 to 40hectare Large Area – Non Mining(120)- Mining(150)

Compensatory Afforestation Fund Act, 2016 – National and State Funds – 90% to state fund, 10% to Nat Fund (interest bearing, Non Lapsable under Public Account) – Nat & state Auth.

Zoos exempted from Permissions under FCA – MoEFCC – Zoos on forest land as forestry activity – under Forest Conservation Act(FCA), 1980

CZA(1992) – Central Zoo Auth – under WPA 1972 – Chairman+10M+Member Sect

3.3.2 Community Forest Rights (CFR)

KNP – Kanger Ghati Nat Park – Kangar River – 3 caves, Kutumbasar, Kailash and Dandak – Tirathgarh Waterfall – humid deciduous forest – Bastar Maina(Chhattisgarh State Bird)

Simlipal(Odisha) and KNP(Chhattisgarh) – recognized CFR

CFR – common forest land – sustainable use by community – Under Forest Rights Act 2006 – Forest Dwellers – rules of forest by self – authority to Gram Sabha

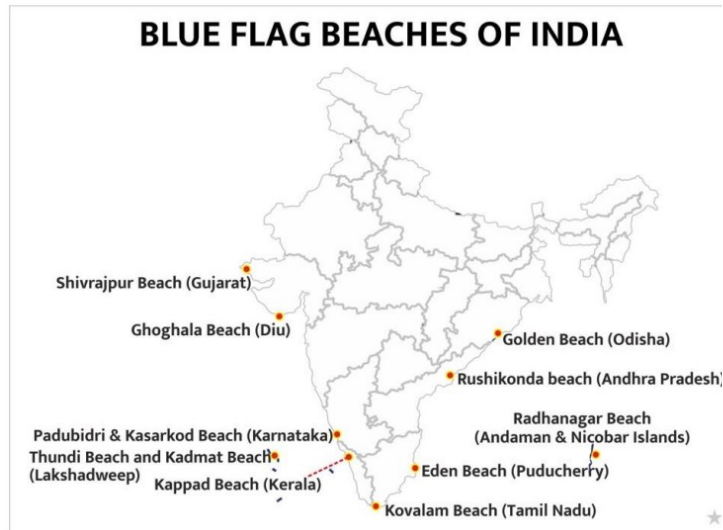
3.4.3 Island Protection Zone (IPZ)

Changes approved – by MoEFCC – under IPZ and ICRZ(Island Coastal Regulation Zone) – recommended by Nat Coastal Zone Mgmt Auth (NCZMA)

ICRZ2019 Notification - limits infra devp on vulnerable coastal stretches

3.4.4 Blue Flag Beaches (now 12)

2 new beaches – Minicoy Thundi Beach and Kadmat Beach – both Lakshadweep Certification – by FEE Foundation for Environmental Education Denmark



Abidjan Convention – CoP13 - Convention for Marine and Coastal Environment

3.4.5 Great Barrier Reef (GBR)



New method – Cryomesh to freeze and store coral larvae
GBR – world's largest – World heritage Area in - 1981 – visible from space – 3000 individual reefs

Coral – invertebrate animals – single is Polyp – algae Zooxanthellae - Coral polyps (animals) provide algae (plants) a home, and in exchange the algae provide polyps with food they generate through photosynthesis – home to 25% marine life
Types

- Hard Coral – extract calcium carbonate from seawater
- Soft Coral – lack solid skeleton

Coral Reefs in India – under Sch 1 of WPA – 570 Hard Coral – 90% near A & N islands – Gulf of Mannar, Palk Bay, Gulf of Kutch, AnN Islands, Lakshadweep & Malvan(Mah)

List of World heritage in Danger – joint report – IUCN & UNESCO's World Heritage Centre (WHC) – allocate immediate assistance

Acropora Corals – fast growing – susceptible to env pressures

Black Corals – new species – all over world – at depth – also as deep sea corals – rarely black, vary in color – filter feeders – eat tiny zooplankton(aquatic microorganisms)

Filter Feeder - an animal (as a clam or baleen whale) that obtains its food by filtering food particles or tiny living things from water

Azooxanthellate Corals –not contain Zooxanthellae – nourishment from planktons - 4 new species in AnN – family Flabellidae – shallow coastal waters – Japan to Philippines

4 are - Truncatoflabellumcrassum, T. incrustatum, T. aculeatum, and T. irregulare

3.5 Other Biodiversity Initiatives

AWBI – Animal Welfare Board of India – statutory – 1962 – under Prevention of Cruelty to Animal Act 1960

Champions of the Earth Award – by UNEP – to Dr. Purnima Devi Barman – UN Highest Env Award – Barman's Hargila Army, all female grassroots conservation movement

Oran land – sacred spaces – Jaisalmer(Raj) – rich in Biodiversity

Acetoclofenac – veterinary painkiller – metabolises into **diclofenac** (anti inflammatory drug, decline of vulture population)

World Green City Award 2022 – won by Hyderabad – results by The International Association of Horticulture producers

Sponge Bleaching – at reefs – Sponges, aquatic animals, filter water, habitat to crabs, shrimps and starfish

3.6 Reports and Indices

State of the World's Birds – by Birdlife International
Critically Endangered Birds in India – Himalayan Quail – GIB – Bengal Florican – Sociable Lapwing – Jerdon's Courser – White Belled Heron – Red Headed Vulture – White Rumped Vulture – Indian Vulture – Slender Billed Vulture – Bugun LioCichla – Yellow Breasted Bunting

State of World's Forests 2022 – by UNFAO – 54% forest in 5 nations – Russia+Brazil+Canada+USA+China

IPBES Assessment Report : Sustainable use of Wild Species – by IPBES
IPBES = Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services – 2012 – 139M(India) – secretariat by UNEP – not UN body

State of Mangroves – by Global Mangrove Alliance(GMA)
GMA – 2018 – at World Ocean Summit by IUCN, TNC, CI, WI, WWF – 30+ Organizations as Members

Living Planet Report 2022 and Living Planet Index (LPI) – by WWF(1961) – every 2yrs

Global Forest Declaration Assessment Report 2022 – independent, civil society initiative – assess progress on halting deforestation

4 Sustainable Development

4.1 Sustainable Development report 2022

SSDN – 2012 – SDGs and Paris Agreement – 1700+ M
Report - India 121/163

Spillover Effect – effect on the economy of a country from unrelated events happening in another country

In- Sust. Devp. Coop. Framework 2023-2027 = capture 26 UN Entities plans and programmes in India

4.2 Sustainable Cities integrated approach Pilot Project(SCIAP)

UN-Habitat – UN Agency for Human settlements - HQ Nairobi
SCIAP – by UNIDO and UN Habitat + MoHUA – Fund be GEF – infuse sustainable strategies

4.2.1 Other Sustainable Habitat Initiatives

11th World Urban Forum (WUF) 2022 – at Poland – premiere global conference
WUF – 2001 by UN – examine rapid urbanization

GRIHA – Green Rating for Integrated Habitat Assessment – by TERI – national rating system for green buildings 2007

CITIIS (City Investments to Innovate, Integrate & Sustain) pgm – joint Pgm by MoHUA+French Devp Agency+NIUA – fund smart city projects
NIUA- Nat Inst. Of Urban Affairs

4.3 India's First Sovereign Green Bonds(SGB) Framework

Green Bonds – 2017 – fixed income instrument – support climate related or environmental projects

SGB – issued by Gov -excludes, nuclear power, landfill, waste incineration, hydropower larger than 25MW – proceeds added to CFI

Municipal Green Bonds - SEBI Announced – Issuer of Municipal Debt Securities can issue green Bonds

Blue Bonds – investment in healthy oceans and blue economies - mobilize private sector capital

4.4 Green Permits

Environmental Clearance(EC) tenure extended – under EPA 1986 by MoEFCC

River Valley(13yrs)

Nuclear Power(15yrs)

Other than mining and river valley (10yrs)

Recent Amendments to EIA Rules 2006

- Exempt Highway projects
- Category B Projects – appraised at Central level

EIA Rules 2006

- Prior EC mandatory – 4 stages – 105 days (60 day Appraisal + 45 day decision by Auth)
- Category A & Category B projects undertake Public Consultation(45days)

Category A – need EC from C Gov – decision on Expert Appraisal Committee(EAC)

Category B – need EC from State/UT – decision on recomment of SEIAA

SEIAA – State EIA Auth – provide EC

4.5 Cloud Forest Assets

Cloud Forest – Areas with Forest Cover greater than 10% and fog present greater than 70% of the time – mountain tropical forests – river headstreams – covered with clouds - clean water storage – 95% in developing countries

CF25 Initiative – investment initiative

NbS – Nature Based Solutions – actions – ecosystems

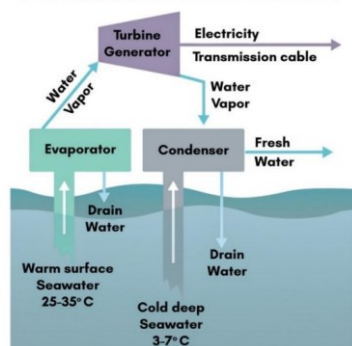
State of Finance for nature 2022 report – by UNEP+ELD

4.6 Alternative Fuels and Energy Resources

4.6.1 Ocean Thermal Energy

1st OTEC plant – by NIOT(MES) – 65kW – Kavaratti, Lakshdweep

OCEAN THERMAL ENERGY CONVERSION SYSTEM



OTEC – Ocean Thermal Energy Conversion – energy from temp difference b/w ocean surface water and deep ocean water - temp diff of 20C

Other Ocean Energy – Wave+Current+Tidal

Sindhuja-I

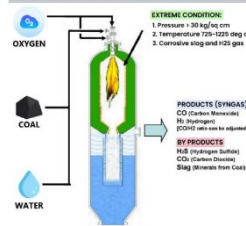
Ocean Wave Energy Converter by IIT madras

4.6.2 Coal Gasification(CG)

CG – convert coal into synthesis gas (Syngas = mix of H₂, CO & CO₂) – Clean Coal tech

Sulphur to Hydrogen Sulphide(H₂S)

BASICS OF COAL GASIFICATION PROCESS



TYPES OF GASIFIERS

Fixed Bed Gasifiers
Flow of solids is independent of the flow of gas.
Requires minimal pre-treatment of feed coal.
Have high thermal efficiency.

Fluidized Bed Gasifiers
Characterised by uniform particle mixing, uniform temperature gradients with high char recycling rate and less capital cost.

Entrained Flow Gasifiers
Ability to handle practically any feed. Syngas obtained is free of oils and tars.

National Coal Gasification Mission – 100MT by 2030

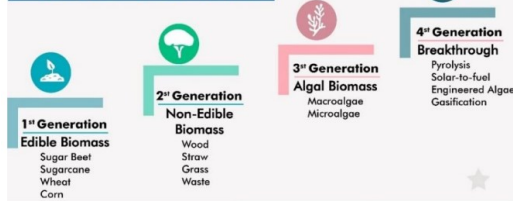
- Appoint nodal officer
- Interest rate subvention
- Import Duty exemption(capital goods)

4.6.3 National Policy on Biofuels 2018

Implement – NBCC Nat BioFuel Coordination Committee in 2020 by Min of Petroleum and Nat Gas – Develop Nat Biomass repository

New Target – 20% Ethanol Blending in Petrol by 2025 (earlier 2030)

BIOFUELS



4.6.4 National Bioenergy Programme

5yrs – 2021 to 2026 – MNRE

Bioenergy – electricity and gas from organic matter(Biomass)

Biogas – CH₄ + CO₂

3 Sub-Schemes

1. Waste to Energy Pgm – from urban/ind/agri waste - by IREDA(1987, a mini Ratna)
2. Biomass Pgm – setup biomass briquette/pellet – by IREDA
3. Biogas Pgm – set biogas plants – small power need – by designated PIA Programme Implementing Agency

4.6.4 PM KUSUM (Urja Suraksha Evam Utthaan Mahaabhiyaan)

2019 – MNRE - Harvest Solar Energy

2022 – removed PBG Performance Bank Guarantee clause from Comp A



4.6.5.1 Other Solar Energy Related News

Scheme for Devp of Solar Parks and Ultra Mega Solar Power Projects - by MNRE – 2014 – implement by SPPD Solar Power Park Developer

OSCs Organic Solar Cells – by IIT Kanpur – convert steel roof as energy producing device – photovoltaic tech – lightweight – low manufacturing cost

India's Largest Floating Solar Power Project – by NTPC – at Ramagundam Telangana

Gharkeupar Solar is Super Campaign – Solar Rooftop – Pan India Rooftop Solar Awareness Campaign – mobilize support – 40% subsidy by Govt

4.6.6 Electricity (Promoting Renewable Energy Through Green Energy Open Access) Rules, 2022

By Min of Power

Rules Highlights

- Demand Green Power from DISCOMS
- Voluntary purchase for Commercial and industrial Consumers
- Uniform Renewable Purchase Obligation
- Green Certificates for Consumers
- Not applicable – Cross subsidy Surcharge

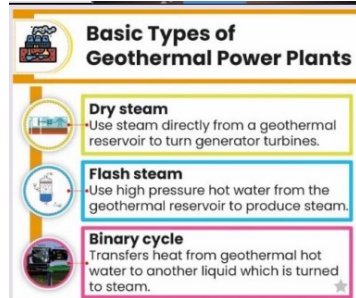
Green Energy Open Access Portal – Min of Power

4.6.7 Other Alternative Energy Sources

CBM – Coal Bed Methane – unconventional form of natural gas – power generation, CNG Auto Fuel, cement, steel

Min of Petroleum – CBM Policy – under Oilfields Act 1948

Geothermal Energy – drill first well at Puga(Ladakh)- use hydrothermal resource – carbon free- as per GSI 300 Geothermal hot springs



Biomass Co-Firing = Buring Biomass in coal fired power plants - lower capital costs, higher efficiency = SAMARTH Mission – National Mission on Use of Biomass in Coal Based thermal Power Plants

Green Methanol – produced with no or low GHG emission

CBG – Compressed Bio Gas – Asia's Largest plant in Sangrur Punjab - Compressed and purified bio gas – from waste/bio-mass sources like agricultural residue, cattle dung etc - also 2018 SATAT scheme

World's First CNG Terminal – Bhavnagar Gujarat – PPP approach

Global Offshore Wind Alliance – by IRENA and GWEC

4.7 Energy Efficiency

4.7.1 Energy Conservation (Amendment) Act, 2022

First Amend in 2010 – norms for buildings – trade of energy savings – appeal to Appellate Tribunal

ECA(Amendment) 2022 – regulate energy consumption – tackle climate change – 2001 deals in saving energy – 2022 deals in saving env and tackle climate change

Features

- Carbon Credit - tradable permit
- Energy Conservation and Sustainable Building Code
- Expanded Scope to include vehicles and Vessels
- Regulations by State Electricity Regulatory Commissions

4.7.3 Other Energy Efficiency Initiatives

Promoting Energy Efficiency and Renewable Energy in Selected MSME clusters in India Project – 2011 – by UNIDO+BEE – Fund by GEF - develop market env for energy efficiency – Support of MNRE+Min of MSME

Saksham 2022 – fuel conservation campaign of PCRA (Petroleum Conservation Research Association)

4.7.2 State Energy and Climate Index

By NITI aayog – 40% share to DISCOMS – First Index

Other Energy Indexes across the globe and India's performance

Index	World Energy Trilemma Index(WETI)	Energy Transition Index (ETI)	Renewable Energy Country Attractiveness Index (RECAI)	Climate Change Performance Index (CCPI)
Publishing Agency	World Energy Council	World Economic Forum (WEF)	Ernst & Young (EY)	German watch eV.
What it measures	Measures energy system performance in terms of Energy Security, Ener Equity, Environmental Sustainability in Country context	Checks nation's energy system information	Ranks performance of economies based on the investment made in the renewable energy sector - energy supply, renewable technologies, & ease of doing business	Measures country's progress towards the NDC 2030 targets and compares climate protection performance of countries
India's Rank	75/127(2021)	87/115(2021)	3/40(2021)	3/40(2021)
Best performing countries	Top 3: Sweden, Switzerland, Denmark	Top 3: Sweden,Norway, Denmark	Top 2: USA & Mainland China	Top 6: Denmark (4 th), Sweden (5 th), Norway (6 th)

4.8 Sustainable Agriculture

4.8.1 National Mission on Natural Farming (NMNF)

Portal – by Min of Agri

Natural Farming – natural biodiversity + chemical free + Livestock Based Components

- Beejamrit – seed treatment with cow dung, urine
- Jivamrit – soil fertility with cow urine, dung, flour of pulses and jaggery
- Mulching – micro climate with mulches
- Contact – activate earthworms
- Plant Protection – spray biological concoctions

NMNF – NF in India as Bharatiya Prakritik Krishi Paddhati Programme – sub mission under Paramparagat Krishi Vikas Yojana - 6yrs till 2024

SIMILARITY BETWEEN ORGANIC FARMING AND NATURAL FARMING

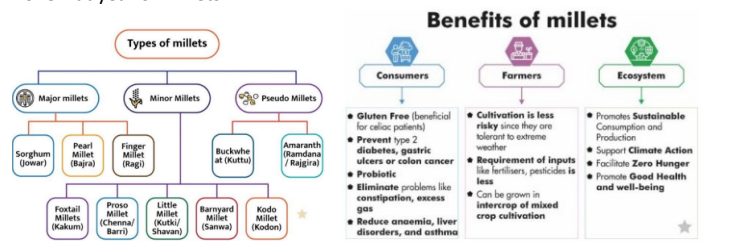
- Both are non-chemical system of farming.
- Both are based on diversity, on-farm biomass management and biological nutrient recycling.
- Diversity, rotation multiple cropping and resource recycling is key.

Differences between Organic Farming and Natural Farming	
Organic Farming	Natural Farming
Open for use of off-farm organic and biological inputs	No external inputs, only on-farm inputs based on Desi Cow (Jeevamrit, Beejamrit, Ghanajeevamrit)
Open for micronutrient correction through use of minerals	Use of compost/vermicompost and minerals are not allowed
Plowing, tilling, mixing manure, weeding, and other fundamental agro activities are still required.	There is no plowing, no soil tilling, no fertilizers, and no weeding.
Widely popular, Global market at 132 billion US\$	Evolving markets are yet to be developed

4.8.2 Int year of Millets 2023

UN adopted in 2021 – India's Proposal

Millets – small grained cereals – nutri cereals – largest staple before Green Revolution – 20% production by India – states MP>Guj>Ktk>Raj>Mah
2018 Nat year of Millets



4.8.3 Direct-Seeded Rice (DSR)

Advantages of DSR	Issues with DSR
<ul style="list-style-type: none"> Saves labour. Sowing can be done in stipulated time frame because of easier and faster planting. Early crop maturity by 7-10 days which allows timely planting of subsequent crops. More efficient water use and higher water stress tolerance. Less methane emission. 	<ul style="list-style-type: none"> Uses more seed than transplanting. Laser land levelling costs Rs 1,000/acre is compul in DSR. This is not so in transplanting. Some direct-sown crops may be harder to get star in cold (or hot) conditions. Non-availability of the herbicides. Seed requirement for DSR is higher, at 8-10 kg/a compared to 4-5 kg in transplanting.

4.9 Miscellaneous

4.9.1 Right to Repair

RtR – make original part available for device repair – US, UK, EU Portal by Ministry of Consumer Affairs

4.9.2 Scope of Authority Under Dam Safety Act 2021

US>China>India(large dams 5334)

Dam Safety Act – surveillance, inspection, operation – 2 Bodies= NDSA and Nat Commission on Dam Safety

Mullaperiyar Dam – 126y – TN Gov Ctrl – Periyar River within Periyar TR

Rule Curve – tabulation to specify quantum of water storage or empty space

4.9.2.1. HYDROELECTRIC PROJECTS IN NEWS

Project	Details
Kwar Hydroelectric Project	<ul style="list-style-type: none"> Location: Kishtwar district of Jammu and Kashmir. River: River Chenab. Other Details: Other projects (running or under-construction) initiated to har potential of Chenab basin: Baglihar HE Power project; Dulhasti Power Station; Power Station; PakalDul HE Project; Kiru HE Project; Kirthai-II HE Project.
Upper Siang multi-purpose project	<ul style="list-style-type: none"> Location: Yingklong in Arunachal Pradesh. River: Brahmaputra. Other Details: NHPC has been tasked with building the 10 GW Storage project th central to counter China's water diversion scheme of Siang river that f downstream into the Brahmaputra.
Dibang hydel project (DHP)	<ul style="list-style-type: none"> Location: Lower Dibang Valley district in Arunachal Pradesh River: Dibang, with dam site located upstream of the confluence of Ashu Pani Dibang rivers. Other Details: The DHP has been designed as the world's tallest concrete gravity at 278 metres above sea level.
Etailn Hydroelectric Project (HEP)	<ul style="list-style-type: none"> Location: Dibang Valley in Arunachal Pradesh <ul style="list-style-type: none"> Dibang Valley is situated in the Eastern Himalayan Global Biodiversity Hotspot home to unique and endemic species of flora and fauna such as Tigers, Clo Leopard, Asiatic Golden Cat, Red Panda etc. River: Dibang river (tributary of Brahmaputra river). Other Details: <ul style="list-style-type: none"> Proposed in 2008, expected to produce 3097MV of electricity. Envisages construction of two dam on Dir River and Tangon river (tributari Dibang). Anonpani small HEP and Athunli HEP are other HEP on the Tangon River.

4.9.3 Deep Sea Mining

Deep Sea Mining – extract ores rich in cobalt, zinc, rare metals

ISA – International Seabed Authority – autonomous Int Org – 1994

Protect marine env – 168M(India)

Deep Sea Critical Minerals

- Polymetallic Nodules – precipitated iron oxyhydroxides and manganese oxides
- Seafloor massive sulphides
- Cobalt rich Ferromanganese Crusts

4.9.4 River Projects

Kalasa-Banduri Project - divert water from two tributaries of the Mahadayi river (also known as Mandovi): Kalasa and Banduri to the Malaprabha river (Tributry of Krishna River)

4.10 Reports and Indices

Fostering Effective Energy transition - by WEF

Environment Performance Index – by WEF – biennial

Renewables 2022 Global Status Report – by REN21

Renewable Capacity Statistics 2022 – by IRENA

Renewable Power Generation Costs in 2021 - by IRENA

Renewable Energy and Jobs Annual Review 2022 – by IRENA and ILO

Renewable Energy Report 2022- by IEA

World Energy Employment report 2022 – by IEA

World Energy Outlook 2022 – IEA

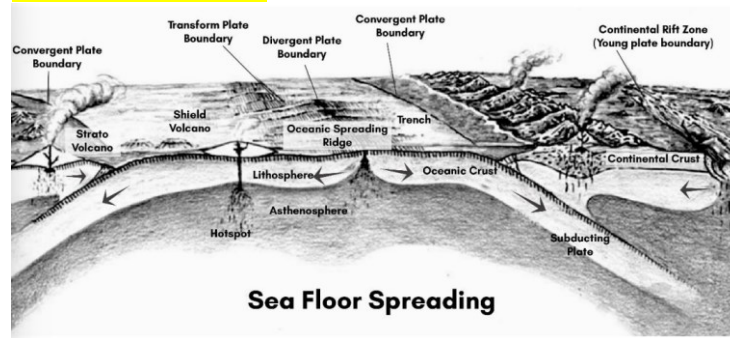
Global Wind report 2022 – by Global Wind Energy Council

State of India's Environment in Figure – by Centre for Science and Environment

EnviStats India 2022 – by NSO

5 GEOGRAPHY

5.1 Sea Floor Spreading

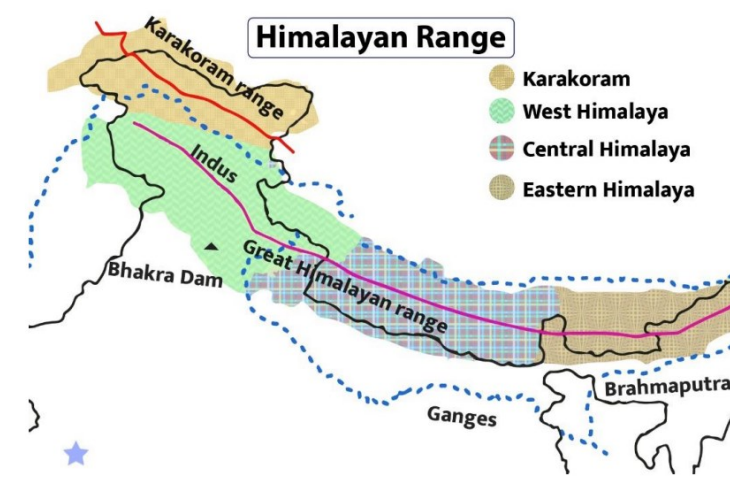


5.2 El Nino & La Nina

(read directly from Geography Static Notes – Save your time here)

5.3 Karakoram Anomaly

Stability or abnormal growth of glaciers



6. Disaster Management

6.1 Joshimath Land Subsidence



6.2 Cyclones

Fujiwhara Effect - interaction b/w tropical storms – same time same region - centres close to 1400km – leads to change of track and intensity

Dvorak Technique - statistical method - estimate intensity of tropical cyclones – use infrared

Bomb Cyclone – meteorological phenomenon – low pressure system experiences a rapid and drastic drop in atm. Pressure - winter months – common in mid latitudes

6.8 Other Important News

Mei Yu Front – active rainfall spell – western pacific region – drives moisture away from Ind

Madden Julian Oscillation – MJO – rain bearing, eastward propagating intraseasonal circulation

Azores High – subtropical high pressure system – eastern subtropical North Atlantic – during Winter

Hydraulic Fracking – technique – recover gas and oil from shale rock

6.3 CDRI – Coalition for Disaster Resilient Infrastructure

CDRI - global partnership – 2019 – by India – 31M – Sendai Framework – Paris Agreement

India Signed 'Headquarter Agreement' = now Independent and Int Legal Entity

HQ Agreement – b/w Int Org and Host State – determine privileges and Immunity .5

6.4 Global Platform for Disaster Risk Reduction 2022 (GP2022)

7th Session of GP2022 by UNDRR

GP2022 – assess and discuss – Sendai Framework

UNDRR – custodian of Sendai Framework

6.5 Other Disaster Related News

Earthquake Observatory – MES – J&K

Derecho – Storm System – turn skies green – warm water phenomenon – summertime – wide spread, long lived, straight line windstorm

AMR – Avalanche Monitoring Radar – first of it's kind – N.Sikkim – detect within seconds of trigger

SADMS – S.Asia Drought Monitoring System – by IWMI+ICAR – address existing drought mgmt challenges

Damini App – monitor lightning activities – 3hrs advance warning – by IITMPune and ESSO

6.6 Reports

Global Assessment Report on Disaster Risk Reduction 2022 – by UNDRR

Global Status of MultiHazard EWS – by UNDRR+WMO

6.7 Mawmluh Cave

Meghalaya - Listed first 100 IUGS

IUGS – 1961 – org of Geoscientists – member of Int. Sci Council

IGUS Geological Heritage Site – geological elements – scientific int. relevance

Under IGCP731 – knowledge hub under UNESCO



Mamluh Cave(krem Mawmluh) – 4th Longest(Ind) – 7km – Cherrapunji – famous Stalagmite