

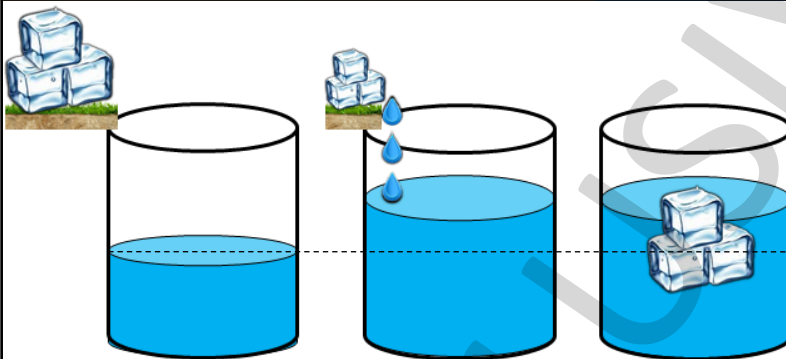
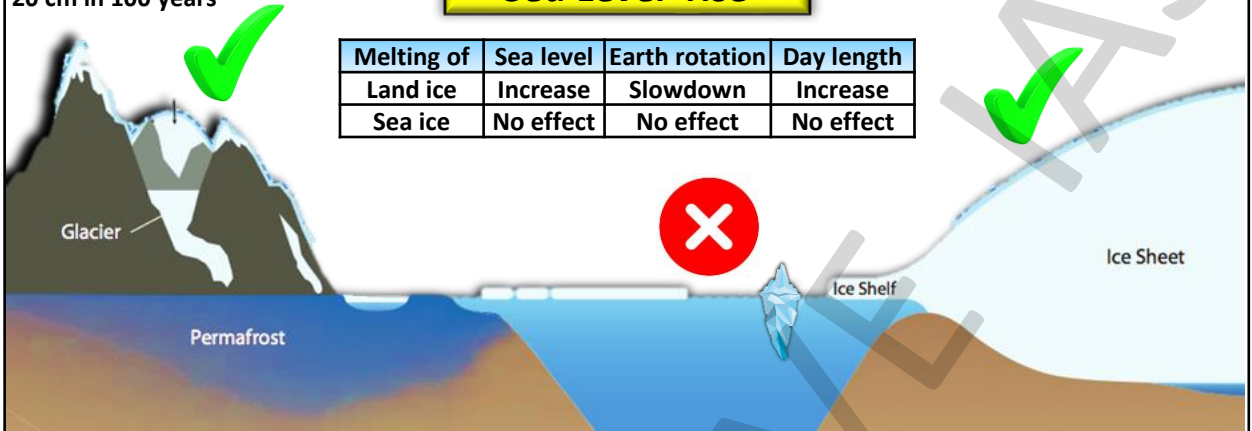
All-Inclusive Current Affairs for Prelims 2021

Environment Class-1

Approx Sea level rise:
20 cm in 100 years

Sea Level rise

Melting of	Sea level	Earth rotation	Day length
Land ice	Increase	Slowdown	Increase
Sea ice	No effect	No effect	No effect



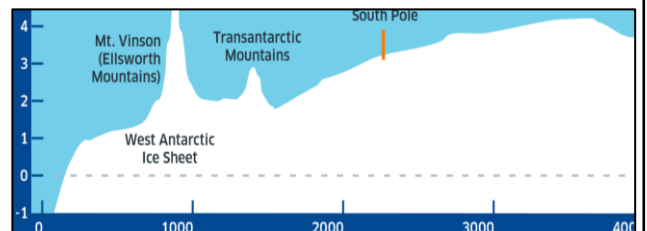
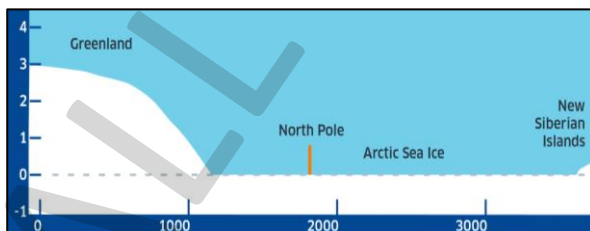
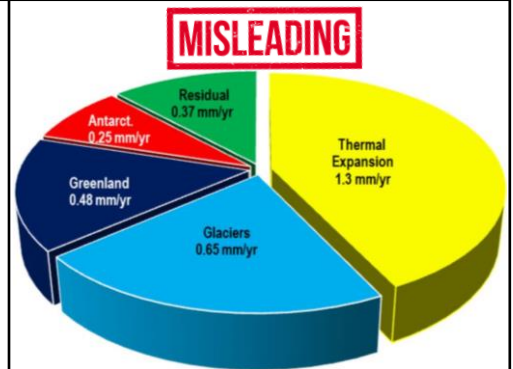
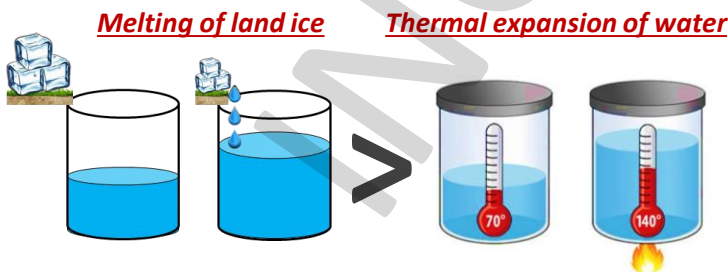
<https://climate.nasa.gov/faq/30>

NASA GLOBAL CLIMATE CHANGE
Vital Signs of the Planet

If all of Earth's ice melts and flows into the ocean, what would happen to the planet's rotation?

Causes of Sea level rise? Mark all correct (but not melting of sea-ice and icebergs)

Biggest contributor to sea level rise?

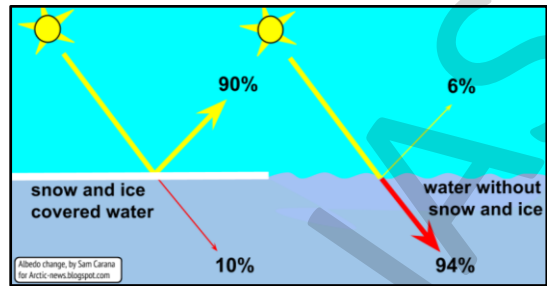
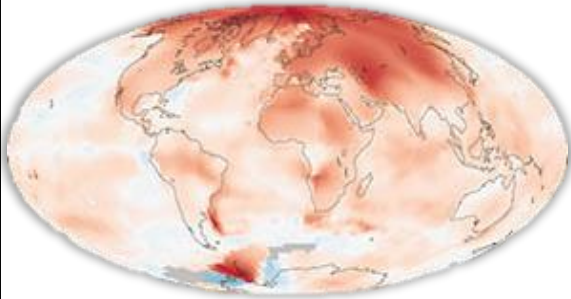


Arctic: Ocean, surrounded by land
Arctic: Covered by thin layer of ice

Antarctica: Land, surrounded by ocean
Antarctica: Covered by thick layer of ice

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Arctic Amplification



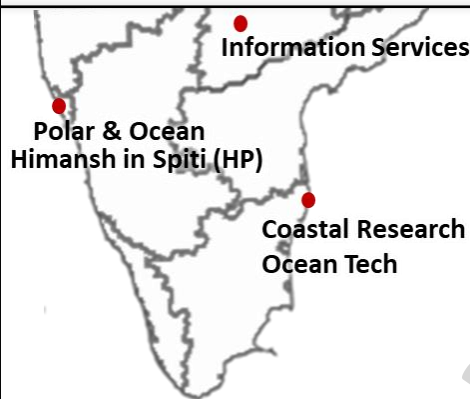
What?

Global temp rise → 1°C
Arctic temp rise → 2°C

Why?

(Less Albedo due to less ice)
ice melts → darker ocean exposed → more heat absorbed

Implications?

 (mark all correct) Polar bear, Weather, Climate, Coastal erosion, more rain, etc.


N.C. for Ocean **Info Services**
N.C. for **Polar & Ocean** Research
N.C. for **Coastal** research
N.I. for **Ocean Technology**

2008 – Himadri (Norway)
2014 – IndARC (Norway)



1983 – Dakshin Gangotri
1989 – Maitri
2012 – Bharti

Oceans by size:

- (PAISA)
- Pacific
- V
- Atlantic
- V
- Indian
- V
- Southern
- V
- Arctic

Arctic Council:

- for cooperation on common arctic issues
- **1996** by **Ottawa declaration**; HQ: **Norway**
- **8 members**: USA, Canada, Denmark, Iceland, Norway, Sweden, Finland, Russia
- **India**, China, etc. are **observers**

Prelims 2014:

Consider the following countries:

1. Denmark
2. Japan
3. Russian Federation
4. United Kingdom
5. United States of America

Which of these are member of 'Arctic Council'?

- (a) 1, 2 and 3 (b) 2, 3 and 4
(c) 1, 4 and 5 (d) 1, 3 and 5



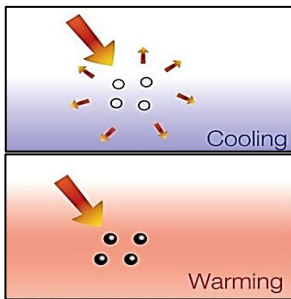
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See explanation of this PDF on **YouTube** www.youtube.com/c/allinclusiveias

Aerosol characterization and radiative effects at High Altitude site in Western-Trans Himalayas

Posted On: 05 JUN 2020 3:08PM by PIB Delhi

Researchers at the Aryabhata Research Institute of Observational Sciences (ARIES), Nainital an autonomous research institute under the Department of Science and Technology (DST) Govt. of India have found that aerosol radiative forcing larger than the global averages, implying some amount of radiative effects, in spite of the clean atmosphere over the trans-Himalayas.



Aerosol Radiative Forcing

Radiative Forcing:

- Diff. b/w insolation absorbed and energy radiated by earth
- Positive:** more absorption → **warming**
- Negative:** more radiation → **cooling**

Aerosols:

- solid/liquid **particles** suspended in air
- their behaviour depends on their size/etc
- Source:** Natural (e.g. dust), Anthro (e.g. combustion)
- Affects:** weather, visibility, health, etc.

National Carbonaceous Aerosols Programme:

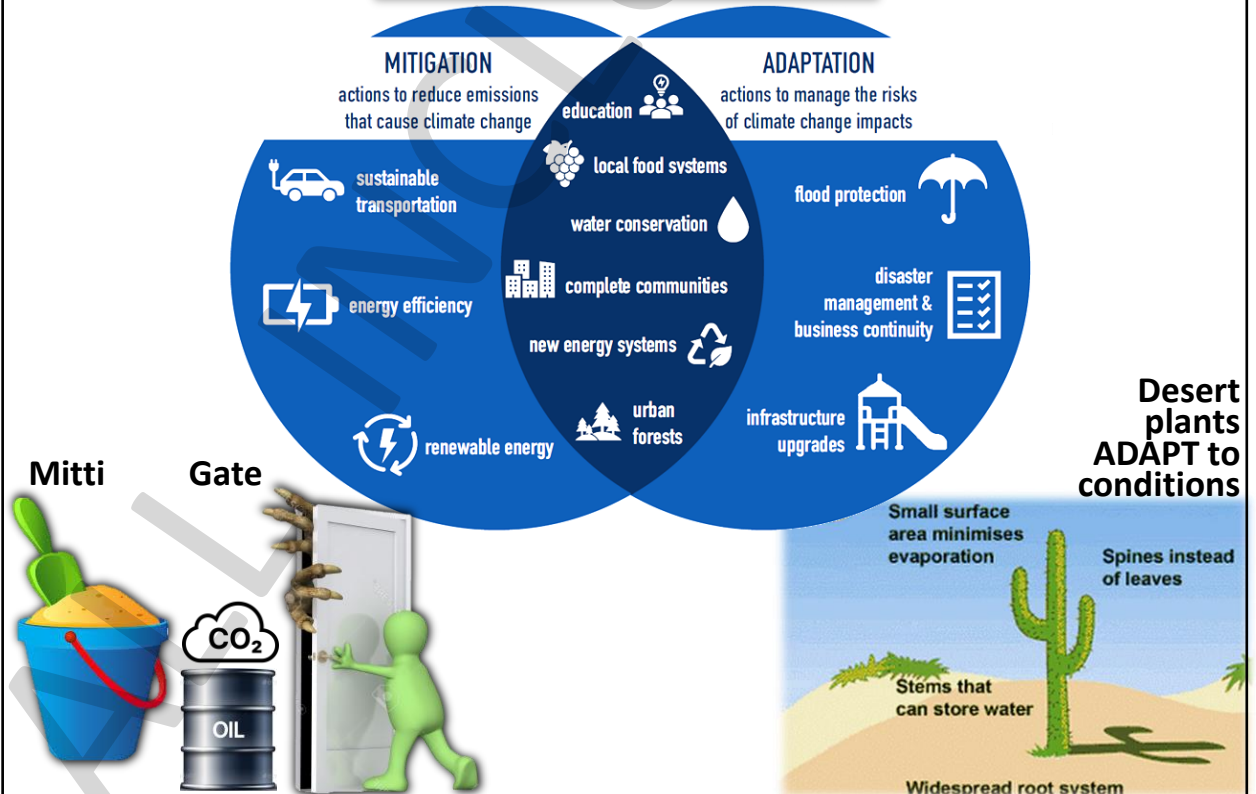
- Launched in **2011** by MoEFCC
- To study effect of Aerosols on **Climate change**

Prelims 2019:

In the context of which of the following do some scientists suggest the use of cirrus cloud thinning technique and the injection of **sulphate aerosol** into stratosphere?

- (a) Creating the artificial rains in some regions
- (b) Reducing the frequency and intensity of tropical cyclones
- (c) Reducing the adverse effects of the solar wind on the earth
- (d) Reducing the global warming**

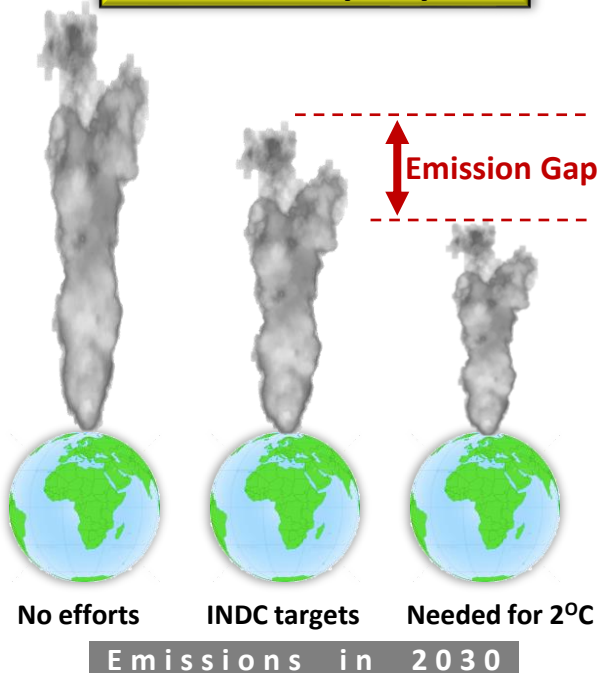
Mitigation vs Adaptation



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Emission Gap Report



Emission Gap:

difference between where GHG **emissions** are **predicted** to be in 2030, and where they **should be** for 2/1.5 °C target

India's INDCs: (by 2030)

- 1) Reduce emissions by **33-35%**, compared to 2005 level
- 2) Create additional **2.5-3 billion** tonne of carbon sink
- 3) Get **40%** energy from **non-fossil** fuel sources.

Intended Nationally Determined Contribution

Key findings:

- Top 4 emitters: China > USA > EU > India
- GHGs are rising at rate of **1.5%** annually
- World needs to cut emissions **7.6%** annually till 2030, to achieve **1.5°C** target by 2100

UNEP

- United Nations Environment
- 1972; HQ: **Nairobi**, Kenya
- 1988: UNEP & WMO est. **IPCC**

UN Environment Assembly:

- Governing body of UNEP
- Has universal membership of all 193 members

Famous publications:

- ✓ Emissions Gap report
- ✓ Adaptation Gap report
- ✓ Making Peace with Nature
- ✓ Global Environment Outlook
- ✓ Cooling emissions and policy synthesis report

Making Peace with Nature:

- 3 planetary emergencies:
- a) Climate change
 - b) Biodiversity loss
 - c) Pollution

Famous awards it gives:

- ✓ SEED Award
- ✓ Sasakawa Prize
- ✓ Champions of Earth
- ✓ Young Champions of Earth

Hosts Secretariat for:

- ✓ 1973 CITES
- ✓ 1979 CMS
- ✓ 1987 Montreal Protocol
- ✓ 1992 CBD
- ✓ 2013 Minamata Convention
- ✓ If u don't know, mark correct



Bamako Convention: no import of hazardous/radioactive waste into Africa

Carpathian Convention: to protect Carpathian mountains (Europe's 3rd longest mountain range)

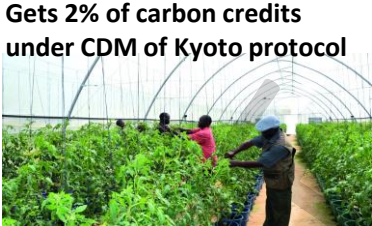

Tehran Convention: to protect marine environment of Caspian sea

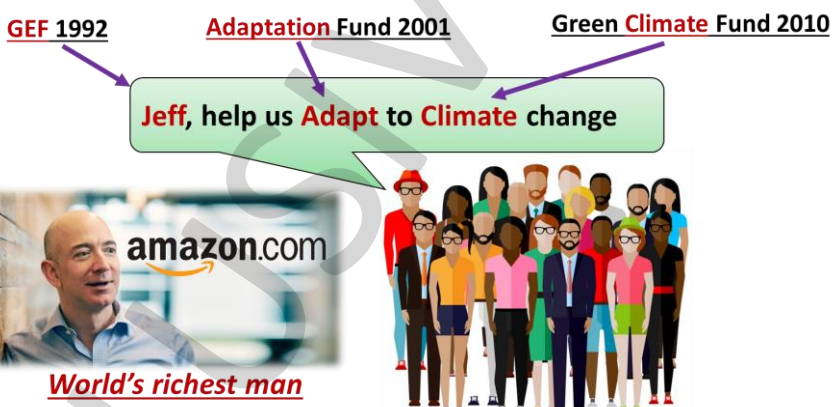
Caspian Sea:

- world's largest inland water body
- Russia, Kazakhstan, Iran, Azerbaijan, Turkmenistan

I read I forget, I see I remember

See explanation of this PDF on www.youtube.com/c/allinclusiveias

	Global Environment Facility	Adaptation Fund	Green Climate Fund
Convention	Earth Summit, Rio (Brazil)	CoP-7 Marrakech (Morocco) Under Kyoto Protocol (UNFCCC)	CoP-16 Cancun (Mexico) Under UNFCCC
Foundation	1992	2001	2010
HQ	Washington DC, USA	Washington DC, USA	Incheon, South Korea
Trustee	World Bank	World Bank	World Bank
Purpose/ Focus area	To help developing countries meet the objectives of international environmental conventions and agreements.	To help developing countries build resilience and adapt to climate change	To help developing countries reduce their GHG emissions .
Other info	<input type="checkbox"/> UNFCCC (also, 2 funds in 2001) → Special Climate Change Fund → Least Developed Countries Fund <input type="checkbox"/> CBD <input type="checkbox"/> UNCCD <input type="checkbox"/> Stockholm Conv. on POPs <input type="checkbox"/> Minamata Conv. on Mercury	Gets 2% of carbon credits under CDM of Kyoto protocol 	Serves Paris agreement 



Prelims 2014:

With reference to 'Global Environment Facility', which of the following statements is/are correct?

- (a) It serves as financial mechanism for 'CBD' and 'UNFCCC'
- (b) It undertakes scientific research on environmental issues at global level
- (c) It is an agency under OECD to facilitate the transfer of technology and funds to underdeveloped countries with specific aim to protect their environment
- (d) Both (a) and (b)

Prelims 2015:

Which of the following statements regarding 'Green Climate Fund' are correct?

1. It is intended to assist the developing countries in adaptation and mitigation practices to counter climate change.
2. It is founded under the aegis of UNEP, OECD, Asian Development Bank and World Bank.

Select the correct answer:

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Climate Change Performance Index:

- Published by:
 - Climate Action Network
 - Germanwatch
 - NewClimate Institute
- Published since 2005 (i.e. not started recently)
- 1st, 2nd, 3rd - None; 4th – Sweden; 10th – India


Global Climate Risk Index:

- by Germanwatch
- India at #7; Mozambique most affected

State of Global Climate report: by WMO

World Meteorological Organization:

- 1950; Geneva (Switzerland)
- Specialized agency of UN (15)

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Methane	<input type="checkbox"/> Colorless, Odourless gas <input type="checkbox"/> Simplest Hydrocarbon CH ₄ <input type="checkbox"/> Flammable, used as fuel <input type="checkbox"/> It has more Global warming potential than CO ₂	Three most important Green House Gases		
		Lifetime	100 year GWP	
	CO ₂	50-200 years	1	
	Methane	12 years	25 (100)	
		Nitrous Oxide	120 years	300

<p>Sources: Landfills, Fossil fuels, Soil, Agriculture, Enteric fermentation, Permafrost melting, etc.</p> <p>Methanogens: microbes that generate methane</p>	<p>Sink: <input type="checkbox"/> Atmosphere, Soil <input type="checkbox"/> Hydroxyl in air, Methanotrophs in soil</p> <p>Methanotrophs: microbes that consume methane</p>
--	---

<p>Prelims 2008: Consider the following</p> <ol style="list-style-type: none"> Rice fields Coal mining Domestic animals Wet lands <p>Which of the above are sources of methane, a major greenhouse gas?</p> <p>(a) 1 and 4 only (b) 2 and 3 only (c) 1, 2 and 3 only (d) 1, 2, 3 and 4</p>	<p>Global Methane Initiative:</p> <ul style="list-style-type: none"> ➤ Reduce emission, use as energy ➤ Formed in 2004, HQ Washington DC ➤ Secretariat hosted by US EPA ➤ India is founding partner since 2004 <p>Methane hydrates:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Gas tapped in ice; 90% methane; <input type="checkbox"/> Found in many places, in Indian ocean also
--	--

<p>Prelims 2019: Which of the following statements are correct about deposits of methane hydrate?</p> <ol style="list-style-type: none"> Global warming might trigger the release of methane gas from these deposits Large deposits of 'methane hydrate' are found in Arctic Tundra & under seafloor Methane in atmosphere oxidizes to carbon dioxide after a decade or two. <p>Select the correct answer:</p> <p>(a) 1 and 2 only (b) 2 and 3 only (c) 1 and 3 only (d) 1, 2 and 3</p>	<p>The diagram illustrates various methane hydrate deposits. On the left, a drill ship is shown near hydrate mounds on the seafloor. On the right, a drilling rig is positioned over Arctic methane hydrate deposits above and below the lower limit of permafrost. Below the seafloor, there are methane hydrate deposits, and faults provide conduits for methane seepage. Biogenic methane is also shown being generated by bacterial action in shallow sediments. Arrows indicate the slow seepage of thermogenic methane from below.</p>
--	---

<p>Prelims 2010: Due to their extensive rice cultivation, some regions may be contributing to global warming. To what possible reason / reasons is this attributable?</p> <ol style="list-style-type: none"> The anaerobic conditions associated with rice cultivation cause the emission of methane. When nitrogen based fertilizers are used, nitrous oxide is emitted from the cultivated soil. <p>Which of the statements given above is/are correct?</p> <p>(a) 1 only (b) 2 only (c) Both 1 and 2 (d) Neither 1 nor 2</p>

Nitrous Oxide laughing gas	<p>Sources: (many)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Most from agriculture <input type="checkbox"/> Also from lightning 	<p>Multiple applications like</p> <ul style="list-style-type: none"> <input type="checkbox"/> Anaesthetic, pain relief <input type="checkbox"/> Engines, Rocket propellant 	<p>Problem:</p> <ul style="list-style-type: none"> <input type="checkbox"/> GHG <input type="checkbox"/> Harms ozone
--------------------------------------	--	---	---

Global Carbon Project	CO ₂ Budget / Methane Budget / N ₂ O Budget
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Assessment of Climate Change over Indian Region

mint e-paper

Climate Change Tracker: India's first ever climate change assessment

1 min read . Updated: 19 Jun 2020, 01:45 PM IST

Bibek Bhattacharya

The Indian government has prepared the first ever national report on the climate crisis, and it makes for grim reading

For the first time, India has released its own national report on the state of the climate crisis. Prepared under the aegis of the ministry of earth sciences (MoES), the report, Assessment Of Climate Change Over The Indian Region, takes a close look at where we stand regarding long-term changes in climate patterns, and their attendant risks.

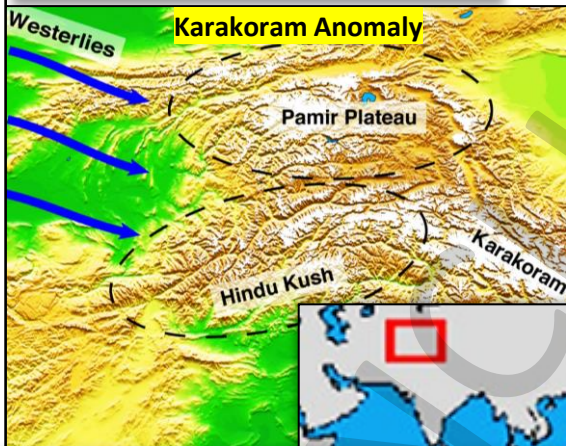
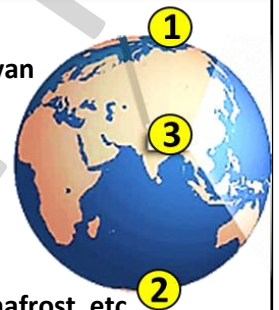
- ❑ **Findings of the report:**
 - ❑ good points for Mains, not Prelims
- ❑ **Impact of climate change:**
 - ❑ mark all correct
- ❑ **Related concepts:**
 - ❑ Third pole; retreating glaciers; cryosphere; Karakoram anomaly

Third pole:

- ➔ Hindu Kush – Karakoram – Himalayan
- ➔ Largest area of ice and snow other than the two poles

Cryosphere:

- ➔ Areas where water is in solid form
- ➔ Ice in sea/river/lake; glaciers; permafrost, etc.



CARE for SAR

- **Climate Adaptation & REsilience for South Asia Region**
- **World Bank** project for South Asia
- Will work with RIMES and ADPC

RIMES for Asia and Africa:

- Regional Integrated Multi-Hazard Early Warning System
- Formed in **2009** (efforts after 2004 tsunami)
- Operates from **Thailand** early warning center
- Administrative Secretariat in **Maldives**
- Program Secretariat in **Mongolia**

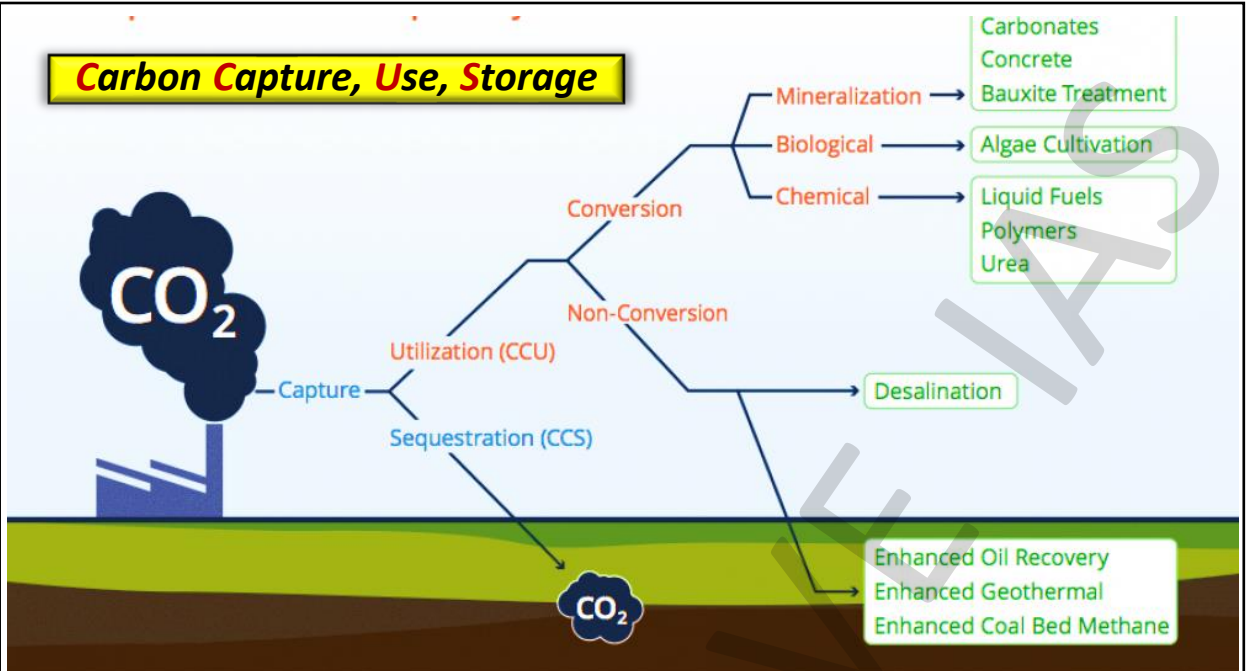
Asian Disaster Preparedness Center (ADPC):

- Est. in **1986**; HQ **Bangkok**
- To build disaster resilience in **Asia and Pacific**
- 9 founding members: Bangladesh, Cambodia, China, **India**, Nepal, Pakistan, the Philippines, Sri Lanka, and Thailand

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Carbon Capture, Use, Storage



Prelims 2017:

In the context of mitigating the impending global warming due to anthropogenic emissions of carbon dioxide, which of the following can be the potential **sites for carbon sequestration**?

1. Abandoned and uneconomic coal seams
2. Depleted oil and gas reservoirs
3. Subterranean deep saline formations

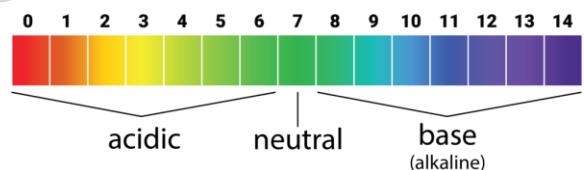
Select the correct answer:

- (a) 1 and 2 only (b) 3 only
 (c) 1 and 3 only **(d) 1, 2 and 3**

Ocean acidification:

- Decrease in pH** of Oceans
- Due to oceans absorbing CO₂
- Sea water is slightly basic (pH > 7)
- Acidification: shift towards 7
- Ocean absorbs **23%** of annual CO₂ emissions

The pH scale



Green-Ag

- launched in **2018**
- by **MoA&FW** & **FAO**
- In 5 states (not pan-India)
- Funds from **GEF**

1. Madhya Pradesh: **Chambal** Landscape
2. Mizoram: **Dampa** Landscape
3. Odisha: **Similipal** Landscape
4. Rajasthan: **Desert Nat. Park** Landscape
5. Uttarakhand: **Corbett-Rajaji** Landscape

GHG emissions from agriculture:

- 39% from livestock
- 37% from rice
- 12% meat

Decarbonizing Transport

- It means reducing GHG emissions from transport sector.
- Which of the following can **help in decarbonizing** the transport sector in India? (obvious like metro trains, electric vehicles, carpooling, etc.)

Decarbonizing Transport in Emerging Economies:

- ✓ Currently in **India, Argentina, Azerbaijan, Morocco**
- ✓ In India, it was launched by **NITI and ITF** in June 2020.
 - International Transport Forum is under **OECD**.
 - India is member of ITF since 2008.

NDC – Transport Initiative for Asia:

- ✓ Decarbonise transport to help achieve NDCs
- ✓ Supported by many organisations including ITF
- ✓ For India, China, Vietnam, for 2020-24 (NITI from India)

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Carbon pricing

Monetary value applied to carbon emissions. e.g.

- Green tax, Carbon tax, Clean Environment Cess
 - Internal Carbon Pricing, Trading of Carbon Credits
 - Clean Development Mechanism of Kyoto protocol
 - Sustainable Development Mechanism of Paris Ag.
- Article 6 of Paris Ag: carbon trading mechanisms

Carbon Pricing Leadership Coalition:

- Launched in 2015 at COP-21 in Paris
- Voluntary initiative of countries, companies, NGOs, etc.
- Secretariat administered by World Bank
- From India, DMRC & Indian Railways

Carbon trading



Kyoto Protocol:

- 1st legally binding treaty to reduce GHG emissions
- 1997: adopted in Kyoto
- 2005: came into force
- Commitment periods 2008-12, 2013-20

Kyoto mechanisms

- To help Annex-1 countries meet their emission reduction targets
- 1) Clean Development Mechanism
- 2) Joint Implementation
- 3) Emissions trading

CDM of Kyoto:

- Annex-I countries can buy CERs from projects in developing countries
- 1 Certified Emission Reduction = 1 tonne CO₂
- 2% goes to Adaptation Fund

Prelims 2008:

Consider the following statements:

1. Clean Development Mechanism (CDM) in respect of carbon credits is one of the Kyoto Protocol Mechanisms.
2. Under the CDM, the projects handled pertain only to the Annex-I countries.

Which of the above statements are correct?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

Prelims 2016:

Terms in news	Their origin
1. Annex-1 countries	Cartagena Protocol
2. Certified Emissions Reductions	Nagoya Protocol
3. Clean Development Mechanism	Kyoto Protocol

Which of the above pairs are correctly matched?

- (a) 1 and 2 only (b) 2 and 3 only
(c) 3 only (d) 1, 2 and 3

National CDM Authority:

- Est. in 2003, under EPA 1986
- Chairperson is Secretary MoEFCC

National Adaptation Fund for Climate Change:

- 2015; Central sector scheme; for vulnerable states/UTs
- NABARD is implementing agency (also for Kyoto's AF)

Apex Committee for Implementation of Paris Agreement (AIPA):

- Est. in 2020, under EPA 1986
- Chairperson is Secretary MoEFCC
- Regulate Carbon markets;
- Achieve 2030 INDCs

I read I forget, I see I remember | See explanation of this PDF on [YouTube](https://www.youtube.com/c/allinclusiveias) www.youtube.com/c/allinclusiveias

1971 Ramsar Convention	1981	1991	2001 Stockholm Convention on PoPs	2011
1972 Stockholm Conference	1982 Nairobi declaration	1992 Earth Summit in Rio de Janeiro	2002 Earth Summit in Johannesburg	2012 Earth Summit in Rio de Janeiro
1973 CITES	1983 UN appoints Brundtland Commission	1993	2003	2013 Minamata convention
1974	1984	1994	2004	2014
1975	1985 Vienna Convention	1995 1 st CoP of UNFCCC	2005	2015 Paris Agreement
1976	1986	1996	2006	2016 Kigali amendment to Montreal Protocol
1977	1987 Brundtland report; Montreal Protocol	1997 Kyoto Protocol	2007	2017 CoP-23 Bonn Germany
1978	1988	1998 Rotterdam convention	2008	2018 CoP-24 Katowice Poland
1979 Convention of Migratory Species; Convention on Long-Range Transboundary Air Pollution	1989 Basel Convention on Transboundary Movements of Hazardous Wastes	1999	2009	2019 CoP-25 Madrid under Chilean Presidency
1980	1990	2000 Cartagena protocol	2010 Nagoya protocol	2020

<ul style="list-style-type: none"> ● 1971 Ramsar Convention For sustainable use of wetlands Only global Env. treaty that deals with a particular ecosystem. 	<p>1981</p> <ul style="list-style-type: none"> ● Nairobi Declaration. ● To celebrate 10th anniversary of Stockholm Conference. ● Envisaged creation of a special commission for long term strategies. ● Declaration endorsed by UNEP in 1987 	<p>1991</p> <ul style="list-style-type: none"> ● UN Conference on Environment and Development aka (Rio) Earth Summit ● UNFCCC: (Secretariat in Bonn, Germany) To reduce emission of GHGs. No limits; no enforcement. Rather, provided for updates (Kyoto protocol). ● CBD: (Secretariat in Montreal, Canada) three main goals- (1) Conservation of biodiversity; ● (2) Sustainable use of it's components; (3) Fair and equitable sharing of benefits. Followed by Cartagena (2000) and Nagoya (2010) protocols. ● UNCCD: (Secretariat in Bonn, Germany) It is the only internationally legally binding framework to address desertification. CoP-14 was held in 2019 in New Delhi. ● Agenda 21: take actions at all three levels to achieve certain goals by 2021. Later revised to 2030. 	<p>2001</p> <ul style="list-style-type: none"> ● Convention on POPs aka Stockholm convention POPs are organic pollutants that are resistant to environmental degradation 	<p>2011</p>
<ul style="list-style-type: none"> ● 1972 (5th June) UN Conference on Human Environment. ● aka Stockholm Conference ● First declaration of international protection of environment. ● Formed UNEP 	<p>1982</p> <ul style="list-style-type: none"> ● Nairobi Declaration. ● To celebrate 10th anniversary of Stockholm Conference. ● Envisaged creation of a special commission for long term strategies. ● Declaration endorsed by UNEP in 1987 	<p>1992</p> <ul style="list-style-type: none"> ● UN Conference on Environment and Development aka (Rio) Earth Summit ● UNFCCC: (Secretariat in Bonn, Germany) To reduce emission of GHGs. No limits; no enforcement. Rather, provided for updates (Kyoto protocol). ● CBD: (Secretariat in Montreal, Canada) three main goals- (1) Conservation of biodiversity; ● (2) Sustainable use of it's components; (3) Fair and equitable sharing of benefits. Followed by Cartagena (2000) and Nagoya (2010) protocols. ● UNCCD: (Secretariat in Bonn, Germany) It is the only internationally legally binding framework to address desertification. CoP-14 was held in 2019 in New Delhi. ● Agenda 21: take actions at all three levels to achieve certain goals by 2021. Later revised to 2030. 	<p>2002</p> <ul style="list-style-type: none"> ● Earth Summit 2002 aka Rio +10 ● Johannesburg (South Africa) 	<p>2012</p> <ul style="list-style-type: none"> ● United Nations Conference on Sustainable Development aka Rio +20 ● Rio de Janeiro (Brazil)
<ul style="list-style-type: none"> ● 1973 CITES (Convention on International Trade in Endangered species of Wild flora and fauna) ● To control or prevent international commercial trade in Endangered species or products derived from them. ● Aim not to directly protect, but to reduce economic incentive to poaching by closing international trade. 	<p>1983</p> <ul style="list-style-type: none"> ● UN appoints World Commission on Environment and Development ● Later known as Brundtland Commission ● In 1987 it released the report 'Our Common Future'. ● Concept of 'Sustainable Development' crystallized. 	<p>1993</p>	<p>2003</p>	<p>2013</p> <ul style="list-style-type: none"> ● Minamata convention on mercury To protect humans and environment against mercury emissions. ● Japanese city, Minamata, had faced severe mercury poisoning. ● CoP-19 Warsaw (Poland) ● Warsaw International Mechanism for Loss and Damage. ● Rich countries liable for climate change impact being faced by poor countries.
<p>1974</p> <p>1975</p> <ul style="list-style-type: none"> ● Vienna Convention for protection of ozone layer. ● Provided frameworks for reductions in chlorofluorocarbons (CFCs). ● Became basis for further international action to protect ozone layer. 	<p>1984</p> <p>1985</p> <ul style="list-style-type: none"> ● Vienna Convention for protection of ozone layer. ● Provided frameworks for reductions in chlorofluorocarbons (CFCs). ● Became basis for further international action to protect ozone layer. 	<p>1994</p> <p>1995</p> <ul style="list-style-type: none"> ● First CoP of UNFCCC held in Berlin, Germany 	<p>2004</p> <p>2005</p>	<p>2014</p> <p>2015</p> <ul style="list-style-type: none"> ● CoP-21 Paris (France) ● Paris Agreement ● Countries' INDCs are not binding. ● Loss & Damage included, but diluted.

1976	1986	1996	2006	2016
1977	1987	1997	2007	2017
1978	1988	1998	2008	2018
1979	1989	1999	2009	2019
1980	1990	2000	2010	2020
<ul style="list-style-type: none"> ● Kigali amendment to Montreal protocol. Kigali is in Rwanda ● After 1987, HFCs replaced CFCs. But HFCs are powerful GHG. ● India has to phase out HFC by 85% by 2047 over the 2024-2026 level ● Cop-22/CMA-1 Marrakech (Morocco) 	<ul style="list-style-type: none"> ● Brundtland report / Our Common Future ● Montreal Protocol on Ozone Depleting Substances ● 1st universally ratified treaty in UN history. ● Phase out halogenated hydrocarbons that contain chlorine or bromine (substances containing only fluorine don't harm ozone). ● All nations should not be treated equally as some have contributed more to ozone depletion. ● A nation's obligation to reduce emissions should reflect its technological and financial ability to do so. 	<ul style="list-style-type: none"> ● Kyoto protocol signed under UNFCCC ● World's only legally binding treaty to reduce GHG emissions ● 1st commitment period: 2008-12 ● 2nd commitment period: 2013-20 	<ul style="list-style-type: none"> ● Cop-23 Bonn (Germany), but chaired by Fiji ● Talanoa dialogue: Pacific concept of "talanoa" - storytelling that leads to consensus building. in Cop it was used for NDC stock-taking. ● Gender Action plan adopted which strives for gender-responsible climate policy equal representation for women at global climate meet 	<ul style="list-style-type: none"> ● Cop-24 Katowice (Poland) ● Paris Ag. Work Programme was finalized. ● Practical implementation guidelines to track progress and ensure that climate action is transparent.
<ul style="list-style-type: none"> ● CMS - Convention of Migratory Species Cop-13 in Gandhinagar in February 2020. ● Convention on Long-Range Transboundary Air Pollution. Focused on Europe. India not member. 	<ul style="list-style-type: none"> ● Basel Convention on the Control of Transboundary Movements of Hazardous Wastes ● To reduce the movements of hazardous waste between nations (especially developed to least developed) ● Doesn't address movement of radioactive waste. 	<ul style="list-style-type: none"> ● Rotterdam convention ● To control international trade of certain hazardous chemicals ● Created 'Prior Informed Consent' procedure. 	<ul style="list-style-type: none"> ● Cop-25/CMA-2 Madrid (Spain) under Presidency of Chile. ● Adopted the "Chile Madrid Time for Action" document. ● Urged to enhance NDCs. ● Established Santiago Network for tech assistance to poor countries under WIM for Loss & Damage. ● Did not finalize rules on Carbon Markets. 	<ul style="list-style-type: none"> ● Cartagena protocol on biosafety to CBD ● For safe handling, transport and use of Living Modified Organism ● Established Advance Informed Agreement procedure ● Established Biosafety Clearing House
<ul style="list-style-type: none"> ● Nagoya protocol fair and equitable sharing of benefits arising out of the utilization of genetic resources 				

All-Inclusive Current Affairs for Prelims 2021

Environment Class-2

Stubble burning



Why stubble burning increased?

- Laws
- Mechanization



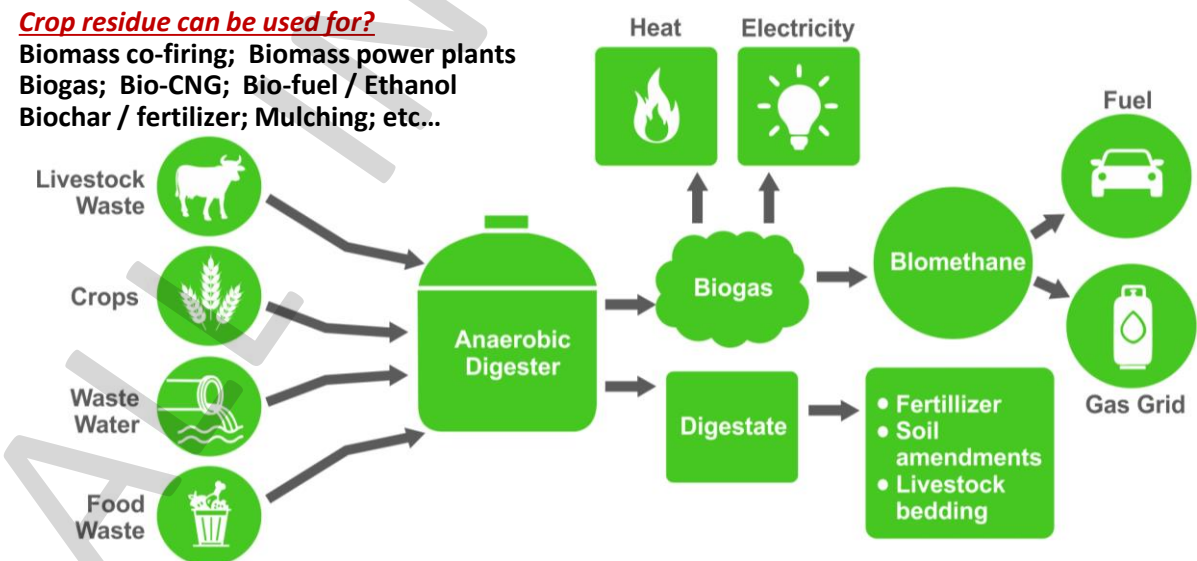
Happy Seeder cuts and lifts paddy straw, sows wheat into the bare soil and deposits the straw over the sown area as mulch.



Pusa decomposer capsules made by IARI. Dissolved in water, and sprayed on fields. Decomposes stubble.

Crop residue can be used for?

Biomass co-firing; Biomass power plants
Biogas; Bio-CNG; Bio-fuel / Ethanol
Biochar / fertilizer; Mulching; etc...



I read I forget, I see I remember

See explanation of this PDF on [YouTube](https://www.youtube.com/c/allinclusiveias) www.youtube.com/c/allinclusiveias

Biochar / Green Charcoal



- Made by heating **stubble** in absence of oxygen; Used as **fertilizer**
- Improve land's **water-holding** capacity

From Punjab Agri University and JNU, a solution to stubble burning

Biochar is granular material obtained by heating crop residue at 400°C to 600°C in a kiln-shaped structure in the absence of oxygen. It is used as fertilizer to improve soil health and water-holding capacity of agriculture land.

Prelims 2020:

What is the use of **biochar** in farming?

1. Biochar can be used as a part of the growing medium in **vertical farming**.
2. When biochar is a part of growing medium, it promotes growth of **nitrogen-fixing** microorganisms.
3. When biochar is a part of growing medium, it enables growing medium to **retain water** for longer time.

Which of the above statements are correct?

- (a) 1, 2 only (b) 2 only (c) 1, 3 only **(d) 1, 2 and 3**

Dry Biomass → Pyrolysis → **Biochar** Wet biomass → Hydrothermal Carbonization → **Hydrochar**

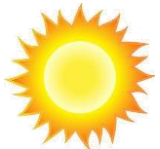


Biomass co-firing



- Adding biomass as fuel in coal fired thermal power plants.
- 5-10% of coal can be replaced by biomass.

Smog



Photochemical smog
Los Angeles smog
Oxidising smog

Reason:

Primary pollutants react in sunlight to form Secondary pollutants



Sulfurous smog
London smog
Reducing smog

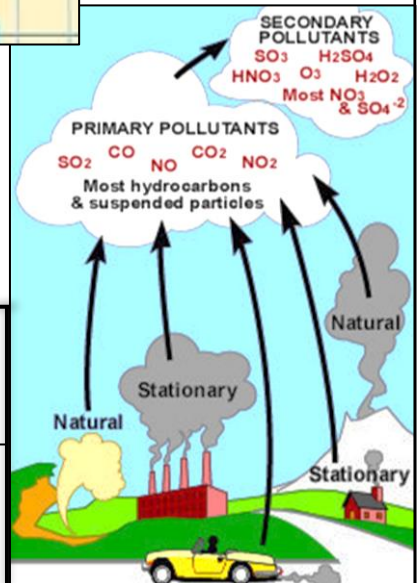
Reason:

Primary pollutants

Prelims 2013:

Photochemical smog is a resultant of the reaction among

- (a) NO₂, O₃ and peroxyacetyl nitrate in presence of sunlight
- (b) CO, O₂ and peroxyacetyl nitrate in presence of sunlight
- (c) CO, CO₂ and NO₂ at low temperature
- (d) high concentration of NO₂, O₃ and CO in the evening



Green Crackers

- by **CSIR-NEERI**
- have Logo and QR code
- Cost almost same** as traditional crackers
- Less polluting: no/low PM_{2.5}, lithium, arsenic, lead, barium
- Sivakasi in TN is famous for firecrackers (90%)

SWAS, STAR, SAFAL ?

Safe Water Releaser (SWAS)
Safe Thermite Cracker (STAR)
Safe Minimal Aluminium (SAFAL)

I read I forget, I see I remember

See explanation of this PDF on [YouTube](https://www.youtube.com/c/allinclusiveias) www.youtube.com/c/allinclusiveias

<p><u>National Environmental Engineering Research Institute:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Under CSIR (MoS&T) <input type="checkbox"/> Nagpur, 1958 <input type="checkbox"/> PM is ex-officio President of CSIR 	<p><u>Petroleum & Explosives Safety Organisation:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Ministry of C&I (DPIIT) <input type="checkbox"/> HQ: Nagpur <input type="checkbox"/> Regulates crackers, explosives, etc. 	<p><u>Indian Agricultural Research Institute</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Under ICAR, MoA&FW <input type="checkbox"/> 1905: est. in Pusa, Bihar <input type="checkbox"/> 1936: shifted to Delhi
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AUM Photonic System:

- Air Unique-quality Monitoring
- Developed indigenously
- Uses laser to monitor air quality
- Can simultaneously quantify various pollutants in real time

GRAP	NCAP	<p><u>Prelims 2016:</u></p> <p>In cities of our country, which among following atmospheric gases are normally considered in calculating value of <u>Air Quality Index?</u></p> <ol style="list-style-type: none"> 1. Carbon dioxide 2. Carbon monoxide 3. Nitrogen dioxide 4. Sulfur dioxide 5. Methane <p>Select the correct answer:</p> <p>(a) 1, 2 and 3 only (b) 2, 3 and 4 only</p> <p>(c) 1, 4 and 5 only (d) 1, 2, 3, 4 and 5</p>
For Delhi & adjoining areas	For 132 cities (initially 102)	
Responsibility of EPCA	Responsibility of CPCB	
Response based on pollution	Reduce PM 20-30% by 2024 (2017 base)	
Uses AQI (8 pollutants):	Uses NAAQS (12 pollutants):	
<input type="checkbox"/> PM 2.5, PM 10	<input type="checkbox"/> Benzopyrene	
<input type="checkbox"/> NO ₂ , SO ₂	<input type="checkbox"/> Benzene	
<input type="checkbox"/> CO, Ozone	<input type="checkbox"/> Arsenic	
<input type="checkbox"/> Lead, Ammonia	<input type="checkbox"/> Nickel	
<p><u>International Day of Clean Air for Blue Skies</u> 7th Sept. 2020; by UN; to raise awareness, etc.</p>		

EPCA / CAQM	<p><u>Environmental Pollution (Prevention & Control) Authority:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Set up in 1998; under EPA 1986 <input type="checkbox"/> Set up by MoEFCC; on SC order <input type="checkbox"/> For air pollution in NCR
--------------------	---

CAQM in NCR & AR Ordinance 2021:

Sets up “Commission for Air Quality Management in NCR & adjoining areas”

- Replaced **EPCA**
- NCR and areas adjoining NCR in Haryana, UP, Punjab, Rajasthan
- Chair is **ex-bureaucrat**; around 21 members (from ministries, states, industry, farmers, etc)
- Not following Commission's order is punishable with ₹ 1 crore fine; 5 year jail (non-farmers)
- Its orders will prevail over **orders of others** (CPCB, State govt, etc.)
- Cases involving commission will go to **NGT**, not civil courts

Thermal Power Plants

Air: PM, SO_x, NO_x, CO, Lead, Mercury, Arsenic, etc.

<p><u>Prelims 2011:</u></p> <p>Consider the following:</p> <ol style="list-style-type: none"> 1. Carbon dioxide 2. Oxides of Nitrogen 3. Oxides of Sulphur <p>Which of the above are emissions from coal combustion at thermal power plants?</p> <p>(a) 1 only (b) 2 and 3 only</p> <p>(c) 1 and 3 only (d) 1, 2 and 3</p>	<p><u>Prelims 2003:</u></p> <p><u>Assertion:</u> Coal based power stations contribute to acid rain.</p> <p><u>Reason:</u> Oxides of carbon are emitted when coal burns</p> <p>(a) Both are true; R is correct explanation of A</p> <p>(b) Both are true; R is not correct explanation of A</p> <p>(c) A is true but R is false</p> <p>(d) A is false but R is true</p>
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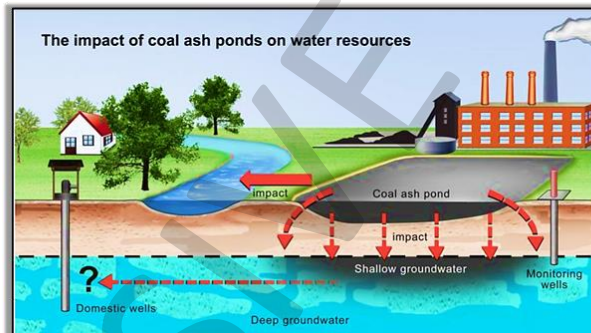
<p><u>Water:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Water consumption norms framed in 2015 <input type="checkbox"/> Water is used for cooling and ash disposal <input type="checkbox"/> Coal power plants consume 70% of all freshwater withdrawn by industries 	<p><u>Prelims 2013:</u></p> <p>Which one among the following industries is the maximum consumer of water in India?</p> <p>(a) Engineering (b) Paper and pulp</p> <p>(c) Textiles (d) Thermal power</p>
--	--

Fly Ash

It is a **by-product** of coal burning.

It has **pollutants** like arsenic, lead, oxides of silica, aluminium, calcium. **Indian** coal has high **ash** content (30-45%).

Only coal with less than 34% ash can be used by power plants? No



Within 300 km of powerplants:

- Sell fly ash at **Rs 1 per tonne**
- Full **transport cost** borne by powerplant
- Convert Clay-brick kilns to **fly-ash brick plants**

Fly ash utilization in India:

Target: 100%

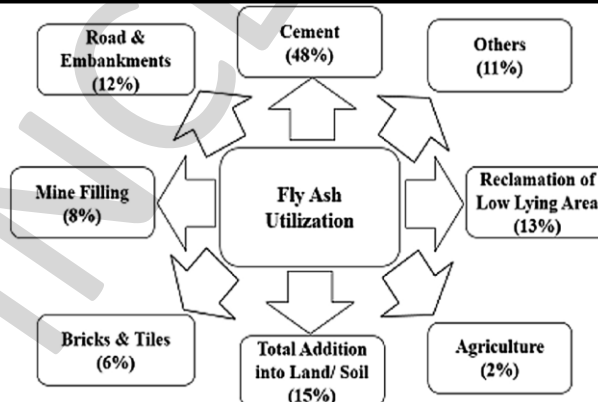
Actual: **78%**

Ash Track mobile app:

- links fly ash consumers & power plants

First state to have a fly-ash utilization policy?

Maharashtra (2016)



Prelims 2013:

Which of the following are characteristics of Indian coal?

1. High ash content
2. Low sulphur content
3. Low ash fusion temperature

Select the correct answer

- (a) 1 and 2 only (b) 2 only
(c) 1 and 3 only (d) 1, 2 and 3

Prelims 2020:

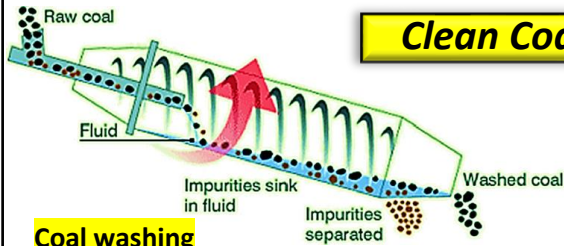
Consider the following statements:

1. Coal ash contains arsenic, lead and mercury.
2. Coal-fired power plants release sulphur dioxide and oxides of nitrogen into the environment.
3. High ash content is observed in Indian coal.

Which of the statements given above is/are correct?

- (a) 1 only (b) 2 and 3 only
(c) 3 only (d) **1, 2 and 3**

Clean Coal Technologies



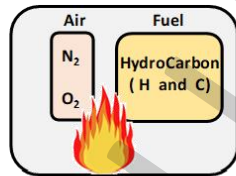
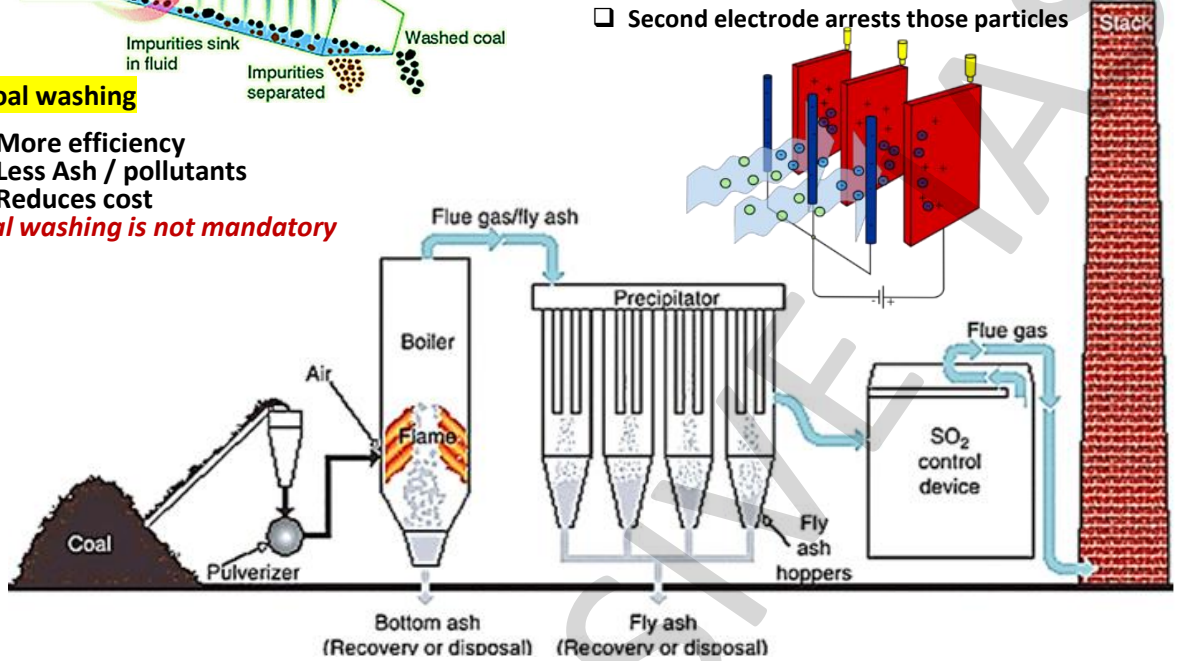
Coal washing

- ✓ More efficiency
- ✓ Less Ash / pollutants
- X Reduces cost

Coal washing is not mandatory

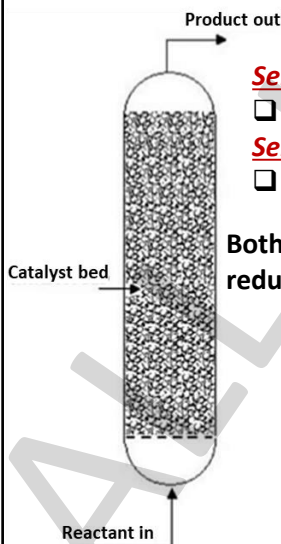
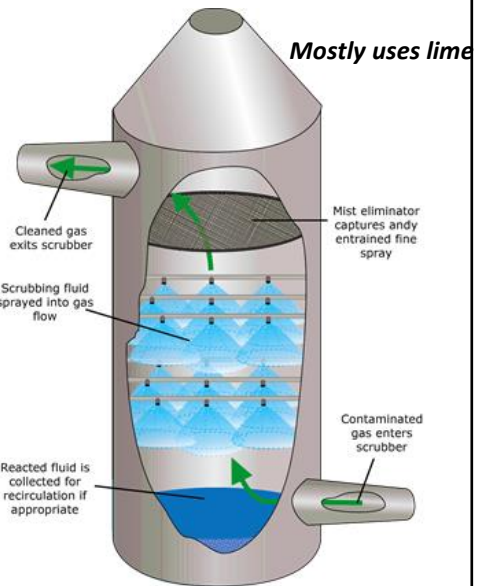
Electrostatic precipitator

- First electrode gives charge to particles
- Second electrode arrests those particles



Oxy-fuel combustion:

- Burning fuel using pure oxygen instead of air.
- Uses less fuel (since nitrogen is not burned).
- Less polluting, as less NO_x is produced.



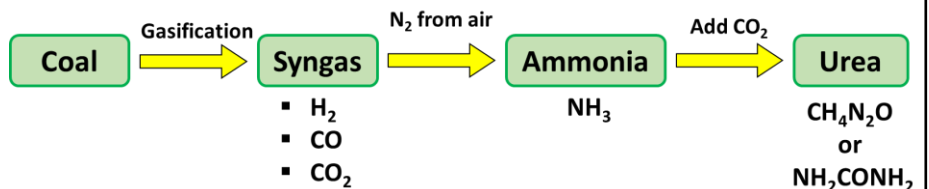
Selective Catalytic Reduction

- Uses catalyst

Selective Non-Catalytic Reduction

- Does not use catalyst

Both use Ammonia to reduce NO_x emissions



Ammonia

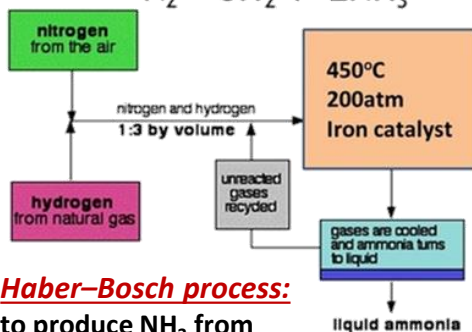
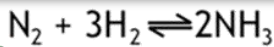
The Indian EXPRESS

IFFCO gas leak: How dangerous is ammonia?

Ammonia is stored for industrial use in liquid form under high pressure or in gaseous form at low temperature, as was the case in the IFFCO unit where the accident took place.

Written by **Avaneesh Mishra**, Edited by Explained Desk | Lucknow |

December 24, 2020 8:24:56 pm



Haber-Bosch process:

to produce NH_3 from nitrogen of air

- lighter than air; colourless; pungent smell
- Alkaline/basic (not acidic)
- Secreted by kidneys to neutralize excess acid
- Soluble in water; found in soil/air/water;
- BIS limit in drinking water: 0.5 mg/l

Issues:

- Creates health problems (even death)
- Eutrophication; Dead zones

Uses: (many)

- To make Ammonium Nitrate (fertilizer)
- To make Formaldehyde

Indo-Gangetic Plain is global hot-spot of atmospheric ammonia due to intense agricultural activities

Prelims 2019:

Consider the following statements:

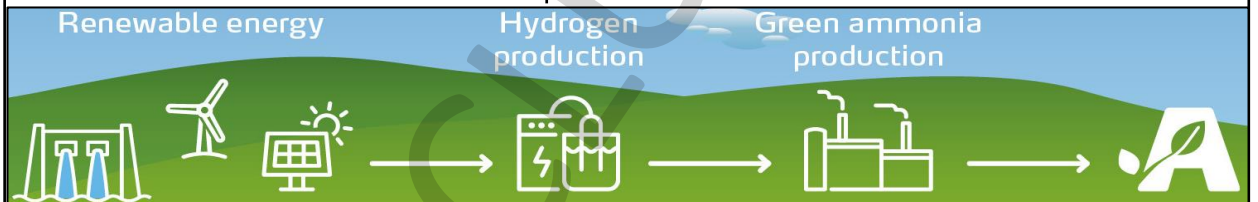
1. Agricultural soils release nitrogen oxides into environment.
2. Cattle release ammonia into environment.
3. Poultry industry release reactive nitrogen compounds into environment.

Which of the statements given above is/are correct?

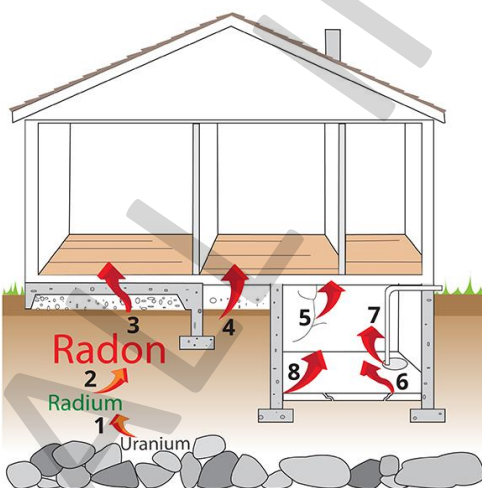
- (a) 1, 3 only (b) 2, 3 only (c) 2 only **(d) 1, 2, 3**

Green Ammonia:

NH_3 made by renewable sources e.g. make Hydrogen from renewable sources of energy



Indoor Air Pollution



Generally more than outdoor air pollution

Sources: cooking; paint; bacteria; mud floor; radon, etc

RAISE:

- Retrofit of AC to improve Indoor Air Quality for Safety and Efficiency
- By Ministry of Power (EESL & USAID)

Radon Gas:

- Colorless / Odourless / Noble / Radioactive
- From decay of Uranium/Thorium/Radium
- Enters buildings through ground cracks, water, etc.
- Denser than air; accumulates in basements.
- Causes cancer

I read I forget, I see I remember

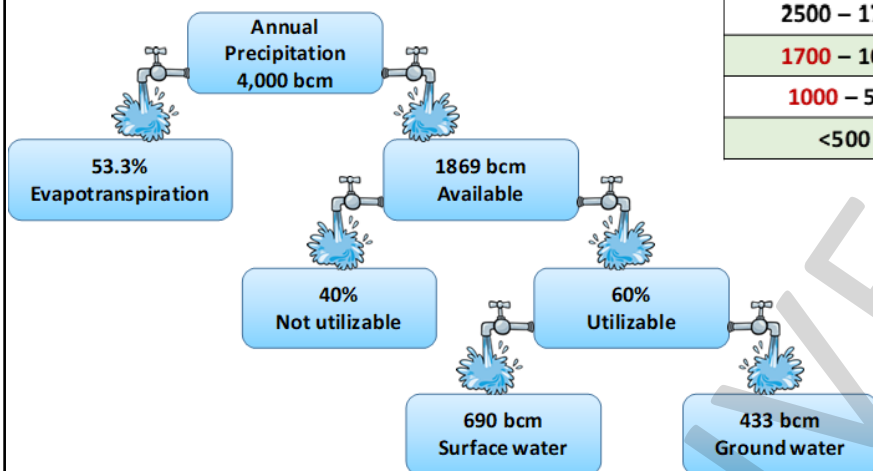
See explanation of this PDF on [YouTube](https://www.youtube.com/c/allinclusiveias) www.youtube.com/c/allinclusiveias

Water

India's annual per capita water availability:

- ❑ 2001 : 1,820
- ❑ 2011 : 1,545 (water stressed)
- ❑ 2025 : 1,341 (expected)

Annual per capita water availability (m ³ /person/year)	Classification
> 2,500	Ok
2500 – 1700	Water vulnerability
1700 – 1000	Water stress
1000 – 500	Water scarcity
<500	Absolute water scarcity



- ❑ India extracts **253 bcm** of groundwater every year (25% of global)
- ❑ **80%** of rural & **50%** of urban water needs are met by groundwater
- ❑ **90%** of groundwater is used for irrigation

CGWA guidelines 2020 for groundwater extraction:

- ❑ No Objection Certificate:
 - Mandatory for bulk water withdrawal
 - In over-exploited areas, only MSMEs will get NOC
 - Penalty of up to ₹ **10 lakh**
- ❑ Exemptions:
 - Agriculture; MSME up to 10 cubic m/day; Individuals; Rural drinking water supply schemes; Armed forces
- ❑ Charges
 - based on amount of extraction.

Central Ground Water Authority:

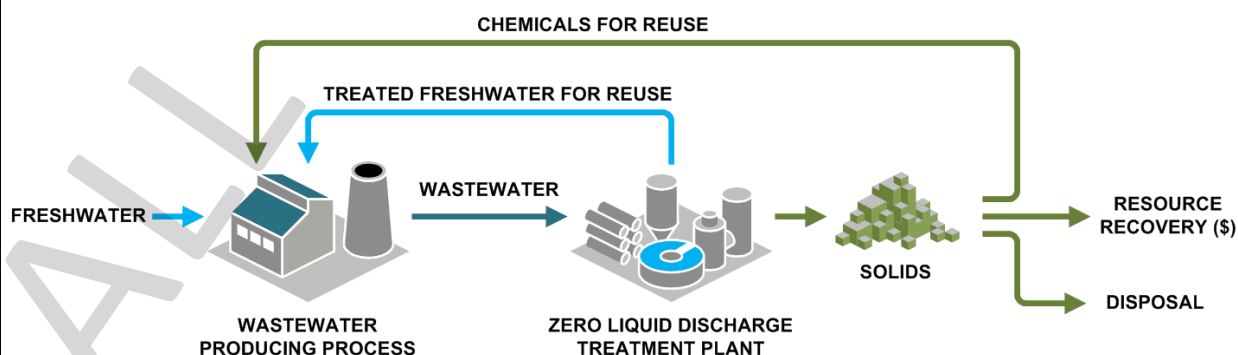
- ❑ Statutory body; EPA 1986
- ❑ Under Ministry of Jal Shakti

Atal Bhujal Yojana:

- ❑ Jal Shakti Ministry
- ❑ Central sector scheme
- ❑ for groundwater management
- ❑ for **seven states**
- ❑ 50% funds from **World Bank**
- ❑ duration **2020-2025**

Bhujal
ज़मीन पानी

Zero Liquid Discharge



I read I forget, I see I remember | See explanation of this PDF on www.youtube.com/c/allinclusiveias


Prelims 2019:

As per **Solid Waste Management Rules, 2016**, which of the following statements is correct?

- (a) Waste generator has to segregate waste into **five categories**.
- (b) The Rules are applicable to notified urban local bodies, notified towns and all industrial township **only**.
- (c) The Rules provide for exact and elaborate **criteria** for the identification of sites for **landfills** and **waste processing** facilities.
- (d) It is mandatory on the part of waste generator that the waste generated in one **district** cannot be moved to another district.

Municipal Solid Waste



		Pyrolysis	Gasification	Combustion
	Air (Oxygen)	No air	Little air	Ample air
	Temperature	350-600 °C	800-1200 °C	1500-2000 °C
	Result	Large molecules break down into smaller molecules	Matter converted into producer gas (syngas)	Ash and harmful gases
		Chemical process, irreversible	Chemical process, irreversible	Chemical process, irreversible

Biomedical waste

Biomedical Waste Management Rules 2016:

- On-site pre-treatment, segregation, safe storage
- **Segregate** into 4 categories: human, animal, soiled, biotech
- **Transport** to common biomedical waste treatment facility
- Regular **training** and immunization of healthcare workers.

E-waste

Global e-waste Monitor report:

- ❑ **UNEP & International Telecommunication Union**
ITU is specialized agency of UN, 1865, Geneva
- ❑ Top e-waste generators: USA > China > India

E-waste Management Rules 2016:

- ❑ applies to all **stakeholders**
- ❑ PRO / EPR authorization by **CPCB**
- ❑ Covers more than 20 products, even **CFLs**
- ❑ Introduced interest-bearing **Deposit Refund Scheme**
- ❑ **Reduction of Hazardous Substances (RoHS)** testing cost borne by Producer if test fails (else govt)

India's first e-waste clinic in? Bhopal, MP

POPs / Forever chemicals

- ❑ Organic pollutants **resistant** to environmental **degradation**
- ❑ They **bio-accumulate** in living organisms
- ❑ They cover **long distance** in environment
- ❑ Restricted by **Stockholm Convention 2001**
Ratified by India in 2006

The original dirty dozen:

DDT; Dioxins; Furans; PCBs; Heptachlor; Hexachlorobenzene; Aldrin; Chlordane; Dieldrin; Endrin; Mirex; Toxaphene
(Some are Organochlorine pesticides)

Now 35: Dicofol; PFAO (added in 2018)

Cabinet ratified 7 PoPs:

- ❑ **Already in Convention; MEA/MoEFCC in future**
- 1) **Chlordecone**
- 2) **Hexabromobiphenyl**
- 3) **Hexabromodiphenyl ether and Heptabromodiphenylether (octa-BDE)**
- 4) **Tetrabromodiphenyl ether and Pentabromodiphenyl ether (penta-BDE)**
- 5) **Pentachlorobenzene**
- 6) **Hexabromocyclododecane**
- 7) **Hexachlorobutadiene**

I read I forget, I see I remember | See explanation of this PDF on  www.youtube.com/c/allinclusiveias

Plastic



Single-use plastic:

- Plastic intended to be used **only once**
- Can be **recyclable** or **non-recyclable**
- Maharashtra** was the first state to ban single-use plastic.

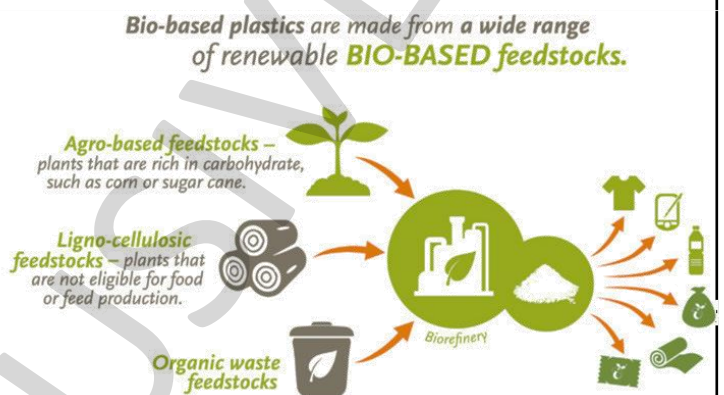


Plastic Waste Management Rules, 2016 (amended in 2018):

- Minimum **50 micron** thickness for plastic carry bags
- **EPR** applicable
- Phase out **multi-layer plastic**
- In villages, responsibility of **Gram Sabhas**

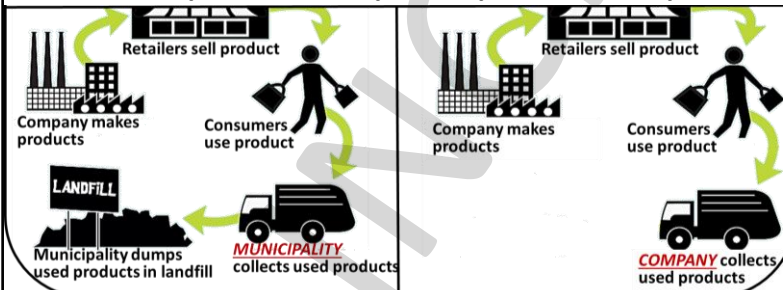
Bio-plastics

- Plastic **made from biomass** like vegetable oil, corn starch, wood chips, food waste, etc. [Conventional plastic is made from petroleum]
- Some bioplastics are biodegradable, some are **not biodegradable**.
- **Drop-in bioplastic:** Non-biodegradable bio-plastic
- Producing Bioplastics is energy intensive and **expensive**.



Extended Producers Responsibility

Producer is responsible for disposal of post-consumer product



Plastic credit model, Producer Responsibility Organizations, Fee-based mechanism are related to Draft EPR framework under PWMR 2016

Benefits of EPR:

- Can **lower cost** of products (components come back to manufacturer)
- Help in **efficient** recovery of metals (rare-earths!)
- May reduce use of **toxic** components
- Can lower ecological impact (works on **circular economy**)

Circular economy aims at continual use of resources & eliminating waste



Prelims 2019:

In India, 'Extended Producer Responsibility' was introduced as an important feature in which of the following?

- (a) Bio-medical Waste (Management & Handling) Rules, 1998
- (b) Recycled Plastic (Manufacturing & Usage) Rules, 1999
- (c) E-Waste (Management & Handling) Rules, 2011
- (d) Food Safety and Standard Regulations, 2011

I read I forget, I see I remember

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Marine Plastic Pollution

Marine Plastic Pollution:

- ❑ It is **80%** of all marine debris.
- ❑ **Microplastic**: smaller than **5mm**
- ❑ **Nanoplastic**: smaller than **100nm**
- ❑ **Source**: disintegration of plastic, intentional addition to cosmetics, toothpaste, clothing, etc.
- ❑ In 2018, **India** said we are banning microplastics, but the ban will be implemented after two years. Till now it has not been implemented.

1972 **London Convention**, 1996 Protocol to London Convention, and MARPOL are related to **Marine Pollution**

MARPOL: International Convention for Prevention of Pollution from **Ships**

- ✓ Adopted at **IMO** in **1973** (in force 1983)
- ✓ **Ratified** by all major countries like US, Russia, **India**, China, EU, etc.

Un-plastic Collective (UPC):

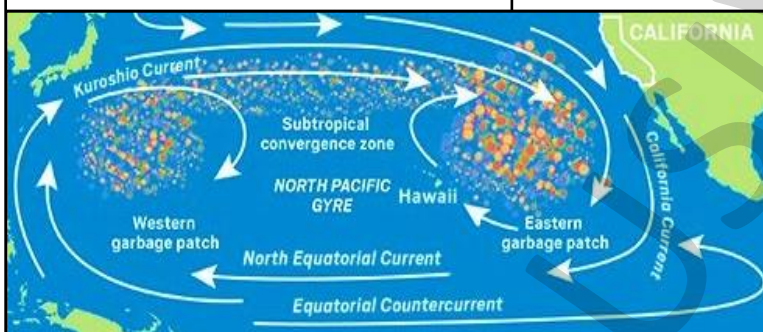
- ✓ Initiative of CII, UNEP, WWF-India.
- ✓ Aim is to eliminate **unnecessary** use of plastic and reuse plastic through **circular** economy.

Close the Plastic Tap programme:

- ✓ By **IUCN** to tackle plastic pollution at its **source**
- ✓ **India** is **not** its part.

"Breaking the Plastic Wave" report:

- ❑ By Pew Trust and System IQ
- ❑ *Just remember it's not UNEP, etc.*



Global Partnership on Marine Litter:

- ✓ It was launched in 2012 at **Rio+20**
- ✓ **UNEP** provides secretariat services

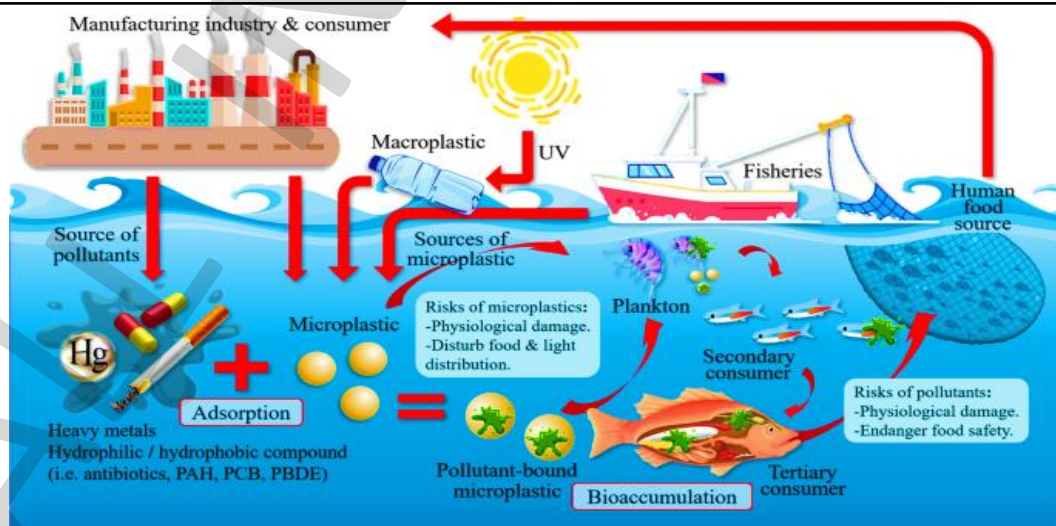
Great Pacific Garbage Patch:

- ✓ aka Pacific Trash vortex
- ✓ collection of marine debris
- ✓ almost entirely of **microplastics**.
- ✓ It is **not** visible from space.

Prelims 2019:

Why is there a great concern about **microbeads** that are released into environment?

- (a) They are considered harmful to marine ecosystem
- (b) They are considered to cause skin cancer in children
- (c) They are small enough to be absorbed by crop plants in irrigated fields
- (d) They are often found to be used as food adulterants



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Community Forest Rights

FRA 2006: recognizes the rights
MoTA: issues guidelines
Gram Sabha: initiates process
Individual rights e.g. Self-cultivation, Habitation
Community rights e.g. Grazing, Fishing, Habitat rights
Note: hunting, trapping of animals not allowed

Prelims 2018:

Consider the following statements:

- The definition of "Critical Wildlife Habitat" is incorporated in the Forest Rights Act, 2006.
- For the first time in India, Baigas have been given Habitat Rights. **MoTA**
- Union Ministry of Environment, Forest and Climate Change officially decides and declares Habitat Rights for Primitive and Vulnerable Tribal Groups in any part of India

Which of the statements given above is/are correct?

- (a) 1 and 2 only (b) 2 and 3 only
 (c) 3 only (d) 1, 2 and 3

Prelims 2013:

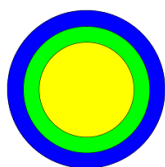
Under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 who shall be the authority to initiate the process for determining the nature and extent of individual or community forest rights or both?

- (a) State Forest Department
 (b) District Collector/ Deputy Commissioner
 (c) Tahsildar/ BDO/ Mandal Revenue Officer
(d) Gram Sabha

Biosphere Reserve

3 main zones of BR:

Core: protected area; no external human pressure
Buffer: tourism, fishing, grazing, etc
Transition: zone of cooperation; usually not delimited

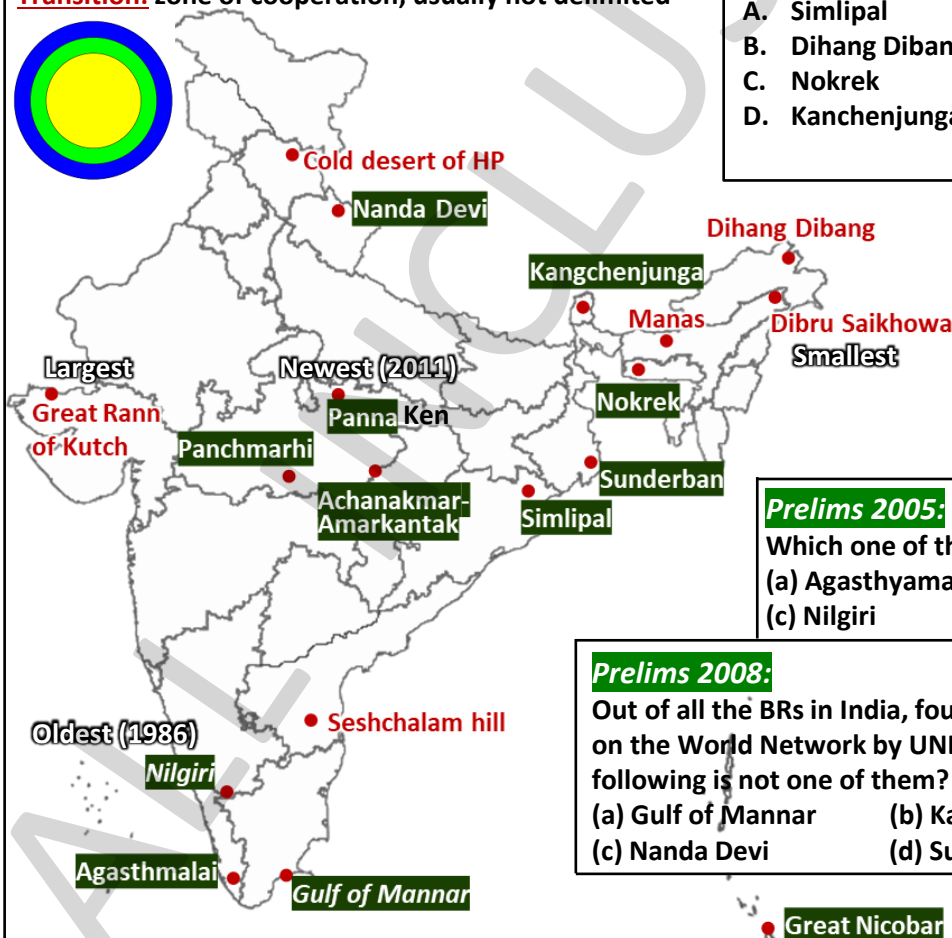


Prelims 2004:

- | List-I | List-II |
|------------------|-----------------|
| A. Simlipal | 1. Sikkim |
| B. Dihang Dibang | 2. Uttaranchal |
| C. Nokrek | 3. Arunachal P. |
| D. Kanchenjunga | 4. Odisha |
| | 5. Meghalaya |

Man and Biosphere Programme:

- 1971; UNESCO
- 714 Biosphere Res.
- 129 countries
- 12 from India



Prelims 2005:

- Which one of the following is not a BR?
- (a) Agasthyamali (b) Nallamalai
 (c) Nilgiri (d) Panchmarhi

Prelims 2008:

- Out of all the BRs in India, four have been recognized on the World Network by UNESCO. Which one of the following is not one of them?
- (a) Gulf of Mannar (b) Kanchenjunga
 (c) Nanda Devi (d) Sunderbans

I read I forget, I see I remember | See explanation of this PDF on [YouTube](https://www.youtube.com/c/allinclusiveias) www.youtube.com/c/allinclusiveias

Prelims 2010:

Consider the following statements:

1. The boundaries of a **National Park** are defined by legislation.
 2. A **Biosphere Reserve** is declared to conserve a few specific species of flora and fauna.
 3. In **Wildlife Sanctuary**, limited biotic interference is permitted
- Which of the statements given above is/are correct?

- (a) 1 only (b) 2 and 3 only **(c) 1 and 3 only** (d) 1, 2 and 3

Prelims 2011:

Which one of the following is **not** a site for **in-situ** method of conservation of flora?

- (a) Biosphere Reserve
(b) Botanical Garden
 (c) National Park
 (d) Wildlife Sanctuary

Prelims 2012:

In which one among the following categories of protected areas in India are local people **not allowed** to collect and use the **biomass**?

- (a) Biosphere Reserves
(b) National Parks
 (c) Wetlands declared under Ramsar Convention
 (d) Wildlife Sanctuaries

Prelims 2014:

The most important strategy for the conservation of **biodiversity** together with traditional **human** life is the establishment of

- (a) Biosphere reserves** (b) Botanical gardens
 (c) National Parks (d) Wildlife Sanctuaries

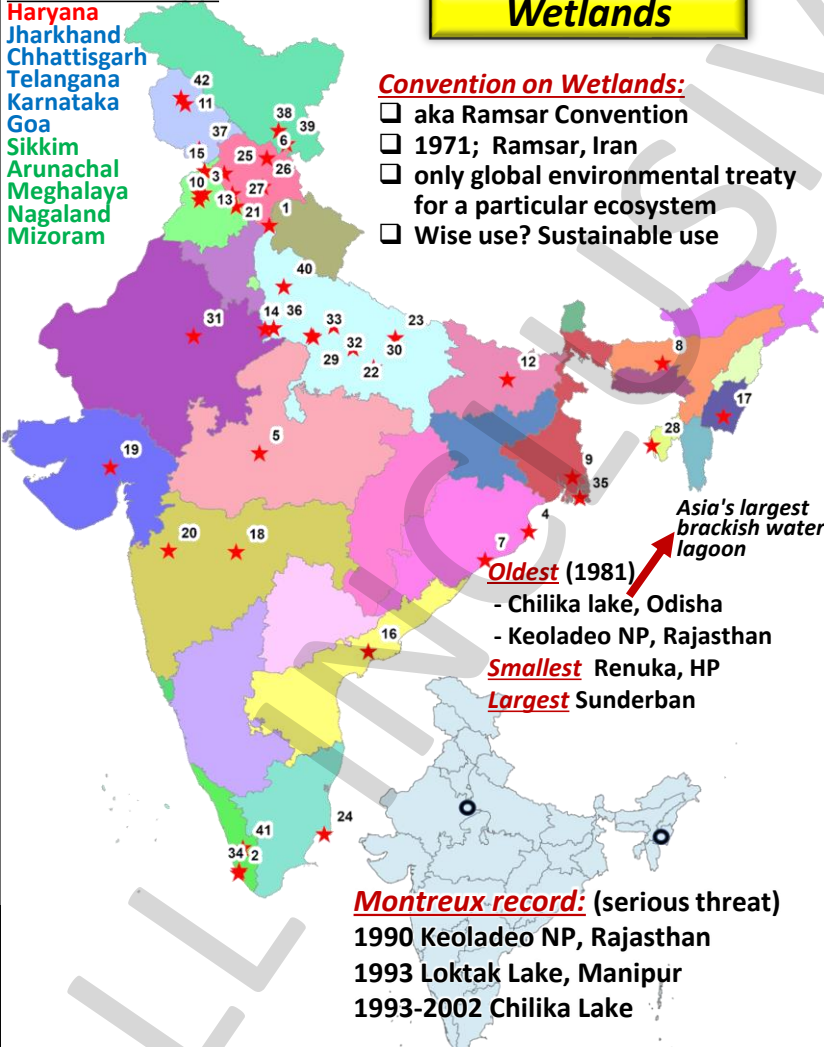
No Ramsar sites in:

- Haryana
 Jharkhand
 Chhattisgarh
 Telangana
 Karnataka
 Goa
 Sikkim
 Arunachal
 Meghalaya
 Nagaland
 Mizoram

Wetlands

Convention on Wetlands:

- aka Ramsar Convention
- 1971; Ramsar, Iran
- only global environmental treaty for a particular ecosystem
- Wise use? Sustainable use



No.	Ramsar site	State
16	Kolleru Lake	Andhra P.
8	Deepor Beel	Assam
12	Kabartal Wetland	Bihar
19	Nalsarovar Bird Sanctuary	Gujarat
6	Chandertal Wetland	HP
25	Pong Dam Lake	HP
26	Renuka Wetland	HP
11	Hokera Wetland	J&K
36	Surinsar-Mansar Lakes	J&K
39	Tsomoriri Lake	J&K
42	Wular Lake	J&K
2	Asthamudi Wetland	Kerala
34	Sasthamkotta Lake	Kerala
41	Vembanad Kol Wetland	Kerala
38	Tso Kar Wetland Complex	Ladakh
18	Lonar Lake	Maharashtra
20	Nandur Madhameshwar	Maharashtra
17	Loktak Lake	Manipur
5	Bhoj Wetlands	MP
4	Bhitarkanika Mangroves	Odisha
7	Chilika Lake	Odisha
3	Beas Conservation Reserve	Punjab
10	Harike Lake	Punjab
13	Kanjli Lake	Punjab
15	Keshopur-Miani	Punjab
21	Nangal Wildlife Sanctuary	Punjab
27	Ropar Lake	Punjab
14	Keoladeo Ghana NP	Rajasthan
31	Sambhar Lake	Rajasthan
24	Point Calimere	Tamil Nadu
28	Rudrasagar Lake	Tripura
22	Nawabganj Bird Sanctuary	UP
23	Parvati Agra Bird Sanctuary	UP
29	Saman Bird Sanctuary	UP
30	Samaspur Bird Sanctuary	UP
32	Sandi Bird Sanctuary	UP
33	Sarsai Nawar Jheel	UP
37	Sur Sarovar	UP
40	Upper Ganga River	UP
1	Asan Conservation Reserve	Uttarakhand
9	East Kolkata Wetlands	WB
35	Sunderbans Wetland	WB

Montreux record: (serious threat)

- 1990 Keoladeo NP, Rajasthan
- 1993 Loktak Lake, Manipur
- 1993-2002 Chilika Lake

Prelims 2018:

Which one of the following is an **artificial lake**?

- (a) Kodaikanal (TN)** (b) Kolleru (Andhra P.)
 (c) Nainital (Uttarakhand) (d) Renuka (HP)

Sukhna Lake:

- Chandigarh; Manmade lake (1958);
- Notified Wetland? Yes Ramsar site? No

I read I forget, I see I remember

See explanation of this PDF on **YouTube** www.youtube.com/c/allinclusiveias

Prelims 2010:

India is a party to the Ramsar Convention and has declared many areas as Ramsar sites. Which of the following statements best describes as to how we should maintain these sites in the context of this convention?

- (a) Keep all the sites **completely inaccessible** to man so that they will not be exploited.
- (b) Conserve all sites through ecosystem approach and permit tourism and recreation **only**.
- (c) Conserve all sites through ecosystem approach for a period without any exploitation, with specific criteria and specific period for each site, and then allow sustainable **use** of them **by future generations**.
- (d) Conserve all the sites through ecosystem approach and allow their **simultaneous sustainable use**.**

Prelims 2019:

Consider the following statements:

1. Under Ramsar convention, it is **mandatory** on the part of the Government on India to **protect** and conserve **all the wetlands** in the territory of India
2. The Wetlands (Conservation and Management) Rules, 2010 were framed by the Government of India based on the **recommendations of Ramsar convention**.
3. The Wetlands (Conservation and Management) Rules, 2010 also encompass the **drainage area or catchment regions** of the wetlands as determined by the authority.

Which of the above statements is/are correct?

- (a) 1 and 2 only**
- (b) 2 and 3 only
- (c) 3 only**
- (d) 1, 2 and 3

Peatland: a wetland with partially decayed plant matter due to water-logging and subsequent anoxia.



Marsh: wetland with herbaceous vegetation



Swamp: wetland with trees



Peatlands

- ❖ covers 3% of global land surface
- ❖ largest natural terrestrial carbon store
- ❖ drained peatlands release huge amounts of GHGs

- ❖ **2016 Global Peatlands Initiative**; at CoP-22 Marrakech
- ❖ **2018 Brazzaville Declaration on Peatlands**; by Congo and Indonesia; To prevent degradation of Congo's peatlands (world's largest tropical peatlands).
- ❖ **2019 Global resolution on peatlands** at 4th UNEP Assembly

Lunar Lake

World's largest crater in **basaltic** rock. Formed by **meteorite** impact 50,000 years ago. Recently turned **pink** due to **Haloarchaea**. It is a National **Geological Heritage** Monument Site (declared by Geological Survey of India, total 34)



Loktak lake

Manipur

- Largest freshwater lake in NE India.
- Phumdis (small islands) float on it.
- Has Keibul Lamjao NP (the only floating NP in the world)



Minerals, water, shelter
 Fungi ↔ Algae
 Food from photosynthesis

Lichens



Prelims 2014:

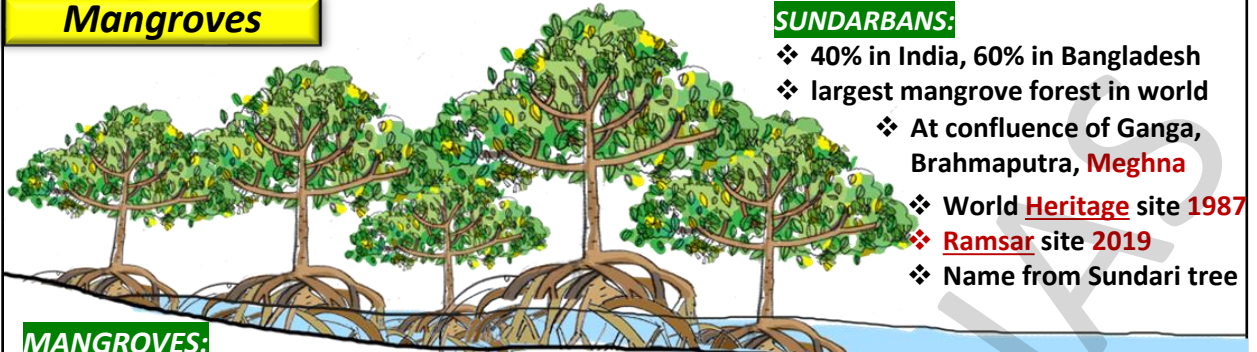
Lichens, which are capable of initiating ecological succession even on a bare rock, are actually a symbiotic association of

- (a) algae and bacteria
- (b) algae and fungi**
- (c) bacteria and fungi
- (d) fungi and mosses

I read I forget, I see I remember

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Mangroves



SUNDARBANS:

- ❖ 40% in India, 60% in Bangladesh
- ❖ largest mangrove forest in world
- ❖ At confluence of Ganga, Brahmaputra, **Meghna**
- ❖ World **Heritage** site **1987**
- ❖ **Ramsar** site **2019**
- ❖ Name from Sundari tree

MANGROVES:

- ✓ **Halophyte** (salt-tolerant)
- ✓ grows in **coastal** saline or brackish water (intertidal zones)
- ✓ found in **all** coastal states of India
- ✓ **42%** in WB; 23% Gujarat; 12% A&N
- ✓ 0.15% of India; **increased** between 2017-19 (FSI)

Prelims 2015:

Which one of the following regions of India has a combination of **mangrove** forest, **evergreen** forest and **deciduous** forest?

- (a) North Coastal Andhra Pradesh
- (b) South-West Bengal
- (c) Southern Saurashtra
- (d) Andaman and Nicobar Islands**

Prelims 1996:

Assertion (A): Mangroves are very specialised forest eco-systems of tropical and sub-tropical regions bordering certain sea coasts.

Reason (R): They stabilise shoreline and act as bulwark against encroachments by the sea.

- (b)** Both A and R are true and R is **not correct explanation** of A

Prelims 2011:

The 2004 Tsunami made people realize that mangroves can serve as a reliable safety hedge against coastal calamities. **How do mangroves function as a safety hedge?**

- (a) The mangrove swamps separate the human settlements from the sea by a wide zone in which people neither live nor venture out
- (b) The mangroves provide both food and medicines which people are in need of after any natural disaster
- (c) The mangrove trees are tall with dense canopies and serve as an excellent shelter during a cyclone or tsunami
- (d) The mangrove trees do not get uprooted by storms and tides because of their extensive roots.**

Adaptations in mangroves:

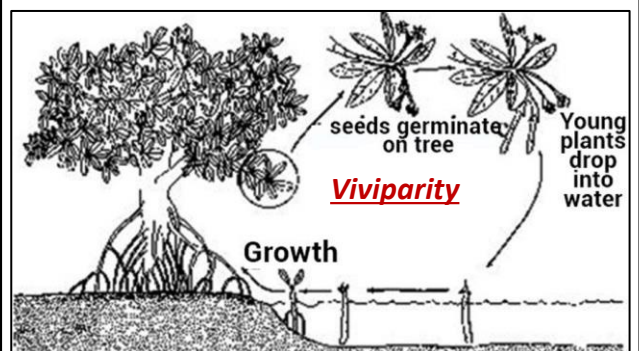
Pneumatophores:

- ❖ Breathing roots, to take in oxygen



Leaves:

- ❖ Thick and leathery to conserve water
- ❖ Glands to secrete salt





First state to declare a state Mangrove tree?
Maharashtra
White Chippi / Sonneratia alba / Mangrove apple

Prelims 2016:

Recently, for the first time in our country, which of the following States has declared a particular butterfly as 'State Butterfly'?

(a) Arunachal Pradesh (b) Himachal Pradesh
 (c) Karnataka (d) Maharashtra

Blue Flag

Blue Flag Programme:

- Launched in **1985** in **France**;
- By FEE (NGO, 1981, Denmark)
- Most blue flag beaches are in **Spain**.
- Criteria: safety, facilities, cleanliness, etc.

FEE: Foundation for Environmental Education

BEAMS:

- Beach Env. & Aesthetics Mgmt Services
- By MoEFCC; for clean beaches

Mass Extinction

Prelims 2018:

The term "6th mass extinction/6th extinction" is often mentioned in the news in the context of

(a) Widespread **monoculture** practices in agriculture & large-scale commercial farming with indiscriminate use of **chemicals** in many parts of world that may result in loss of good native ecosystems.

(b) Fears of a possible collision of a **meteorite** with the Earth in the near future in the manner it happened 65 million years ago that caused the mass extinction of many species including those of dinosaurs

(c) Large scale cultivation of **genetically modified crops** in many parts of the world and promoting their cultivation in other parts of the world which may cause the disappearance of good native crop plants and the loss of food biodiversity.

(d) Mankind's **over-exploitation**/misuse of natural resources, fragmentation/loss of natural habitats, destruction of ecosystems, pollution and global climate change.

IUCN

- 1948; HQ: Gland, Switzerland
- It has observer status at UN
- It is not a specialized agency of UN.

Prelims 2015:

With reference to **IUCN** and Convention on International Trade in Endangered Species of Wild Fauna and Flora (**CITES**), which of the following statements is/are correct?

1. **IUCN is an organ of the United Nations** and CITES is an international agreement between governments.
2. IUCN runs thousands of field projects around the world to better manage natural environments.
3. CITES is legally binding on the States that have joined it, but this Convention does not take the place of national laws.

Select the correct answer

- (a) 1 only (b) 2 and 3 only
 (c) 1 and 3 only (d) 1, 2 and 3

Prelims 2011:

The "Red Data Book" published by IUCN contains list of?


1. **Endemic** plant and animal species present in biodiversity hotspots.
2. **Threatened** plant and animal species.
3. **Protected sites** for conservation of nature and natural resources in various countries.

Select the correct answer


- (a) 1,3 (b) 2 only (c) 2, 3 (d) 3 only

Extinct


Dodo; 1681; Mauritius; Flightless



Tasmanian Tiger; Tasmanian Wolf; 1936; Australia



Golden Toad; 1989; Costa Rica



Extinct in wild

Golden Skiffia



Wyoming Toad



Critically Endangered

Gharial



Asiatic Cheetah (Iran)



Blue Throat Macaw (South America)



Great Indian Bustard



Jerdon's courser Sri Lankamalleswar WS (A.P.)



Hump-backed Mahseer Tor remadevii; tiger of water Found only in Kaveri basin Has orange fins



Elongated Tortoise (Sal Forest Tortoise)



Himalayan Quail; Western Himalayas



Endangered

Tiger



Ganges Dolphin



Red Panda Sikkim st. an.



Pangolin (scaly ant-eater)



Greater Adjutant



Lion Gujarat st. an.



Elephant Jh. / Krl / Krnt st. an.



Nilgiri Tahr TN st. an.



Dhole wild dog



Lion-tailed macaque Western ghats



Vulnerable

Fishing cat WB st. an.



African Cheetah



Indian Star Tortoise



Polar Bear



Black Bear



Dugong / Sea Cow A&N st. an. Only veg marine mammal



Snow Leopard HP st. an.



Narcondam Hornbill



Indian Rhino Assam st. an. 70% in Kaziranga




Gaur (Indian Bison) Largest bovine Bihar, Goa st. an.




Near Threatened

Least Concern


Nilgai Delhi st. an.




Willow Warbler




Hilsa (Food fish) Bangladesh 70%



Jacobian / Pied Cuckoo




Amur Falcon




Critically Endangered in India

Caracal



Brown Bear



Tiger

Census 2018

- M-STripES → mobile app
- CaTRAT → AI software
- Madhya Pradesh most tigers most increase
- TR with most tigers: Corbett
- TR with highest density: Corbett
- TR without tiger: Buxa, WB, Dampa, Mizoram, Palamu, Jharkhand

Tiger Census

By **NTCA** and **WII**
Every 4 years since 2006
1411 → 1706 → 2226 → **2967**

Methods to estimate tiger numbers:



Tiger reserves:

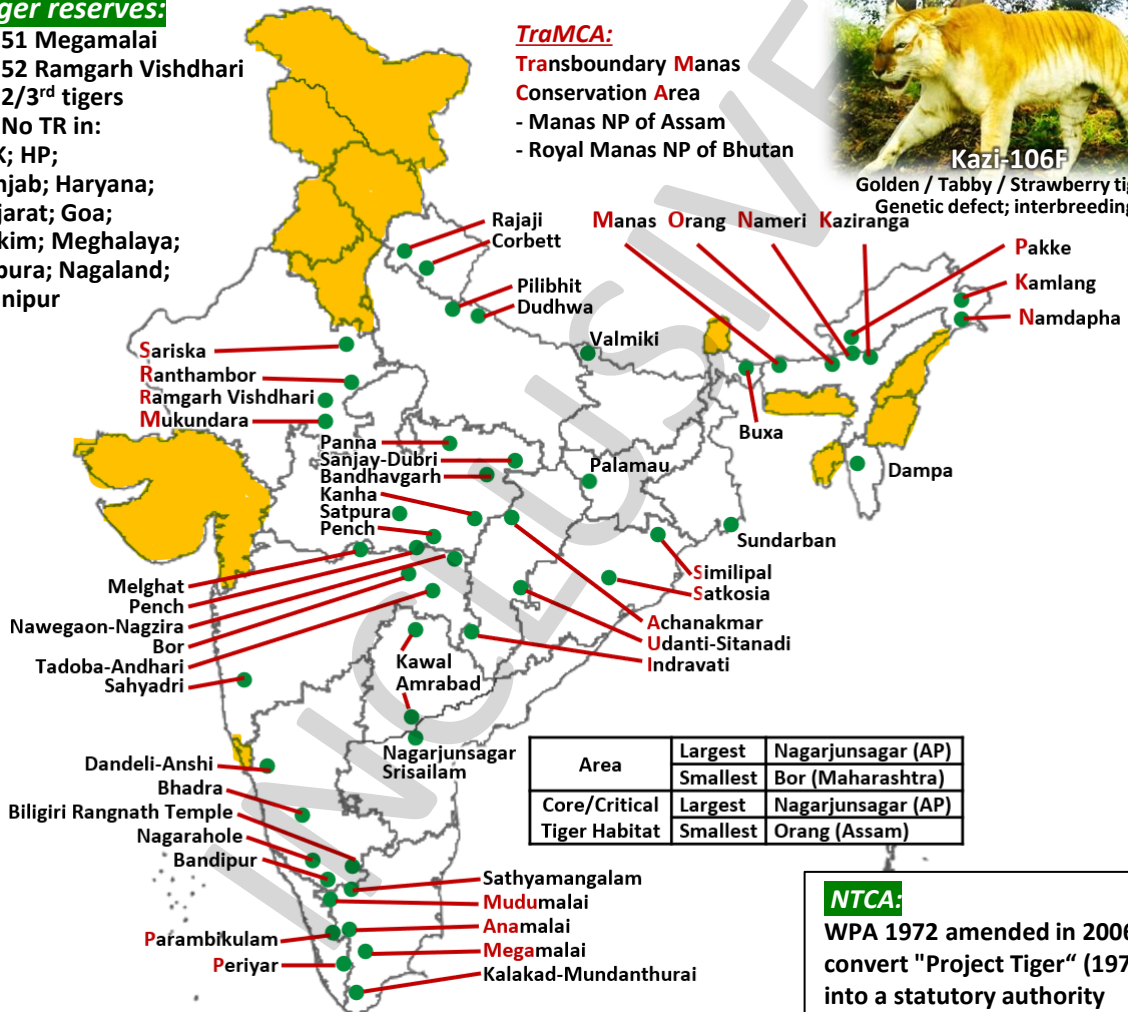
- 51 Megamalai
- 52 Ramgarh Vishdhari
- 2/3rd tigers
- No TR in: J&K; HP; Punjab; Haryana; Gujarat; Goa; Sikkim; Meghalaya; Tripura; Nagaland; Manipur

TraMCA:

Transboundary Manas Conservation Area
- Manas NP of Assam
- Royal Manas NP of Bhutan



Kazi-106F
Golden / Tabby / Strawberry tiger
Genetic defect; interbreeding



NTCA:

WPA 1972 amended in 2006 to convert "Project Tiger" (1973) into a statutory authority

2008 **GTI**

2010 **GTRP to TX2** St. Petersburg Declaration

2013 **Use CATS** **Snow leopard**

2015 **GTI (20)**

GTF (13) **GSLEP (12)**

- GTI **G**lobal **T**iger **I**nitiative
 - GTRP **G**lobal **T**iger **R**ecovery **P**rogram
 - TX2 Tiger times two (3200 → 7000 by 2022)
 - CATS **C**onservation **A**ssured **T**iger **S**tandards
 - GTF **G**lobal **T**iger **F**orum at **D**elhi (est. 1993)
 - GSLEP **G**lobal **S**now **L**eopard & **E**cosystem **P**rotection Program at **B**ishkek, Kyrgyzstan
- Secure 20 by 2020: secure at least 20 snow leopard landscapes by 2020

I read I forget, I see I remember

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Prelims 2012:

Consider the following protected areas:

- 1. Bandipur 2. Bhitarkanika
- 3. Manas 4. Sunderbans

Which of the above are declared Tiger Reserves?

- (a) 1 and 2 only (b) 1, 3 and 4 only
- (c) 2, 3 and 4 only (d) 1, 2, 3 and 4

Prelims 2017:

Recently there was a proposal to translocate some of the lions from their natural habitat in Gujarat to which one of the following sites?

- (a) Corbett National Park
- (b) Kuno Palpur Wildlife Sanctuary
- (c) Mudumalai Wildlife Sanctuary
- (d) Sariska National Park

Leopard

13,000

Most in MP

1st state to launch project leopard? Rajasthan in 2017



Snow Leopard

The only big cat that does not roar



SECURE Himalayas:

- 2017 - 2023; UNDP / MoEFCC. Funded by GEF
- Focus on livelihoods, ecosystem, snow leopard
- First conservation centre? Will be in **Uttarakhand**

Asiatic Lion

674

Only in Gir NP? No
Only in Gujarat? Yes
Smaller than African



Cheetah



Fastest land animal

1947: last killed in Chhattisgarh
1952: declared extinct in India

Reintroduction:

NTCA has permitted
South Africa → Kuno NP

Great Indian Bustard



- Once frontrunner to be **National bird**
- Only **150** remains; Only in India? No
- Rajasthan**: State Bird; Project **Godawan**
- Mascot of CMS CoP13
- Reasons for decline:**
 - Agri **pesticides** (feeds on food grains)
 - No **grasslands** (attacked by dogs)
 - **Power** lines (poor vision)
- Heavy, but flies

Vultures

Nature's Clean-Up Crew

Vulture Action Plan:
by MoEFCC 2020-25

- CR – **Red, White, Billed, Indian**
- EN – Egyptian
- VU – Andean
- NT – **Himalayan**
- LC – Eurasian



Prelims 2012:

Vultures which used to be very common in Indian countryside some years ago are rarely seen nowadays. This is attributed to

- (a) destruction of their nesting sites by invasive species
- (b) drug used by cattle owners for treating diseased cattle **Diclofenac**
- (c) scarcity of food available to them
- (d) a widespread, persistent, fatal disease among them

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Dolphin

South Asian River Dolphin

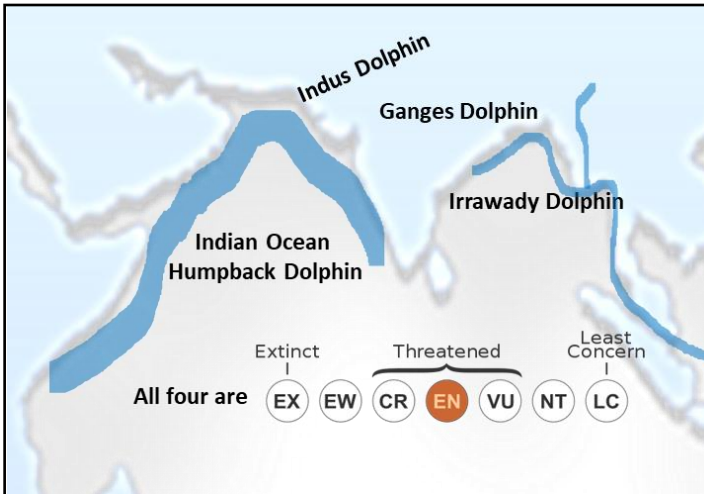
Practically blind; uses echolocation

Bhulan

Indus Dolphin; Indus and Beas
National mammal of Pakistan

Susu

Ganges Dolphin; Ganga, Brahmaputra
National aquatic animal of India



Prelims 2014:

Other than poaching, what are the possible reasons for the decline in the population of Ganges River Dolphins?

1. Construction of dams and barrages on rivers
2. Increase in the population of crocodiles in rivers
3. Getting trapped in fishing nets accidentally
4. Use of synthetic fertilizers and other agricultural chemicals in crop-fields in the vicinity of rivers

Select the correct answer using the code given below

- (a) 1,2 only (b) 2,3 only **(c) 1,3,4 only** (d) 1,2,3,4

Vikramshila Gangetic Dolphin Sanctuary:

- Since 1991; in Bihar
- 1st Dolphin observatory

Prelims 2015:

Which one of the following is the national aquatic animal of India?

- (a) Saltwater crocodile
- (b) Olive ridley turtle
- (c) Gangetic dolphin declared in 2010**
- (d) Gharial

Turtles

TURTLE



LIVES IN WATER

TORTOISE



LIVES ON LAND

Olive Ridley Sea Turtles: **Vulnerable**

- 2nd smallest and most abundant of all sea turtles.
- Kemp's Ridley turtle is the smallest sea turtle
- Gahirmatha marine sanctuary in Odisha is world's largest nesting beach for Olive Ridley turtle.

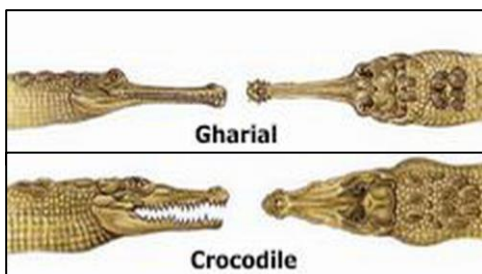
Operation Save Kurma?

- Against trafficking in turtles
- By WCCB (2006; WPA 1972; MoEFCC)

Locusts



- 90 days lifespan
- Short horned grasshoppers
- Travel in day; rest in night
- Feeds on variety of crops
- Lay eggs in damp soil in bare ground
- Biphasic: two different forms
- Pesticides are used to control locusts.
- Locust Warning Organisation:
 - Est. in 1939; MoA&FW
 - Responsible to control locusts.



Crocodiles

Crocodiles in India:

- Saltwater crocodile - eastern coast
- Muger crocodile - in lakes & rivers
- Gharial - river areas

I read I forget, I see I remember

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Regulating trade of Exotic species:

- ❑ **Exotic:** of a distant foreign country [another name for **invasive alien species**]
- ❑ **Exotic live species:** animal or plant moved from original range to new, mostly by people.
- ❑ All exotic live species shall be **declared** by owner to Chief Wildlife Warden of the state/UT.
- ❑ All process to be done through **Parivesh portal** (MoEFCC portal for environment clearances)
- ❑ Which ones? Those in CITES but **not** in WPA 1972.

Miscellaneous

- ❑ **'Tettllobus trishula'**/'Shivas pygmy trishula'? New species of grasshopper in Eravikulam NP Kerala
- ❑ **Dehing Patkai:** Now a NP; Amazon of East; Dehing river, Patkai hill; Oldest refinery of Asia in Digboi is located near the sanctuary.
- ❑ Money Laundering and the **Illegal Wildlife Trade** Report released by **FATF**
- ❑ **Nandankanan Zoological Park:** Bhubaneswar; first zoo with a white tiger safari; first zoo in the World to breed White tiger and Melanistic tiger; the only conservation breeding centre of Indian Pangolins in the world.
- ❑ **Management Effectiveness Evaluation:** report released by MoEFCC; evaluates how well a NP/WS is being managed. Highest score by Tirthan WS and Great Himalayan NP of HP. Turtle WLS, UP and Kharparwas WLS, Haryana ranked at the bottom.
- ❑ **Protected Special Agriculture Zone:** created by TN in Cauvery delta region; mainly to protect agri and prevent oil & gas projects. Spread over 8 districts; rice bowl of TN
- ❑ **Natural Conservation Zone:** mainly for NCR region; no construction allowed, except on 0.5% area for parks; MoEFCC is nodal ministry
- ❑ **Black panther:** Melanistic leopard / jaguar / any big cat; Reason: Melanin pigment
- ❑ Krishna Peacock, Indian Jezebel, Orange Oakleaf are? **Butterflies**
- ❑ White grub; Charru mussel; Woolly whitefly are? **Invasive species**
- ❑ **Noctiluca scintillans:** aka sea sparkle; marine species of dinoflagellate; shows Bioluminescence
- ❑ **Bioluminescence:** production and emission of light by a living organism.
- ❑ **Pinanga andamanensis:** CR; palm variety found only in Mount Harrier NP in A&N is.
- ❑ **Himalayan trillium:** EN; aka Nagchatri; medicinal properties; one of the most traded plants
- ❑ **Brahma Kamal:** blooms after sunset; sate flower of Uttarakhand
- ❑ **Nagar Van Scheme:** develop Urban forests in 200 cities; funds from CAMPA
- ❑ Green **Highway** → trees along highways
- ❑ Green **Corridor** → no red lights in traffic (medical)
- ❑ Green **Energy** Corridor → integrate renewable energy with grid



Strategic Plan for Biodiversity 2011-2020 (SPB 2011-2020):

- Adopted at CoP-10 of CBD in **2010** at Nagoya Japan.
- It has 20 targets under **5 goals**, known as **Aichi** Biodiversity Targets (ABTs).
- Designated 2020 as “**Super year** for biodiversity” as ABTs end in 2020.

State of World's Forests report by **UNEP and FAO** (FAO: 1945, Rome). **Facts for Prelims:**

- ✓ 31% : of global land **area** is under forests
- ✓ 93% : **natural**, 7% manmade
- ✓ 34% : are **primary** forests (no human activity)
- ✓ 18% : are in **protected** areas (**Aichi** target 17%)
- ✓ **Deforestation** rate today is **less** than 1990s.
- ✓ **Agriculture** is main **reason** for deforestation.
- ✓ Most gain in **Asia**, most loss in **Africa**

Some reports given in World's Forest report:

- State of the World's **Biodiversity** for Food and Agriculture:
 - ✓ **FAO**
- Global Assessment Report on **Biodiversity** and Ecosystem Services:
 - ✓ **IPBES**
- Global **Biodiversity** Outlook:
 - ✓ **CBD**

Living Planet Report has Living Planet **Index**
It's about global biodiversity



Below The Canopy Report has Forest Specialist **Index**
It's about wildlife that lives '**only**' in forests
Forest wildlife population fell 53% since 1970

Both are released by **WWF – international NGO; est. in 1961 ; HQ in Gland, Switzerland**

Central Zoo Authority:

- ✓ Formed in 1992 under WPA, 1972
- ✓ **MoEF&CC** minister is its **chairperson**
- ✓ It sets criteria & gives **recognition** to zoos
- ✓ No zoo can be operated without recognition from CZA.
- ✓ India has **149** recognized zoos.

- Bhopal** Indian Institute of Forest Management
- Dehradun** Wildlife Institute of India
- Chennai** CPR Environmental Education Centre
- Bengaluru** Indian Plywood Industries Research & Training Institute
- Ahmedabad** Centre for Environment Education
- Coimbatore** Salim Ali Centre for Ornithology and Natural History
- Jabalpur** Tropical Forestry Research Institute



Botanical Survey of India	Zoological Survey of India	Forest Survey of India
1890	1916	1981
Kolkata	Kolkata	Dehradun
Plants	Animals	Forest
MoEFCC	MoEFCC	MoEFCC

National Board for Wildlife:

- ✓ Headed by PM
- ✓ Statutory body WPA 1972
- ✓ Change in boundary of NP/WS needs its recommendation

2011 - 2020

- ☐ **UND on Biodiversity**
- ☐ **UND for Deserts and fight against Desertification**



2021 - 2030

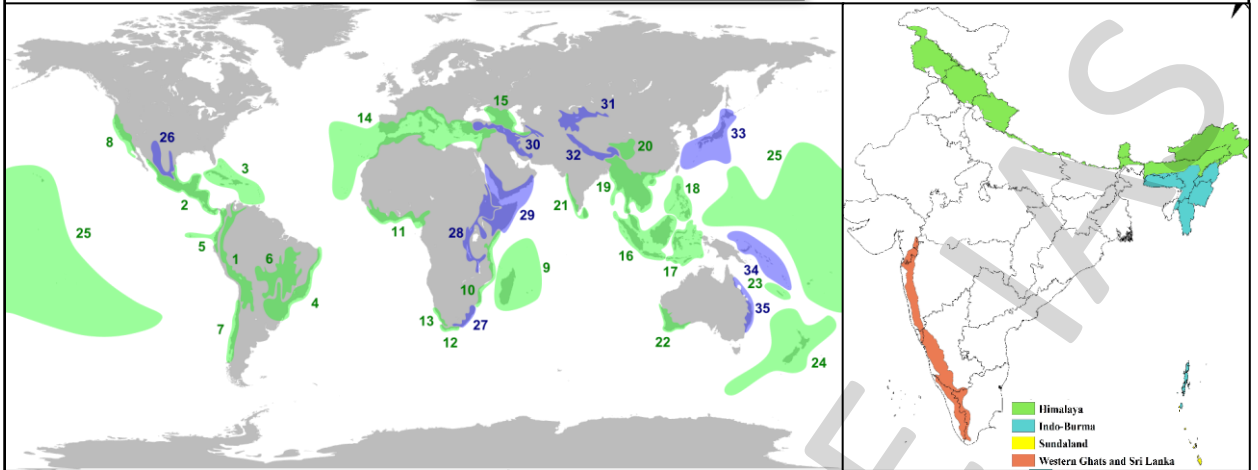
- ☐ **UND on Ecosystem Restoration**
- ☐ **UND of Ocean Science for Sustainable Development**

Initiatives to restore degraded lands:

- ☐ **20x20** : Latin America; 20 mha by 2020
- ☐ **AFR100** : Africa; 100 mha by 2030

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Hotspots



Prelims 2009:

Consider the following regions:

1. Eastern Himalayas
2. Eastern Mediterranean region
3. North-Western Australia

Which of the above is/are

Biodiversity Hotspots?

- (a) 1 only **(b) 1 and 2 only**
 (c) 2 and 3 only (d) 1, 2 and 3

Prelims 2010:

Consider the following statements:

1. **Biodiversity hotspots** are located only in tropical regions.
2. India has four biodiversity hotspots i.e., Eastern Himalayas, Western Himalayas, Western Ghats and Andaman and Nicobar Islands.

Which of the statements given above are correct?

- (a) 1 only (b) 2 only (c) Both 1 & 2 **(d) Neither 1 nor 2**

Prelims 2011:

Three of the following **criteria** have contributed to the recognition of Western Ghats, Sri Lanka and Indo Burma regions as **hotspots of biodiversity**:

1. Species richness
2. Vegetation density
3. Endemism
4. Ethno-botanical importance
5. Threat perception
6. Adaption of flora & fauna to warm & humid conditions

Which three of above are correct criteria in this context?

- (a) 1, 2, 6 (b) 2, 4, 6 **(c) 1, 3, 5** (d) 3, 4, 6

Biodiversity Hotspots:

Concept by Norman Myers. Criteria:

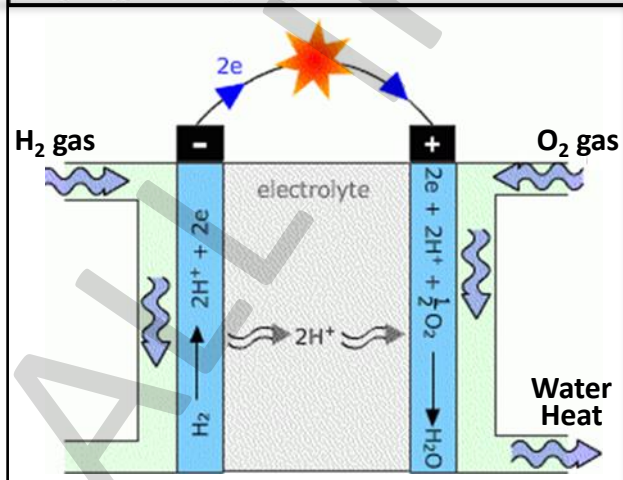
- contain at least **1,500** species of vascular **plants** as endemics
- lost** at least **75%** of its primary vegetation
- 36 globally; four in India: Himalayas, Indo-Burma, Western Ghats, Sundaland

All-Inclusive Current Affairs for Prelims 2021

Environment Class-4

Grey Hydrogen	Blue Hydrogen	Green Hydrogen
<p>Steam reforming?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Natural gas + Steam → Hydrogen + CO/CO₂ <input type="checkbox"/> Grey H₂ (CO₂ released); Blue H₂ (CO₂ captured) <input type="checkbox"/> 90% of world's Hydrogen is produced by this process 		

<p>Petrol</p>	<p>Petrol tank</p>	<p>Engine</p>	<p>Petrol car</p>
<p>Charging point</p>	<p>Battery</p>	<p>Motor</p>	<p>Electric car</p>
<p>Hydrogen</p>	<p>Hydrogen tank</p>	<p>Fuel Cell</p>	<p>Hydrogen car</p>



Prelims 2015:

With reference to 'fuel cells' in which hydrogen-rich fuel & oxygen are used to generate electricity, consider the following statements.

1. If pure hydrogen is used as a fuel, the fuel cell emits heat and water as by-products.
2. Fuel cells can be used for powering buildings and not for small devices like laptop computers.
3. Fuel cells produce electricity in the form of Alternating Current (AC).

Which of the above statements are correct?

- (a) 1 only (b) 2 and 3 only
 (c) 1 and 3 only (d) 1, 2 and 3



Hydrogen fuel $\begin{cases} \text{Mix with CNG} \\ \text{Fuel cell} \end{cases}$

Prelims 2019:

In the context of proposals to the use of hydrogen-enriched CNG (**H-CNG**) as fuel for buses in public transport, consider the following statements :

1. The main advantage of the use of H-CNG is the **elimination** of carbon monoxide emissions.
2. H-CNG as fuel **reduces** carbon dioxide and hydrocarbon emissions.
3. Hydrogen up to **one-fifth** by volume can be blended with CNG as fuel for buses.
4. H-CNG makes the fuel less **expensive** than CNG

Which of the statements given above is / are correct?
 (a) 1 only (b) 2 and 3 only (c) 4 only (d) 1, 2, 3 and 4

- H-CNG:** Hydrogen added to CNG
- Engine **modification** not required.
- Improves fuel **efficiency** (5%).
- Efficiency increases with load, hence good for **buses**.
- Reduces **pollution:** CO₂, CO, NO_x, etc.
- Issues: **expensive**, handling, production

Electric vehicles

FAME (2015, 2019):

- Faster Adoption and Manufacturing of Electric Vehicles
- Scheme by **Ministry of Heavy Industries;**
- to promote electric vehicles.
- Part of National Electric Mobility Mission Plan

State EV Policy:

Karnataka was the first state to have an EV policy (2017)

Advantages:

- Running cost (Rs 1/km vs Rs 8/km)
- Eco-friendly

Disadvantages:

- Initial cost (30-40% due to battery)
- Range limitation (200-500km)
- Raw material import dependence e.g. Lithium

Real Time Market in Electricity

Energy Exchange:

Just like a company's shares are traded on BSE/NSE Electricity/REC/ESCs are traded on IEX/PXIL
 India Energy Exchange / Power Exchange India Ltd.

Earlier: day-ahead, week-ahead
 Now: Just one hour ahead also

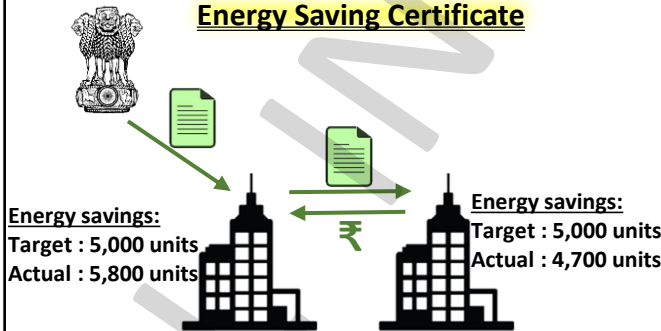
India Gas Exchange:

- Subsidiary of IEX
- for trade in imported LNG.

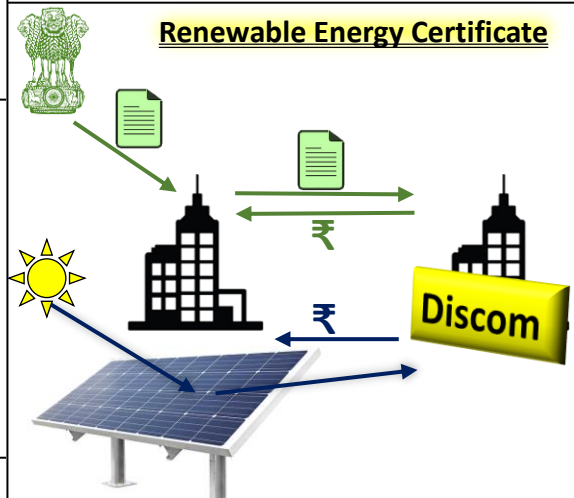
Green Term Ahead Market:

- for short-term trade in Renewable energy

Energy Saving Certificate



Renewable Energy Certificate



Energy Transition:

- Petrol to electric, coal to nuclear, etc.
- Energy Transition Index by? **WEF**
- Fostering Effective Energy Transition initiative? **WEF**

Renewable Purchase Obligation:

It is necessary for Discoms to meet certain part of energy need from Renewable sources.

Energy Intensity:

- Energy used to produce one unit of GDP
- **Low EI** can indicate **labor intensive** economy.

Renewable Energy Certificates:

Purchase certificates instead of purchasing renewable power

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Gas

Natural Gas:

- 6% of energy mix
- Domestic:Import - 50:50

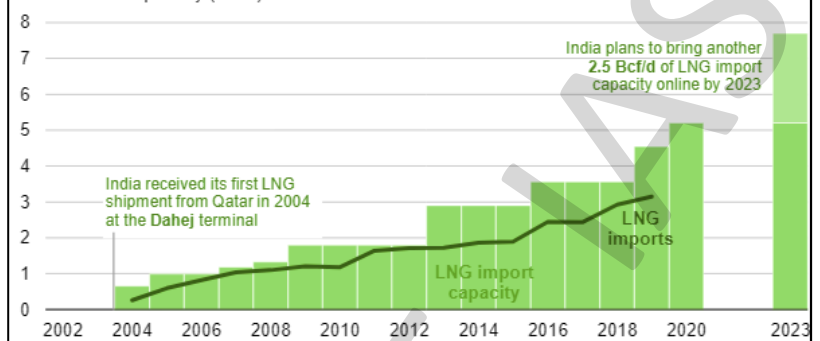
India imports LNG from:

- Qatar (most), Nigeria, etc.
- Also USA, Russia, Australia

LNG import terminals:

- Gujarat: Dahej and Hazira
- Maharashtra: Dabhol
- Kerala: Kochi

India liquefied natural gas (LNG) imports and import capacity (2004-2023)
billion cubic feet per day (Bcf/d)



Domestically produced natural gas price:

- Revised by Govt every six months
- Average from US, UK, Russia, Canada

National Gas grid: connect existing gas pipelines

City Gas Distribution: piped gas supply within cities

PM Urja Ganga: piped gas for eastern India Sustainable Alternative Towards

Affordable Transportation:

- Ministry of Petroleum & Natural Gas
- Use of compressed Bio-gas in vehicles

Prelims 2005:

- Assertion:** Main constituent of liquified petroleum gas is methane.
 - Reason:** Methane can be used directly for burning in homes and factories where it can be supplied through pipelines.
- (a) Both A and R are true and R is the correct explanation of A
 (b) Both A and R are true but R is not the correct explanation of A
 (c) A is true but R is false
 (d) A is false but R is true

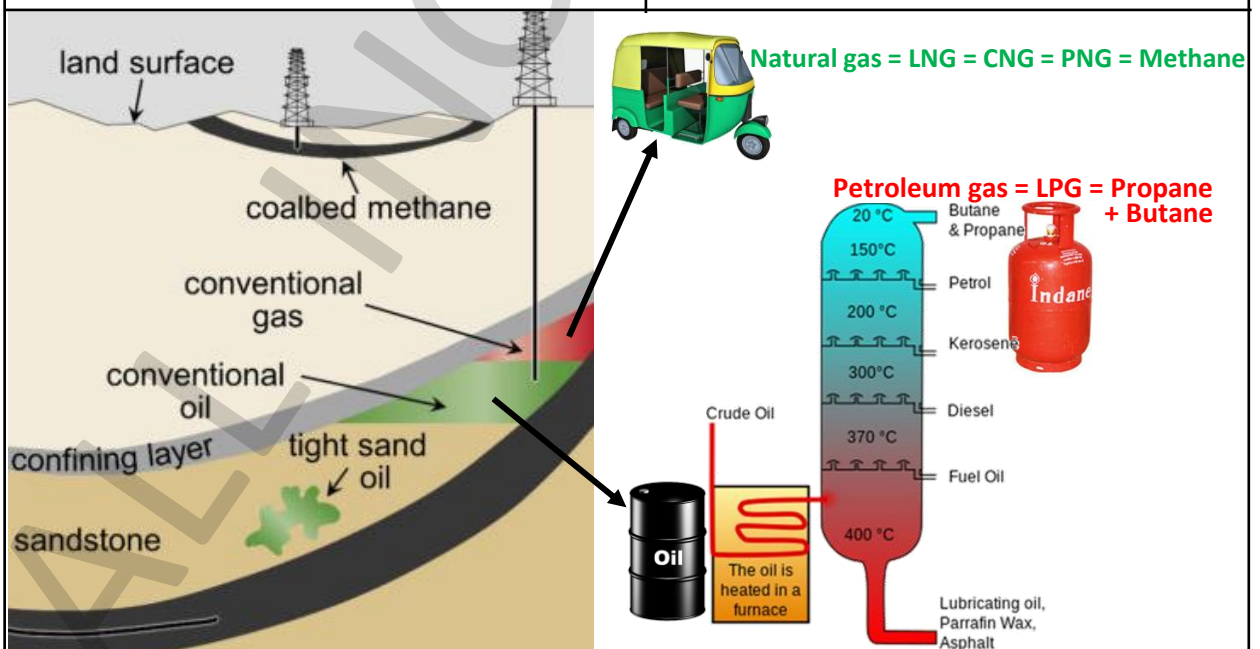
Prelims 2019:

Consider the following statements:

1. Petroleum and Natural Gas Regulatory Board (PNGRB) is the **first regulatory body** set up by the Govt. of India.
2. One of the tasks of PNGRB is to ensure competitive markets for gas.
3. Appeals against decisions of PNGRB go before Appellate Tribunal of Electricity.

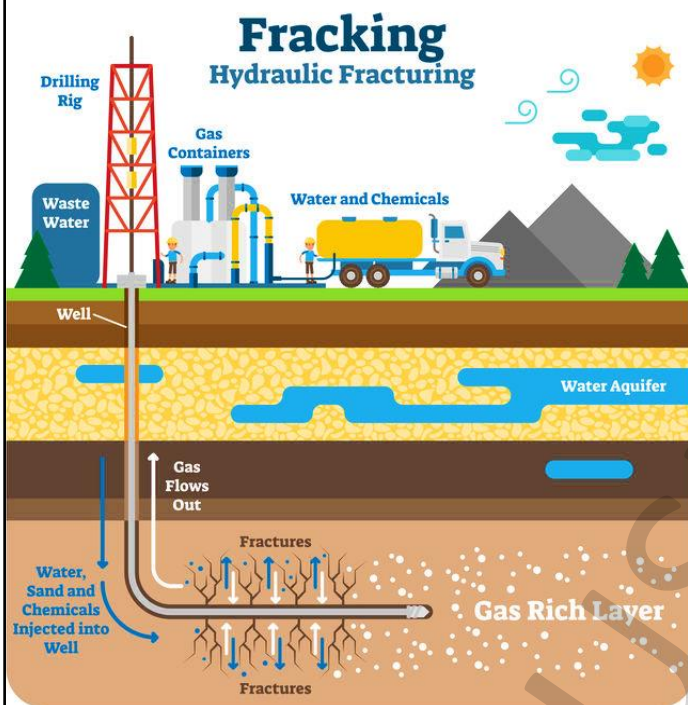
Which of the above statements are correct?

- (a) 1 and 2 only (b) 2 and 3 only
 (c) 1 and 3 only (d) 1, 2 and 3



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When something is extracted from earth, it's never really 'pure'



Prelims 2014:

With reference to two non-conventional energy sources called 'coalbed methane' & 'shale gas', consider the following:

1. Coalbed methane is the pure methane gas extracted from coal seams, while shale gas is a mixture of propane and butane only that can be extracted from fine-grained sedimentary rocks.
2. In India abundant coalbed methane sources exist, but so far no shale gas sources have been found.

Which of the above statements are correct?

- (a) 1 only (b) 2 only
(c) Both 1 & 2 (d) Neither 1 nor 2

Prelims 2014:

In India, cluster bean (Guar) is traditionally used as vegetable or animal feed, but recently its cultivation has assumed significance. Which of the following statements is correct in this context?

- (a) The oil extracted from seeds is used in manufacture of biodegradable plastics
(b) The gum made from its seeds is used in the extraction of shale gas
(c) The leaf extract of this plant has the properties of anti-histamines
(d) It is a source of high quality biodiesel

Survey of India	1767	Dehradun	Ministry of Science & Tech
Geological Survey of India	1851	Kolkata	Ministry of Mines
Archaeological Survey of India	1861	Delhi	Ministry of Culture

Biodiversity Coldspots

- areas with high biodiversity, but low threat value
- e.g. Amazon rainforests, Boreal forests
- threatened species thrive here

Sustainable ocean economy for 2050: report by World Resource Institute

Indian Monsoon Index and Indian Rain Index:

Rainfall performance indicator, launched by NCDEX.

Data will be provided by SkyMet, not IMD.

- BSE/NSE: exchange for shares
- NCDEX: exchange for commodities
- Sensex: index of top 30 companies of BSE
- Nifty: index of top 50 companies of NSE

Sustainable Renewables Risk

Mitigation Initiative:

- Previously known as Solar Risk Mitigation Initiative
- By World Bank, ISA, and few others
- To help countries with funding for renewable energy

I read I forget, I see I remember | See explanation of this PDF on www.youtube.com/c/allinclusiveias

<https://powermin.gov.in/en/content/power-sector-glance-all-india>
(as on 15-07-2021)

Electricity

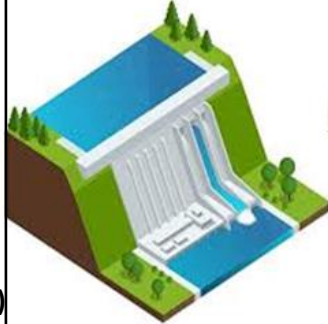
Total capacity:

48% Private
27% States
25% Centre
3.8 lakh MW

02% Nuclear
12% Hydro
25% RES
61% Thermal
(Coal 52%, Gas 6%)
3.8 lakh MW total

Renewable energy

136 GW; 3rd largest globally; 36%



47 GW
Large hydro



40 GW
Wind

40 GW
Solar



10 GW
Bioenergy



5 GW
Small hydro

Target?

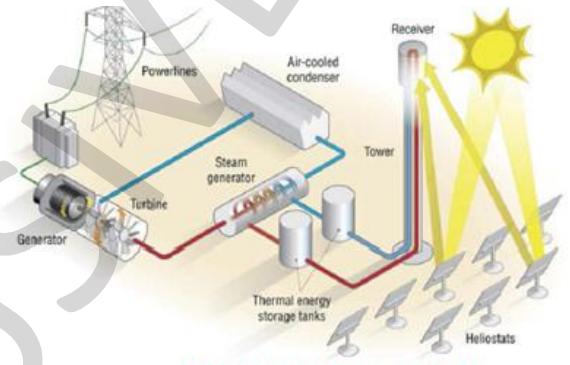
2015 Paris: 175 GW by 2022 (100 Solar)
2019 UN: 450 GW by 2030 (280 Solar)

Solar energy



Photo-voltaic

Sunlight is directly converted into electricity

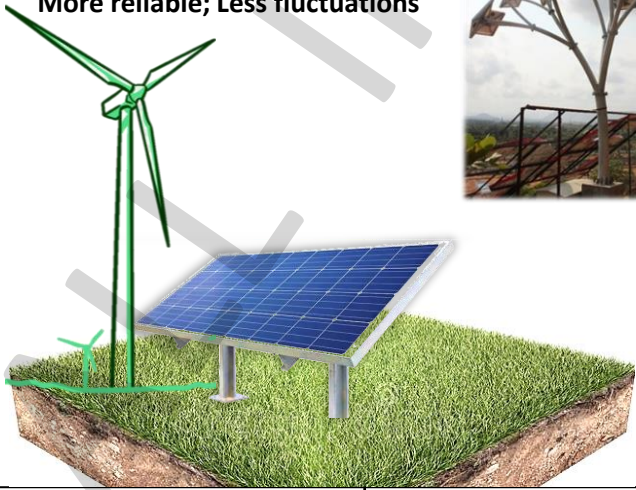


Thermal Solar power plant

Sunlight heats up water to form steam.
Steam rotates turbine.
Turbine generates electricity

Hybrid

Combines multiple renewable energy sources
More reliable; Less fluctuations



Solar tree

By CSIR-CMERI



PM-KUSUM



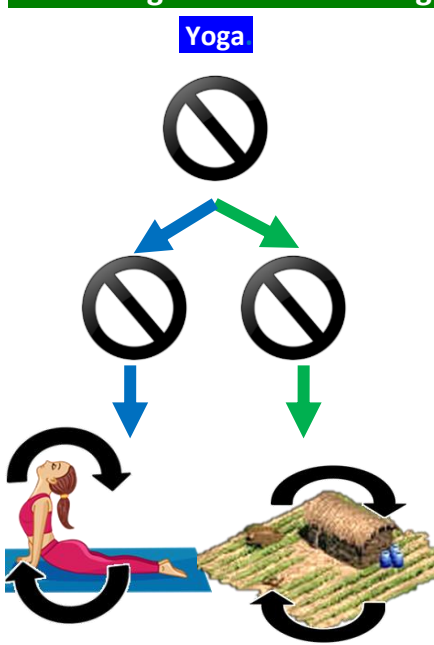

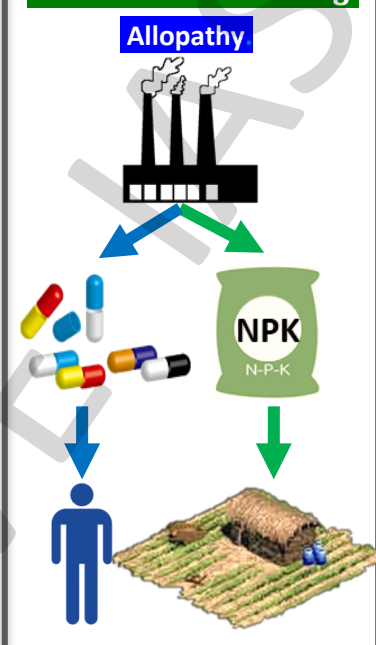
2019; Solar power to farms
Min. of New & Renewable Energy

Floating Solar

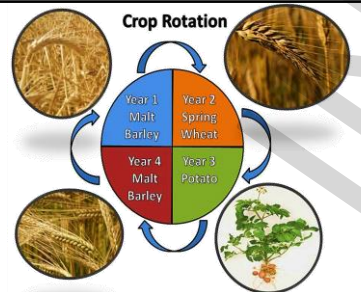




Does not waste land;
But is costlier

ZBNF vs Organic farming

Zero-Budget Natural Farming	Organic Farming	Conventional Farming
<p style="background-color: #000080; color: white; padding: 2px; margin: 0;">Yoga</p> 	<p style="background-color: #000080; color: white; padding: 2px; margin: 0;">Ayurveda</p> 	<p style="background-color: #000080; color: white; padding: 2px; margin: 0;">Allopathy</p> 
Organic inputs from farm itself	Organic inputs from outside	Chemical inputs from outside
<p>Benefits</p> <ul style="list-style-type: none"> <input type="checkbox"/> Low cost <input type="checkbox"/> No debt trap <input type="checkbox"/> Same as Organic f. 	<p>Benefits</p> <ul style="list-style-type: none"> <input type="checkbox"/> Less soil erosion (more SOM) <input type="checkbox"/> Less nitrate pollution <input type="checkbox"/> Less pesticides 	<p>Benefits</p> <ul style="list-style-type: none"> <input type="checkbox"/> High yield <input type="checkbox"/> Off-season also <input type="checkbox"/> Pest control
<p>Issues</p> <ul style="list-style-type: none"> <input type="checkbox"/> Yield: Low yield/acre, especially in first few years <input type="checkbox"/> Weather dependent; No off-season crops <input type="checkbox"/> Risks of fluctuations in output, food shortages, inflation 		<p>Issues</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pesticides <input type="checkbox"/> Eutrophication

Sustainable Agriculture

<p style="font-size: small; margin: 0;">Crop Rotation</p> 		
<p><u>Crop rotation</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> On same land, grow different crops in different season/year <input type="checkbox"/> Maintains nutrients, prevents disease 	<p><u>Conservation Agriculture</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Minimum tillage <input type="checkbox"/> Maintain permanent Soil cover <input type="checkbox"/> Diversification of plant species 	<p><u>Planting cover crops</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Crop grown to protect (cover) soil, rather than for purpose of being harvested
<p><u>Integrated Pest Management</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Using natural enemies, using beneficial microbes, crop rotation, etc. 	<p><u>Permaculture</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Permanent agriculture <input type="checkbox"/> Replicating natural ecosystem's stability in agriculture 	<p><u>Vermicomposting:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Using earthworms to convert organic waste into manure

I read I forget, I see I remember

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Prelims 1999:

Which one of the following agricultural practices is **eco-friendly**?

- (a) **Organic farming**
- (b) Shifting cultivation
- (c) Cultivation of high yielding varieties
- (d) Growing plants in glass-houses

Prelims 2020:

In the context of India, which of the following is/are considered to be practices of **eco-friendly agriculture**?

- 1. Crop diversification 2. Legume intensification
 - 3. Tensiometer use 4. Vertical farming
- Select the correct answer using the **code** given below:
 (a) 1,2,3 (b) 3 (c) 4 **(d) 1,2,3,4**

Prelims 2017:

Which of the following practices can help in **water conservation** in agriculture?

- 1. Reduced or zero tillage of the land
 - 2. Applying gypsum before irrigating field
 - 3. Allowing crop residue to remain in field
- Select the correct answer:
 (a) 1,2 (b) 3 **(c) 1,3** (d) 1,2,3

Prelims 2012:

Consider the following agricultural practices:

- 1. Contour bunding
- 2. Relay cropping
- 3. Zero tillage

In the context of global climate change, which of the above helps in **carbon sequestration** in the soil?
 (a) 1,2 (b) 3 **(c) 1,2,3** (d) None of the above

Prelims 2018:

With reference to the circumstances in Indian agriculture, the concept of "Conservation Agriculture" assumes significance. Which of the following fall under the **Conservation Agriculture**?

- 1. Avoiding the monoculture practices
 - 2. Adopting minimum **tillage**
 - 3. Avoiding the cultivation of plantation crops
 - 4. Using crop residues to **cover** soil surface
 - 5. Adopting spatial & temporal crop sequencing/**rotation**
- Select the correct answer:
 (a) 1,3,4 (b) 2,3,4,5 **(c) 2,4,5** (d) 1,2,3,5

Prelims 2020:

What are the advantages of **zero tillage** in agriculture?

- 1. Sowing of wheat is possible without burning residue of previous crop.
- 2. Without the need for nursery of rice saplings, direct planting of paddy seeds in wet soil is possible.
- 3. Carbon sequestration in soil is possible

Select the correct answer:
 (a) 1,2 (b) 2,3 (c) 3 **(d) 1,2,3**



Vertical farming

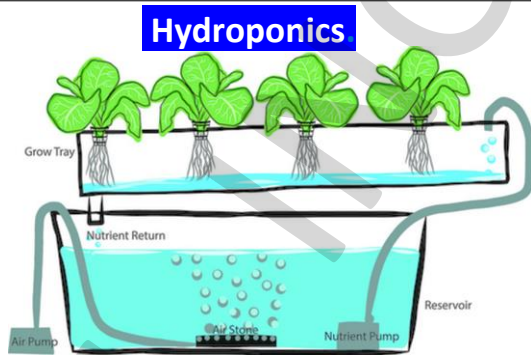
Hydro/Aqua/Aero ponics

General Benefits:

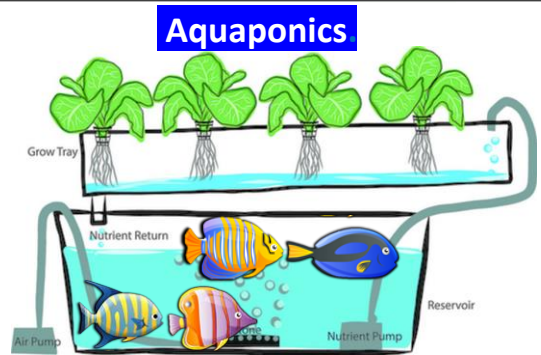
- 90% less water
- Less space
- Faster growth
- Controlled environment
- No weeds

Challenges:

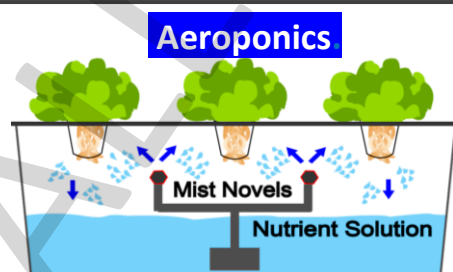
- Technical know-how
- Capital intensive



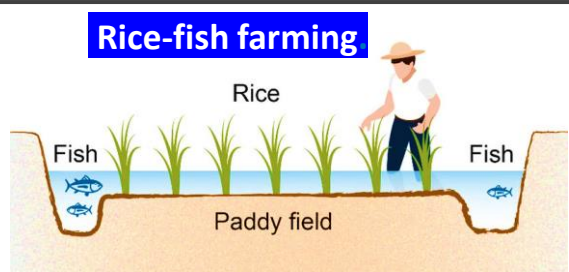
Hydroponics



Aquaponics



Aeroponics



Rice-fish farming

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See explanation of this PDF on **YouTube** www.youtube.com/c/allinclusiveias

Climate Smart Cities

Climate Smart Cities

Assessment Framework 2.0

- by MoHUA; Sept. 2020
- 5 categories:
 - Green buildings;
 - Green cover;
 - Transport;
 - Water mgmt;
 - Waste mgmt

Prelims 2018:

With reference to the 'Global Alliance for Climate Smart Agriculture (GACSA)', which of the following statements are correct?

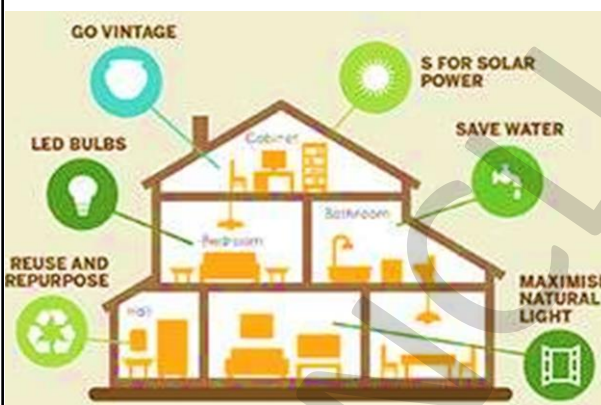
1. GACSA is outcome of Climate Summit held in Paris in 2015
 2. Membership of GACSA doesn't create any binding obligations
 3. India was instrumental in the creation of GACSA
- Select the correct answer using the code given
 (a) 1 and 3 only **(b) 2 only** (c) 2 and 3 only (d) 1, 2 and 3

District Cooling Systems

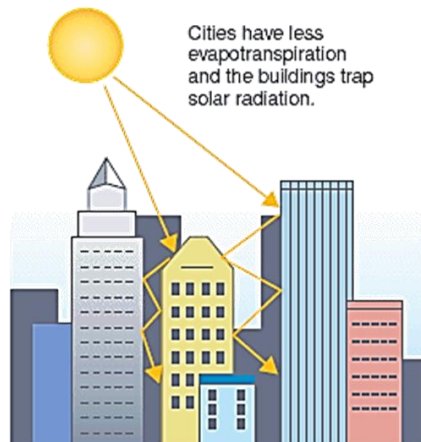
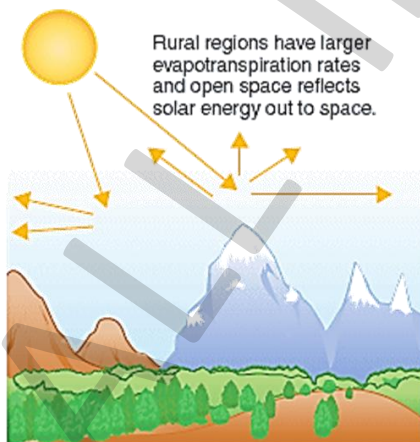


- Make lots of chilled water at one location
- Supply it to various buildings by pipes
- Buildings won't need own air conditioning

BEE Bureau of Energy Efficiency	EESL Energy Efficiency Services Limited
Statutory body; Energy Conservation Act, 2001	Joint Venture of PSUs
2002	2009
Ministry of Power	Ministry of Power
Frame national policies for energy efficiency	To facilitate energy efficiency projects
Bee Star label; ECBC for buildings	Works on sustainable business models



Energy Conservation Building Code	By BEE For commercial buildings	mandatory for certain new commercial buildings
Eco-Niwasa Samhita	By Min. of Power For residential buildings	New Indian Way for Affordable & Sustainable Homes
GRIHA	By TERI & MNRE Rating tool	Green Rating for Integrated Habitat Assessment
LEED	By US Green Building Council . Similar to GRIHA, but at global level	Leadership in Energy and Environmental Design



Urban Heat Island

Urban area warmer than surrounding areas

The temperature difference is usually larger at night than during the day, and is most apparent when winds are weak.

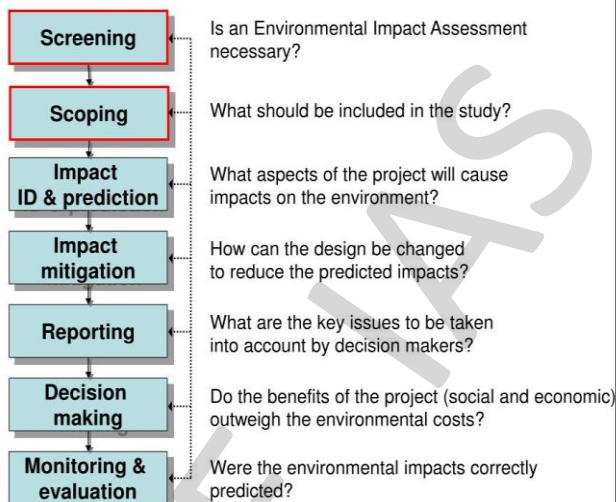
EIA

Environment Impact Assessment (EIA):

- ❖ evaluating the likely environmental impacts of a proposed project.
- ❖ EIA notification is made by **MoEF&CC** under **EPA, 1986**. Current notification is of **2006**.

Categories of projects:

- Category A** : EIA mandatory, so no screening.
- Category B** : screening classifies projects as:
 - **Category B1** projects: EIA required
 - **Category B2** projects: EIA not required



Who gives Environmental clearance?	Category A projects: Expert Appraisal Committee → MoEFCC	Category B projects: State EAC → State EIA Authority
------------------------------------	---	---

NGT

Prelims 2018:

How is **NGT** different from **CPCB**

1. **NGT** has been established by an **Act** whereas **CPCB** has been created by an **executive order** of the Government.
2. **NGT** provides environmental justice and helps reduce the burden of litigation in the higher courts whereas **CPCB** promotes cleanliness of streams and wells, and aims to improve the quality of air in the country.

Which of the above statements is/are correct:

- (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

Prelims 2012:

The **National Green Tribunal Act, 2010** was enacted in consonance with which of the following provisions of the **Constitution of India**?

1. Right to healthy **environment**, construed as a part of **Right to life** under Article 21
2. Provision of grants for raising level of administration in Scheduled Areas for welfare of **Scheduled Tribes** u/a 275(1)
3. Powers and functions of **Gram Sabha** as mentioned under Article 243 (A)

Select correct answer using codes given below:

- (a) 1 only (b) 2 and 3 only
 (c) 1 and 3 only (d) 1, 2 and 3

- Statutory body; **NGT Act 2010**
- India 1st to set up env tribunal? No Aus/NZ
- Civil cases**? Yes; Criminal cases? No
- Natural justice**;
Not bound by Code of Civil Procedure 1908
- Delhi** (Principal)
Pune, Kolkata, Bhopal, Chennai
- Decision can be challenged '**only**' in **SC**? **No**

- Chairperson**:
serving/retd. SC Judge or HC CJ
- 10-20 Judicial members**:
serving/retd. SC Judge / HC CJ / HC Judge
- 10-20 Expert members**
- 5 year term; no reappointment

Laws under NGT

WPA 1972? No

- Water** Act 1974;
- Water** Cess Act 1977;
- Air** Act 1981;
- Forest** (Conservation) Act 1980;
- Environment** (Protection) Act 1986;
- Public Liability** Insurance Act 1991;
- Biological Diversity** Act 2002

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Disaster Management

Who **notifies** a disaster? **MHA**
 Which **law** was used to impose lockdown and other orders like quarantine?
 ✓ **Disaster Management Act, 2005**
 ✓ **Epidemic Diseases Act, 1897**

Disaster Management Act, 2005

- ❑ At National, State, District level it provides for Authority (PM/CM/DM), Fund, Mitigation Fund.
- ❑ National Executive Committee headed by Home secretary (not Health secretary).

Epidemic Disease Act, 1897

To tackle Bubonic plague in Bombay
 Doesn't define dangerous epidemic disease

Strict vs Absolute Liability:

If company's equipment/chemical caused harm to people, then is the company liable?

Strict liability: Yes, but with exceptions (Act of God, Act of Stranger, etc) (old concept)

Absolute liability: Yes, no exceptions (since 1986 Oleum case)
 Today there are many methods / technologies / procedures for company to protect its equipment.

India Meteorological Department:

- ❑ 1875; HQ Delhi
- ❑ Ministry of Earth Sciences

National Disaster Response Fund:

- ✓ It is defined in **Disaster Management Act, 2005**
- ✓ It gets money from **cess**, **budgetary** allocations, and **voluntary** contributions. ★
- ✓ It is placed in the '**Public Account**' of Union Govt.
- ✓ It is audited by **CAG**. ★
- ✓ It supplements SDRF of a State.
- ✓ Disasters: Cold wave? Yes. Heat wave? No.
- ✓ Cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloudburst, pest attack, frost and cold waves.

Global Assessment Report on DRR

- ❑ published biennially by the UN Office for Disaster Risk Reduction (UNDRR)

UNDDR:

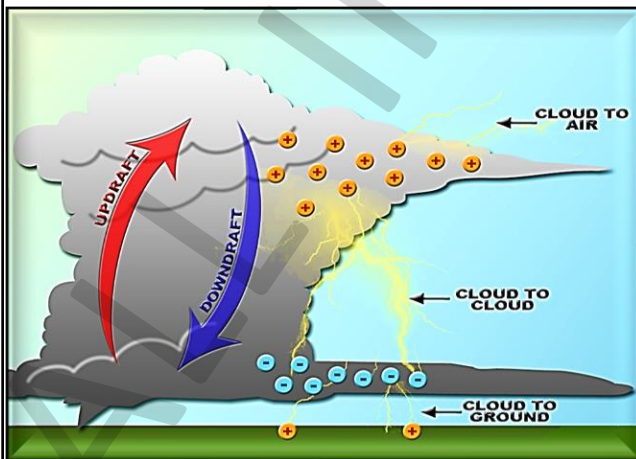
- ❑ 1999 ; HQ Geneva, Switzerland
- ❑ part of **UN Secretariat**

Sendai framework for DRR:

- ❑ For 15 years **2015-2030**
- ❑ It is successor to **Hyogo Framework** for Action 2005-2015

National Institute of Disaster Management:

- ❑ **Statutory** body; Disaster Management Act, 2005
- ❑ under Ministry of **Home** Affairs



Lightning

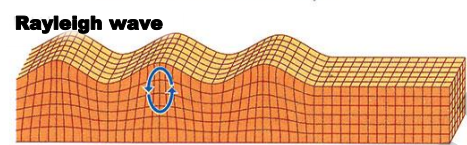
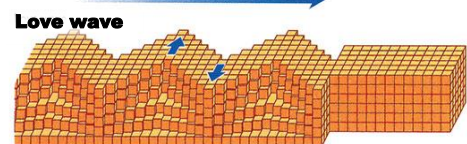
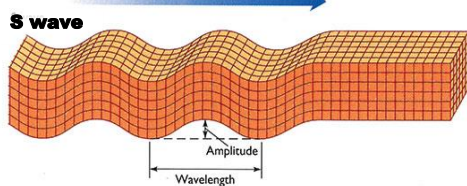
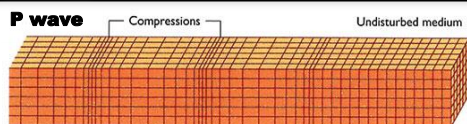
How lightning is formed:

- Winds inside the **cloud** are very turbulent.
- **Updraft** carries water droplets up the cloud.
- **Downdraft** push ice to bottom part of cloud.
- The process triggers release of **electrons**.
- **Top** of cloud forms **positive** charge.
- **Bottom** of cloud forms **negative** charge.
- Lightning occurs within the cloud, between clouds, between cloud and earth.

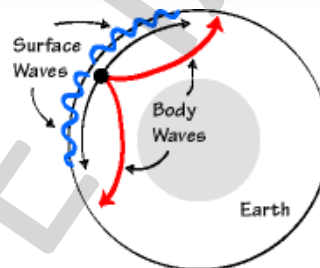
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Styrene

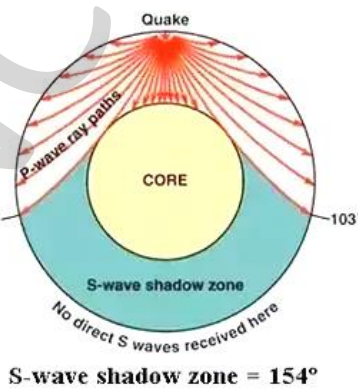
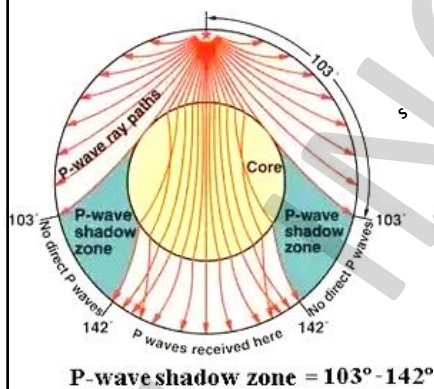
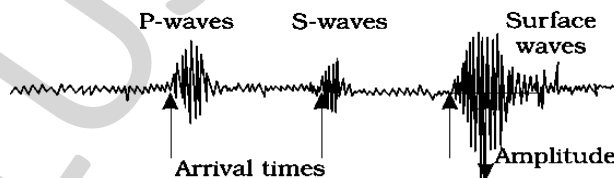
- ✓ Stored as liquid, **evaporates** easily.
- ✓ It is a '**hazardous chemical**' under Hazardous Chemical Rules 1989. (multiple ill effects)
- ✓ Used to make **Polystyrene**
- ✓ Polystyrene is used in disposable cups, home appliances, automobiles, electronics, etc.



Earthquakes



- All natural earthquakes take place in the **lithosphere**
- Waves are **faster** in denser material.
- **Body waves**: move through the body. **P-waves** travel through solid liquid gas. **S-waves** travel only through solid.
- **Surface waves**: move along the surface. They are generated when body waves interact with surface rocks. Most **destructive**.



- Earthquakes can be **predicted** few hours before. No
- Warning** can be sent seconds before an earthquake strikes? Yes (**P vs S**)
- Google** is turning Android phones into Earthquake Detectors.
- Benefit**: Elevators, gas pipelines can be shut off automatically

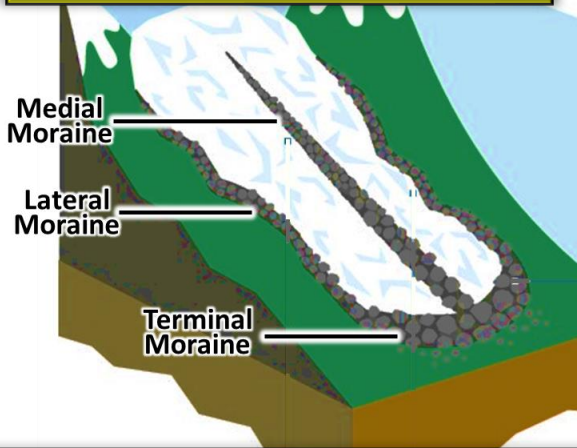


Mercalli - intensity - observed effects of earthquake
Richter - magnitude - seismic waves or energy released energy

If confused in exam, just recall two things:

1. Which scale is mentioned in news? **Richter**
2. When is it mentioned? Within 5 minutes of earthquake. Within 5 minutes, we can measure magnitude (i.e. Energy, not intensity or destruction)

Glacial Lake Outburst Floods

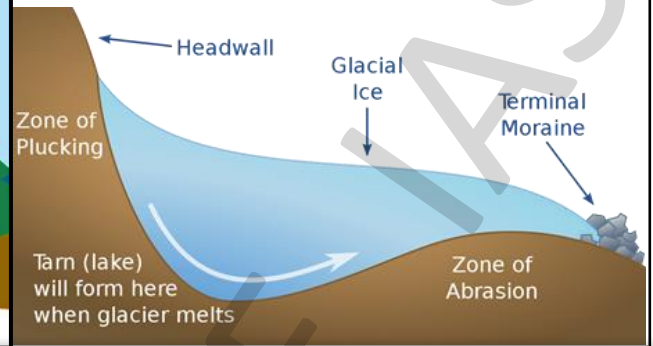


Glacial till:

sediment deposited by glacier (can form moraine)

Moraine:

material left behind by a moving glacier (soil, rock)



Drought

Prelims 2014

- **Meteorological drought:** less **rain**
- **Hydrological drought:** less water in **dams**
- **Agricultural drought:** low **soil moisture**
- **Ecological drought:** low **ecosystem productivity**

Flash drought:

If no rain happens, and temperature also rises abnormally, soil will lose moisture fast, leading to sudden drought, called as Flash drought. Biggest impact seen on Agriculture.

4. Consider the following pairs :

Programme/Project	Ministry
1. Drought-Prone Area Programme	: Ministry of Agriculture
2. Desert Development Programme	: Ministry of Environment and Forests
3. National Watershed Development Project for Rainfed Areas	: Ministry of Rural Development

Heat Waves

- Heat Wave is a notified disaster under Disaster Management Act, 2005? **No**
- Heat wave is included in the list of 12 disasters eligible for relief under National/State Disaster Response Funds? **No**

	Plains	Coastal	Hills
Precondition	40	37	30
Heat wave	Normal + 4.5 or 45	Normal + 4.5	Normal + 4.5
Severe Heat wave	Normal + 6.4 or 47	Normal + 6.4	Normal + 6.4

* All figures indicate maximum temperature

Forest Fires

Causes: lightning, rockfall sparks, cigarette, camp fire, electric cables, shifting cultivation, mafia, etc.

Impacts: air, water, wildlife, livelihood, loss of carbon sink; increase tropospheric ozone; damage stratospheric ozone

Benefits of light forest fire:

- ✓ Return nutrients to soil, that were stored in dead trees
- ✓ Eliminates invasive weeds, insects, diseases
- ✓ Clears forest floor for new seeds to germinate
- ✓ Some trees need light fire to flower e.g. Banksia
- ✓ Controlled fires can prevent natural fires



21% of India's forest area is prone to fire

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Cyclones

Name	Region
Cyclone	Indian Ocean
Hurricane	Atlantic Ocean
Typhoon	Japan, China
Willy Willies	Australia

Temperate cyclone	Tropical cyclone	Trick to remember
Move west to east → (Westerlies)	Move east to west ← (Easterlies)	Cyclones come from Bay of Bengal to Odisha
Affects larger area	Affect less area	Mostly only Odisha is in news
Lower wind speed	Higher wind speed	Very high winds in news
Can form on sea as well as land	Forms on sea, dissipates on land	Most news comes only till it reaches coast
Formed due to fronts	Frontal system absent	Never saw this in news
Usually lasts 14 days	Usually lasts 7 days	News only for 3-4 days

Conditions favorable for the formation and intensification of tropical cyclones:

- Large sea surface with temperature higher than 27° C**
 - For low pressure area to form
- Small variations in the vertical wind speed**
 - Air rises; moisture in air condenses; releases latent heat; this energy intensifies cyclone
- Presence of the Coriolis force enough to create a cyclonic vortex**
 - At the equator, the Coriolis force is zero.
 - Low pressure gets filled instead of getting intensified.
- A pre-existing weak low-pressure area or low-level-cyclonic circulation**
 - Many Bay of Bengal cyclones are remains of typhoons
- Upper divergence above the sea level system**

Why more cyclones recently in Arabian sea?

Main reason is global warming, but exactly how, is under research, multiple theories, not for prelims

Why more cyclones in Bay of Bengal than Arabian sea?

- Higher sea surface temperature
- Many Bay of Bengal cyclones are remains of typhoons

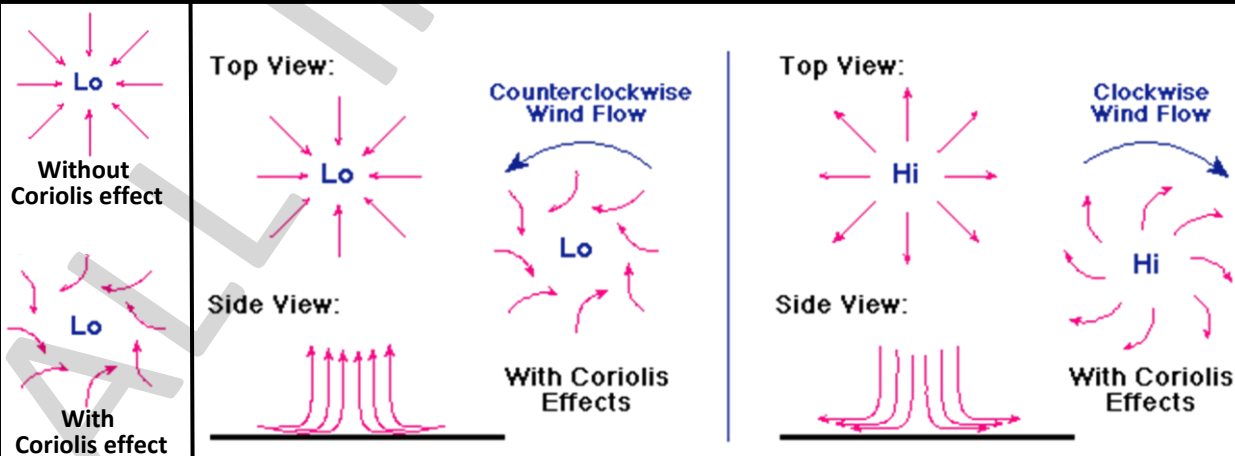
Medicanes? Mediterranean Hurricanes; colder; smaller

Naming of cyclones in Indian Ocean:

- ✓ Chosen from list of 169 names (13 countries submit 13 names each)
 - ✓ Mechanism by WMO and UN-ESCAP
 - ✓ **IMD** as RSMC names cyclones in Indian Ocean
- RSMC: Regional Specialised Meteorological Centres

Table 10.2 : Pattern of Wind Direction in Cyclones and Anticyclones

Pressure System	Pressure Condition at the Centre	Pattern of Wind Direction	
		Northern Hemisphere	Southern Hemisphere
Cyclone	Low	Anticlockwise	Clockwise
Anticyclone	High	Clockwise	Anticlockwise



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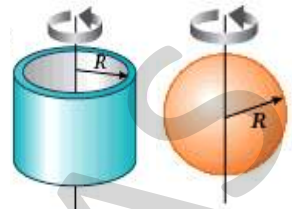
Prelims 2010:

What causes wind to deflect towards left in the Southern Hemisphere?

- (a) Temperature
- (b) Magnetic field
- (c) Rotation of earth**
- (d) Pressure

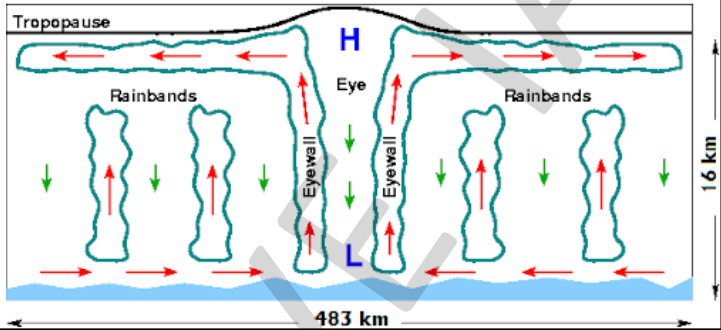
Coriolis Force

The rotation of the earth about its axis affects the direction of the wind. This force is called the Coriolis force after the French physicist who described it in 1844. It deflects the wind to the right direction in the northern hemisphere and to the left in the southern hemisphere. The deflection is more when the wind velocity is high. The Coriolis force is directly proportional to the angle of latitude. It is maximum at the poles and is absent at the equator.



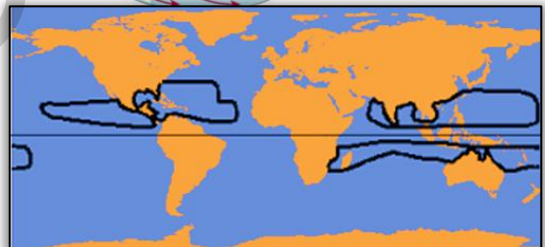
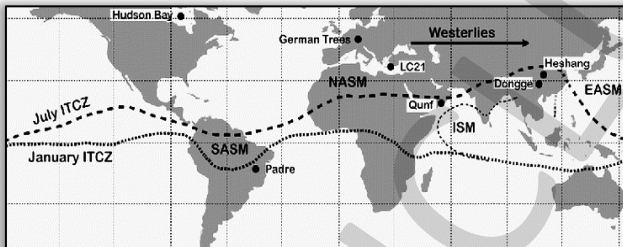
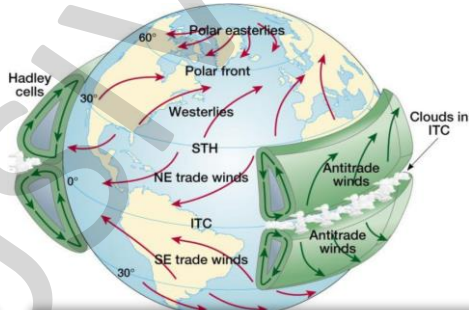
Prelims 2002:

- (A): Surface winds spiral inwards upon the centre of cyclone
- (R): Air descends in the centre of cyclone
- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true but R is NOT a correct explanation of A**
- (c) A is true but R is false
- (d) A is false but R is true



Prelims 2015:

- In the South Atlantic and South Eastern Pacific regions in tropical latitudes, cyclone does not originate. What is the reason?
- (a) Sea Surface temperatures are low
- (b) ITCZ seldom occurs**
- (c) Coriolis force is too weak
- (d) Absence of land in those regions



Prelims 2020:

Consider the following statements:

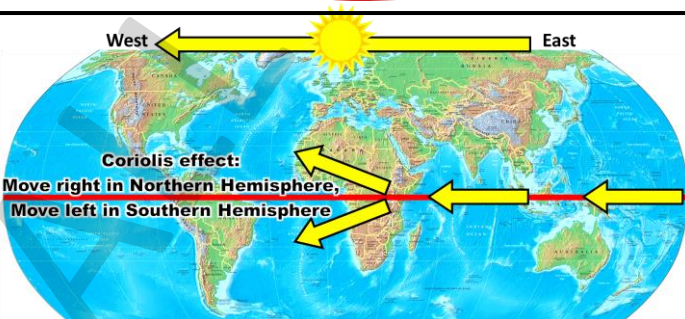
- 1. Jet streams occur in Northern Hemisphere only
- 2. Only some cyclones develop an eye
- 3. The temperature inside the eye of a cyclone is nearly 10°C lesser than that of the surroundings

Which of the above statements is/are correct:

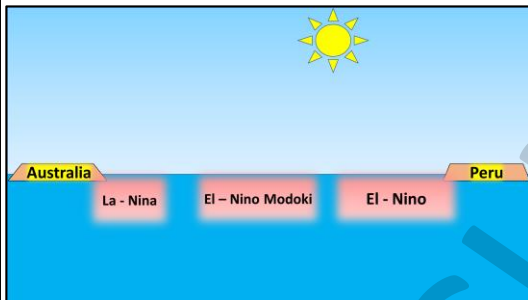
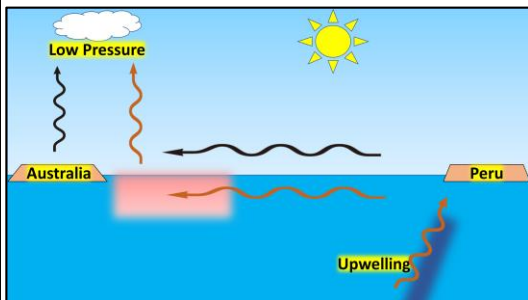
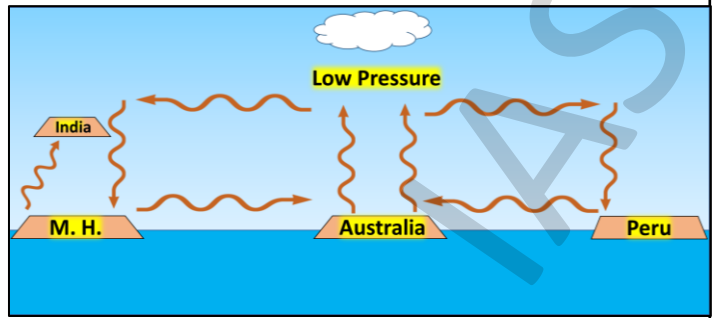
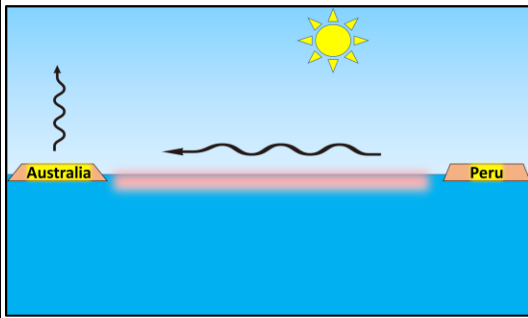
- (a) 1 only
- (b) 2, 3 only
- (c) 2 only**
- (d) 1, 3 only



Fujiwhara effect: two nearby cyclonic vortices move around each other. They may merge, or move away on their own paths after some time.



ENSO ; El-Nino ; El-Nino Modoki; La-Nina

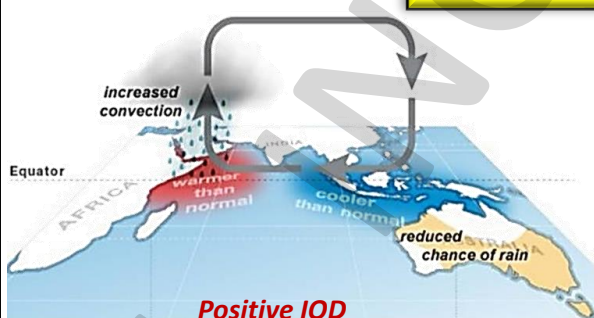


La Nina : normal situation gets intensified
El Nino : normal situation gets weakened

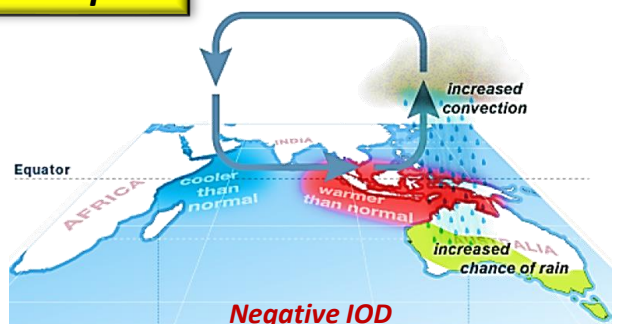
Nina is a **good** girl, she strengthens monsoon
Nino is a **bad** boy, he weakens monsoon
Modoki is both **good and bad**.

- It **decreases** cyclones in Bay of Bengal,
- but **increases** cyclones in Arabian sea (& hurricanes)

Indian Ocean Dipole



- Positive IOD**
- Arabian warmer; BoB cooler
 - More rain in India
 - Less rain in Australia



- Negative IOD**
- Arabian cooler; BoB warmer
 - Less rain in India
 - More rain in Australia

Madden Julian Oscillation

- Eastern moving system** of wind, cloud and pressure
- Brings rain** as it circles around the equator.
- Recurs every **30 to 60 days**.
- Affects weather** activities across the globe.

Prelims 2002:

For short-term climate prediction, which one of the following events, detected in the last decade, is associated with occasional **weak monsoon** rains in the India subcontinent?

- (a) La Nina
- (b) Movement of jet streams
- (c) El Nino and southern oscillations
- (d) Greenhouse effect on global level

Prelims 2011:

La Nina is suspected to have caused recent floods in Australia. How is **La Nina** different from **El Nino**?

1. La Nina is characterised by an usually cold ocean temperature in equatorial **Indian Ocean** whereas El Nino is characterised by unusually warm ocean temperature in the equatorial Pacific Ocean.
2. El Nino has an adverse effect on the south-west monsoon of India but La Nina has **no effect** on monsoon climate.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Prelims 2010:

A new type of El Nino called **El Nino Modoki** appeared in the news. In this context, consider the following statements:

1. Normal El Nino forms in the Central Pacific ocean whereas El Nino Modoki forms in Eastern Pacific ocean.
2. Normal El Nino results in diminished hurricanes in the Atlantic ocean but El Nino Modoki results in a greater number of hurricanes with greater frequency.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Prelims 2017:

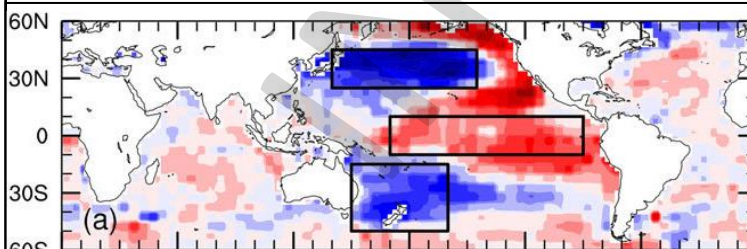
With reference to **Indian Ocean Dipole (IOD)** sometimes seen in news while forecasting Indian monsoon, which of the following statements is/are correct?

1. IOD phenomenon is characterised by a difference in sea surface temperature between tropical Western Indian Ocean and tropical Eastern **Pacific Ocean**.
2. An IOD phenomenon **can influence** an El Nino's impact on the monsoon.

Select the correct answer:

- (a) 1 only
- (b) 2 only
- (c) Both 1 & 2
- (d) Neither 1 nor 2

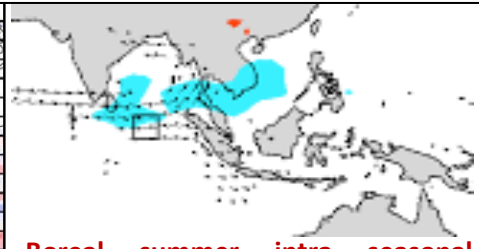
Miscellaneous



Inter-decadal Pacific Oscillation

- **Positive:** warmer tropical pacific, cooler northern pacific
- **Negative:** cooler tropical pacific, warmer northern pacific
- Pattern oscillates every 15-30 years.

Latest research: positive phase weakens Indian monsoon.



Boreal summer intra seasonal oscillation: movement of **heat** from Indian Ocean to western Pacific Ocean roughly every 10-50 days during **monsoon** (June-September)

Urban Flooding

- **CFLOWS-Chennai** and **IFLOWS-Mumbai** are flood warning apps.
- Reasons for urban flooding (obvious). Guidelines, etc. not for exam.

I read I forget, I see I remember

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Prelims 2009:

In the structure of Earth, below the mantle, the core is mainly made up of which of the following?

- (a) Aluminium (b) Chromium
(c) Iron (d) Silicon

Lithosphere:

Crust and some upper mantle
 Thickness varies 10-200 km

Asthenosphere:

Up to 400 km; Upper portion of mantle
 Main source of magma

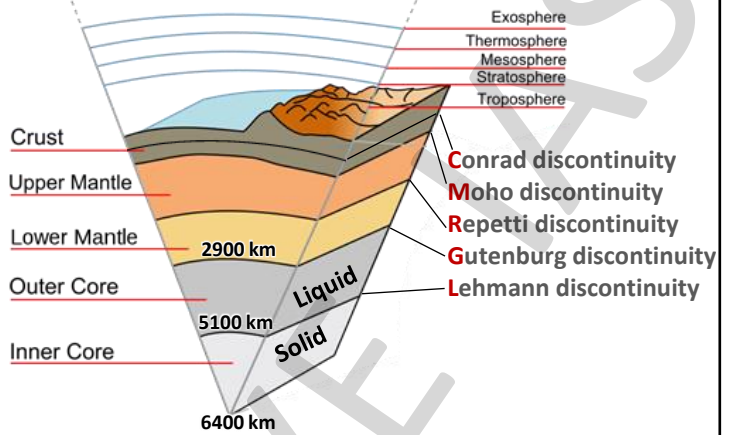
Core:

Mostly made of nickel & iron (nife)

Why layers?

- Formation of earth; High temperature
- Material separated as per to density
- Heavy sank; lighter rose
- Crust cooled and solidified

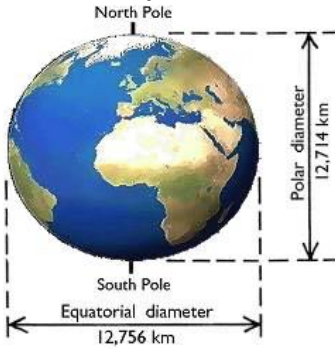
Structure of Earth



- 70 km** : thickness of Continental crust at **Himalayas**
- 30 km** : thickness of Continental crust at **plains**
- 05 km** : thickness of **oceanic** crust

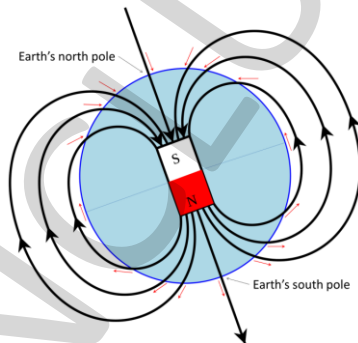
Earth is perfect sphere?

No, its ellipsoid



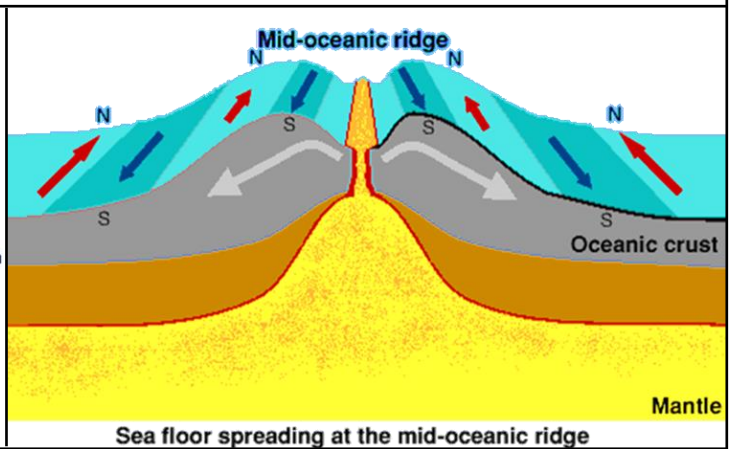
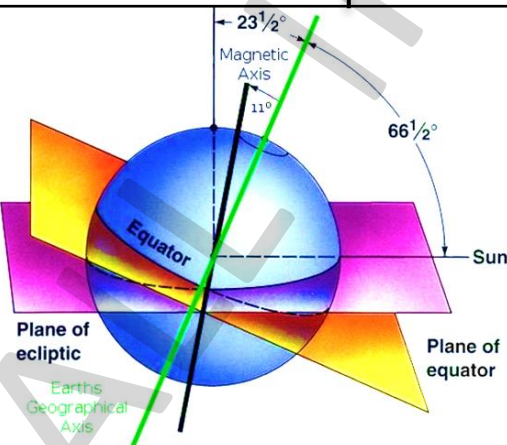
Equator is 21 km far than poles

Earth's Magnetic Field



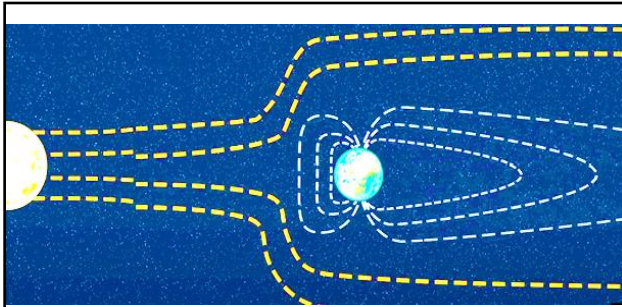
Earth's magnetic field:

- Reason: iron in core; earth rotates
- Protects us from harmful radiation
- If larger core → stronger MF
- If faster rotation → stronger MF
- Reversed every few lakh years
- Magnetic axis makes 11° angle with Geographic axis
- Magnetic equator passes through Thumba, Kerala



I read I forget, I see I remember

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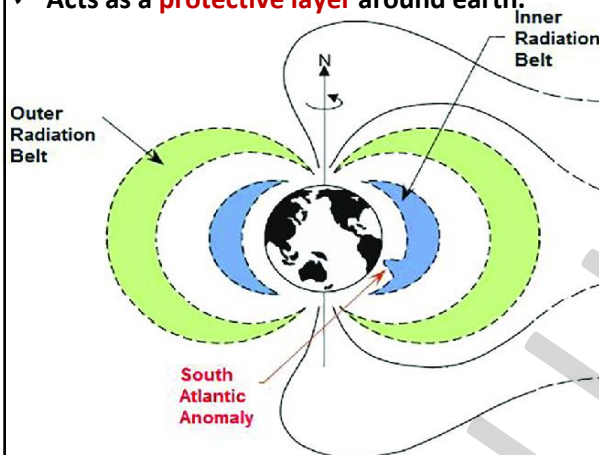
Magnetosphere:

- ❑ Region where earth's magnetic field dominates
- ❑ Its shape is influenced by **Solar wind**
- ❑ **6-10 times** of earth's radius on **sun side**
- ❑ **1000 times** of earth's radius on **night side**
- ❑ **Magnetopause:** outer boundary of earth's magnetosphere

Auroras; VARs; SAA

Van Allen Radiation belt:

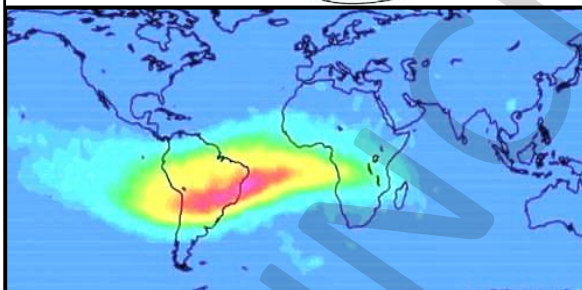
- ✓ High energy particles **trapped** by earth's MF
- ✓ **Two** such belts (inner and outer)
- ✓ Extends from **600 km to 60,000 km**.
- ✓ Acts as a **protective layer** around earth.



Auroras:

Formed at poles due to disturbances in earth's magnetosphere caused by solar wind.

- Polar lights (**aurora polaris**)
- Northern lights (**aurora borealis**)
- Southern lights (**aurora australis**)



South Atlantic Anomaly:

- Over South America & southern Atlantic Ocean.
- Here earth's **magnetic field is relatively weak**.
- Here inner VAR belt comes down to just **200 km**.
- Adversely affects **people** living under this area? **No**
- Adversely affects **satellites** passing through? **Yes**

Gravity Anomaly

What: difference b/w actual and expected gravity at a place

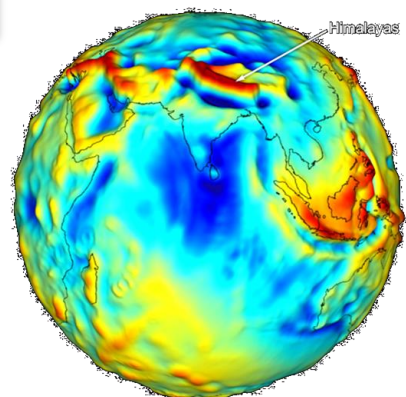
Reason: uneven distribution of mass in earth

Gravity comes from mass.

Mass is **not** uniformly distributed.

GRACE & GRACE-FO:

- ✓ 2002-17 and 2018
- ✓ NASA and Germany
- ✓ *Tom & Jerry* are the nicknames of two satellites.
- ✓ To make gravity map, to track water movement.



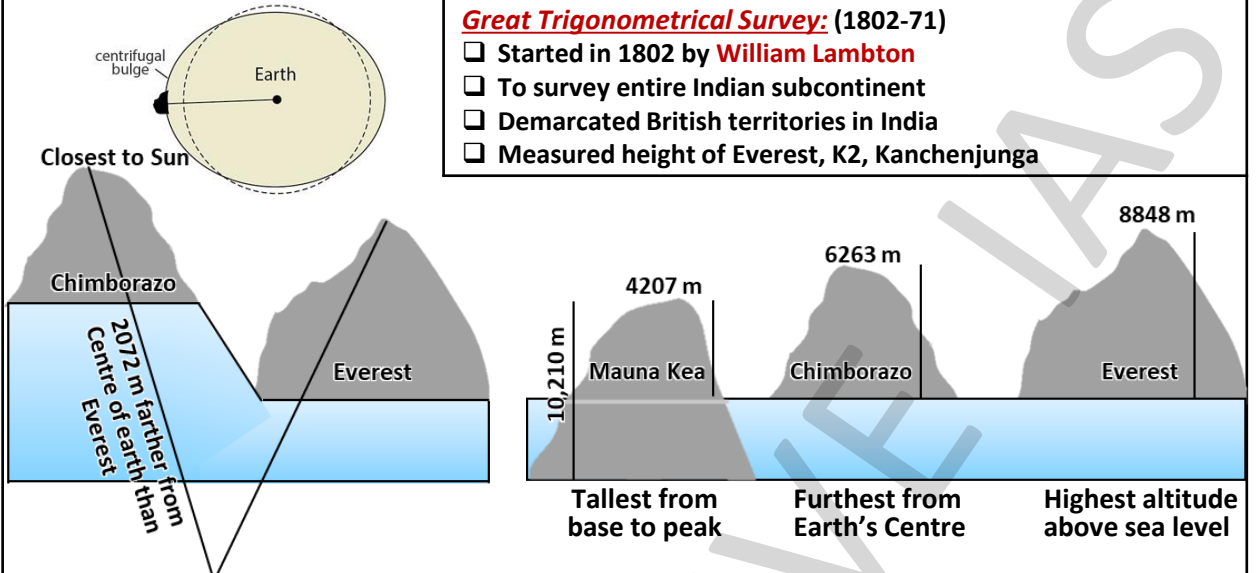
I read I forget, I see I remember | See explanation of this PDF on www.youtube.com/c/allinclusiveias

Mt. Everest

aka Chomolungma, Sagarmatha
named after **George Everest** (Surveyor General of India 1830-43)

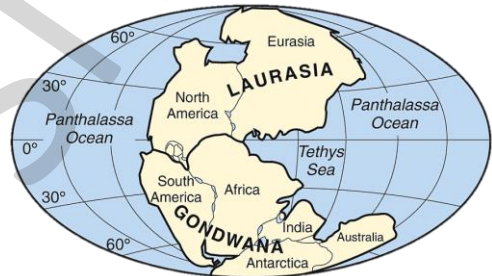
Great Trigonometrical Survey: (1802-71)

- Started in 1802 by **William Lambton**
- To survey entire Indian subcontinent
- Demarcated British territories in India
- Measured height of Everest, K2, Kanchenjunga

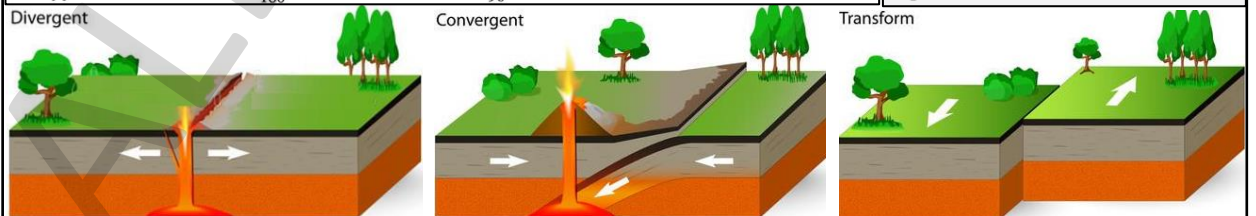
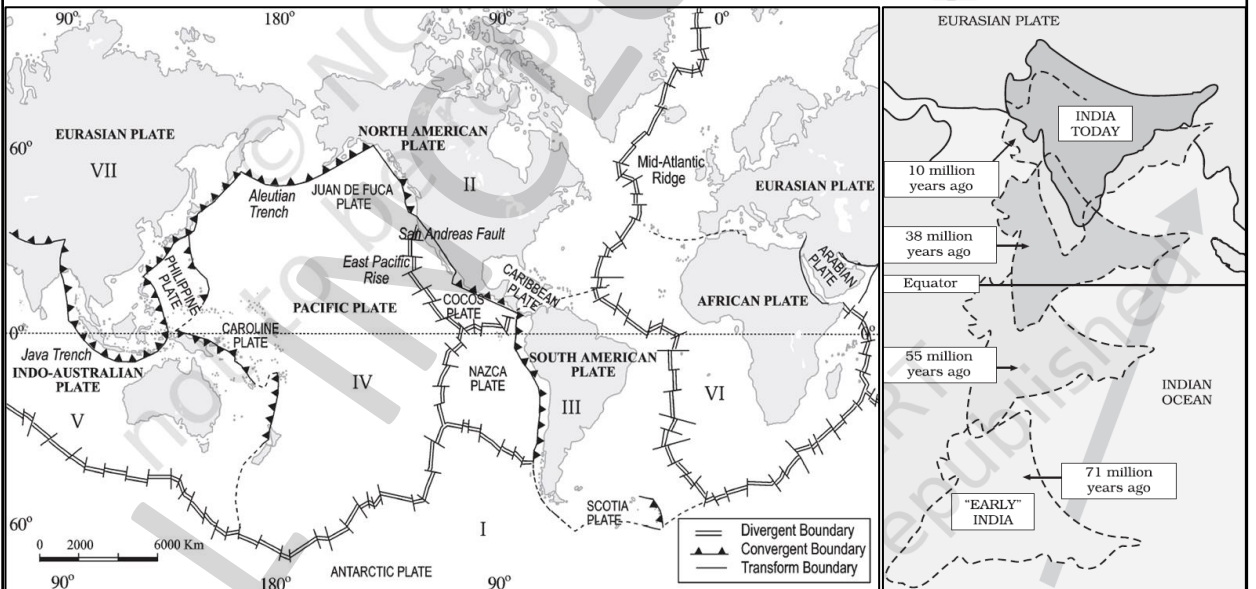


Ocean **Panthalassa**; Continent **Pangaea**

- 200 mya:** Pangea broke; India started moving north
- 140 mya:** India at 50°S
- 60 mya:** outpouring of lava; Deccan traps formed
- 40 mya:** India collided with Asia



Q. Which sea separated India from Asia? **Tethys Sea**



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Seabed

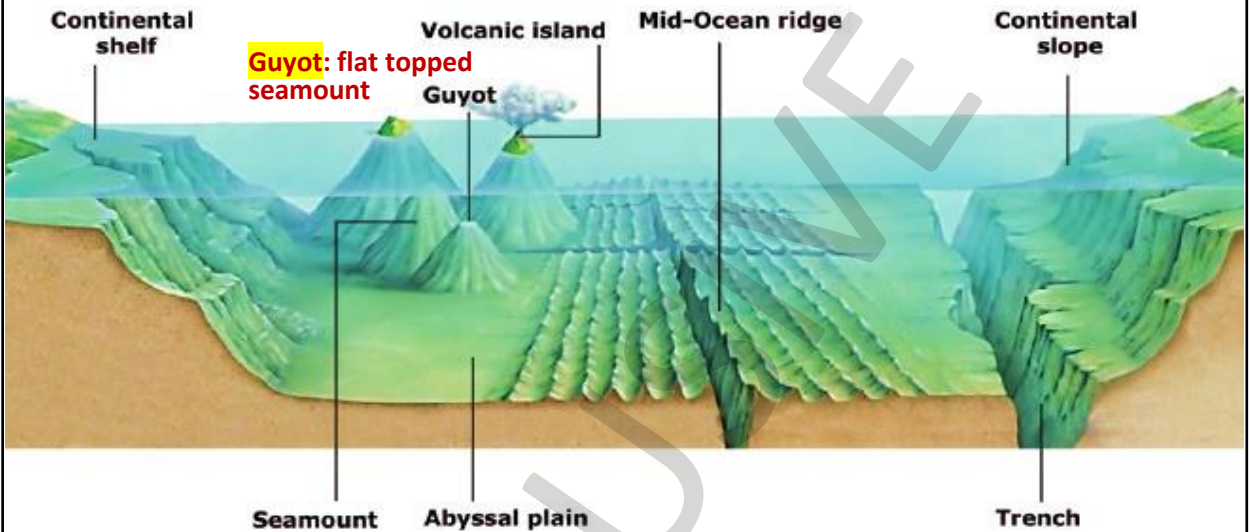
Seabed 2030 Project:

- to make detailed map of ocean floor by 2030;
- by Nippon & GEBCO (General Bathymetric Chart of Oceans)
- GEBCO operates under UNESCO's International Hydrographic Organization & Intergovernmental Oceanographic Commission

Continental Shelf: extended margin of continent occupied by seas; average width 80km; largest is Siberian shelf in Arctic ocean (1,500 km); depth 30m to 600m; source of fossil fuels; ends at shelf break

Mid-Oceanic Ridges: two mountain chains separated by a large depression; Iceland is part of mid- Atlantic Ridge

Continental Slope: connects continental shelf and ocean basin; depth 200-3000m; its boundary indicates end of continents



Seamount: mountain with pointed summit that does not reach surface; Emperor seamount is extension of Hawaiian islands

Deep sea plain: flattest and smoothest regions of the world; 3-6 km deep; covered with fine sediments like clay and silt

Oceanic Deeps or Trenches: deepest part of ocean; 3-5km deeper than surrounding; occur at base of continental slopes; associated with active volcanoes & earthquakes; most in Pacific

Deep Ocean Mission:

- Explore oceans for minerals, energy, biodiversity, etc.
- Involves multiple agencies like MoES, ISRO, DRDO, National Biodiversity Authority

Digital Ocean:

- web portal for all ocean related data
- By Indian National Centre for Ocean Information Services (MoES)

Samudrayaan:

MoES project to send humans to 6km deep ocean

Millets

- small grained cereal
- grown here for thousands of years
- drought** tolerant; need less **inputs** (fertilizers, pesticides)
- Called **famine reserves** (grow in 65 days, keep for years)
- "Mostly" grown as **kharif** crop

Health benefits: (many)

- Micronutrients** (aka nutri-cereals) calcium, iron, phosphorus, etc. more nutritious than wheat & rice
- high fibre; **detoxify**; non-allergenic
- gluten free; low in Glycemic Index;
- Helps prevent type 2 **diabetes**;

Major Millets:

Jowar (Sorghum)
Bajra (Pearl Millet)
Ragi (Finger Millet)

Minor Millets:

Kodo, **Foxtail**,
Proso, **Barnyard**

Pseudo Millets:

Amaranth (Ramdana); **Buckwheat** (Kuttu)

Largest producer:

- India: 30-40% of global production.
- Rajasthan, Maharashtra, Karnataka

Indian Institute of Millets Research:

under ICAR; est. in 1958; HQ: Hyderabad

2018: Year of millets in India

2023: Year of millets by UN

Prelims 1997:

List-1

- A. Barley
- B. Rice
- C. **Millets**
- D. Tea

List-2

1. **Hot and dry climate with poor soil**
2. Cool climate with poorer soil
3. Warm & moist climate with high altitude
4. Hot & moist climate with rich soil

Codes:

(a) A - 2; B - 4; C - 1; D - 3

(b) A - 3; B - 4; C - 1; D - 2

(c) A - 2; B - 1; C - 4; D - 3

(d) A - 3; B - 2; C - 4; D - 1

Prelims 2016:

With reference to 'Initiative for Nutritional Security through Intensive **Millets** Promotion', which of the following statements is/are correct?

1. This initiative aims to **demonstrate** improved production and post-harvest **technologies**, and to demonstrate value addition techniques, in an integrated manner, with cluster approach.
2. **Poor**, small, marginal and tribal **farmers** have larger stake in this scheme.
3. An important objective of the scheme is to encourage farmers of **commercial crops to shift to millet** cultivation by offering them free kits of critical inputs of nutrients & microirrigation equipment.

Select the correct answer:

(a) 1 only

(b) 2 and 3 only

(c) 1 and 2 only

(d) 1, 2 and 3



Climate Vulnerability

Understand like this:

Threat: something that can harm you

Vulnerability: your weakness

Risk: damage it can cause you

National climate vulnerability assessment report:

- by MoEFCC Ministry of Science & Technology
- identifies vulnerability of states & districts
- 8 eastern states are most vulnerable

National Action Plan on Climate change: (8 missions):

1. National Mission on Strategic **Knowledge** for Climate Change
2. National Mission on Sustainable **Habitat**
3. National Mission for Enhanced Energy **Efficiency**
4. National **Solar** Mission
5. National **Water** Mission
6. National Mission for a **Green India**
7. National Mission for Sustainable **Agriculture**
8. National Mission for Sustaining the **Himalayan** Ecosystem

IPCC:

- Intergovernmental Panel on **Climate Change**
- It is a **UN body**; **Geneva**, Switzerland
- Est. in **1988** by **UNEP and WMO**
- Does **not** conduct original research
- IPCC got 2007 Nobel Peace Prize

IPBES:

- Intergovernmental Platform on **Biodiversity** and Ecosystem Services
- It is **not** a UN body; **Bonn**, Germany
- Est. in **2012** by 94 **Governments**
- Does **not** conduct **original** research
- UNEP** provides **secretariat** services to IPBES

Biennial Update Report (BUR) - 3

India's Third Biennial Report to UNFCCC:

- Submitted by MoEFCC
- Emission intensity fell by 24% in 2005-2016

(But absolute GHG emissions increased)

India GDP (current US\$):

- 2005: 0.82 trillion
- 2015: 2.10 trillion
- 2019: 2.87 trillion
- 2020: 2.62 trillion

Source: data.worldbank.org

Emission Intensity:

GHG emissions per unit of GDP

Some examples mentioned:

Direct seeding of rice (pg-50); Neem coated urea

Correction for page-4:

India's INDCs: (by 2030)

- 1) Reduce **emission intensity** by **33-35%**, compared to 2005 level
- 2) Create additional **2.5-3 billion** tonne of carbon sink
- 3) Get **40%** energy from **non-fossil** fuel sources.

Intended Nationally Determined Contribution

Prelims 2016:

Why does govt. promote use of **Neem-coated urea** in agriculture?

- (a) Release of Neem oil in soil increases nitrogen fixation by soil microorganisms
- (b) Neem coating slows down rate of dissolution of urea in soil
- (c) Nitrous oxide, which is a greenhouse gas, is not at all released into atmosphere by crop fields
- (d) It is a combination of weedicide & fertilizer for particular crops

Neem Coated Urea:

- Neem coated urea **slows down nitrogen release**, so plants absorb more.
- Less diversion to industry; less consumption by farmer; low subsidy burden

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Emission Norms

TREM Stage norms:

- by MoEFCC MoRTH
- for tractors, harvesters, etc.
- Tractors above 50 hp (only 7%)
- TREM Stage-IV norms will come in force from October 2021.

Coal power plants and fly ash:

Covered on pages 16,17,18

CEV Stage norms:

- by MoEFCC MoRTH
- for construction equipment vehicles

Central Pollution Control Board

- CPCB is a statutory body under MoEFCC
- Water (Prevention & Control of pollution) Act, 1974
- Gives technical services to MoEFCC under EPA, 1986
- also has powers under some other laws.

Bharat Stage Norms: (both fuel & vehicle needs to be upgraded)

1. They are based on **Euro** emission norms.
2. They are issued by **CPCB** (Central Pollution Control Board).
3. "**India 2000**" was the first BS norm enforced in the year **2000**.
4. In **April 2018 Delhi** became first city to run on BS-VI fuel
5. India skipped BS-V, and enforced BS-VI from **April 2020**.
6. SOx **10 ppm** (earlier 50 ppm)
7. NOx **70%** less in diesel, **25%** less in petrol
8. Apply to: 2/3 wheelers, cars, trucks, buses, (not airplanes)

Source of air pollution:

As per International Energy Agency's Clean Coal Centre:

- Air pollution:**
→ coal power plants
- SO₂:**
→ coal Power plants
- NOx:**
→ Transport

GloLitter Partnerships Project:

- by IMO, FAO, Norway
- help developing countries reduce marine litter, especially plastic.

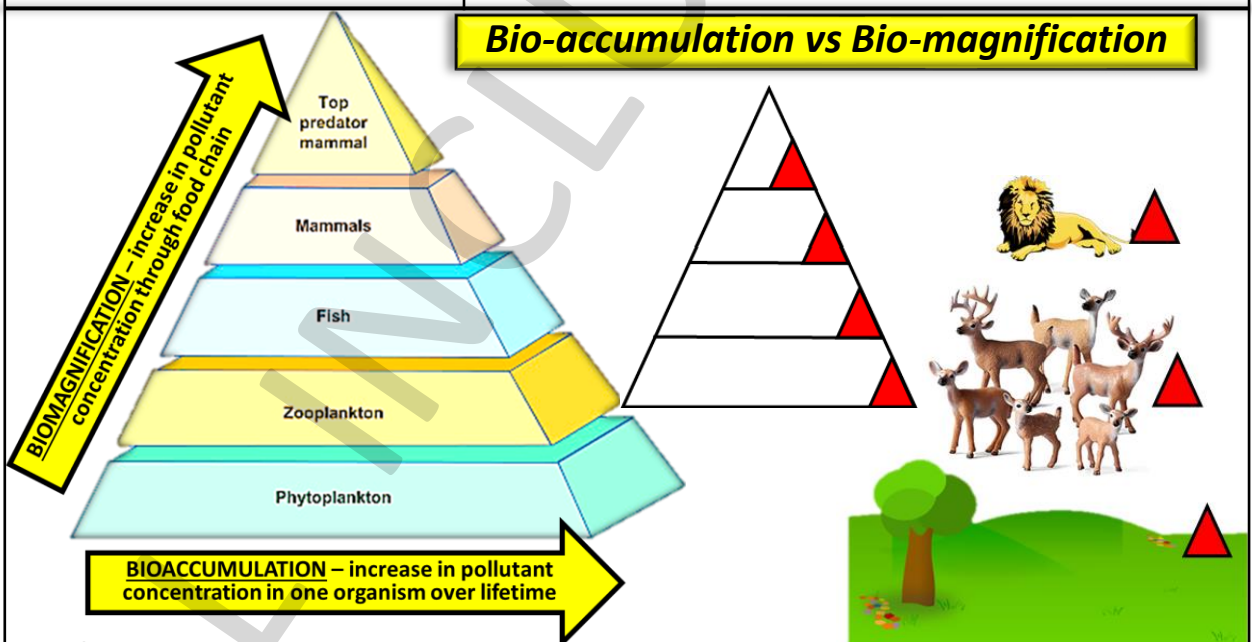
Marine Litter

See page-23

Food and Agriculture Organization UN sp. ag; Rome; 1945

International Maritime Organization UN sp. ag; London; 1948

Bio-accumulation vs Bio-magnification



Prelims 2010:

A pesticide which is a chlorinated hydrocarbon is sprayed on a food crop. The food chain is: Food crop – Rat – Snake – Hawk. In this food chain, **highest concentration** of the pesticide would accumulate in which one of the following?

- (a) Food crop (b) Rat (c) Snake **(d) Hawk**

Which substances bio-accumulate and bio-magnify?

- Does not degrade;
- Not easily excreted; It
- Is soluble in fats.
- e.g. Mercury, PoPs (page-21)

I read I forget, I see I remember

See explanation of this PDF on www.youtube.com/c/allinclusiveias

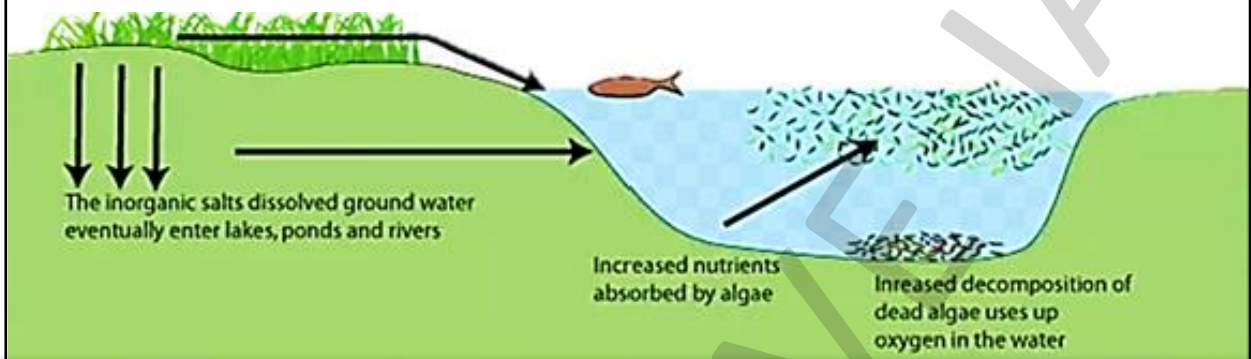
Dead Zones

What are Dead zones w.r.t. water bodies?

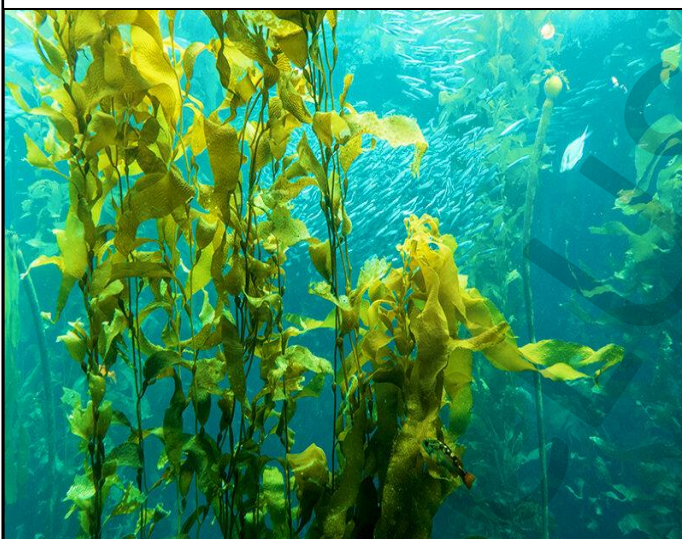
- Areas in a water body with **too less oxygen** (**hypoxia**) for marine life to survive.
- Mostly happens due to **Eutrophication**
- One such Dead zone seen in **Bay of Bengal**

What are the reasons for ocean deoxygenation?

- Global warming (warm water holds less oxygen)
- Eutrophication:
excess nutrients → Algal bloom → Algae decomposition uses up oxygen



Seaweed



- plant/algae growing in water body
eg: phytoplankton, kelps, etc.
- Benefits:**
→ Many are edible, nutrient rich, medicines, chemicals for industries, cosmetics, biofuel, etc.
- China:**
→ Half the global production
- India:**
→ nominal, will increase
→ Cultivated at **Palk Bay** (TN), etc.
→ Multipurpose **Seaweed park** to be set up in **Tamil Nadu**

Coastal Zone Management

Integrated Coastal Zone Management:

- 2010; with World Bank assistance
- For livelihoods and environment

SICOM:

- Society for Integrated Coastal Management;
- under MoEFCC
- Implements: **ICZM, ENCORE**

National Centre for Sustainable Coastal Management:

- Chennai;
- under MoEFCC;

RoRo:
Roll on Roll off

Coastline: 7516.6 km
Mainland: 5422.6 km
Islands: 2094 km

RoPax:
RoRo passenger

Longest: Gujarat 1600 km
Shortest: Goa 131 km

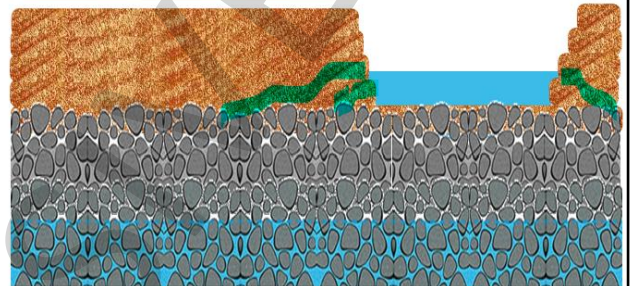
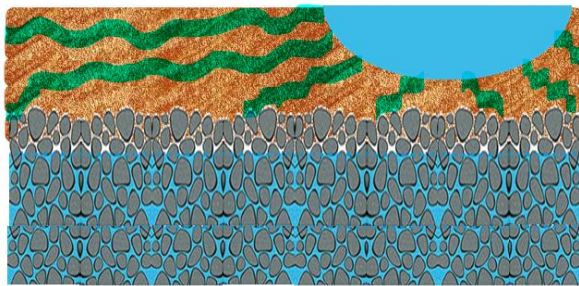
- CRZ notifications by MoEFCC under **EPA 1986**
- CRZ **2018** notification allows more activities compared to CRZ **2011** notification (1991-2011-2018)
- It is based on recomm. of Shailesh Nayalk Committee

CRZ	Coastal Regulation Zone; 500m from HTL
CRZ I A	Eco-sensitive areas
CRZ I B	Inter-tidal areas
CRZ II	Areas which have been developed up to or close to the shore
CRZ III A	Population density > 2,161 sq km
CRZ III B	Population density < 2,161 sq km
CRZ IV A	12 nautical miles from LTL towards sea
CRZ IV B	Tidal influenced waterbodies
NDZ	50m from HTL in CRZ-IIIA; 200m from HTL in CRZ-IIIB

I read I forget, I see I remember

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Sand mining



Prelims 2018:

Which of the following are the possible consequences of heavy **sand mining** in riverbeds?

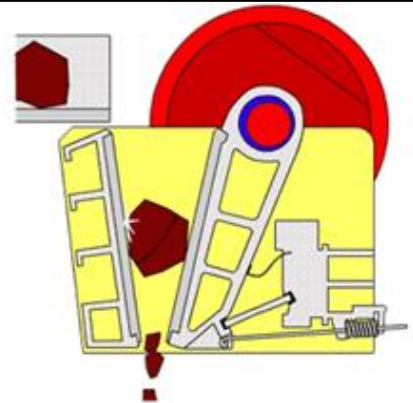
1. **Decreased salinity** in the river
2. **Pollution** of groundwater
3. Lowering of the **water-table**

Select the correct answer using the code given below:

- (a) 1 only **(b) 2 and 3 only**
 (c) 1 and 3 only (d) 1, 2 and 3

Alternatives of river bed sand:

- M-sand
 Fly ash



Prelims 2019:

With reference to the management of **minor minerals** in India, consider the following statements:

1. **Sand** is a 'minor mineral' according to the prevailing law in the country.
2. State Governments have the power to grant mining leases of minor minerals, but the powers regarding the formation of **rules** related to the grant of minor minerals lie with the **Centre** Government.
3. **State** Governments have the power to frame **rules** to **prevent illegal** mining of minor minerals.

Which of the statements given above is/are correct?

- (a) 1 and 3 only** (b) 2 and 3 only
 (c) 3 only (d) 1, 2 and 3 only

What you need to remember:

- Sand is a **minor mineral**.
 For minor minerals, **State govt.** :
 → Frames rules to grant mining lease
 → Grants mining lease
 → Frames rules to prevent illegal mining

See page-33

Turtles

Turtle Wildlife Sanctuary:

- in **Varanasi**, since 1989

Turtle Rehab Centre:

- for freshwater turtle
- in **Bihar's** Bhagalpur

Threats:

- probably all correct

Denotify turtle nesting site in Andaman for shipment project: Wildlife board

The National Board for Wildlife has suggested the implementation of a mitigation plan to facilitate nesting of turtles as well as connectivity between the Galathea river and the Bay of Bengal

By Jayashree Nandi
UPDATED ON JAN 28, 2021 10:28 AM IST

- ❑ **Five species** in Indian waters: Olive Ridley, Leatherback, Green, Hawksbill, Loggerhead
- ❑ All protected under Schedule I of WPA 1972

Leatherback turtle:

- nests in Galathea National Park (south Great Nicobar)

Red-eared turtle:

- **invasive** species recently seen in Kerala (originally from Mexico)

UNDP Sea Turtle Project in India:

- for many sea turtle species.
- since 1999; with WII (1982, Dehradun)

MoEFCC in 2021 launched:

- National Marine Turtle Action Plan
- Marine MegaFauna Stranding Guidelines

IOSEA Marine Turtle MoU:

- Indian Ocean South East Asia
- MoU to conserve turtles
- India is part of it.

Smallest	Kemp's Ridley	Atlantic ocean	CR
2 nd smallest	Olive Ridley	Everywhere	VU
Largest	Leatherback	Everywhere	VU



<https://www.fisheries.noaa.gov/species/kemps-ridley-turtle>

- **Kemp's** Ridley sea turtles are the **smallest** sea turtle in the world.

<https://www.fisheries.noaa.gov/species/olive-ridley-turtle>

- **Olive** Ridley sea turtle is **among the smallest** of the world's sea turtles.

<https://www.wwf.org/about-wwf/priority-species/lesser-known-species/olive-ridley-turtle/>

- **Olive** Ridley turtles are the **smallest** and most abundant of all sea turtles found in the world



Coelacanth

- ❑ Existed 40-50 crore years ago
- ❑ Assumed extinct; seen in 1938
- ❑ Indian Ocean; deep sea



Mandarin Duck

- ❑ IUCN: LC; Migratory bird
- ❑ East China, Japan, etc.
- ❑ Recently seen near Dibru Saikhowa NP in Assam

Bharitalasuchus tapani



- ❑ reptile; lived 24 crore years ago
- ❑ Fossils found in Yerrapalli rock formation Pranhita-Godavari basin in Telangana

Himalayan Serow



- Recently seen in HP, Assam
- Many species of Serow, all in Asia
- Like cross of cow, pig, goat, donkey
- They are Herbivores
- IUCN: VU; Schedule-1 WPA 1972

I read I forget, I see I remember

See explanation of this PDF on www.youtube.com/c/allinclusiveias

Elephants

Prelims 1999:

"India has the largest population of the Asian X. Today, there are just about 20,000 to 25,000 X in their natural habitat spreading across the evergreen forests, dry thorn forest, swamps and grasslands. Their prime habitats, are however the moist deciduous forests. The X population in India ranges from north-west India where they are found in the forest divisions of Dehradun, Bijnor and National districts, of UP to the Western Ghats in the states of Karnataka and Kerala and Tamil Nadu. In Central India, their population distributed over Southern Bihar and Orissa. In the East, they are seen in North Bengal, Assam and a few other states." The animal "X" referred to in this quotation is:

- (a) Lion (b) Elephant (c) Tiger (d) One-horned rhinoceros

Prelims 2009:

Elephant pass, frequently in news, is mentioned in context of the affairs of which of the following?

- (a) Bangladesh
(b) India
(c) Nepal
(d) Sri Lanka



Prelims 2020:

With reference to Indian elephants, consider following statements:

1. The leader of an elephant group is a female
2. The maximum gestation period can be 22 months.
3. Elephant can normally go on calving till the age of 40 years only
4. Among the States, the highest elephant population is in Kerala.

Which of the statements given above is/ are correct?

- (a) 1 and 2 only (b) 2 and 4 only
(c) 3 only (d) 1, 3 and 4 only



African Forest Elephant



African Bush Elephant

Elephant (IUCN: Endangered)

- ✓ 1992: Project Elephant
- ✓ 2010: National **Heritage** animal
- ✓ 60% of 50,000 Asian Elephants are in India
- ✓ State with most wild elephants: **Karnataka**
- ✓ State with most captive elephants: **Assam**

Surakhya:

- ✓ portal on Human-Elephants Conflict
- ✓ using data for better policy formulation

Miyawaki Technique



Miyawaki style afforestation:
Raising native trees in dense plantations

Venus Flytrap



- Dionaea muscipula
- IUCN: VU
- carnivorous plant
- Native to USA
- Magnetic fields detected recently



Tiger

See page-31

Tiger translocation:

- ❑ **2018:** Kanha (MP) and Bandhavgarh (MP) → Satkosia (Odisha)
Failed: one died, another taken back
 - ❑ **2020/21:** Jim Corbett → Rajaji
- Hailey/Corbett NP: 1st NP (1936) and also 1st under Project Tiger (1973)



Lantana camara

- ❑ Native of Americas;
- ❑ **Invasive species** in India
- ❑ Affecting 40% of tiger habitat

Mahseer



Rhinos are herbivores



They weigh 1000 kg, still can swim.

New Delhi Declaration on Asian Rhinos:

- ❑ 2019; By MoEFCC, IUCN, WWF
 - ❑ India, Nepal, Bhutan, Indonesia, Malaysia
 - ❑ To increase population of Asian Rhinos
- Nat. Conservation Strategy for Rhino also 2019

Rhino

Indian Rhino Vision 2020: (2005-2020)

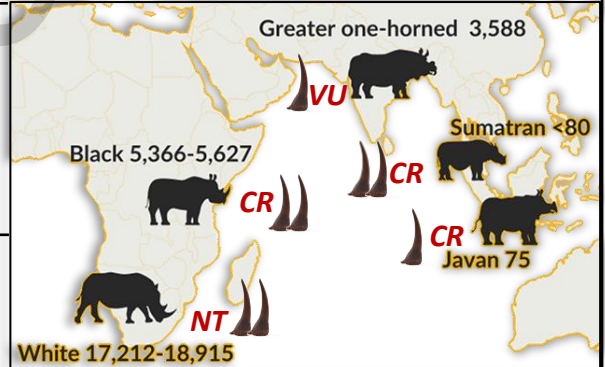
- ❑ Target: 3,000 rhinos in **Assam** by 2020 by establishing populations in new areas.
- ❑ Translocate **from Kaziranga and Pobitora** to
✓Manas, ✓Orang, Laokhowa, Buracharpori, Dibrusaikhowa
- ❑ **Manas: 0** in 2005 → **WHS 2011** → **48** in 2021
- ❑ **2008:** Indian Rhino declared VU (from EN)

Prelims 2019:

Consider the following statements:

1. Asiatic **lion** naturally found in **India only**
2. **Double-humped camel** is naturally found in **India only**
3. **One-horned rhinoceros** is naturally found in **India only**

Which one of the statement given above is/are correct?
(a) 1 only (b) 2 only (c) 1 and 3 only (d) 1, 2 and 3



White and Black Rhinos are actually Grey in color



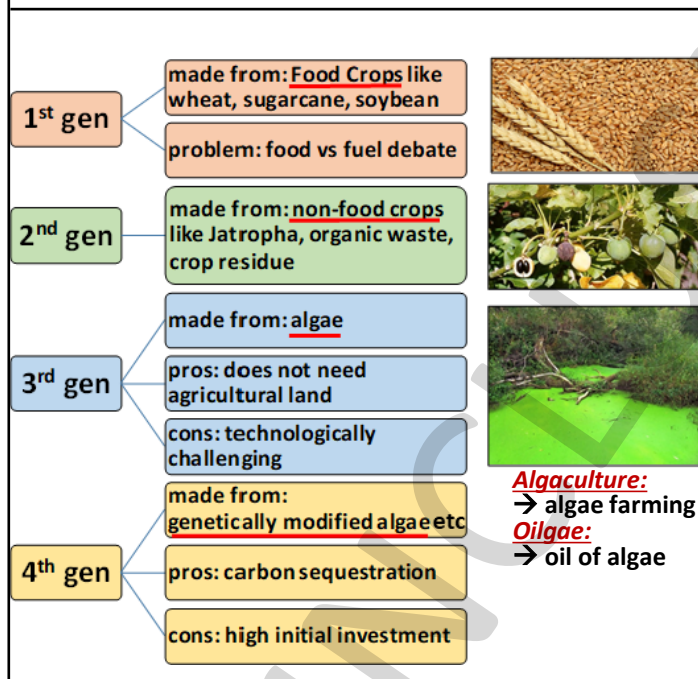
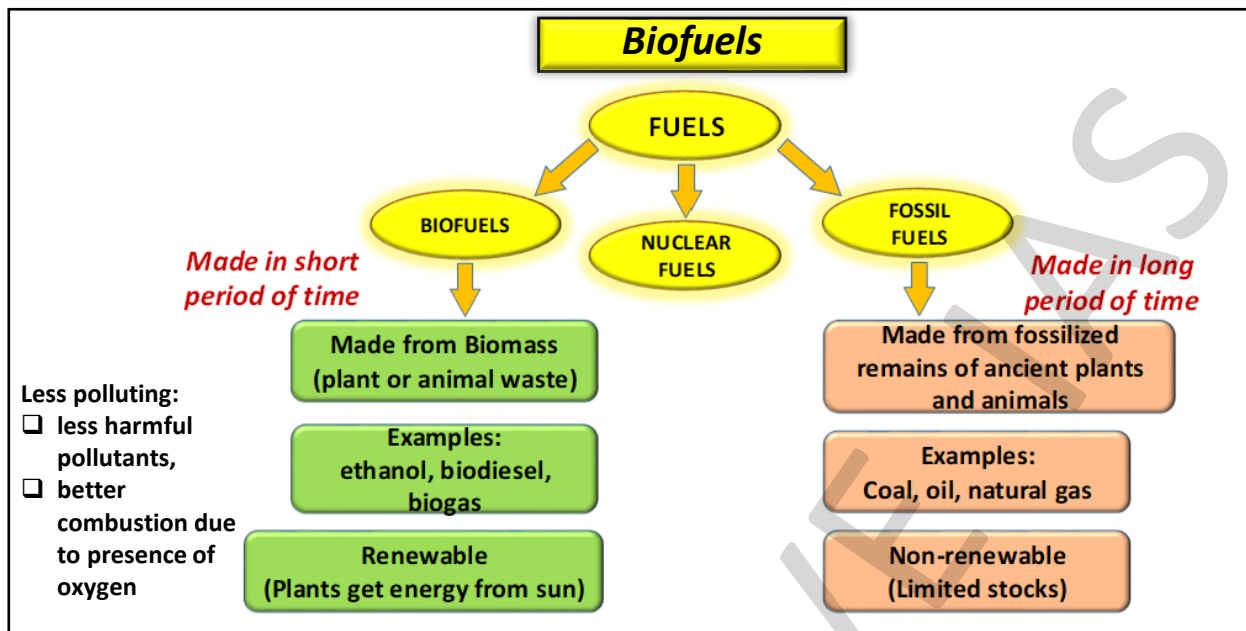
Indian rhinoceros:

- Greater one-horned rhino
- More than 2/3 in Kaziranga NP
- Highest density in Pobitora
- Pobitora WS aka Mini Kaziranga

- NATIONAL/STATE BOUNDARY
- HISTORICAL DISTRIBUTION
- CURRENT DISTRIBUTION
- POTENTIAL HABITAT

I read I forget, I see I remember

See explanation of this PDF on [YouTube](https://www.youtube.com/c/allinclusiveias) www.youtube.com/c/allinclusiveias



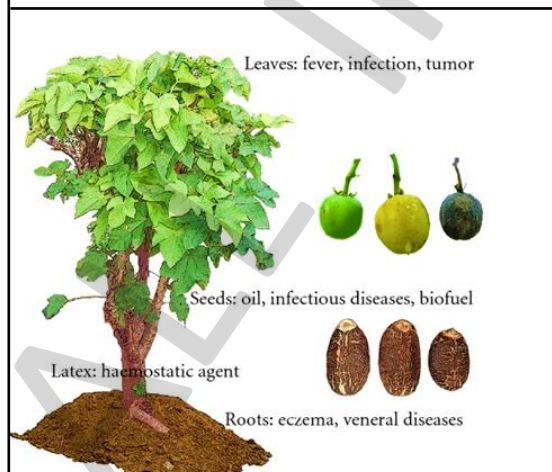
Prelims 2017:

It is possible to produce algae based biofuels, but what are the likely limitations of developing countries in promoting this industry?

1. Production of algae based biofuels is possible in seas only and not on continents.
2. Setting up and engineering the algae based biofuel production requires high level of expertise/technology until the construction is completed.
3. Economically viable production necessitates the setting up of large scale facilities which may raise ecological and social concerns.

Select the correct answer:

- (a) 1 and 2 only **(b) 2 and 3 only**
 (c) 3 only (d) 1, 2 and 3



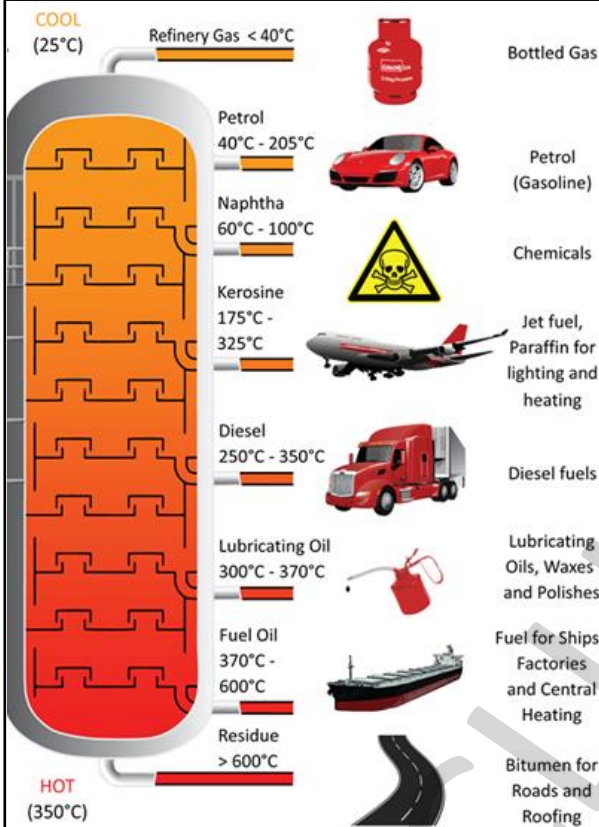
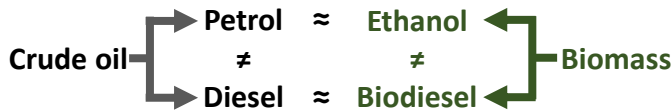
Prelims 2010:

Given below are the names of four energy crops. Which one of them can be cultivated for ethanol?

- (a) Jatropha **(b) Maize**
 (c) Pongamia (d) Sunflower

Jatropha:

- native of **India Americas**
- drought-resistant
- used in medicines, insecticides, fertilizers, etc.
- seeds have up to 35% non-edible oil.
- used for making ~~ethanol~~ **biodiesel**



Prelims 2014:
 Consider the following statements:
 1. Maize can be used for the production of **starch**.
 2. Oil extracted from maize can be a feedstock for **biodiesel**.
 3. **Alcoholic** beverages can be produced by using maize.
 Which of the above statements are correct?
 (a) 1 only (b) 1 and 2 only
 (c) 2 and 3 only (d) 1, 2 and 3

Blending target by 2030:
 ➤ Ethanol: (E20) 20% (currently 8.5%) by **2025**
 ➤ Biodiesel: 5% (currently 0.1%)
 ➤ Price that OMCs pay is set by CCEA
 ➤ Problem: performance, mileage, etc.

Drop-in fuel:
 ➤ functionally same to conventional fuel
 ➤ don't require engine modification

Bi-fuel vehicle: Fuels stored in separate tanks
Flex-fuel vehicle: Fuels store in same tank (May become mandatory, can run even E85)

Stardust 1.0: in India USA
 ➤ First commercial space launch vehicle powered by biofuel;

<p>An indicative target of 20% blending of ethanol in petrol and 5% blending of biodiesel in diesel is proposed by 2030.</p>	<p>With a thrust on Advanced Biofuels, the Policy indicates a viability gap funding scheme for 2G ethanol Bio refineries of Rs.5000 crore in 6 years in addition to additional tax incentives, higher purchase price as compared to 1G biofuels.</p>	<p>Categorization of Biofuels into Basic Biofuels - First generation(1G) Bioethanol & biodiesel and "Advanced Biofuels"- Second Generation(2G) ethanol, drop-in fuels, algae based Third Generation(3G) Biofuels.</p>	<p>Increase scope of raw material for ethanol procurement by encouraging Intermediate (B-Molasses), Sugarcane Juice, other Sugar containing materials and damaged as well as surplus food grains.</p>	<p>National Biofuel Policy 1st in 2009; new in 2018</p> <p>Basic vs Advanced: 1G is Basic; 2G & 3G are Advanced</p> <p>For using used cooking oil? RUCO by FSSAI</p>
<p>Develop National Biomass repository by conducting appraisal of biomass across the Country.</p>	<p>Bio diesel production to be encouraged from non edible oilseeds, used cooking oil, short gestation crops and development of supply chain mechanisms.</p>	<p>Thrust on research, development and demonstration in the field of Biofuel feedstock production, advanced conversion technologies from identified feedstock.</p>	<p>Setting up of National Biofuel coordination committee (NBCC) under Ministry of Petroleum & Natural Gas and Working Group on Biofuels.</p>	<p>NBCC under ministry? X Ministry of Agriculture ✓ Ministry of P&NG</p> <p>Scheme for 2G ethanol? PM Ji-VAN Yojana</p>

Prelims 2020:

According to India's National Policy on Biofuels, which of the following can be used as raw materials for the production of biofuels?

1. Cassava
2. Damaged wheat grains
3. Groundnut seeds
4. Horse gram
5. Rotten potatoes
6. Sugar beet

Select the correct answer:

- (a) 1,2,5,6 (b) 1,3,4,6 (c) 2,3,4,5 (d) 1,2,3,4,5,6

	1	2	3	4	5	6
(a)	✓	✓	✗	✗	✓	✓
(b)	✓	✗	✓	✓	✗	✓
(c)	✗	✓	✓	✓	✓	✗
(d)	✓	✓	✓	✓	✓	✓

PM JI-VAN Yojana ?

(Ji-VAN = Jaiv Indhan- Vatavaran Anukool fasal awashesh Nivaran)

- MoP&NG; 2019; to promote **2G ethanol** capacity
 - **Financial support (VGF)** to Integrated Bioethanol projects.
 - Ethanol produced under this scheme will be used **only for blending** purpose.
- * PM JI-VAN should not be confused with PM Jeevan Jyoti yojana which is a life insurance scheme.

Prelims 2003:

Consider the following statements:

1. **Molasses** is a by-product of sugar production process.
2. **Bagasse** obtained in sugar mills is used as fuel in boilers to generate steam for sugar factories.
3. **Sugar** can only be produced from sugarcane as the raw material.

Select the correct answer:

- (a) 1 and 2 (b) 2 and 3
(c) 1 and 3 (d) 1, 2 and 3



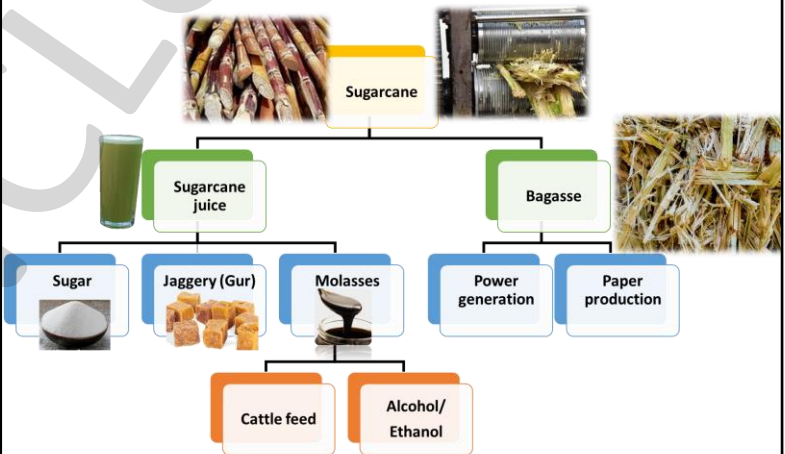
Prelims 2013:

With reference to the usefulness of the **by-products of sugar industry**, which of the following statements is/are correct?

1. **Bagasse** can be used as biomass fuel for the generation of energy.
2. **Molasses** can be used as one of the feedstocks for the production of synthetic chemical fertilizers.
3. **Molasses** can be used for the production of ethanol.

Select the correct answer:

- (a) 1 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3



NEWS SERVICES DIVISION
ALL INDIA RADIO

Nov 06, 2019, 2:06PM

No separate environmental clearance required to produce additional ethanol from B-heavy molasses:
Prakash Javadekar

Q. With reference to **ethanol production** in India, which of the following statements are correct ?

- Molasses and Bagasse are **by-products** of sugar-making.
- Second molasses ('B' Molasses) is created from **second boiling**, and has a slightly bitter taste.
- No separate **environmental clearance** is required to produce ethanol from B-heavy molasses as it does not increase pollution load.

All-Inclusive Current Affairs for Prelims 2021

Environment Class-6

Update (Feb-August)

CMS 1979

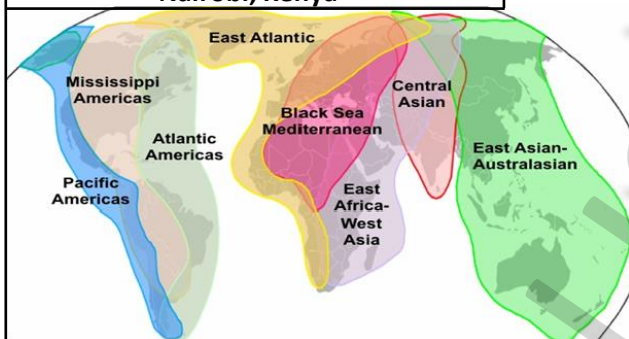
Convention on Migratory Species
Bonn Convention

Important years:

1979: Signed at Bonn, Germany
1983: Entered into force; India signed
1985: First CoP, Bonn, Germany
2020: 13th CoP, Gandhinagar, India

Secretariat:

administered by? UNEP
Location? **Bonn**, Germany
Nairobi, Kenya



Eight major migratory bird flyways

CMS CoP-13:

- ❖ Feb 2020; **Gandhinagar**, India
- ❖ Logo: **Kollam** (S. Indian art)
- ❖ Mascot: **Gibi** (page-32)
- ❖ Theme: Migratory species **connect the planet** & together we welcome them home
- ❖ 10 new species added (7+3)
- ❖ Added to Appendix I:
Asian Elephant, Jaguar, GIB, Bengal Florican/Bustard, etc.



- Appendix I:** species threatened with extinction
- Appendix II:** species that will benefit from international cooperation

CounterMEASURE: **Japan** and UNEP project **plastic pollution** in sea/**rivers** in South-East **Asia** & India, impact on migratory species, etc.

National Action Plan for Conservation of Migratory Birds and their Habitats:

- It was launched by **MoEFCC**
- for period 2018-23
- for birds using **Central Asian Flyway**

CBD 1992

1992 Convention on Biological Diversity

- ❖ Secretariat in **Montreal**, Canada. (1) **Conservation** of biodiversity
- ❖ Followed by Cartagena (2000) (2) Sustainable **use** of it's components and Nagoya (2010) protocols. (3) Fair and equitable **sharing** of benefits

2000 Cartagena Protocol for Biosafety

- For safe handling, transport & use of **Living Modified Organism**
- Established **Advance Informed Agreement** procedure
- Established **Biosafety Clearing House**

2010 Nagoya Protocol

- fair and equitable **sharing of benefits** arising out of the utilization of genetic resources (and associated traditional knowledge)
- Prior Informed Consent** given by provider to user
- Mutually Agreed Terms** between both parties

2010 Nagoya-Kuala Lumpur Supplementary Protocol:

- Adopted in **2010** at **Nagoya**; in force in 2018
- for liability related to **Cartagena Protocol**
- provides rules for **liability** in case of **damage** to biodiversity due to transboundary movement of LMOs

I read I forget, I see I remember

See explanation of this PDF on **YouTube** www.youtube.com/c/allinclusiveias

See page-13

Kigali Amendment

Cabinet approves Ratification of Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer for phase down of Hydrofluorocarbons

National strategy for phase down of Hydrofluorocarbons after required consultation with all the industry stakeholders by 2023

Posted On: 18 AUG 2021 4:12PM by PIB Delhi

- Montreal Protocol 1987 aimed to phase out halogenated hydrocarbons having **B & C**
- Instead used HFCs. But HFC are strong GHG.
- Hence came Kigali amendment 2016

Remember: What depletes ozone?

- Bromine & Chlorine are the real culprits.
- Fluorine is innocent.

Points from PIB article:

- ❑ India became a Party to the **Montreal** Protocol in **1992**
- ❑ India has **successfully met** Montreal **targets**
- ❑ **India HFC targets:** reduction of 10% in **2032**, 20% in **2037**, 30% in **2042** and **85%** in **2047**
- ❑ HFCs do not deplete the stratospheric ozone. But they have high **global warming potential** 12 to 14,000 (12k-14k)

Wetlands

See page-26

Centre for Wetland Conservation & Management:

- ❑ est. in Feb 2021; under MoEFCC
- ❑ Part of National Centre for Sustainable Coastal Management (NCSCM), Chennai

Source: PIB Wetlands: 4.6% of land (15.26 mha)
Ramsar: 42-sites (1.08 mha) **46 sites**

Four new Ramsar sites: (42+4=46)

- 1) Gujarat: **Thol** Lake Wildlife Sanctuary
 - 2) Gujarat: **Wadhvana** Wetland
 - 3) Haryana: **Sultanpur** National Park
 - 4) Haryana: **Bhindawas** Wildlife Sanctuary
- Haryana's first Ramsar sites!
Except Sultanpur, others are man-made

Chipko movement

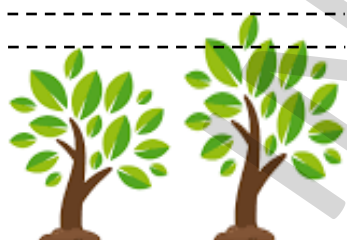
protest by people against felling of trees

1730:

- Jodhpur, Rajasthan; Bishnoi community;
- Raja Abhay Singh ordered felling of trees;
- Amrita Devi, etc. clung to Khejri trees;
- Ban on tree felling

1973:

- Reni village, Chamoli, Uttarakhand
- Contractors felling trees; people protested
- Sundalal Bahuguna, Gaura Devi etc.
- 1980: Ban on tree felling



Earth Overshoot Day

- ❑ By **Global Footprint Network** since 2006
- ❑ 2020: 22 August; 2021: **29 July**
- ❑ When man's ecological footprint exceeds Earth's biocapacity
- ❑ In a year when consumption > formation of natural resources
- ❑ Recent initiatives: #MoveTheDate, 100 days of possibility

Earth Day:

→ 22nd April

Environment day:

→ 5th June

Prelims 2014:

Consider the following statements regarding 'Earth Hour':

1. It is an initiative of **UNEP** and **UNESCO**.
2. It is a movement in which the participants **switch off** the lights for one hour on a certain day every year.
3. It is a movement to raise the **awareness** about the climate change and the need to save the planet.

Which of the statements given above is/are correct?

- (a) 1 and 3 only (b) 2 only (c) 2 and 3 only (d) 1, 2 and 3

Earth Hour:

- ❑ By **WWF**; since 2007
- ❑ Usually on last Saturday of **March**
- ❑ No non-essential lights 8:30-9:30 pm

Doomsday Clock: (since 1947)

- ❑ show how close the world is to a man-made global **catastrophe**.
- ❑ e.g. nuclear risks, climate change
- ❑ By Bulletin of Atomic Scientists

I read I forget, I see I remember

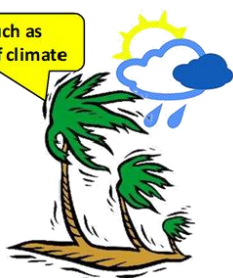
See explanation of this PDF on **YouTube** www.youtube.com/c/allinclusiveias

Ecosystem Services

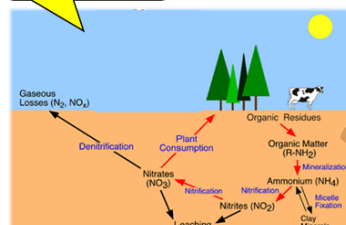
Provisioning such as the production of food and water;



Regulating such as the control of climate



Supporting such as nutrient cycles and oxygen production;



Cultural such as recreational benefits



Prelims 2011:

Biodiversity forms the basis for **human existence** in the following ways:

1. Soil formation
2. Prevention of soil erosion
3. Recycling of waste
4. Pollination of crops (page-72)

Select the correct answer from below

- (a) 1, 2 and 3 only (b) 2, 3 and 4 only
 (c) 1 and 4 only (d) 1, 2, 3 and 4 only

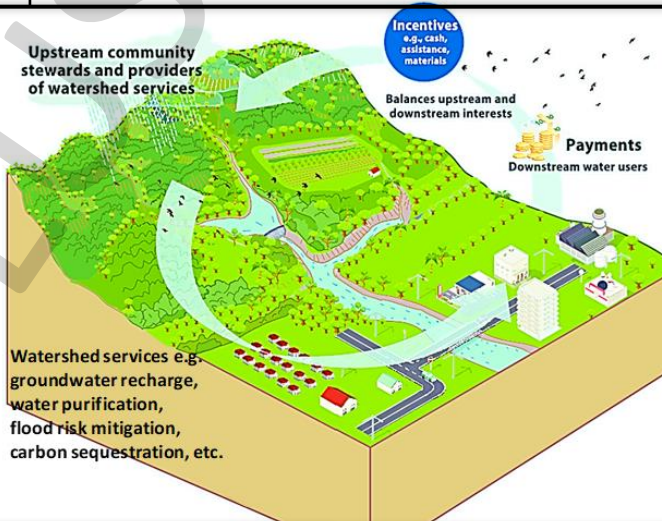
Prelims 2012:

The Millennium Ecosystem Assessment describes the following major categories of **ecosystem services** provisioning, supporting, regulating, preserving and cultural. Which one of the following is **supporting service**?

- (a) Production of food and water
 (b) Control of climate and disease
 (c) **Nutrient cycling and crop pollination**
 (d) Maintenance of diversity

Payment for Ecosystem Services (PES):

- beneficiaries of **ecosystem services**, pay to those who conserve them.
- Based on '**beneficiary pays principle**'
- India's first PES agreement:
 - signed in **2010**
 - between Village Forest Development Society (VFDS) and **Palampur** Municipal Corporation (Himachal).
 - villagers get paid to protect the **catchment area**.



Ecological Fiscal Transfers

Ecological Fiscal Transfers:

- Fiscal transfers from Centre to states (or state to local govt.), based on ecological indicators.
- They act as incentives for governments to perform better on environmental parameters.

Example:

- In 1990s, **Brazil** became first country to use EFTs for municipalities.
- Municipalities were compensated for land use restrictions imposed by protected areas.

EFT in India:

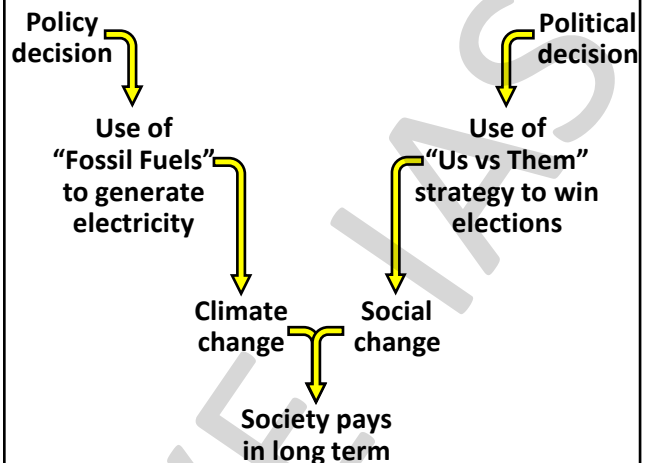
- 14th Finance Commission gave **7.5%** weightage to **Forest cover**
- 15th Finance Commission gave **10%** weightage to **Forest & Ecology**

Social Cost of Carbon

Prelims 2020:

Which one of the following statements best describes the term '**Social Cost of Carbon**'? It is a measure, in **monetary value of**

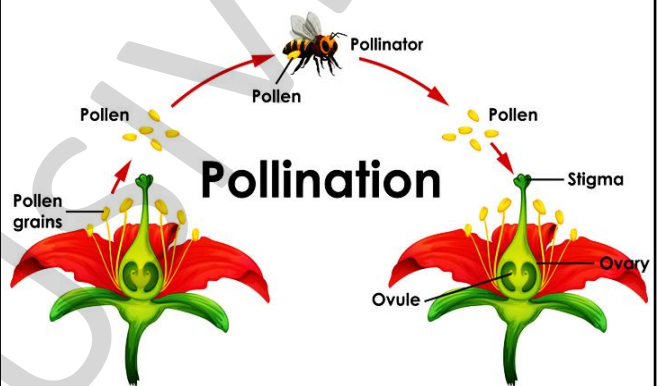
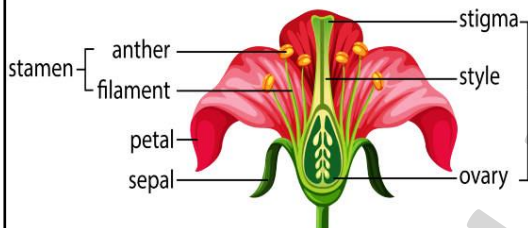
- (a) **long-term damage** done by a tonne of CO2 emissions in a given year.
- (b) requirement of fossil fuels for a country to provide goods and services to its citizens, based on the burning of those fuels.
- (c) Efforts put in by a climate refugee to adapt to live in a new place.
- (d) contribution of an individual person to the carbon footprint on the planet Earth.



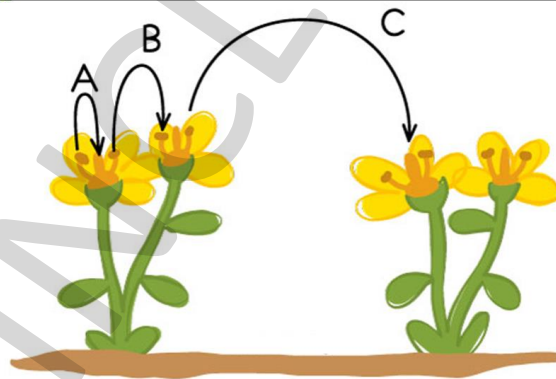
Pollination

Pollination: transfer of pollen from male part (stamen) to female part (stigma)

Common Flower Parts



Self-pollination: from same flower, or another flower on the **same plant**



Cross-pollination: from flower of **different plant** (but same species)

Prelims 2012:

Consider the following kinds of organisms:

1. Bat
2. Bee
3. Bird

Which of the above are **pollinating agents**?

- (a) 1 and 2 only (b) 2 only
- (c) 1 and 3 only (d) 1, 2 and 3

Prelims 2017:

Due to some reason, if there is a huge fall in population of species of **butterflies**, what could be its likely consequences?

1. **Pollination** of some plants could be adversely affected.
2. There could be a drastic increase in the **fungal infections** of some cultivated plants.
3. It could lead to a fall in the population of some species of **wasps, spiders and birds**.

Select the correct answer:

- (a) 1 only (b) 2,3 (c) 1,3 (d) 1,2,3

Update for page-41

BusinessLine

Solar outshines wind power in total capacity

G Balachandar | Chennai | Updated on February 21, 2021

In a significant development in the renewable space, solar power has overtaken wind power in terms of total installed capacity.

Gigawatt Club:

- ☐ unofficial group of countries with more than **1 GW** installed solar capacity.
- ☐ More than **37** (2 from Africa, 9 may soon join)

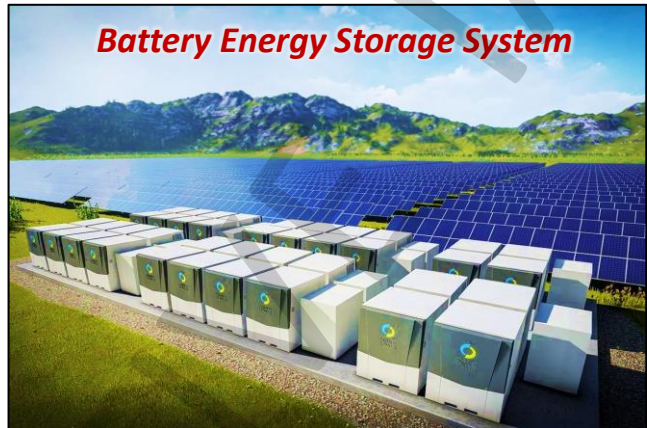
Renewable Energy

IREDA: 1987, MNRE

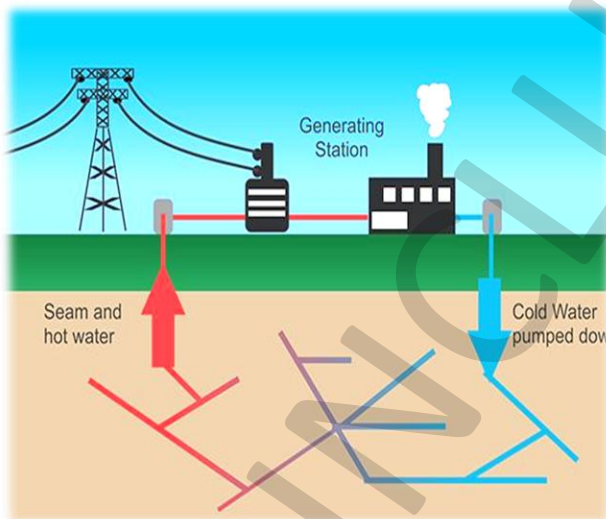
- Indian Renewable Energy Development Agency Ltd
- Mini ratna PSU; Min. of New & Renewable Energy
- It is **NBFC**; finances renewable energy projects

Green deposits:

- FD money used to finance green projects



Battery Energy Storage System



Geothermal Energy:

- ☐ Thermal energy within the Earth
- ☐ It is renewable energy source of energy
- ☐ Source:
 - ➔ formation of earth;
 - ➔ radioactive decay;
- ☐ Applications: heat and electricity!

GSI has identified more than 300 potential sites:

Ladakh	Puga & Chummathang
Himachal Pradesh	Manikaran
Uttarakhand	Tapoban
Haryana	Sohana
Gujarat	Cambay
Bihar	Rajgir
Jharkhand	Surajkund
Chhattisgarh	Tattapani
Maharashtra	Ratnagiri
Telangana	Khammam

Food Systems Summit

See page-42 for Sustainable agriculture

Food Systems Summit:

- ☐ 23rd September 2021; at UNGA

FOLU

- ☐ Food and Land Use Coalition
- ☐ Est. in **2017**, at **UNGA**
- ☐ More than 60 members

10YFP

- ☐ 10-Year Framework of Programmes on **Sustainable** Consumption & Production Patterns
- ☐ adopted at **Rio+20** (UN Conference on Sustainable Development)
- ☐ for sustainable lifestyle, buildings, tourism, food systems, etc.

I read I forget, I see I remember

See explanation of this PDF on [YouTube](https://www.youtube.com/c/allinclusiveias) www.youtube.com/c/allinclusiveias

River Linking

Prelims 2006:

Recently UP and MP governments signed a MoU for linking of two rivers as a link project. Which are these two rivers?

- (a) Betwa and Chambal **(b) Betwa and Ken**
 (c) Chambal and Son (d) Ken and Narmada

Prelims 2016:

Recently, linking of which of the following rivers was undertaken?

- (a) Cauvery and Tungabhadra
(b) Godavari and Krishna
 (c) Mahanadi and Sone
 (d) Narmada and Tapi

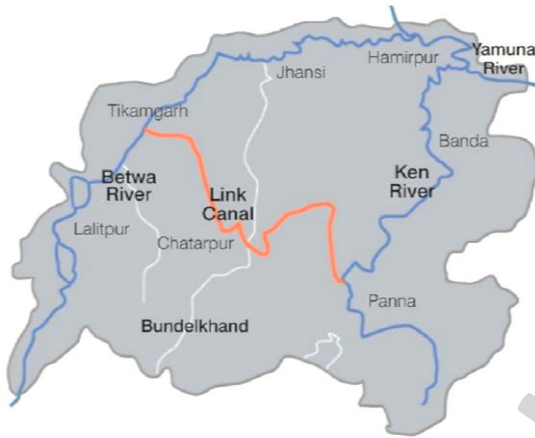
Environmental issues:

- It will submerge 6,000 ha of forest area
- Of this, 4,200 ha is core tiger habitat of Panna Tiger Reserve

Source: Jal Shakti Minister's LS reply

National Perspective Plan:

- aka National River Linking Project
- identified **30** river linking projects
- two groups: Himalayan and Peninsular
- Ken-Betwa** linking is its **first** project
- Managed by **NWDA**:
 - National **W**ater **D**evelopment **A**gency
 - Est. in **1982**; Ministry of **Jal Shakti**



Ken	Betwa
Originates in MP	Originates in MP
Tributary of Yamuna	Tributary of Yamuna
Passes through Panna TR	Dams Rajghat, Paricha, Matatila

Interlinking:

- transfer surplus from **Ken to Betwa**
- To irrigate drought-prone **Bundelkhand**
- Two dams **Daudhan** and **Makodia** and two barrages **Kesari** and **Barari** are proposed under the project.

Water Plus city:

Indore is first water plus city under Swachh Survekshan (by MoHUA)

Conditions:

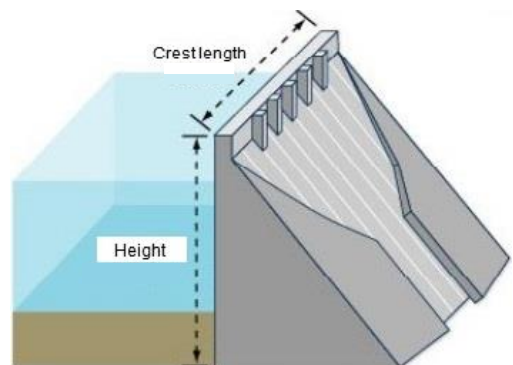
- 1) all **wastewater** must be **treated** before release into environment
- 2) all public **toilets** be cleaned and **connected** to sewers
- 3) **30%** of **sewer** water must be recycled and **reused**.

Dams

Dam Rehabilitation and Improvement Programme (DRIP)

- Phase-1 → 2012-2021 → World Bank
- Phase-2&3 → 2021-2031 → WB and AIIB
- Dam Health And Rehabilitation Monitoring Application (DHARMA)**: web portal for dam related data.

- Large dams**: > 5,000 (height > 15m)
- Maharashtra** (1845) > MP (905) > Gujarat (666)
- Highest**: Tehri dam - Uttarakhand - Bhagirathi
- Longest**: Hirakud dam - Odisha - Mahanadi
- Oldest**: Kallani dam - TN - Cauvery



I read I forget, I see I remember

See explanation of this PDF on **YouTube** www.youtube.com/c/allinclusiveias

Jal Jeevan Mission

by 2024

Ministry of Housing & Urban Affairs

Jal Jeevan Mission (URBAN) to Provide Universal Coverage of Water Supply

Swachh Bharat Mission (URBAN) 2.0 Announced For Next 5 Years

Boost to Green and Clean Urban Mobility

Metrolite and Metroneo System to Come Up in Several Cities

100% Income Tax Exemption for Affordable Rental Housing Projects

Posted On: 02 FEB 2021 3:48PM by PIB Delhi

Jal Jeevan Mission:

- Ministry of **Jal Shakti**
- **55 litres/person/day**
- through **tap** connections
- to every **rural** household

Jal Jeevan Mission (Urban)

- Min. of Housing & **Urban Affairs**
- in all 4,378 statutory towns
- 2.68 crore tap **and sewer**
- improve water quality, **etc.**
- for universal water supply



Ministry of Jal Shakti

Target and Objectives of Jal Shakti Abhiyan

Posted On: 29 JUL 2021 5:41PM by PIB Delhi

Jal Shakti Abhiyan -I (JSA-I) was launched in 2019 in 1592 blocks out of 2836 blocks in 256 water stressed districts of the country in two phases from 1st July to 30th September, 2019 and from 1st October to 30th November 2019. Under Jal Shakti Abhiyan –

Jal Shakti Abhiyan

awareness campaigns

JSA-1:

- For one month in 2019
- not pan India

JSA-2: Catch the Rain

- For few months in 2021
- Pan India

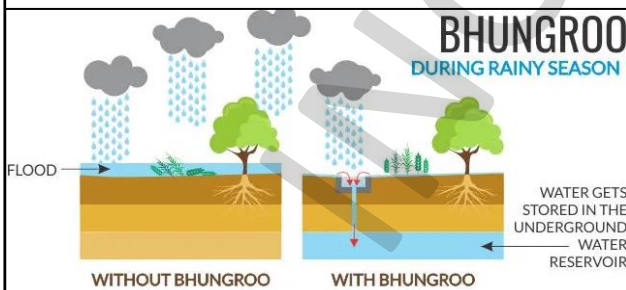
Main goal: water conservation

- rainwater harvesting
- renovate traditional water bodies
- reuse and recharge of bore wells
- watershed development
- intensive afforestation

Traditional water

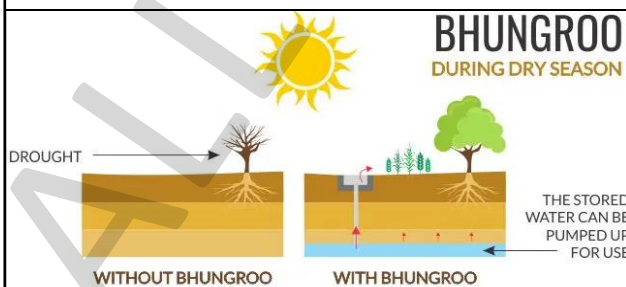
conservation methods:

- ❖ Zabo - Nagaland
- ❖ Eri - TN
- ❖ Johad - Northern plains
- ❖ Ahar pynes - Bihar
- ❖ Bawari Rajasthan



Bhungroo system, Gujarat:

- Bhungroo: 'straw' or 'hollow pipe'
- Rain → water percolates underground
- Dry season → water extracted for irrigation



Floods and Border Areas

Flood Management and Border Areas Programme (FMBAP):

- ☐ by merging the components of:
 - 1) Flood Management Programme
 - 2) River Management Activities & Works related to Border Areas

Caution: the two schemes are not closed.

I read I forget, I see I remember

See explanation of this PDF on www.youtube.com/c/allinclusiveias

CLIMATE TIPPING POINTS

The world has already crossed nine 'tipping points' that will lead to catastrophic climate change, scientists have warned.



Tipping point

- ❑ A threshold that, when exceeded, leads to large and irreversible changes.
- ❑ May be increase of global temperature of 1.5–2 °C (2.7–3.6 °F) over pre-industrial times



Climate Feedback Loops

Myth:

- **Good** things are **positive** feedback
- **Bad** things are **negative** feedback

Reality:

- Things that **strengthen** the loop are **positive** feedback
- Things that **weaken** the loop are **negative** feedback

Poverty → **school dropout** → Poverty (school dropout is **positive** feedback)

Poverty → **free quality education** → Employment (free quality education is **negative** feedback)

Two examples of positive feedback

Warmer earth → **melting of ice** → Less reflection → Warmer earth

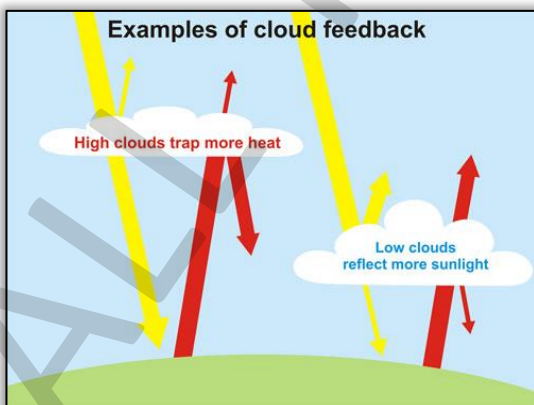
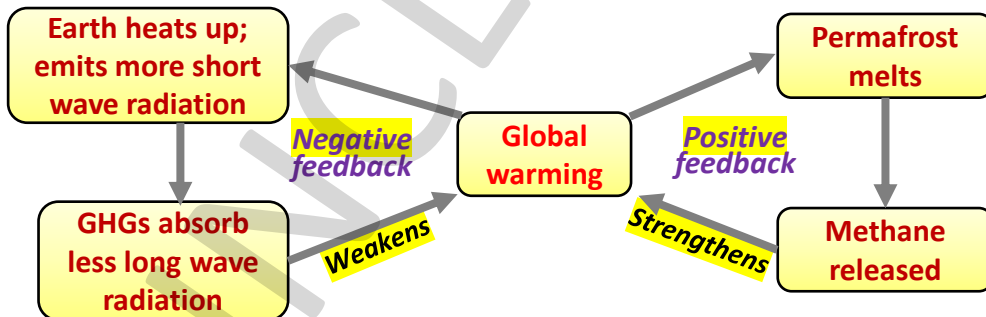
Warmer earth → **warmer oceans** → more evaporation → Warmer earth

- ❑ Water vapor is the largest contributor to Earth's greenhouse effect.
- ❑ Water vapor accounts for 60-70% of the greenhouse effect while CO₂ accounts for 25%

Popular misconception

Warmer earth → **warmer oceans** → more evaporation → more clouds → more albedo → **Cooler earth**

Reasons: it is uncertain if cloud production will increase or decrease with warming; height of cloud



Ecosystem restoration



Forest degradation: (forest are sick, not dead)

- ✓ Excessive fuelwood extraction
- ✓ excessive rearing- sheep goat eating new plants
- ✓ forest fire, acid rain, Soil erosion, Pest or disease
- ✓ Roads through forest- pollution, habitat fragmentation

Deforestation: (forest are dead)

- ✓ cutting of trees
- ✓ uncontrolled degradation

Land Degradation:

- loss of **productivity** of land.
- Land Degradation Neutrality:**
- quantity and quality of land, to support ecosystem services, remains **stable or increases**.

What is land desertification? [UNCCD]

- a) degradation of land in dry areas
 - b) gradual loss of soil productivity
 - c) thinning out of vegetative cover
- It's 'not' natural expansion of deserts.
 - 30% of India's area is undergoing land degradation/desertification.

India:

- **26 mha** by 2030 under Bonn challenge (joined in Paris 2015)
- Land Degradation **Neutrality** by 2030

2011 - 2020

- UND on **Biodiversity**
- UND for Deserts and fight against **Desertification**

2021 - 2030

- UND on **Ecosystem** Restoration
- UND of **Ocean** Science for Sustainable Development

Bonn challenge:

Launched in 2011; by IUCN & Germany; 350 mha by 2030

CoP-14 of UNCCD:

India hosted CoP-14 of UNCCD in September 2019. Key outcomes:

- **Delhi Declaration:** Countries will make SDG target of achieving land degradation neutrality by 2030, their national targets.
- **Peace Forest initiative:** promote peace through land restoration in post-conflict areas.
- **Drought Toolbox:** a knowledge bank to help countries fight drought effectively.
- **International Coalition on Sand and Dust Storms:** to improve monitoring and response to SDS.

(UNCCD is the only international legally binding framework to address desertification)

Initiatives to restore degraded lands:

- 20x20 :** Latin America; 20 mha by 2020
- AFR100 :** Africa; 100 mha by 2030
- Bonn challenge:** Globally 350 mha by 2030

Wasteland Atlas of India:

- first published in 2000; 5th edition in 2019
- By **Ministry of Rural development**
- Major findings:
 - **17%** of India's area is wasteland.
 - Wasteland area slightly decreased 2009-16

Geochemical Baseline Atlas of India

- chemicals in top and bottom soil
- By **National Geophysical Research Institute**, Hyderabad (also Gravity map, seismic map)

Desertification and Land Degradation Atlas:

- Space Application Centre, **ISRO**, Ahmedabad
- For 2003-18; degraded land increased

I read I forget, I see I remember | See explanation of this PDF on **YouTube** www.youtube.com/c/allinclusiveias



Benefits of restoring degraded lands?

- Prevent soil erosion; Carbon sequestration
- Groundwater recharge; Reduce flood impact
- Livelihood opportunities; Wildlife conservation

Forest Landscape Restoration

- in 5 states; by NAEB & IUCN

National Afforestation & Eco-Development Board:

- 1992; MoEFCC; afforestation, restoration, etc.

Social Forestry:

- forestry for social/rural development

Joint Forest Management:

- state forest departments & local community
- detailed in National Forest Policy of 1988

REDD and REDD+

REDD

- Reducing Emissions from Deforestation and Forest Degradation
- It is a multilateral **body**
- It was formed by **FAO, UNDP, UNEP**
- Formed in **2008**
- HQ: **Geneva**, Switzerland
- It helps developing countries implement REDD+

REDD+

- It is a climate change mitigation **approach**
- It has been developed by parties to UNFCCC.
- It **incentivizes** developing countries to:
 - Reduce **emissions** from deforestation,
 - Reduce **emissions** from forest degradation,
 - conserve forest **carbon stocks**,
 - enhance forest **carbon stocks**,
 - sustainably** manage forests.

Forest-Plus

- Bilateral program between India and USA
- USA helps India develop capacity in forest management, to benefit from REDD+
- 2012 : Forest Plus 1.0 (for 5 years)
- 2018 : Forest Plus 2.0 (for 5 years)

Prelims 2016:

Which of the following statements is/are correct?
Proper design and effective implementation of UN-**REDD+** Programme can significantly contribute to

1. protection of biodiversity
2. resilience of forest ecosystems
3. poverty reduction

Select the correct answer using the code given below

- (a) 1,2 (b) 3 (c) 2,3 (d) 1, 2, 3

Virtual water

Virtual water:

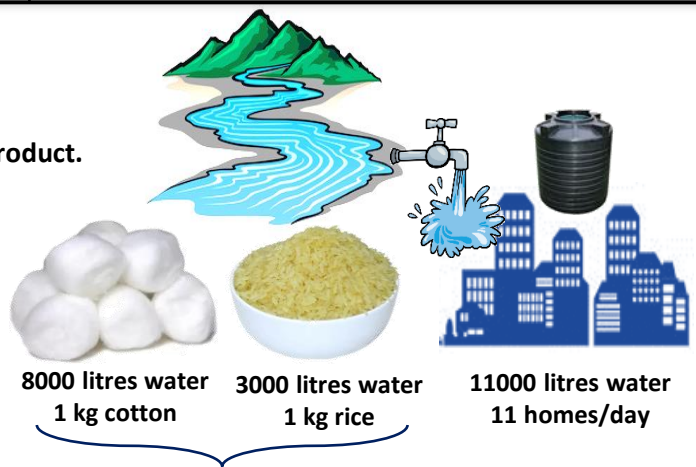
- Volume of water used to produce a product.

Virtual water exports:

- water embedded in exported goods
- water rendered unusable by production of these goods

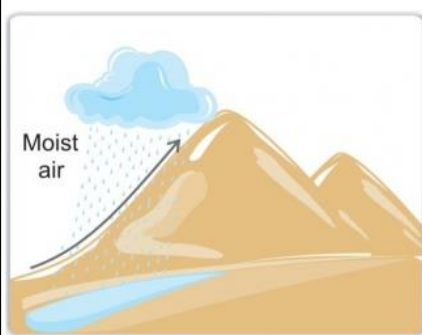
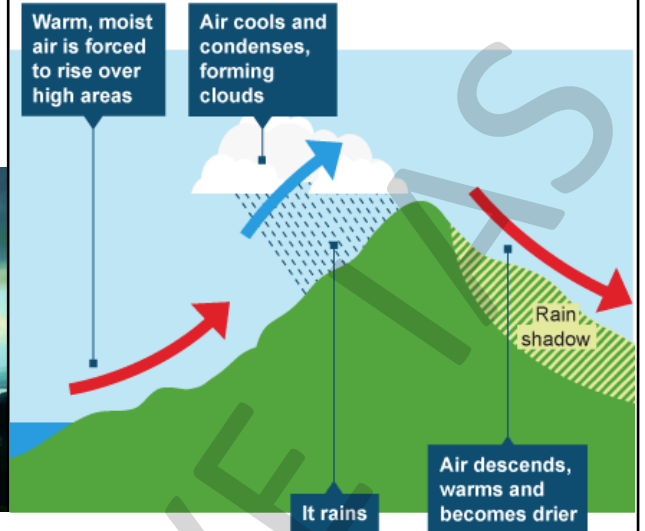
India:

among the largest exporters of virtual water.

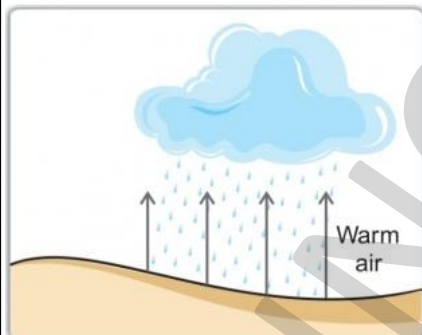


Virtual water

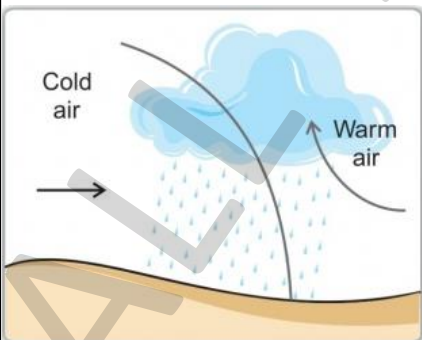
Cloudburst



Relief (Orographic) Rainfall



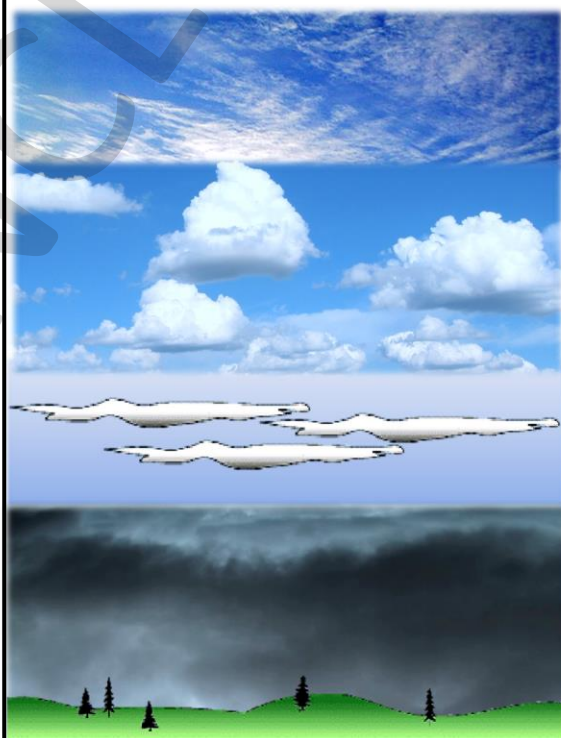
Convectional Rainfall



Cyclonic Rainfall

Cloudburst:

- moisture-rich air travels up the slope
- forms vertical column of Cumulonimbus clouds
- strong updraft may push raindrops higher
- large amount of water accumulates
- when updraft weakens, sudden rain
- IMD: 100 mm rain per hour
- usually in Himalayas during monsoon
- Reasons: cyclonic air, climate change, etc.



Cirrus Clouds

- 8-12 km altitude
- Thin & detached
- Feathery appearance
- Always white in colour

Cumulus clouds

- 4-7 km altitude
- look like cotton wool
- Have flat base

Stratus clouds

- layered clouds
- formed due to mixing of air masses of different temperatures

Nimbus clouds

- very near to surface
- shapeless
- black or dark grey
- opaque to rays of sun

Explained: Why the Atlantic Ocean current system is slowing down, and its implications

A recent study notes that the Atlantic Meridional Overturning Circulation (AMOC) is losing its stability. Modelling studies have shown that an AMOC shutdown would cool the northern hemisphere and decrease rainfall over Europe.

Written by **Aswathi Pacha**, Edited by Explained Desk | Kochi |

Updated: August 11, 2021 9:56:32 am

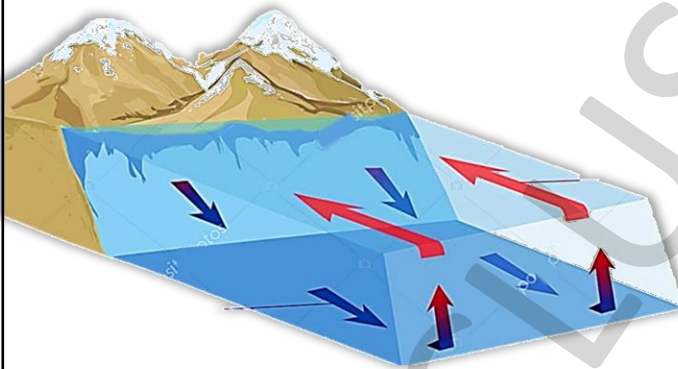
THC and AMOC

ThermoHaline Circulation THC:

- Driven by differences in **density**
- Density: temperature, salt content
- Has both **vertical & horizontal** movement
- **Connects** surface and deep oceans
- Helps in heat redistribution

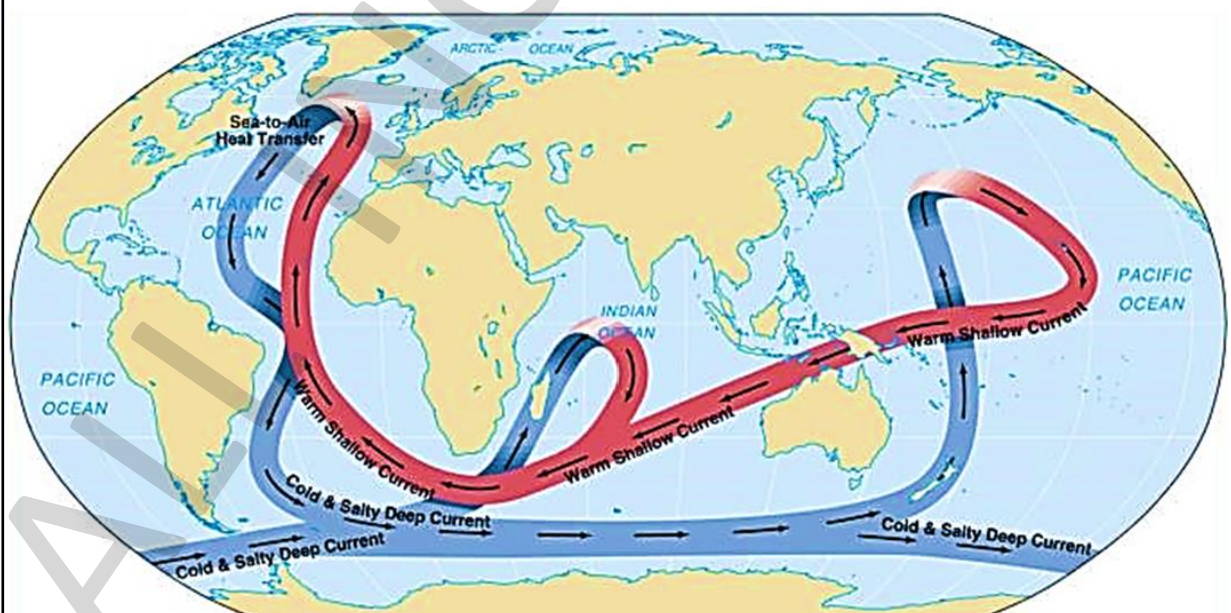
Atlantic Meridional Overturning circulation

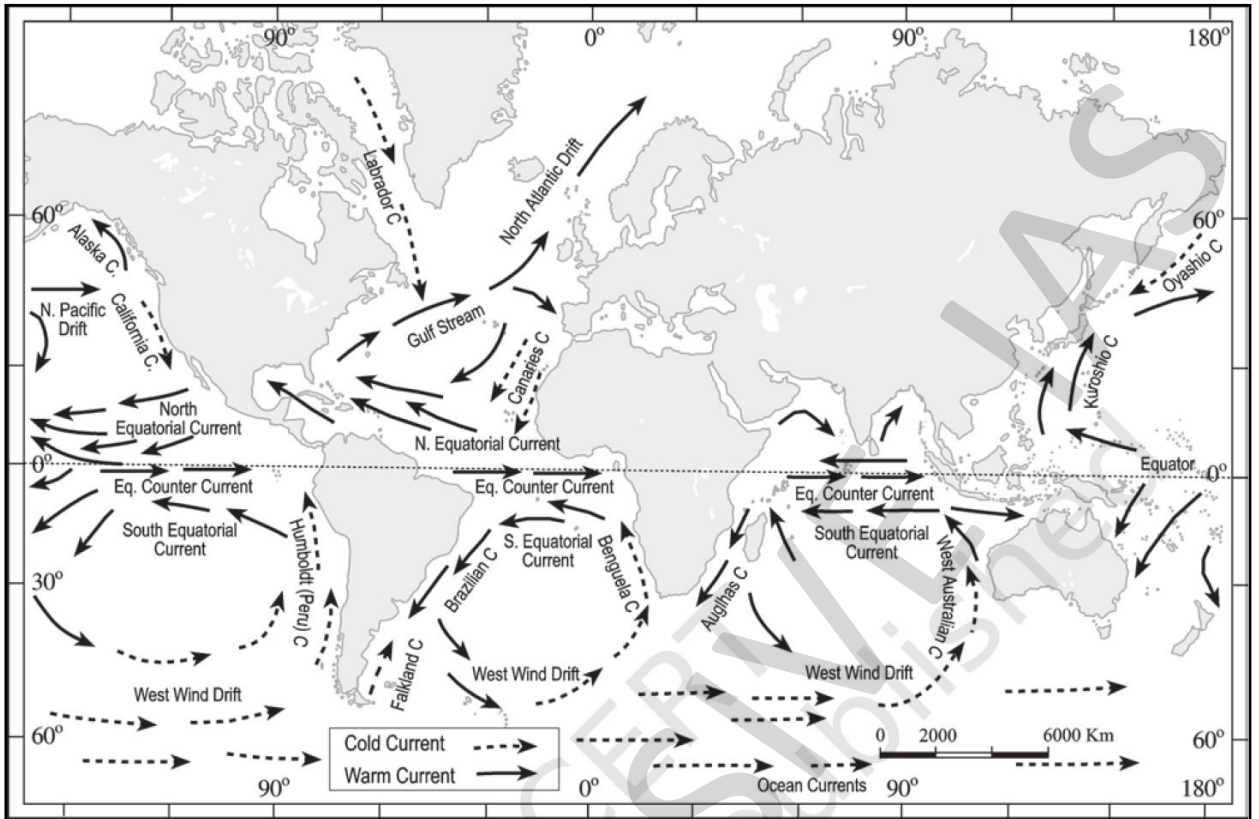
- AMOC is northern branch of THC.
- Gulf stream is part of it.
- AMOC is slowing down.
- Reasons: many, like, ice melt reducing salinity.
- Impacts: many, like, Europe will become colder.



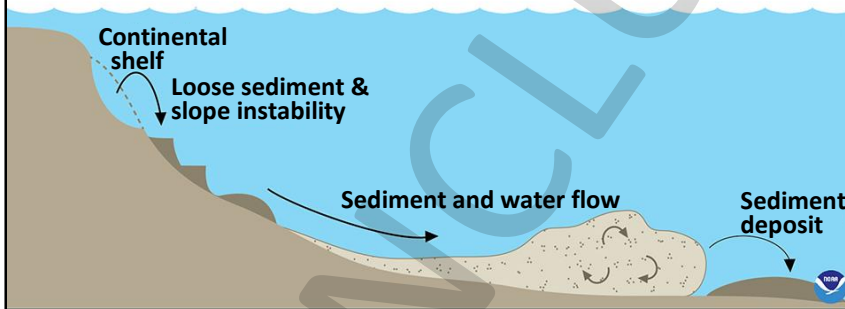
Water density increases at poles:

- 1) Water becomes cold → denser → sinks
Note: density of water is maximum at 4°C
- 2) Water forms ice, leaving salt behind
Salt → nearby water salty → denser → sinks



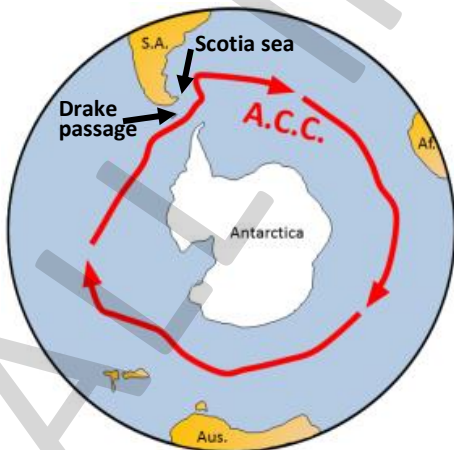


Turbidity current



- Rapid, downhill **flow of water** caused by increased density due to **high amounts of sediment**.
- Reason: earthquakes, collapsing slopes, other geological disturbances.
- Can change the physical shape of the seafloor.

Fifth Ocean



Southern Ocean:

- recognised by National Geographic as fifth ocean.
- the only ocean 'to touch three other oceans
- northern limit is a latitude of 60 degrees south.
- also defined by its Antarctic Circumpolar Current
- flows from west to east around Antarctica.
- Does not include Drake Passage and Scotia Sea

Oceans by size:

(PAISA) **P**acific < **A**tlantic < **I**ndian < **S**outhern < **A**rctic

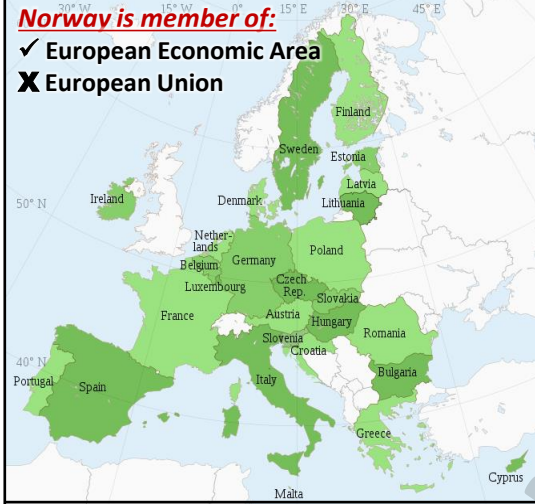


Arctic

Arctic Council: see page-2
 ➤ India has observer status since 2013

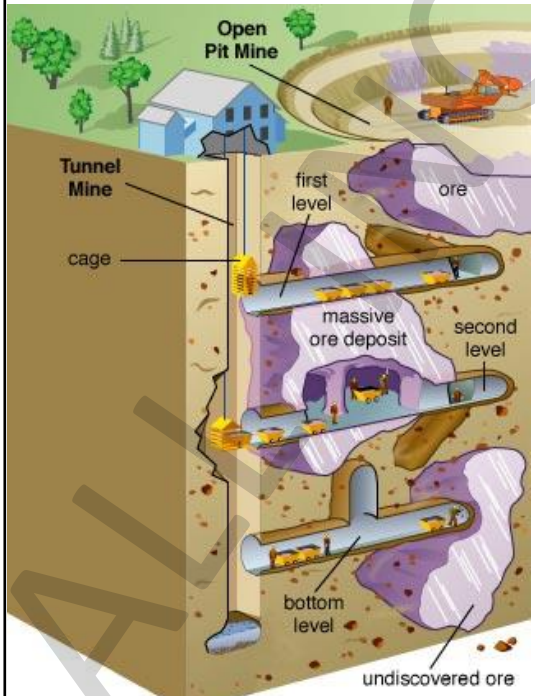
Arctic Science Ministerial:
 ➤ 2016 → 2018 → 2021 (Iceland/Japan)
 ➤ For research & cooperation in Arctic

Svalbard Treaty 1920: (✓India)
 ➤ recognized Norwegian sovereignty



Svalbard Global Seed Vault: (by Norway)
 ➤ (largest) backup facility for world's crop diversity
 2nd largest? National Gene Bank, Delhi (1996)

Open cast mining



Ministry of Coal

Coal India Ltd. (CIL) Takes Out of Box Initiative To Produce Sand From Overburden at a Much Cheaper Price

Will Help In Minimising Environmental Pollution & Will be An Option For Getting Cheaper Sand for Construction Purpose

Production of Sand Already Started & Roadmap of Next Five Years Drawn

Aims to Produce Eight Million Tonnes of Sand In Five Years

Posted On: 27 JUL 2021 5:15PM by PIB Delhi



Ministry of Environment, Forest and Climate Change

Government notifies the Plastic Waste Management Amendment Rules, 2021, prohibiting identified single use plastic items by 2022.

Thickness of plastic carry bags increased from 50 to 75 microns from 30th September, 2021 and to 120 microns with effect from the 31st December, 2022.

Guidelines for Extended Producer Responsibility given legal force.

Posted On: 13 AUG 2021 3:38PM by PIB Delhi

Plastic Waste Management Amendment Rules, 2021 by MoEFCC

Single Use Plastic:

- Ban from 1st July 2022; on items like:
- ear buds with plastic sticks, plastic sticks for balloons, plastic flags, candy sticks, ice-cream sticks, polystyrene [Thermocol] for decoration;
- plates, cups, glasses, cutlery such as forks, spoons, knives, straw, trays, wrapping or packing films around sweet boxes, invitation cards, and cigarette packets, plastic or PVC banners less than 100 micron, stirrers.
- Exempts compostable plastic: degrades into soil conditioning material (i.e. compost)

Minimum thickness of plastic carry bag:

- 050 micron as per 2016 rules
- 075 micron from 30-09-2021
- 120 microns from 31-12-2022

EPR:

for effective implementation, EPR guidelines have been given legal force.

Implementing agency:

CPCB & State PCBs will monitor ban and impose penalties

Organic Farming

Ministry of Agriculture & Farmer Welfare

Paramparagat Krishi Vikas Yojana

- ✓ Launched in 2015
- ✓ part of SHM component of NMSA
- ✓ 50 or more farmers to form a cluster of 50 acre land to take up organic farming.
- ✓ Each farmer to get Rs. 20,000 per acre in three years.

Participatory Guarantee System

- ✓ No 3rd party certification
- ✓ **Collective responsibility** to ensure organic integrity of produce.
- ✓ Farmers assess, inspect and verify the production practices of each other
- ✓ **Does not cover individual farmers** or group of farmers smaller than five members.
- ✓ **It gives every farmer individual certificates**, and farmer is free to market his produce independent of the group.

Ministry of Health and Family Welfare

Food Safety and Standards Authority of India

- ✓ FSSAI issued FSS (Organic food) Regulations, 2017
- ✓ It recognizes PGS and NPOP certificates.
- ✓ It launched **Jaivik Bharat logo** for organic food.



Ministry of Commerce and Industry

National Programme for Organic Production (NPOP):

- ✓ 3rd party certification
- ✓ Standards for organic production are issued.
- ✓ Implemented by **APEDA**
- ✓ Certification bodies give certificates
- ✓ Recognized in USA, Europe

Prelims 2018:

With reference to **organic farming** in India, consider the following statements:

1. '**National Programme for Organic Production**' (NPOP) is operated under the guidelines and directions of the Union Ministry of Rural Development.
2. 'Agricultural and Processed Food Products Export Development Authority' (**APEDA**) functions as the Secretariat for the implementation of NPOP.
3. **Sikkim** has become India's first fully organic State.

Which of the statements given above is/are correct?

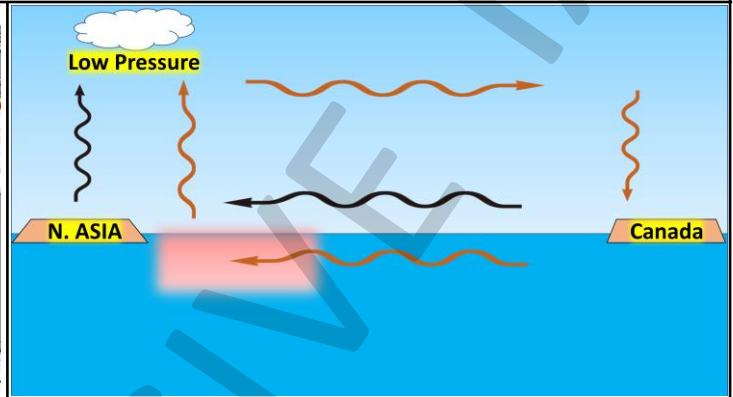
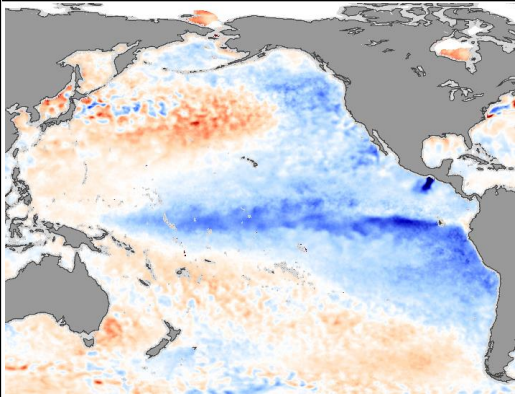
- (a) 1 and 2 only (b) 2 and 3 only (c) 3 only (d) 1, 2 and 3

Heat Dome

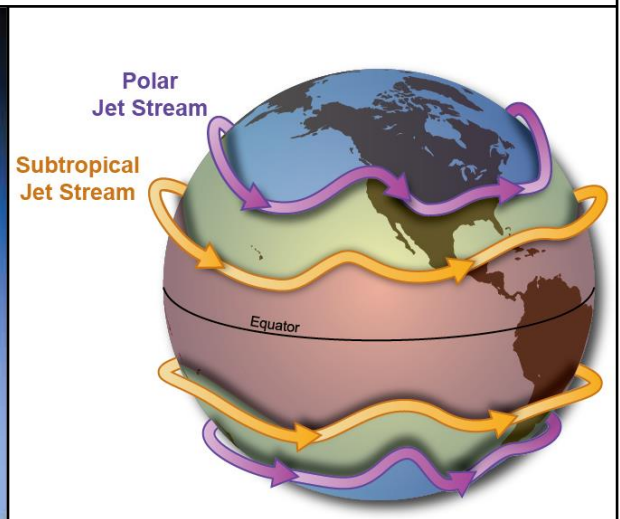
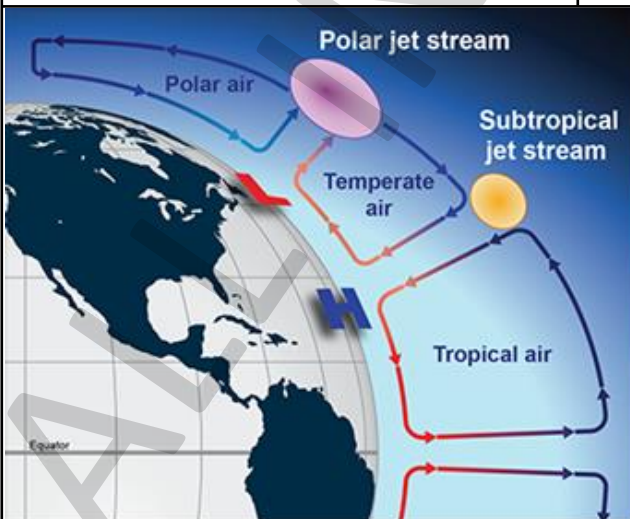
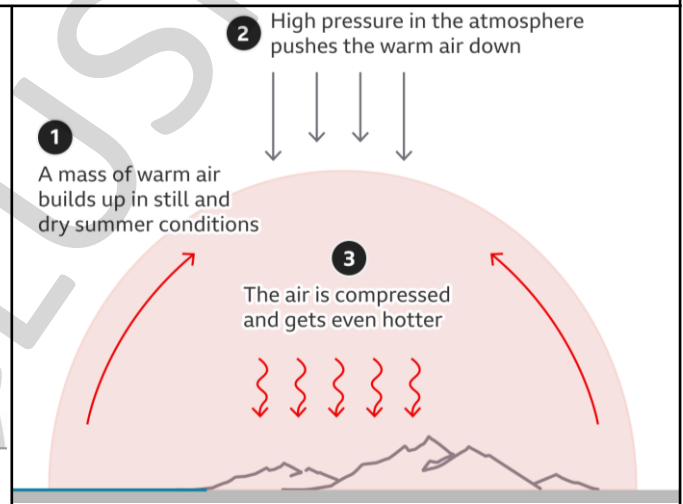
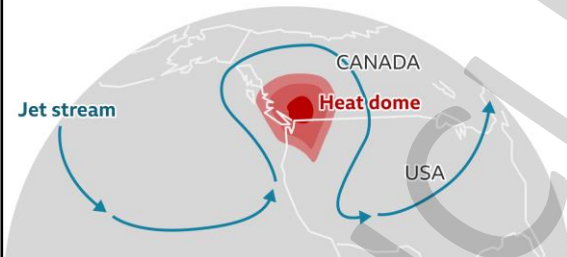
Also see page-51

Heat Dome:

- Recently, 47°C temperature were seen in Canada
- Occurs when strong high-pressure atmospheric conditions combine with weather patterns like La Niña.
- Warm western pacific; Cool eastern pacific
- Air rises in west; moves towards east; falls down.
- Prevents already rising hot air to rise.



Heat dome diverts the jet stream - which in turn holds it in place



Apparent movement of Sun

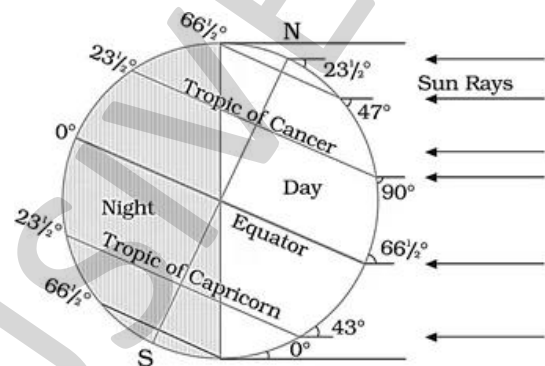
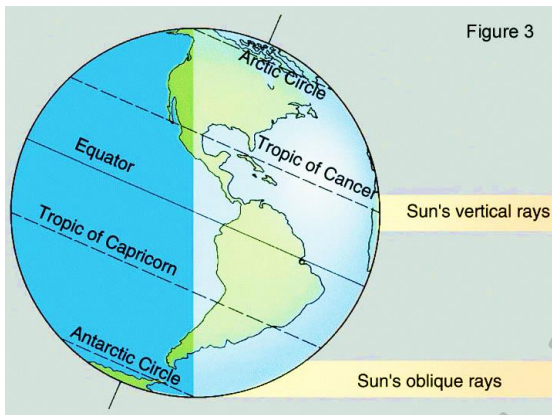
Zero shadow day:

- ❑ happens twice a year for locations between +23.5 and -23.5 degrees of latitude.
- ❑ Date will vary for different locations on Earth.

Prelims 2019:

On 21st June the sun

- (a) Does not set below the horizon at the Arctic circle
- (b) Does not set below the horizon at Antarctic circle
- (c) Shines vertically overhead at noon on the Equator
- (d) Shines vertically overhead at the tropic of Capricorn

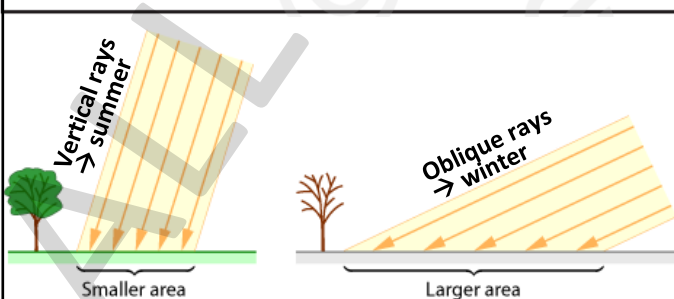
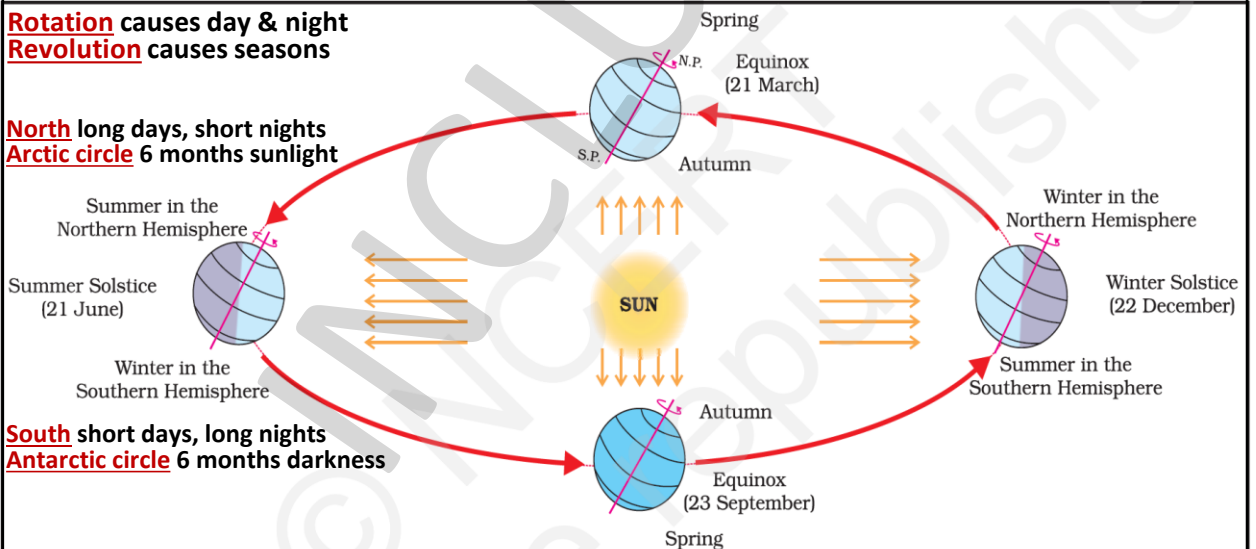


Rotation causes day & night
Revolution causes seasons

North long days, short nights
Arctic circle 6 months sunlight

Summer in the Northern Hemisphere
 Summer Solstice (21 June)
 Winter in the Southern Hemisphere

South short days, long nights
Antarctic circle 6 months darkness



Sun shines vertically overhead at :

- (a) Tropic of Cancer on 21st June
- (b) Tropic of Capricorn on 22nd December
- (c) Equator on 21st March & 23rd September

River Ganga

Prelims 1996:

Consider the following rivers:

1. Kishenganga (JK) 2. Ganga (Utt)
3. Wainganga (MP) 4. Penganga (Mh)

The correct sequence of these rivers when arranged in the north-south direction is

- (a) 1, 2, 3, 4 (b) 2, 1, 3, 4
(c) 2, 1, 4, 3 (d) 1, 2, 4, 3

Prelims 2013:

Consider the following pairs:

- | National Park | River flowing | |
|---------------------|---------------|--------------------|
| 1. Corbett NP | Ganga | <i>Ramganga</i> |
| 2. Kaziranga NP | Manas | <i>Brahmaputra</i> |
| 3. Silent Valley NP | Kaveri | <i>Kunthipuzha</i> |

Which of the above pairs are correctly matched?

- (a) 1 and 2 (b) 3 only
(c) 1 and 3 (d) None of these

Prelims 2014:

Consider the following statements:

- Animal Welfare Board of India is established under EPA 1986. *(PCA 1960)*
- National Tiger Conservation Authority is a statutory body. *(WPA 1972/2006)*
- National Ganga River Basin Authority is chaired by the **Prime Minister**.

Which of the statements given above are correct?

- (a) 1 only (b) 2 and 3 only
(c) 2 only (d) 1, 2 and 3

Prelims 2016:

Which of the following are the key features of 'National Ganga River Basin Authority (NGRBA)'?

- River **basin** is the **unit** of planning and management.
- It spearheads the river conservation efforts at the **national level**.
- One of the **Chief Ministers** of the States through which the Ganga flows becomes the **Chairman** of NGRBA on rotation basis.

Select the correct answer using the code given Below.

- (a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

Important tributaries of Ganga:

Left: Ramganga, Garra, Gomti, Ghaghara, Gandak, Burhi Gandak, Koshi, Mahananda

Right: Yamuna, Tamsa/Tons, Karamnasa, Son, Punpun, Falgu, Kiul, Chandan, Ajoy, Damodar, Rupnarayan

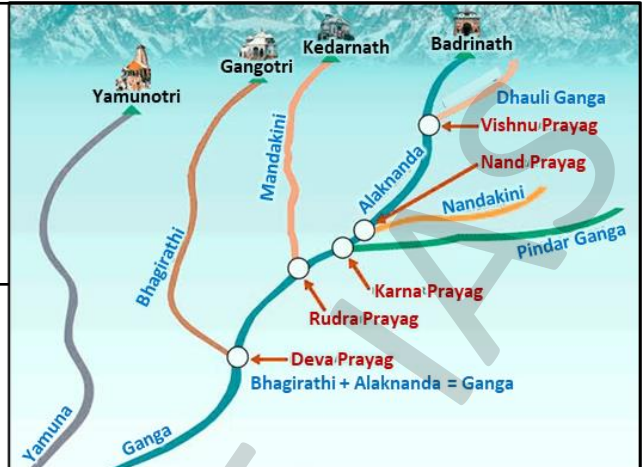


I read I forget, I see I remember | See explanation of this PDF on [YouTube](https://www.youtube.com/c/allinclusiveias) www.youtube.com/c/allinclusiveias

Ganga Basin:

(source: cwc.gov.in, nmcg.nic.in)

- ❖ drains an area of about **10 lakh sq. kms.**
- ❖ India (80%), China, Nepal, Bangladesh
- ❖ **11 states:** HP, Uttarakhand, Haryana, Delhi, Rajasthan, MP, Chhattisgarh, UP, Bihar, Jharkhand, WB



Brief background:

- ❑ **1986:** Ganga Action Plan
- ❑ **2009:** NGRBA; under EPA 1986; Chaired by PM; includes CMs of Ganga states; declared Ganga as 'National River'
- ❑ **2011:** National Mission for Clean Ganga
- ❑ **2014:** Namami Gange Programme launched. Nirmal dhara (unpolluted flow), Aviral dhara (Continuous flow)
- ❑ **2016:** NGRBA replaced by National Ganga Council

Five tier structure:

- National Ganga Council (PM, Ministers, CMs)
- Empowered Task Force (Jal Shakti Minister)
- National Mission for Clean Ganga (DG NMCG)
- State Ganga Committees
- District Ganga Committees

Glacial Lake Atlas of Ganga River Basin:

- ❑ by Jal Shakti Ministry; under NHP
- ❑ 11 Sub-basins; biggest Kosi, smallest Kamla
- ❑ 9/14 highest peaks are in Ganga basin

Glacial Lake?

- ❑ See page-48
- ❑ Moraine/Ice dam



- ❑ since **2009**; by ISRO
- ❑ Just like Google Earth
- ❑ India specific; Lots of information to help govt. in e-governance

National Hydrology Project:

- ❑ since 2016; Central Sector Scheme
- ❑ Ministry of Jal Shakti; World Bank support
- ❑ est. National Water informatics Centre as a repository of nation-wide water resources data
- ❑ ISRO's National Remote Sensing Centre is one of the implementation agencies.

Miscellaneous

Sukhet model:

- ❑ named after Sukhet village in Madhubani
- ❑ by Dr. Rajendra Prasad Agriculture University
- ❑ Garbage/dung → compost → money → LPG cylinders

Forum for Decarbonizing Transport:

- launched by NITI and WRI
- part of NDC-TIA (see page-8)

ESG reporting / Sustainability reporting:


- ❑ Disclosing data on environmental, social and governance impacts.
- ❑ Many benefits, like, shows financial risk due to environmental or social practices.
- ❑ To be included under Business Responsibility and Sustainability Reporting
- ❑ voluntary for FY 2021-22 and mandatory from FY 2022-23 for the top 1,000 listed companies by market capitalization

Triple Bottom Line



I read I forget, I see I remember

See explanation of this PDF on **YouTube** www.youtube.com/c/allinclusiveias

<p><u>RUCO: Repurpose Used Cooking Oil:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> In cooking oil, Total Polar Compounds must be < 25% <input type="checkbox"/> Else, stop re-using cooking oil <input type="checkbox"/> Use it to make bio-diesel <input type="checkbox"/> RUCO is initiative of FSSAI <p>(Trans-fats covered on Science pg-38) (Biofuels on Environment pg-65)</p>	<p><u>European Climate Law:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> By 2030: Europe to reduce net GHG emissions by 55% (compared to 1990) (Fit for 55) <input type="checkbox"/> By 2050: Europe to become carbon neutral <input type="checkbox"/> Carbon Border Adjustment Mechanism: <ul style="list-style-type: none"> <input type="checkbox"/> Type of carbon border tax from 2026 <input type="checkbox"/> Tax on imported goods from countries with less strict climate policies. 			
<p><u>National Automobile Scrappage Policy:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> 15 years: Commercial vehicles <input type="checkbox"/> 20 years: Private Vehicles <input type="checkbox"/> Fitness test, costly re-registration. <input type="checkbox"/> Incentives, discounts for scrapping. 	<p><u>Network for Greening Financial System:</u></p> <ul style="list-style-type: none"> ➤ Est. in 2017; Secretariat in France ➤ Group of 83 central banks ➤ Climate change; Green finance, etc. ➤ India's RBI joined it recently 			
<p><u>E3 Certification Scheme:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Ministry of Power <input type="checkbox"/> Energy Efficiency Enterprise <input type="checkbox"/> to accelerate brick sector modernization e.g. use of efficient technologies, etc. 	<p><u>Blue Nature Alliance:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> for ocean conservation; launched in 2021 <input type="checkbox"/> by Conservation International, GEF, etc. 			
<p>Ministry of Agriculture & Farmers Welfare</p> <p>Bhartiya Prakritik Krishi Padhati (BPKP)</p> <p>Posted On: 22 JUL 2021 4:37PM by PIB Delhi</p> <p>Government is implementing Bhartiya Prakritik Krishi Padhati (BPKP) as a sub scheme of Paramparagat Krishi Vikas Yojana (PKVY) since 2020-21 for the promotion of traditional indigenous practices. The scheme mainly emphasizes on exclusion of all synthetic chemical inputs and promotes on-farm biomass recycling with major stress on biomass mulching; use of cow dung-urine formulations; plant-based preparations and time to time working of soil for aeration. Under BPKP, financial assistance of Rs 12200/ha for 3 years is provided for cluster formation, capacity building and continuous handholding by trained personnel, certification and residue analysis.</p>	<p><u>GOBAR-DHAN scheme:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Ministry of Jal Shakti <input type="checkbox"/> Galvanizing Organic Bio-Agro Resources <input type="checkbox"/> generate wealth & energy from cattle & organic waste <input type="checkbox"/> e.g. cattle dung → biogas and manure <input type="checkbox"/> part of the Swachh Bharat Mission (Gramin) <p>SBM: ODF village and Waste mgmt</p>			
<p>I read I forget, I see I remember</p>	<p><u>Carbon Watch:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> mobile app to assess individual carbon footprint <input type="checkbox"/> recently launched by Chandigarh administration 			
	<p><u>DIWALI platform:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Dutch Indian Water Alliance for Leadership Initiative <input type="checkbox"/> India - Netherlands to cooperate on water challenges 			
	<p><u>Asia Environmental Enforcement Award:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> by UNEP; for govt agencies <input type="checkbox"/> to combat transboundary environmental crime <input type="checkbox"/> 2020 won by WCCB (2006; WPA 1972; MoEFCC) <input type="checkbox"/> For operation Wildnet-II (wildlife trade on Internet) 			
	<p><u>LEAF Coalition:</u></p> <ul style="list-style-type: none"> ➤ Lowering Emissions by Accelerating Forest Finance ➤ Est. in 2021; by USA, UK, Norway, etc. (PPP) ➤ To mobile finances (\$ 1b) to protect tropical forests 			
<p>See explanation of this PDF on  www.youtube.com/c/allinclusiveias</p>				
<p>Prelims 2021</p>	<p>Current Affairs</p>	<p>Environment</p>	<p>Page-88</p>	<p>© All Inclusive IAS</p>

Clean Energy Ministerial:

- ❑ 12th CEM hosted by Chile (June 2021)
- ❑ 29 countries, including India
- ❑ Est in **2009** at UNFCCC; Secretariat **Paris**
- ❑ Global forum to promote clean energy
- ❑ UK India launched IDDI:
 - Industrial Deep Decarbonization Initiative
 - coordinated by UN Industrial Dev. Org.
 - promote low carbon industrial materials

India - US initiatives for clean energy:

- ❑ Strategic Clean Energy Partnership
- ❑ Climate Action & Finance Mobilization Dialogue
- ❑ Partnership to advance clean energy

Partnership for Clean Fuels and Vehicles:

- ❑ launched in 2002 at **Rio+10**
World Summit on Sustainable Development
- ❑ Secretariat at **UNEP** Nairobi, Kenya

Lead Pollution

- ❑ **Knocking** in engines:
 - reduces efficiency; can damage engine
- ❑ **Lead** used to be added:
 - Boosts octane rating; but its toxic
- ❑ **India** stopped adding lead (1994 - **2000**)
- ❑ **Algeria** last country (July **2021**)

Octane and Cetane numbers are about?
Fuel quality (O → Petrol; C → Diesel)

Prelims 2012:

Lead, ingested or inhaled, is a health hazard. After the addition of lead to petrol has been banned, what still are the **sources of lead poisoning?**

- (a) Smelting units (b) Pens pencils
(c) Paints (d) Hair oils and cosmetics

Select the correct answer:

- (a) 1, 2 and 3 only (b) 1 and 3 only
(c) 2 and 4 only (d) 1, 2, 3 and 4

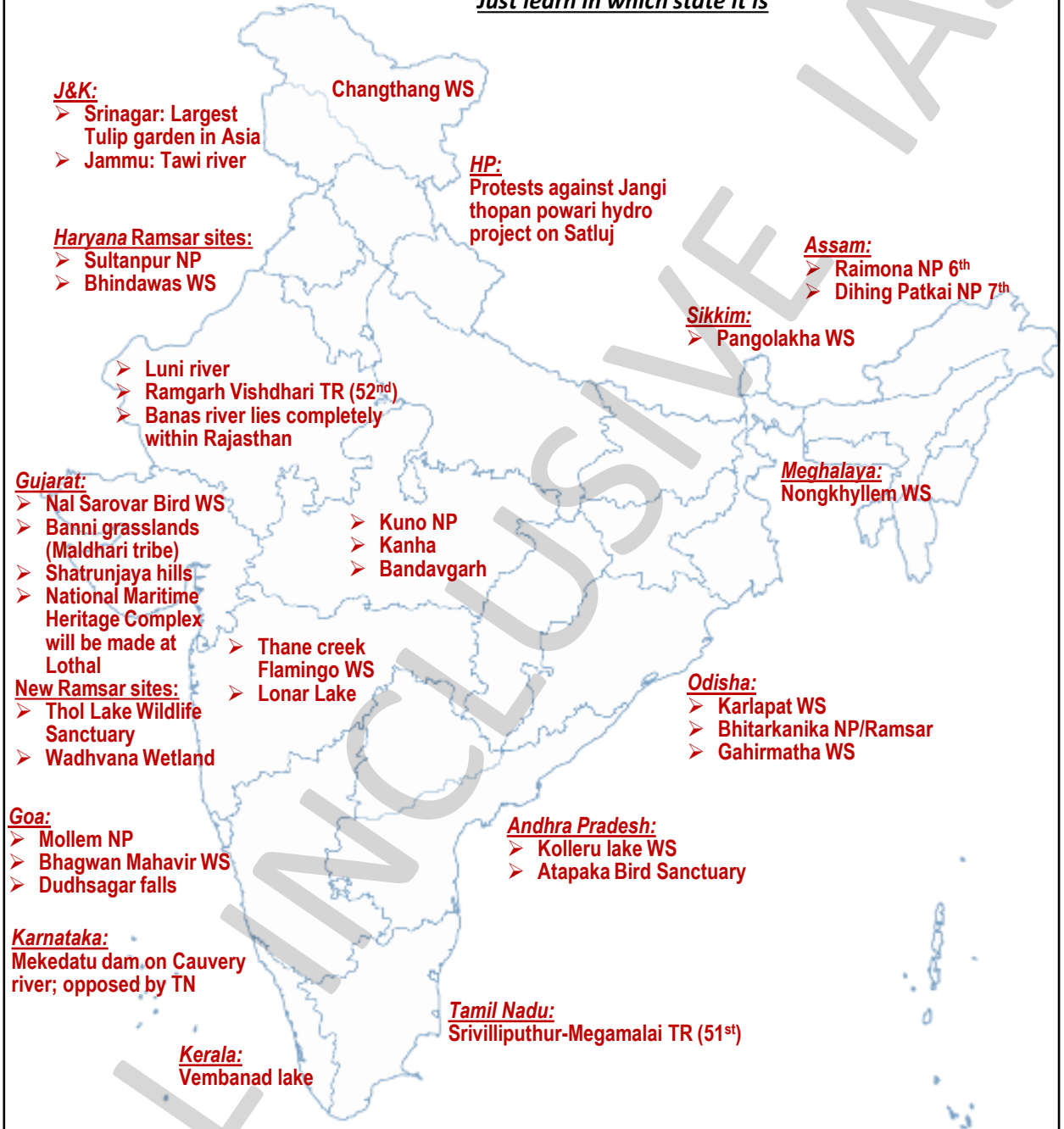
Note:

- ❑ This completes Environment Current Affairs Course (May 2020 to August 2021)
- ❑ In First week of October, please download a concise PDF of protected areas, species, etc. that were in news, from our website www.allinclusiveias.com

(Important) Places in news

Just learn in which state it is

WS: Wildlife Sanctuary
NP: National Park



<p><u>Luni river</u></p> <ul style="list-style-type: none"> ➤ largest river in Thar Desert ➤ Originates in Pushkar valley of the Aravalli Range, near Ajmer ➤ Inland drainage in Rann of Kutch 	<p><u>Bhitarkanika National Park: Odisha</u></p> <ul style="list-style-type: none"> ➤ 1998: NP; 2002: Ramsar ➤ Gahirmatha is on east ➤ 2nd largest mangrove ecosystem in India ➤ Saltwater crocodile found here ➤ rivers Brahmani, Baitarani, Dhamra, Pathsala <ul style="list-style-type: none"> ➤ Brahmani from Jharkhand ➤ Baitarni from Odisha
<p><u>Shatrunjaya hills:</u></p> <ul style="list-style-type: none"> ➤ Bhavnagar Gujarat ➤ imp. in Jainism ➤ recent forest fire 	<p><u>Karlapat WS Odisha</u></p> <ul style="list-style-type: none"> ➤ Near to bauxite mines ➤ Elephant corridor ➤ 6 elephants died of Haemorrhagic Septicaemia (bacterial disease)
<p><u>Dudhsagar Falls:</u></p> <ul style="list-style-type: none"> ➤ in Bhagwan Mahaveer WS & Mollem NP ➤ on Mandovi river in Goa (Mandovi dispute b/w Goa and Karnataka) 	<p><u>Kolleru lake WS: Andhra</u></p> <ul style="list-style-type: none"> ➤ freshwater lake, Ramsar site ➤ between Krishna Godavari ➤ has Atapaka Bird Sanctuary
<p><u>Vembanad lake:</u></p> <ul style="list-style-type: none"> ➤ Punnamada L; Kochi L ➤ longest lake in India ➤ Nehru Trophy Boat Race (Vallam Kali) ➤ 2nd largest Ramsar site ➤ Kumarakom Bird Sanctuary is on north ➤ Kuttanad is on south <p>kuttanad: below sea level farming system Vallam Kali is snake boat race in Kerala</p>	<p><u>Srivilliputhur-Megamalai TR:</u></p> <ul style="list-style-type: none"> ➤ India's 51st; TN's 5th ➤ has Megamalai WS and Srivilliputhur Grizzled Squirrel WS ➤ Will help in saving Vaigai river
<p><u>Biodiversity Heritage Site:</u></p> <ul style="list-style-type: none"> ➤ Notified by States under Biodiversity Act, 2002 ➤ There are 22 BHS in India (April 2021) ➤ http://nbaindia.org/content/106/29/1/bhs.html 	<p><u>Palakkad/Palghat Gap:</u></p> <ul style="list-style-type: none"> ➤ Between TN and Kerala

Crops suitable for hot and humid climate? Paddy and Jute.



Flood irrigation:

- uses lots of water
- causes **salination** of soil
- Salination: water **evaporates**, leaving behind salt. This salt makes soil **impermeable** (can't absorb water)

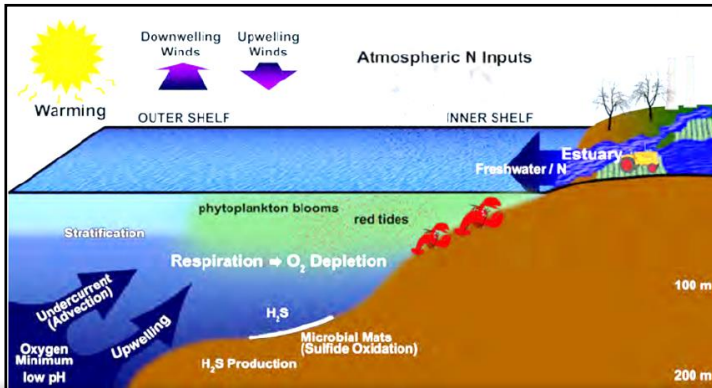
Micro-irrigation:

- drippers, sprinklers, foggers, etc.
- reduces water usage
- maintains soil health
- **not the only method** to conserve water



I read I forget, I see I remember

See explanation of this PDF on  www.youtube.com/c/allinclusiveias

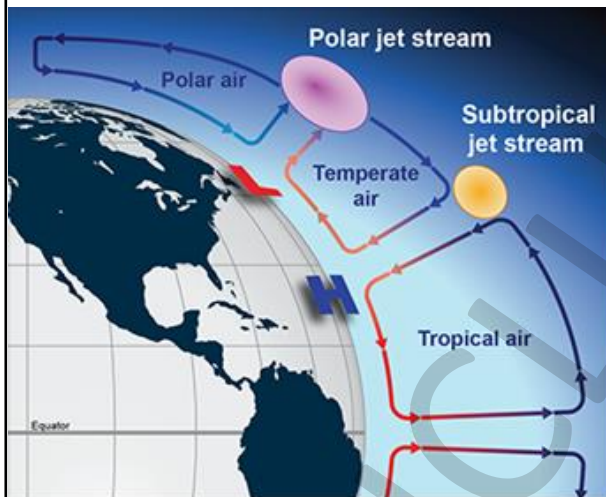
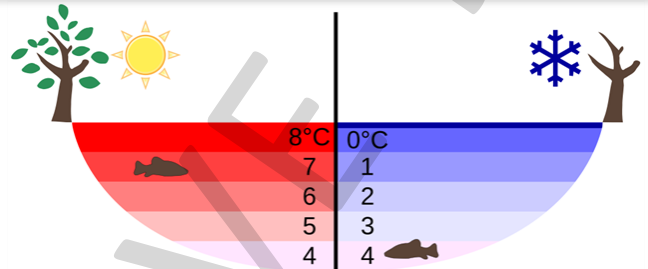


Page-60 Dead Zones:

- **Eutrophication** is due to excess nutrients.
- They may come from rivers, farms, cities, and even **upwelling in the seas**.

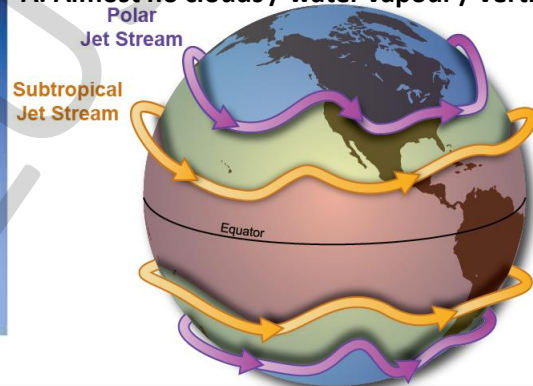
Page-80: THC and AMOC:

- Frozen lake has liquid water below it, why?
- Density of water is max at 4°C, so it sinks.



Page-84 Jet stream:

- moves **eastwards** at altitude 8-15 km
 - can speed up **aircrafts** moving towards east
- Q. Why aircrafts fly in lower stratosphere?
 A. Almost no clouds / water vapour / vertical wind



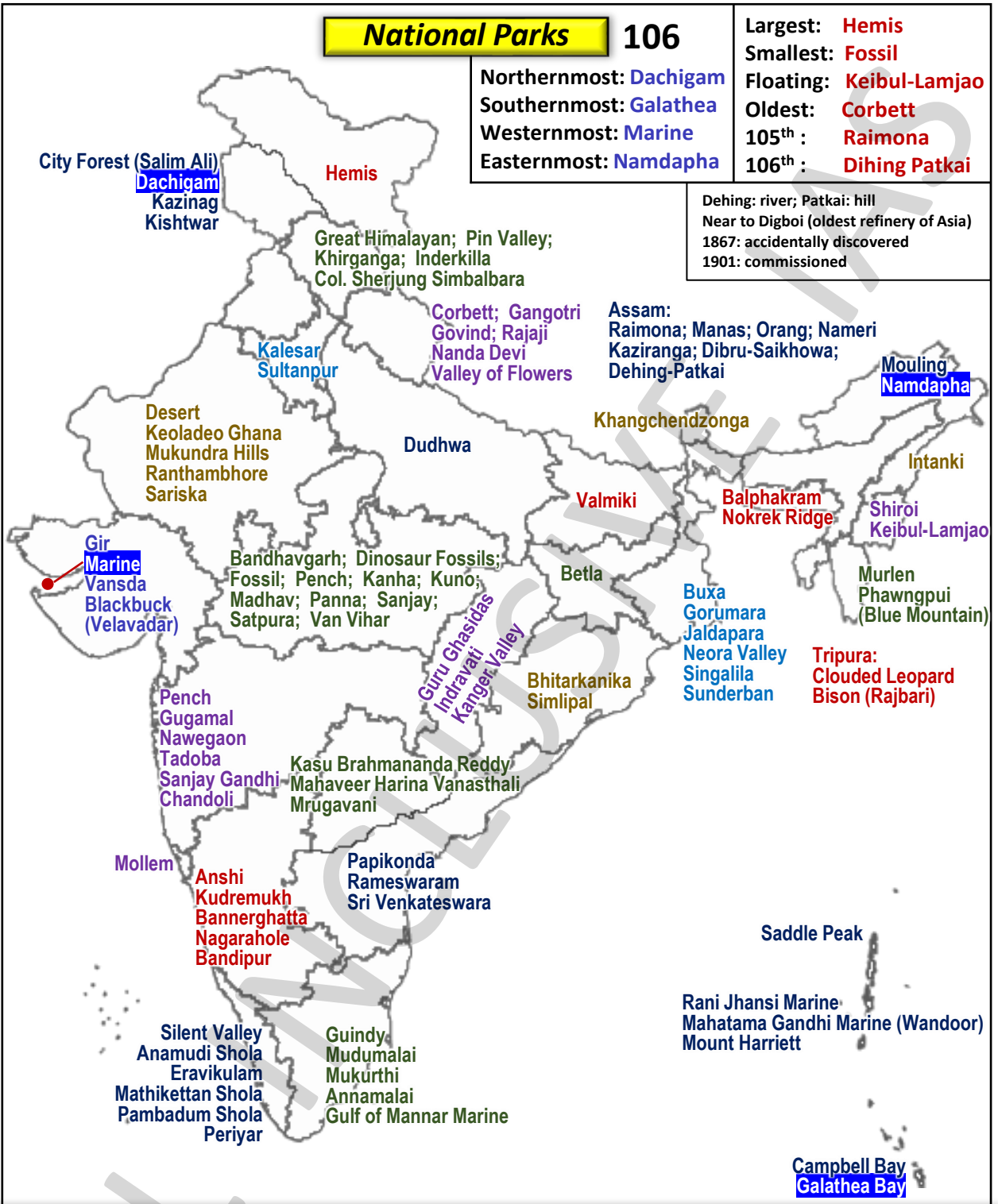
Report	Published by
Making Peace with Nature report	UNEP
Food Waste Index	UNEP
Protected Planet Report	UNEP and IUCN
State of Finance for Nature Report	UNEP and WEF
World's Forgotten Fishes	WWF
Global Energy Review	International Energy Agency
Global EV Outlook	International Energy Agency
World Energy Investment	International Energy Agency
Renewables Integration in India	International Energy Agency and NITI
Global Forest Goals Report	UN Department of Economic & Social Affairs
Global Assessment Report on Disaster Risk Reduction	UN Office for Disaster Risk Reduction
Children's Climate Risk Index	UNICEF
State of global climate report	World Meteorological Organisation

National Parks 106

Largest: Hemis
Smallest: Fossil
Floating: Keibul-Lamjao
Oldest: Corbett
105th: Raimona
106th: Dihing Patkai

Northernmost: Dachigam
Southernmost: Galathea
Westernmost: Marine
Easternmost: Namdapha

Dehing: river; Patkai: hill
 Near to Digboi (oldest refinery of Asia)
 1867: accidentally discovered
 1901: commissioned



Assam: R – MONK – DsDp

● ● ● ● ● ● ●

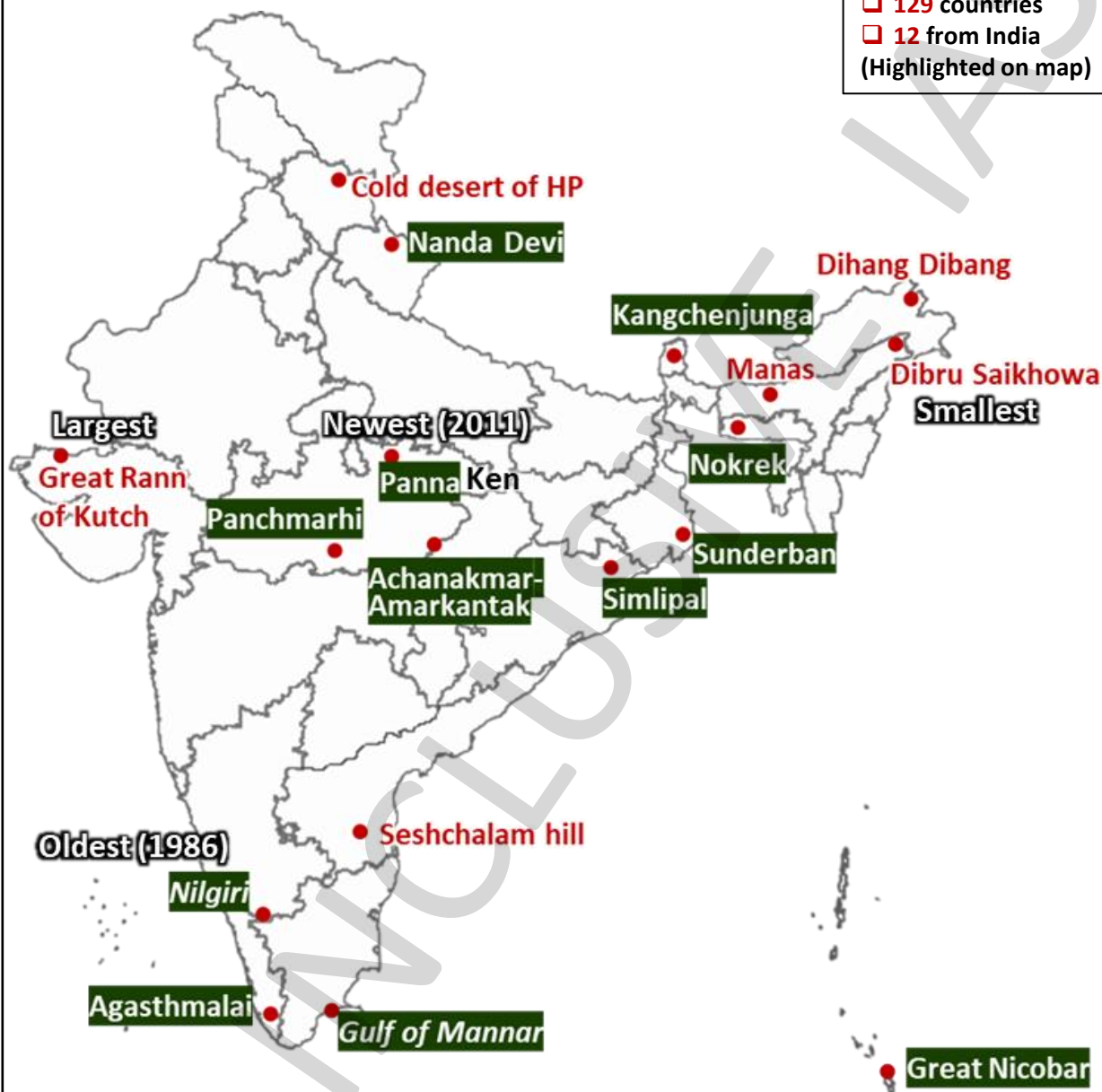
→ Raimona → Manas → Orang → Nameri → Kaziranga → Dibru-Saikhowa → Dehing Patkai

I read I forget, I see I remember | See explanation of this PDF on [YouTube](https://www.youtube.com/c/allinclusiveias) www.youtube.com/c/allinclusiveias

Biosphere Reserves

Man and Biosphere Programme:

- ☐ 1971; UNESCO
- ☐ 714 Biosphere Res.
- ☐ 129 countries
- ☐ 12 from India
(Highlighted on map)



Nanda Devi Biosphere Reserve:

- UNESCO World Heritage site
- has core areas as Nanda Devi NP and Valley of Flowers NP
- lies b/w Zaskar & Great Himalaya
- **Rishi ganga** river flows through it

Caution:

- Nanda Devi peak is "not" India's second highest peak.
- #1 Nepal: Everest
- #2 India: K2
- #3 India: Kangchenjunga
- #9 India: Nanga Parbat
- few more
- #23 India: Nanda Devi

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Tiger

Census 2018

- M-STRIPES → mobile app
- CaTRAT → AI software
- Madhya Pradesh** most tigers
most increase
- TR with most tigers:** Corbett
- TR with highest density:** Corbett
- TR without tiger:** Buxa, WB
Dampa, Mizoram
Palamu, Jharkhand

Tiger Census

By **NTCA** and **WII**
Every **4 years** since **2006**
1411 → 1706 → 2226 → **2967**

Methods to estimate tiger numbers:

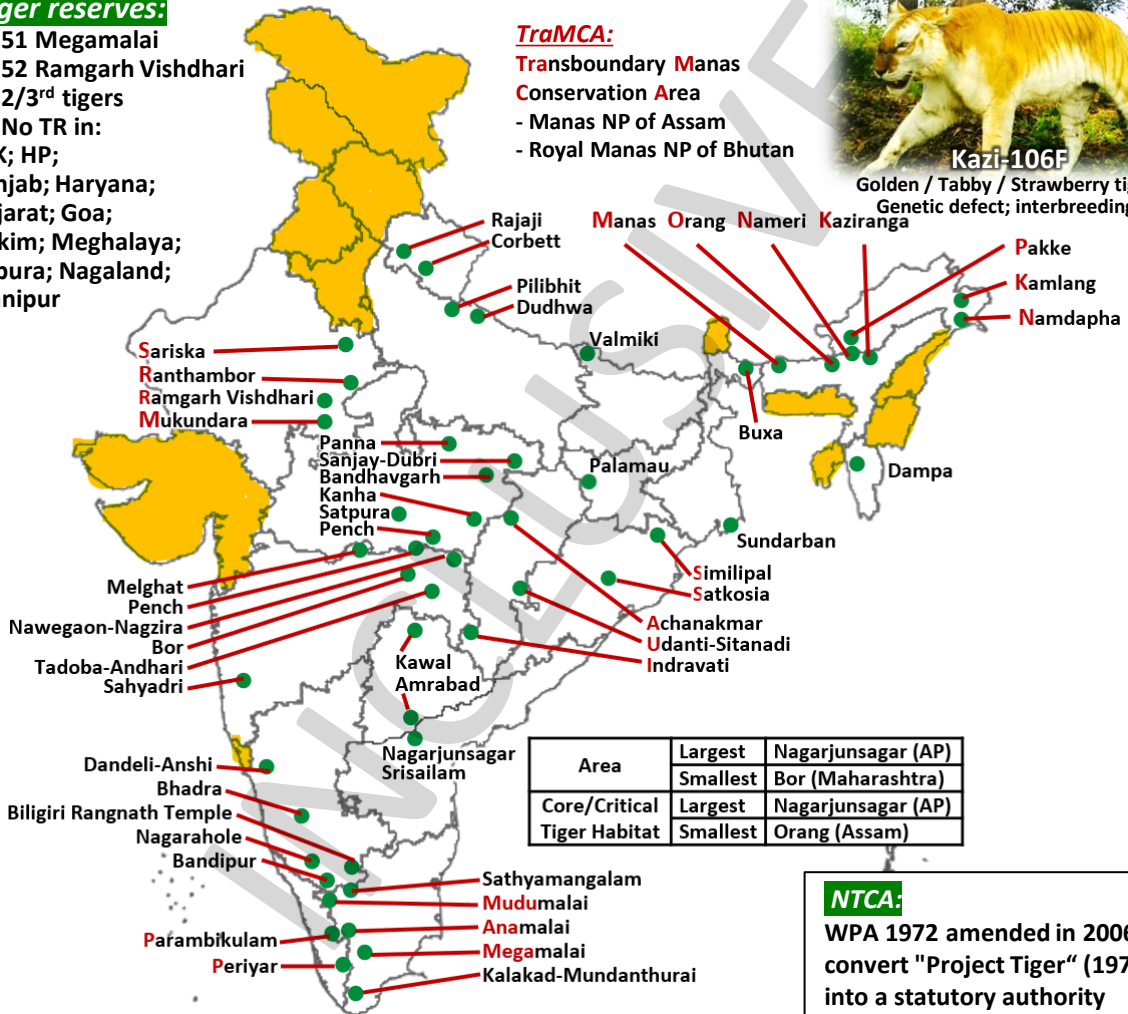


Tiger reserves:

- 51 Megamalai
- 52 Ramgarh Vishdhari
- 2/3rd tigers
- No TR in:
J&K; HP;
Punjab; Haryana;
Gujarat; Goa;
Sikkim; Meghalaya;
Tripura; Nagaland;
Manipur

TraMCA:

Transboundary Manas Conservation Area
- Manas NP of Assam
- Royal Manas NP of Bhutan



NTCA:

WPA 1972 amended in 2006 to convert "Project Tiger" (1973) into a statutory authority

2008 **GTI**

2010 **GTRP to TX2** *St. Petersburg Declaration*

2013 **Use CATS** **Snow leopard**

2015 **GTI (20)**

GTF (13) **GSLEP (12)**

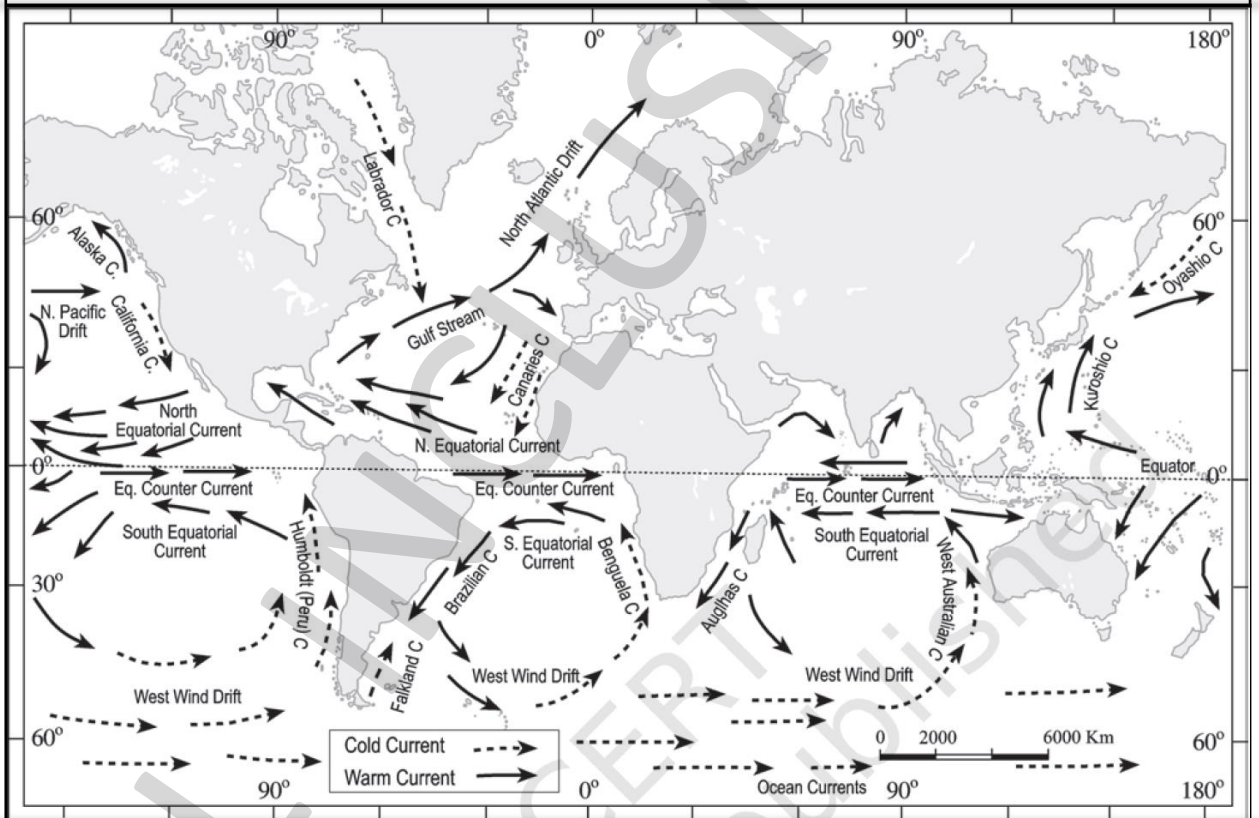
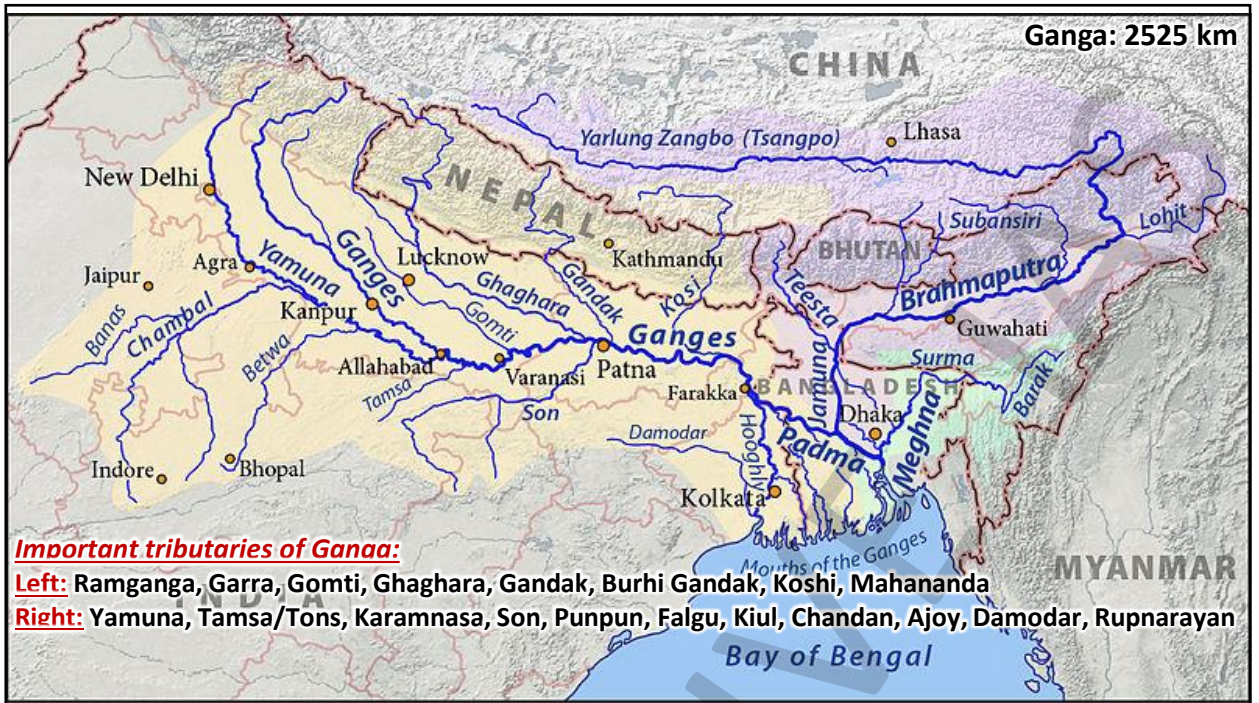
- ❖ **GTI** **G**lobal **T**iger **I**nitiative
 - ❖ **GTRP** **G**lobal **T**iger **R**ecovery **P**rogram
 - ❖ **TX2** Tiger times two (3200 → 7000 by 2022)
 - ❖ **CATS** **C**onservation **A**ssured **T**iger **S**tandards
 - ❖ **GTF** **G**lobal **T**iger **F**orum at **D**elhi (est. 1993)
 - ❖ **GSLEP** **G**lobal **S**now **L**eopard & **E**cosystem **P**rotection Program at **B**ishkek, Kyrgyzstan
- Secure 20 by 2020: secure at least 20 snow leopard landscapes by 2020

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Rivers, Dams



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Deserts:

Why deserts on western margins?

1. High pressure area (e.g. page-84)
2. Cold ocean currents (less moisture)

Fishing grounds:

Most important fishing grounds of the world are found in the regions where **warm and cold** oceanic currents meet.

Page-50 Coriolis force:

- Coriolis force in S. hemisphere is neither weaker, nor stronger, than that in N. hemisphere.
- Reason for Planetary winds to be stronger in southern hemisphere is less land (obstruction).

I read I forget, I see I remember

See explanation of this PDF on **YouTube** www.youtube.com/c/allinclusiveias

Mountain passes

Important passes:

- Zoji La → Great Himalayas
- Banihal → Pir Panjal
- Photu La → Zaskar
- Khardung La → Ladakh range

Freshwater lakes:

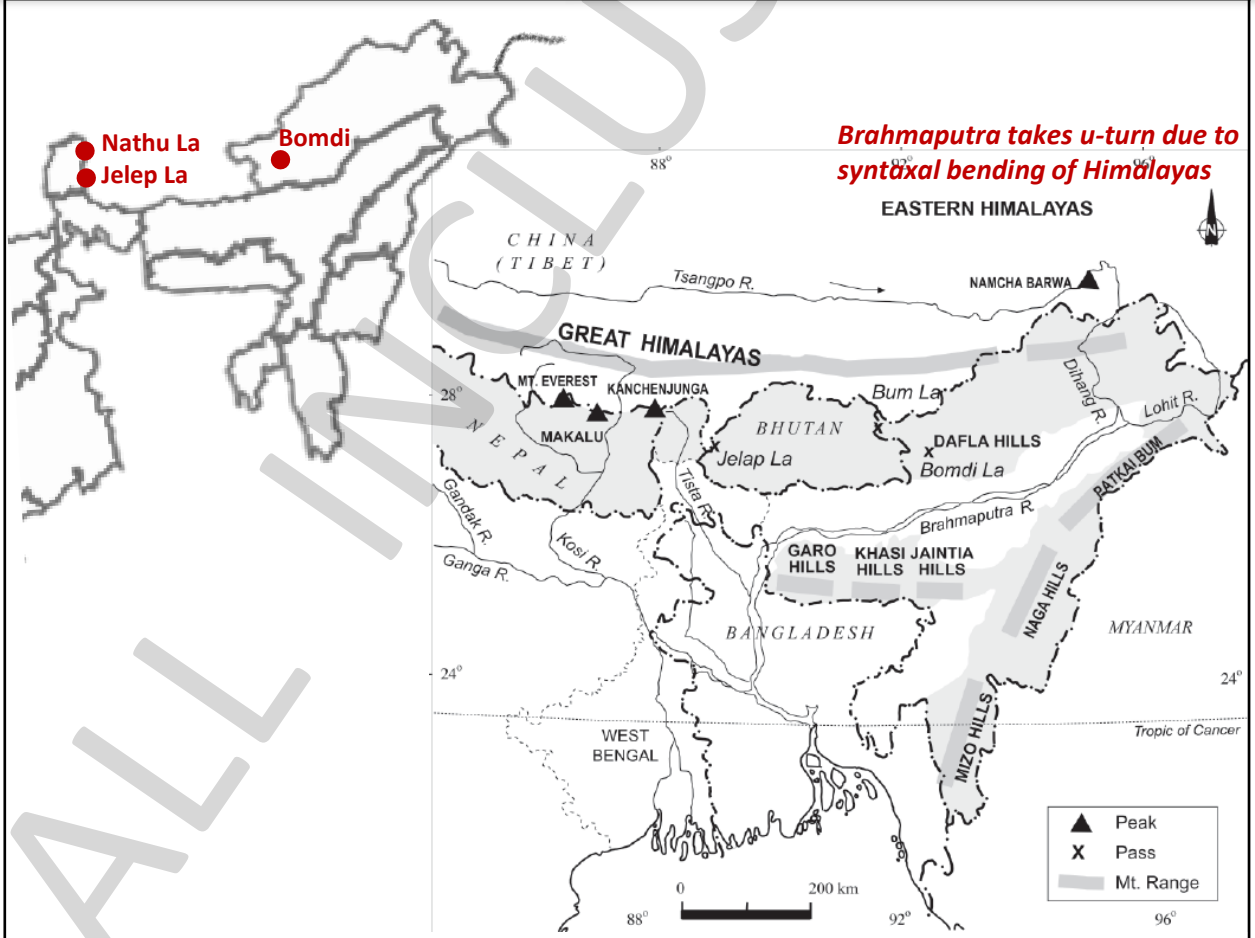
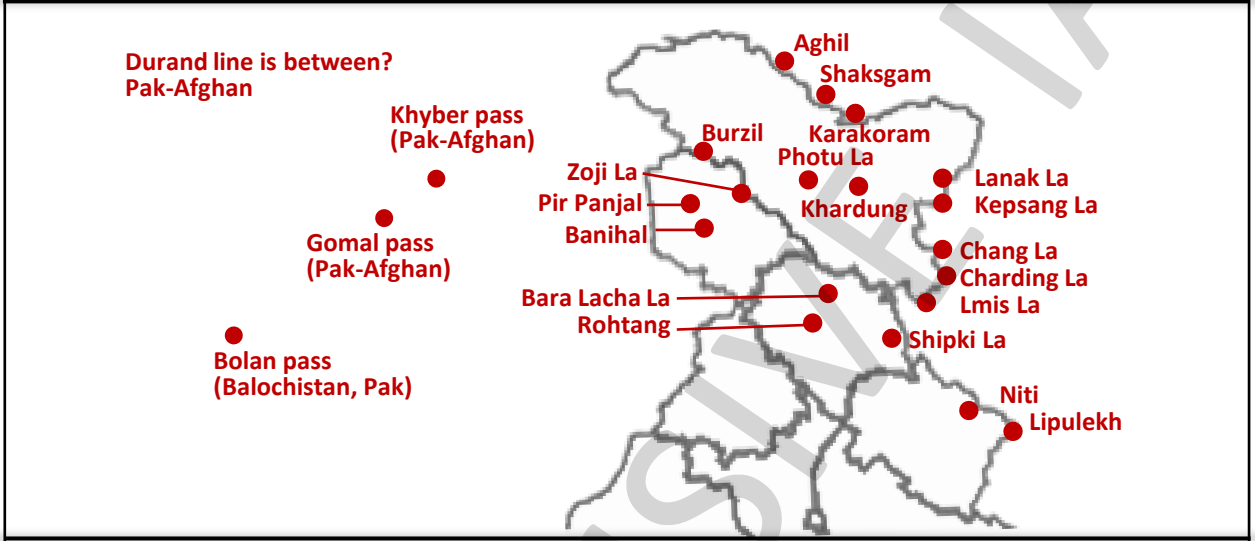
- Dal Jhelum
- Wular

Saltwater lakes:

- Pangong Tso
- Tso Moriri

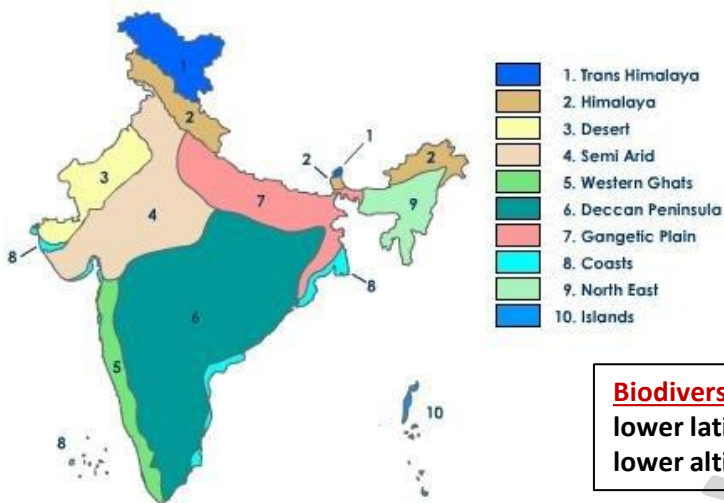
Dal lake:

- Srinagar, Jhelum river
- Jhelum in Kashmir is still in its **youth** stage and yet forms **meanders** (feature of **mature** stage)



Biodiversity

Also see page-30



Why are Himalayas rich in biodiversity?

Because they are confluence zone of different biogeographic zones. (10 in India)

Which laws are relevant for biodiversity conservation?

(mark all correct)
(even laws related to exports, customs, mining, etc.)

Biodiversity is more in:

lower latitudes compared to higher latitudes
lower altitudes compared to higher altitudes

Hypnea Indica and Hypnea Bullata:
two new seaweed species discovered along India's coastline

Nacaduba sinhala ramaswamii Sadasivan:
new butterfly species in discovered Agasthyamalai in TN

Blackbuck:

- IUCN: Least concern
- aka Indian antelope



State animal of Andhra, Haryana, Punjab



Indian wild ass:

- IUCN: Near Threatened
- aka Ghudkhur, Khur or Indian onager
- Mostly in Wild Ass WS Gujarat, Rann of Kutch
- drastic population decline in 1960s due to diseases like Surra and African Horse Sickness
- Also due to habitat destruction by humans and invasive species like Prosopis Juliflora tree

Western Hoolock gibbon:

- IUCN: Endangered
- Found in Arunachal, Assam
- India has only western, not Easter HG
- The only Apes present in India

Ape vs monkey?

Apes don't have tail, are intelligent, use tools.



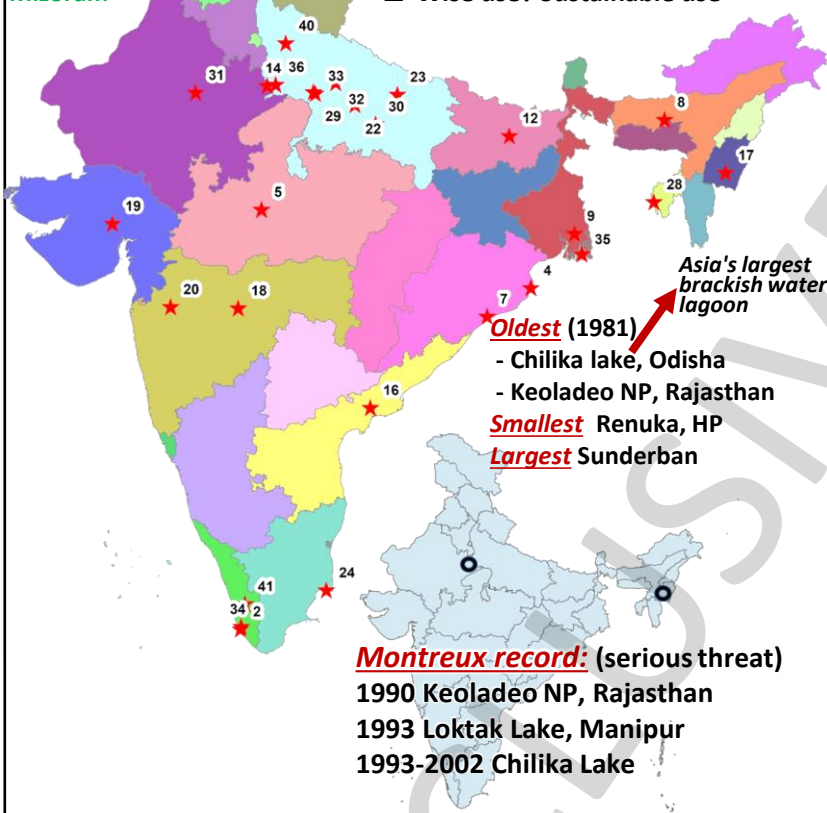
No Ramsar sites in:

Haryana
 Jharkhand
 Chhattisgarh
 Telangana
 Karnataka
 Goa
 Sikkim
 Arunachal
 Meghalaya
 Nagaland
 Mizoram

Wetlands

Convention on Wetlands:

- aka Ramsar Convention
- 1971; Ramsar, Iran
- only global environmental treaty for a particular ecosystem
- Wise use? Sustainable use



No.	Ramsar site	State
16	Kolleru Lake	Andhra P.
8	Deepor Beel	Assam
12	Kabartal Wetland	Bihar
19	Nalsarovar Bird Sanctuary	Gujarat
6	Chandertal Wetland	HP
25	Pong Dam Lake	HP
26	Renuka Wetland	HP
11	Hokera Wetland	J&K
36	Surinsar-Mansar Lakes	J&K
39	Tsomoriri Lake	J&K
42	Wular Lake	J&K
2	Asthmudi Wetland	Kerala
34	Sasthamkotta Lake	Kerala
41	Vembanad Kol Wetland	Kerala
38	Tso Kar Wetland Complex	Ladakh
18	Lonar Lake	Maharashtra
20	Nandur Madhameshwar	Maharashtra
17	Loktak Lake	Manipur
5	Bhoj Wetlands	MP
4	Bhitarkanika Mangroves	Odisha
7	Chilka Lake	Odisha
3	Beas Conservation Reserve	Punjab
10	Harike Lake	Punjab
13	Kanjli Lake	Punjab
15	Keshopur-Miani	Punjab
21	Nangal Wildlife Sanctuary	Punjab
27	Ropar Lake	Punjab
14	Keoladeo Ghana NP	Rajasthan
31	Sambhar Lake	Rajasthan
24	Point Calimere	Tamil Nadu
28	Rudrasagar Lake	Tripura
22	Nawabganj Bird Sanctuary	UP
23	Parvati Agra Bird Sanctuary	UP
29	Saman Bird Sanctuary	UP
30	Samaspur Bird Sanctuary	UP
32	Sandi Bird Sanctuary	UP
33	Sarsai Nawar Jheel	UP
37	Sur Sarovar	UP
40	Upper Ganga River	UP
1	Asan Conservation Reserve	Uttarakhand
9	East Kolkata Wetlands	WB
35	Sunderbans Wetland	WB

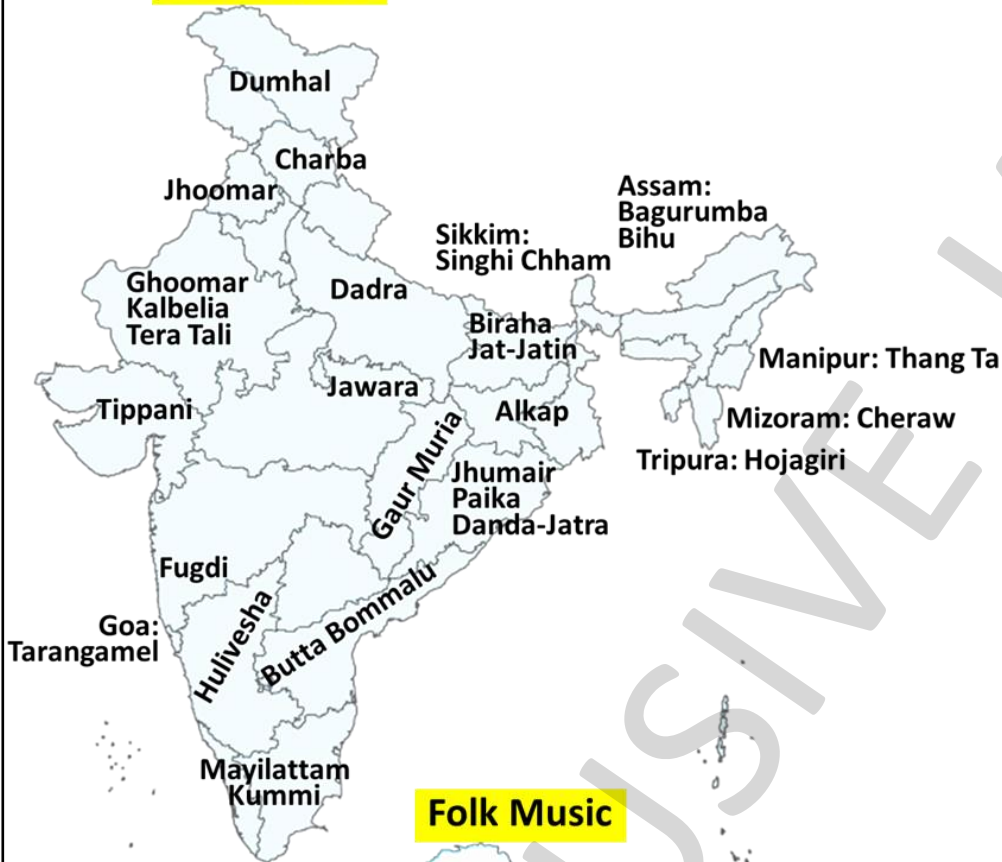
Montreux record: (serious threat)
 1990 Keoladeo NP, Rajasthan
 1993 Loktak Lake, Manipur
 1993-2002 Chilika Lake

Four new Ramsar sites: (42+4=46)

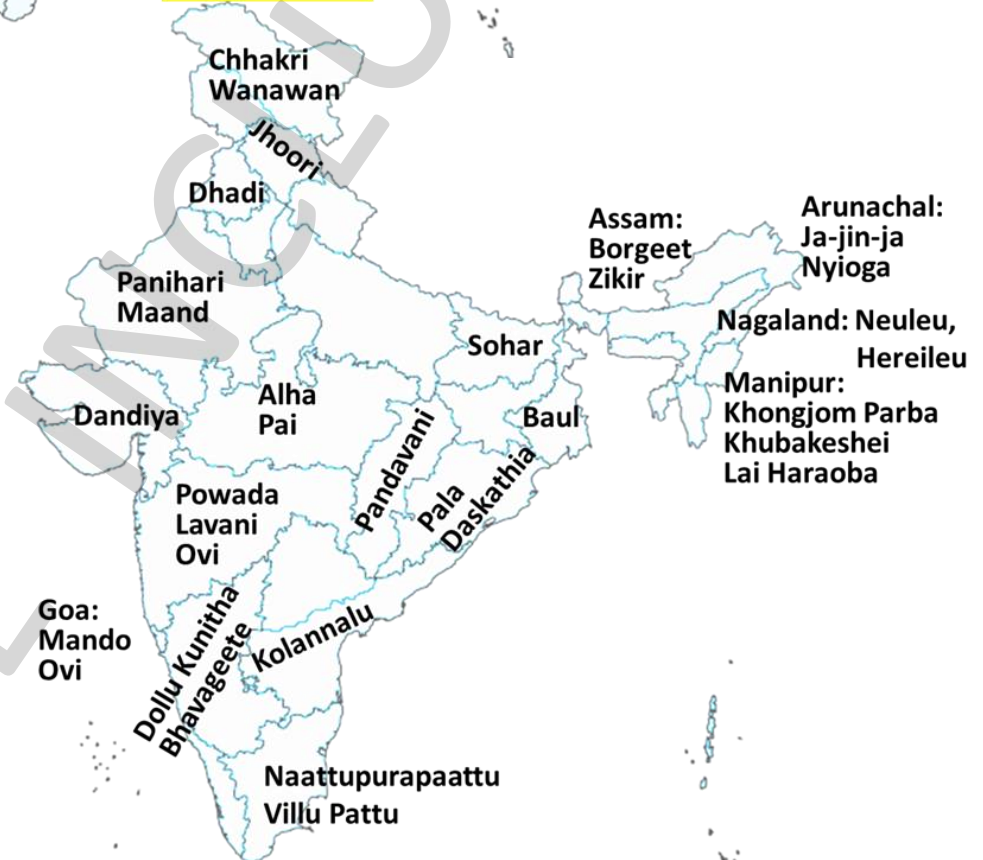
- 1) Gujarat: **Thol** Lake Wildlife Sanctuary
 - 2) Gujarat: **Wadhvana** Wetland
 - 3) Haryana: **Sultanpur** National Park
 - 4) Haryana: **Bhindawas** Wildlife Sanctuary
- Haryana's first Ramsar sites!**
 Except Sultanpur, others are man-made

Folk Dances

Obviously not part of environment, but useful



Folk Music



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