

50 MOST IMPORTANT TOPICS

PART - II

50 Important Topics - 2024	
Scheduled Date	Subject
01/04/24	Economy
02/04/24	Science & Technology
03/04/24	Environment & D.M.
04/04/24	Science & Technology
05/04/24	Environment & D.M.
06/04/24	-----
07/04/24	-----
08/04/24	Economy
09/04/24	Science & Technology
10/04/24	Economy
11/04/24	English
12/04/24	International Relations
13/04/24	-----
14/04/24	-----
15/04/24	Geography
16/04/24	Polity & Governance
17/04/24	Polity & Governance
18/04/24	Geography
19/04/24	Polity & Governance
20/04/24	Maths
21/04/24	-----
22/04/24	Reasoning
23/04/24	Environment & D.M.
24/04/24	Social Schemes



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MOST IMPORTANT TOPICS FOR PRELIMS 2024



HOURS

1500 TOPICS

11th April 2024 – 29th April 2024

Special Inclusions

- 6 FLTs (3 GS+ 3 CSAT)
- Value Additions Material
- Subject Specific MCQS

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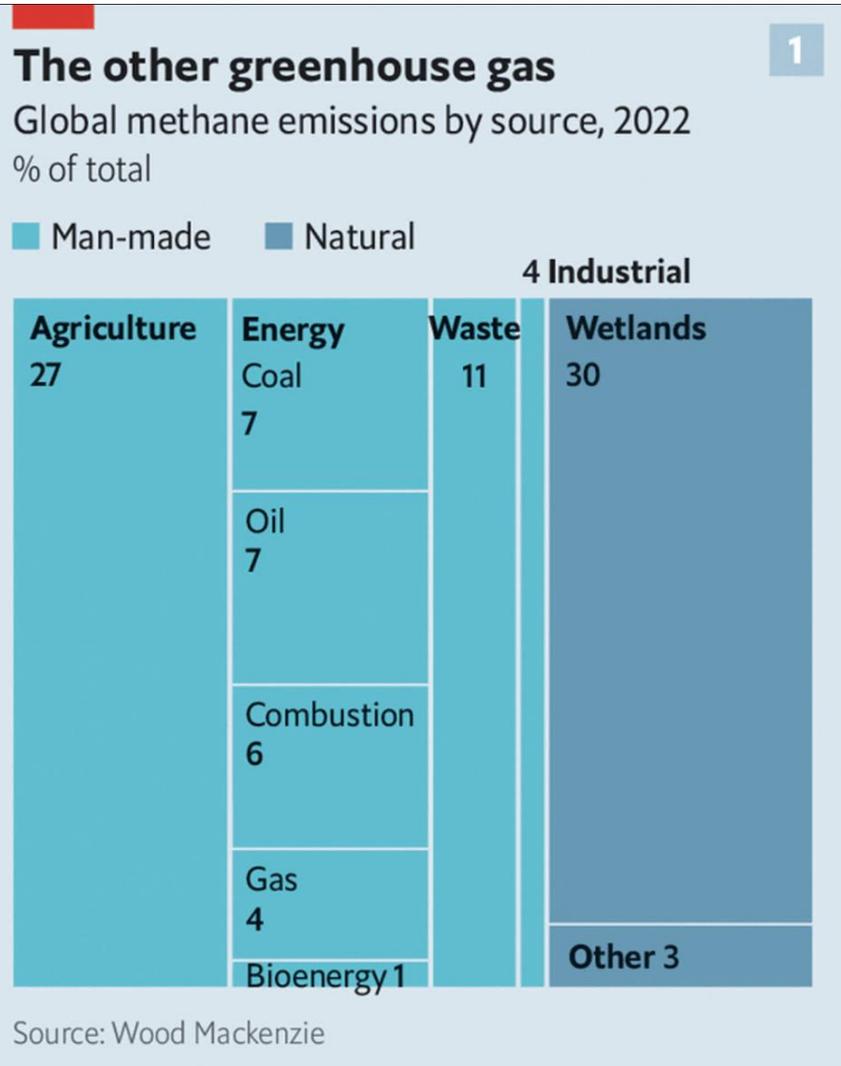
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METHANE SOURCES



METHANE

- Methane from cattle **doesn't have the same warming impact** as methane from fossil fuels.
- Biogenic & fossil methane originate from **different sources**.
- **Biogenic methane** starts as atmospheric CO₂ before it's been emitted by sources such as livestock.
- **Fossil methane** is geological carbon pulled from deep in the earth, where it's been stored for millions of years.

Table 1: Global Warming Potential (GWP) in carbon dioxide equivalents (CO₂e) of different GHGs over different time periods

Greenhouse Gas	100 Year Time Period			20 Year Time Period		
	AR4 (2007)	AR5 (2014)	AR6 (2021)	AR4 (2007)	AR5 (2014)	AR6 (2021)
CO ₂	1	1	1	1	1	1
CH ₄ (fossil)	25	28	29.8	72	84	82.5
CH ₄ (non-fossil)			27.2			80.8
N ₂ O	298	265	273	289	264	273

Source: Intergovernmental Panel on Climate Change (IPCC)

MethaneSAT

- MethaneSAT is an American-New Zealand space mission launched in 2024 aboard SpaceX's Transporter 10 rideshare mission.
- It is an **Earth observation satellite** that will **monitor and study global methane emissions** in order to combat climate change.
- The spacecraft will carry a **high-performance spectrometer methane sensing system**, which will allow the spacecraft to take **high resolution measurements** of global methane emissions from roughly 50 major regions across Earth.
- The mission is **jointly funded and operated by the Environmental Defense Fund (EDF)**, an American non-governmental organization, and the **New Zealand Space Agency**.
- It marks New Zealand's first space science mission.
- The **Bezos Earth Fund**, founded by Jeff Bezos, announced a US\$100 million grant to EDF that will support critical work including completion and launch of MethaneSAT.

MethaneSAT

- Essentially, MethaneSAT will orbit the **Earth 15 times a day, monitoring the oil and gas sector.**
- It will create a large amount of data, which will tell “how much methane is coming from where, who’s responsible, and are those emissions going up or down over time”, according to a statement by EDF.
- The data collected by **MethaneSAT will be made public for free in near real-time.**
- This will allow stakeholders and regulators to take action to reduce methane emissions.
- It can track differences in methane concentrations **as small as three parts per billion** in the atmosphere, which enables it to pick up smaller emissions sources than the previous satellites.
- MethaneSAT also has a wide-camera view – of about 200 km by 200 km – allowing it **to identify larger emitters so-called “super emitters**

An EYE ON METHANE: International Methane Emissions Observatory 2023 Report

- The International Methane Emissions Observatory's **third annual report** provides decision-makers with a **framework of action** to track and monitor methane emissions to plan targeted and ambitious actions for their mitigation.

DIFFERENT GASES

- **Syngas: Mixture of CO and H₂**
- **Water gas: Consists of CO and H₂**
- *Syngas and water gas are two types of fuel gases. Syngas, also known as synthetic gas, is composed of hydrogen, carbon monoxide, and very often some carbon dioxide. Water gas consists mainly of carbon monoxide and hydrogen and is produced from syngas.*
- **Biogas: Methane (40%–75%) + Carbon dioxide (15%–60%)**
- **Compressed biogas/Biomethane/BioCNG: Mainly Methane (CH₄)**
- **Compressed natural gas (CNG): Mainly Methane (CH₄)**
- **Liquefied Petroleum Gas: Mixture of propane (C₃H₈) and butane (C₄H₁₀)**

AIRSHED APPROACH

- Airshed is a **common geographic area** where pollutants mix and create **similar air quality** for everyone.
- Airshed approach to deal with **air pollution**.
- Under this, policymakers will plan actions keeping in view **geographical, meteorological and other factors** which pollute air within the airshed **instead of making policies guided by states' boundaries**.
- The airshed approach is being implemented for **Delhi-NCR and adjoining areas** and in **Indo-Gangetic Plains** and stressed on the need for **regional cooperation** to address the issue of air pollution.

NATIONAL CLEAN AIR PROGRAMME

- The government (MoEFCC) launched **National Clean Air Programme**, a **time-bound national level strategy** to tackle increasing air pollution.
- The NCAP will be a **mid-term, five-year action plan** with **2019 as the first year**.
- The main aim of the programme would be **40% reduction of PM2.5 and PM10 concentration by 2026**.
- It is to be implemented in **131 non-attainment cities**.
- These cities are chosen on the basis of **Ambient Air Quality India (2011-2015)** and **WHO report 2014/2018**.
- The programme would take **2017 as the base year** for the comparison of concentration.

131 NON-ATTAINMENT CITIES

- It includes -
- 123 Non-Attainment Cities (NAC) which exceed the **National Ambient Air Quality Standards (NAAQS) for 5 consecutive years** and
- 42 Million Plus Population Cities/Urban Agglomerations.
- 34 cities are common in both categories.

PRANA Portal

- **“PRANA” – Portal for Regulation of Air-pollution in Non-Attainment cities**, is a portal for monitoring of implementation of National Clean Air Programme (NCAP).
- It will support tracking of the **physical as well as financial status of city air action plan implementation and disseminate information** on air quality management efforts under NCAP to public.
- All cities have been requested to upload **action plans and progress reports** on PRANA portal.

LIGHT POLLUTION

- At **Changthang Wildlife Sanctuary in Hanle, Ladakh**, India's first dark sky region in Ladakh, apart from stars, the Milky Way's galactic centre and its arms are clearly visible to the naked eye.
- We can also see **several star clusters**, nebulae, galaxies such as the Andromeda and the Triangulum.
- **Zodiacal light** - a faint glow of diffuse sunlight scattered by interplanetary dust in the Solar System; **airglow** - an optical phenomenon caused by faint emission of light in the earth's atmosphere; and **gegenschein** - a bright spot in the night sky centred at the antisolar point, caused due to backscatter of sunlight by interplanetary dust - are also visible.
- **Venus can be so bright in the night sky** that its light can cast **shadows on the ground, just as moonlight does.**

ZODIACAL LIGHT



AIRGLOW



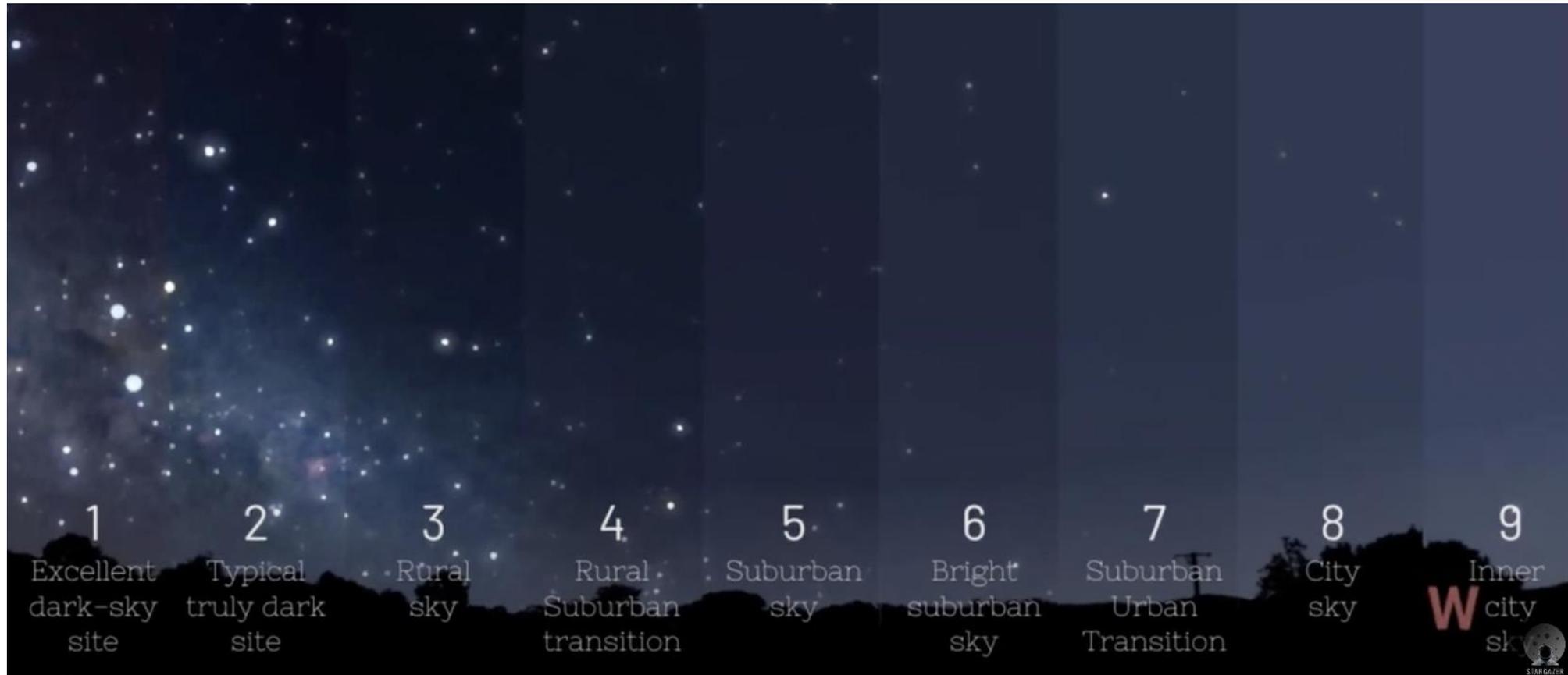
GEGENSCHWEIN



BORTLE SCALE

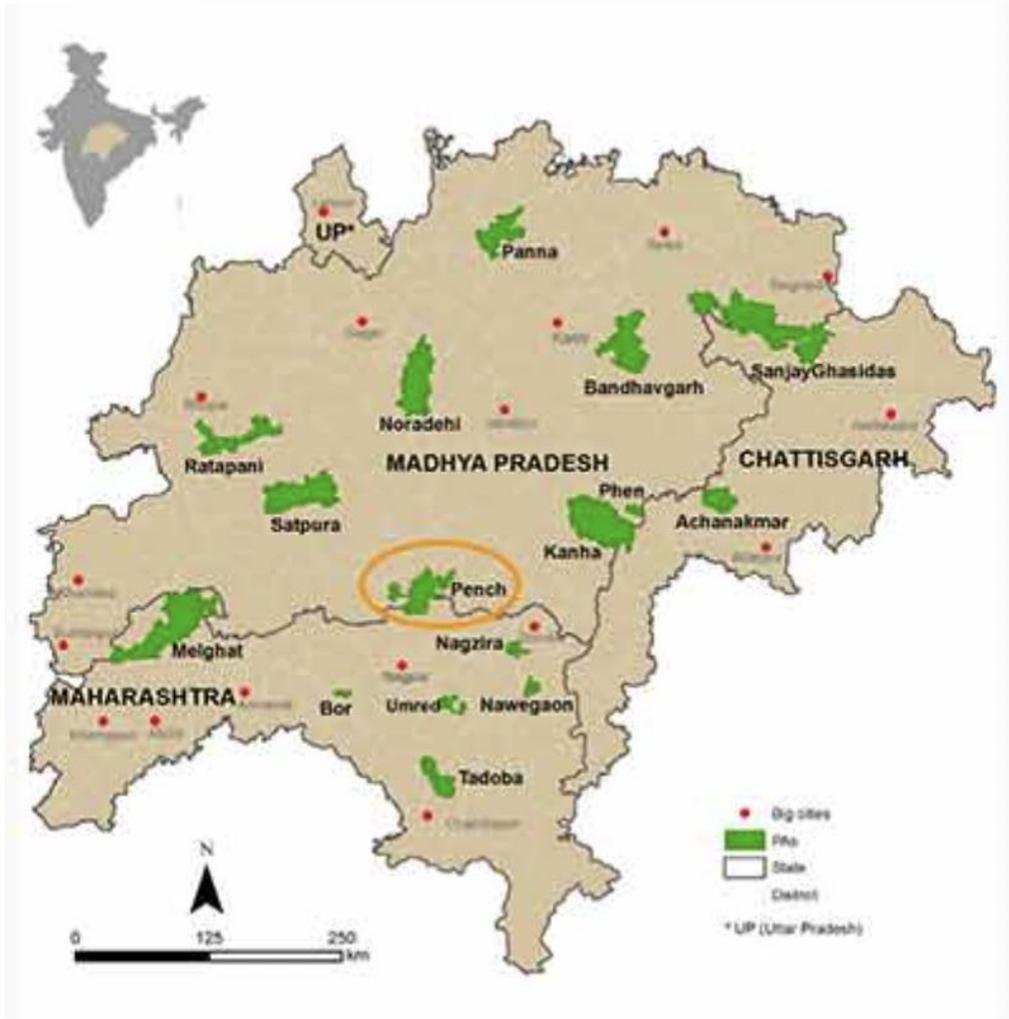
- It is still an overwhelming feeling **to actually observe and experience them under the Bortle Class 1 skies of Hanle.**
- The **Bortle Scale** helps amateur astronomers measure the night sky's brightness at a given location.
- The scale ranges from **Class 1**, the darkest skies available over the earth, through to **Class 9**, which denotes the pale, light-marred skies over the insides of cities.

BORTLE SCALE



PENCH TIGER RESERVE

- The **Pench Tiger Reserve (PTR) in Maharashtra** has become India's first Dark Sky park and is the fifth in Asia.
- The park earned the title for protecting the night sky and preventing light pollution, making the facility ideal for astronomy enthusiasts.
- The Dark and Quiet Skies for Science and Society Working Group, led by the **International Astronomical Union**, has recommended the establishment of 'Dark Sky Oases' by national and local governments.
- **Dark Sky Place certification** focuses on lighting policy, dark sky-friendly retrofits, outreach and education, and monitoring the night sky.
- The reserve has inaugurated a night observatory with the district planning committee (DPC) fund and the **area near Bagholi has been earmarked for stargazing.**



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Plastic Overshoot Day 2023

- The day **when the world officially exceeds the amount of plastic it can effectively manage in a year.**
- **28 July** is significant because it averages out every country in the world's plastic management progress, calculating how much plastic they recycle compared with how much is 'wasted' or dumped.
- Some can process much more plastic than others.
- **Denmark's 'overshoot day' is 26 December** because it is good at managing plastic waste. There are only four days where plastic is wasted in relation to the nation's capacity to recycle it.
- The Plastic Overshoot Day Report by **Swiss-based research consultancy Earth Action (EA)** sheds light on the alarming issue of plastic pollution and its implications on the environment.

Plastic Overshoot Day 2023

- Plastic Overshoot Day is determined based on a country's **Mismanaged Waste Index (MWI)**.
- The gap in waste management capacity and plastic consumption is called MWI.
- The three countries with the highest mismanaged waste percentages – **Mozambique (99.8%), Nigeria (99.44%), and Kenya (98.9%)** belong to Africa.
- **India ranks fourth in the MWI**, with 98.55% of generated waste.
- **Plastic Overshoot Day for India occurred on January 6, 2023**, when the country's plastic waste generation outweighed its waste management capacity.
- India's per-person consumption is 5.3 kg, significantly lower than the global average of 20.9 kg.

Earth Overshoot Day

- **Earth Overshoot Day** marks the date when humanity's demand for ecological resources and services in a given year exceeds what Earth can regenerate in that year.
- In 2022, it fell on **28 July**.
- In 2023, it fell on **2 August**.
- In 2024, it falls on **25 July**.
- EOD is calculated by dividing the **world biocapacity** (the number of natural resources generated by Earth that year), by the **world ecological footprint** (humanity's consumption of Earth's natural resources for that year), and multiplying

$$\frac{\text{world biocapacity}}{\text{world ecological footprint}} \times 365 = \text{EOD}$$

BRIDGE FUEL

- A "bridge fuel" is a **transitional energy source** that reduces reliance on more polluting fossil fuels like coal and oil.
- The objective is to shift towards cleaner, renewable energy sources, minimizing environmental impact and greenhouse gas emissions.
- Besides lower emissions, factors such as enhancing energy independence and reducing pollution costs are considered when evaluating a fuel as a bridge fuel.
- Natural gas is often considered a bridge fuel due to its lower emissions profile and versatility in various applications.

ETHANOL 100 FUEL

- Contrary to popular belief, **E100 fuel is not 100 percent ethanol.**
- **Previously**, the specifications for E100 fuel in India mandated using **100 percent ethanol as fuel.**
- However, due to safety concerns, the specifications were revised to mandate the blending of ethanol with some amount of petrol.
- Under the new specifications, E100 fuel includes 93-93.5 percent ethanol blended with 5 percent petrol and 1.5 percent co-solvent, which is a binder.

ETHANOL 100 FUEL

- As per sources under the new specifications, 100 per cent ethanol cannot be dispensed to any car.
- *When using 100 percent ethanol as fuel, flames are not visible.*
- If there is a fire, you will not know until you go inside the car.
- The addition of petrol gives the flames a **yellow colour**.
- So, you can see that there is a fire.
- So, for **safety reasons**, the specifications have changed,

BIOMINING

- A process that **uses microorganisms** to extract valuable metals from **solid waste materials or low-grade ores**, reducing the environmental impact of traditional mining methods.
- *Delhi's biomining project, aimed at clearing landfill sites, is facing challenges and is likely to miss its latest deadline of 2024.*

BIOLEACHING & BIOOXIDATION

- When the metal of interest is directly dissolved, the biomining process is called “**bioleaching**,”
- and when the metal of interest is made more accessible or “enriched” in the material left behind, it is called “**bio-oxidation**.”

CELLULAR AGRICULTURE

- Cellular Agriculture is gaining traction amidst the **escalating carbon emissions** attributed to the food industry.
- It involves the **creation of animal-based products from cell cultures** rather than relying solely on traditional animal farming methods.
- This innovative approach encompasses two distinct methodologies:
 - **Cell cultivation**, where meat is cultivated **directly from cells** that are nurtured with nutrients in controlled environments.
 - **Precision fermentation**, which **utilizes microorganisms** instead of cell cultures to generate products like milk and egg-white proteins

CELLULAR AGRICULTURE

- There are **two kinds** of agricultural products derived from cell culture: **acellular products and cellular products.**
- Acellular products are made of organic molecules like proteins and fats and contain **no cellular or living material in the final product.**
- Cellular products are made of **living or once-living cells.**

KHAZAN LANDS

- Generally any low-lying land close to a mangrove-fringed estuary reclaimed by salinity control structures can be called as khazan land.
- Serves as a **crucial drainage system**, preventing flooding by managing excess water flow.
- Originally mangrove forests, Khazan Land has been **reclaimed** using dykes, sluice gates, and canals, forming intricate drainage systems.
- Primarily used for agriculture, aquaculture, and salt panning, contributing to livelihoods and local economies.
- Khazans probably originated among the **prehistoric Gowda Tribes of Goa**.
- The **Salim Ali Bird Sanctuary** in low-lying floodplains of Goa is characterized by an estuarine agricultural system called **Khazan farming**.

ORANS

- Residents in **western Rajasthan** are expressing concerns over the State's proposal **to categorize orans (sacred groves) as deemed forests**.
- Orans are **community-conserved sacred spaces** found primarily in Rajasthan, India.
- They are characterized by **rich biodiversity and typically include a water body**.
- Communities believe that once the oran is declared as deemed forest, **they will be deprived of forest produce and access for herds and sheep in the forest area**.

THANK YOU