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## **{EG – Marine Resources – 19/08/04} India's Deep Ocean Mission**

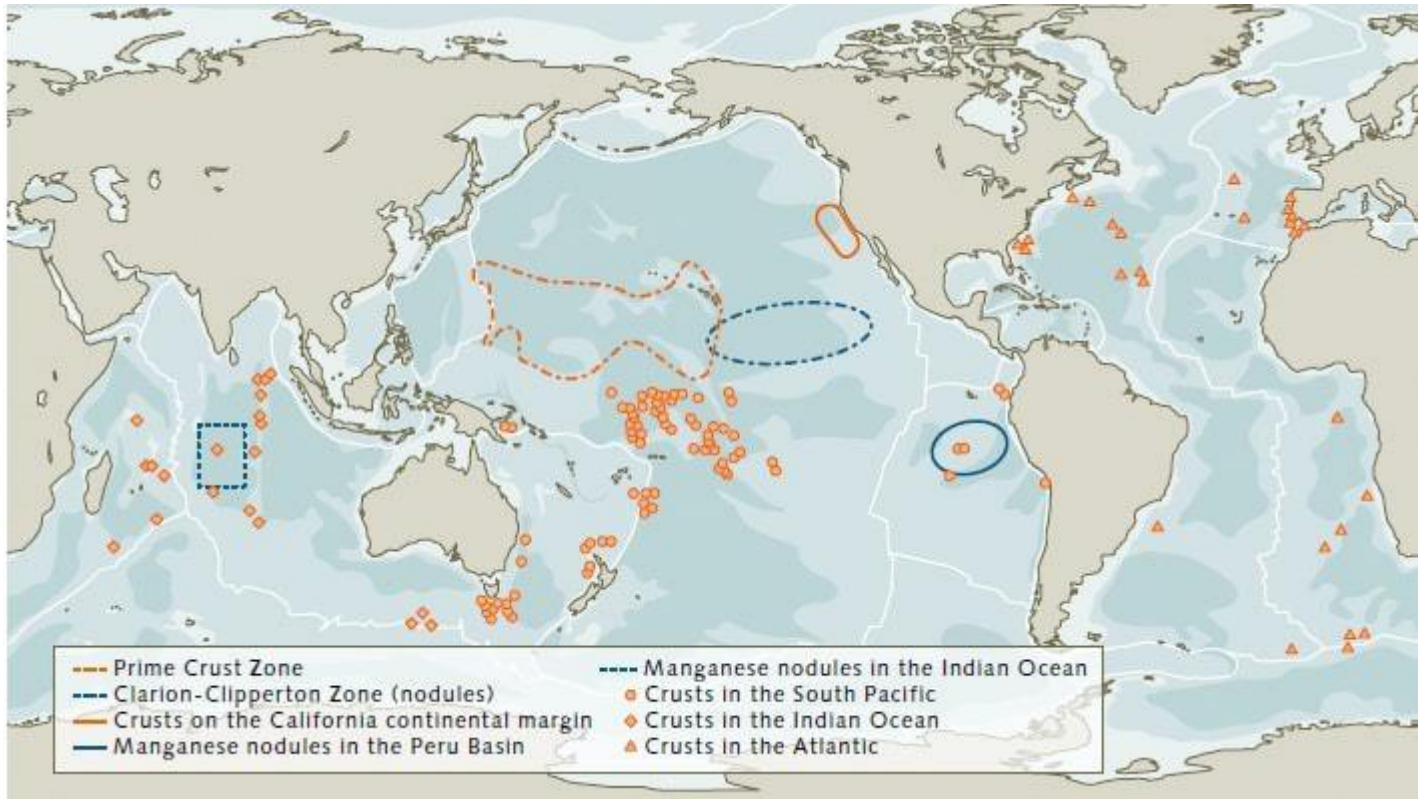
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[TH](#) | 04-08-2019 | Economic Geography > Marine Resources (given in detail in Oceanography 2019 edition)

- India's ₹8,000-crore 'Deep Ocean Mission' to explore deep ocean minerals will be launched in October.
- One of the main aims of the mission is to explore and extract **polymetallic nodules**.
- Polymetallic nodules (marine manganese nodules) are small potato-like accretions composed of minerals such as
  - ✓ **manganese (~30%),**
  - ✓ **nickel (1.25-1.5%),**
  - ✓ **copper (~1%),**
  - ✓ **cobalt (~0.25%) and**
  - ✓ **iron hydroxide.**
- They lie scattered on the ocean floor at depths of about 6,000 m and the size can vary from a few millimetres to centimetres.
- These metals can be extracted and used in electronic devices, **batteries (cobalt is an important component of lithium-ion batteries; Electric Vehicles use lithium-ion batteries)** and even for **solar panels**.

## Central Indian Ocean Basin (CIOB)

- The **International Seabed Authority (ISA)**, an autonomous international organisation established under the 1982 **United Nations Convention on the Law of the Sea**, allots the 'area' for deep-sea mining.
- India was the first country to receive the status of a 'Pioneer Investor' in 1987 and was given an area of about 1.5 lakh sq km in the **Central Indian Ocean Basin (CIOB)** for nodule exploration.



*Locations of known polymetallic nodules. From World Ocean Review 3, (2014) ([Source](#))*

- In 2002, India signed a contract with the ISA and after complete resource analysis of the seabed 50% was surrendered and the country retained an area of 75,000 sq km.
- Further studies have helped narrow the mining area to 18,000 km<sup>2</sup> which will be the 'First Generation Mine-site'.
- According to Ministry of Earth Sciences, the estimated polymetallic nodule resource potential in this area is **380 million tonnes (MT)**, containing
  - ✓ **92.59 MT of manganese**
  - ✓ **4.7 MT of nickel,**
  - ✓ **4.29 MT of copper, and**
  - ✓ **0.55 MT of cobalt.**

## When will India start mining?

- India's mining site is at a depth of 5,500 metres where the pressure is high, and temperature is extremely low.
- India has demonstrated the mining technology with artificial nodules at 500 metres depth.
- The mining machine newly developed for 6000 metres depth will be deployed at 5,500 metres as a part of Deep Ocean Mission.
- However, the commercial mining from such depths is decades away.

### **Which are the other countries that are in the race to mine the deep sea?**

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- Apart from the CIOB, polymetallic nodules have been identified from the central Pacific Ocean. It is known as the **Clarion-Clipperton Zone**.
- ISA has entered into contracts for exploration for **polymetallic nodules, polymetallic sulphides** and **cobalt-rich ferromanganese crusts** till 2022 in the deep seabed with 29 contractors.
- China, France, Germany, Japan, South Korea, Russia and also some small islands such as the Cook Islands, Kiribati have joined the race for deep sea mining.
- Most of the countries have tested their technologies in shallow waters and are yet to start deep-sea extraction.

### **Environmental impact**

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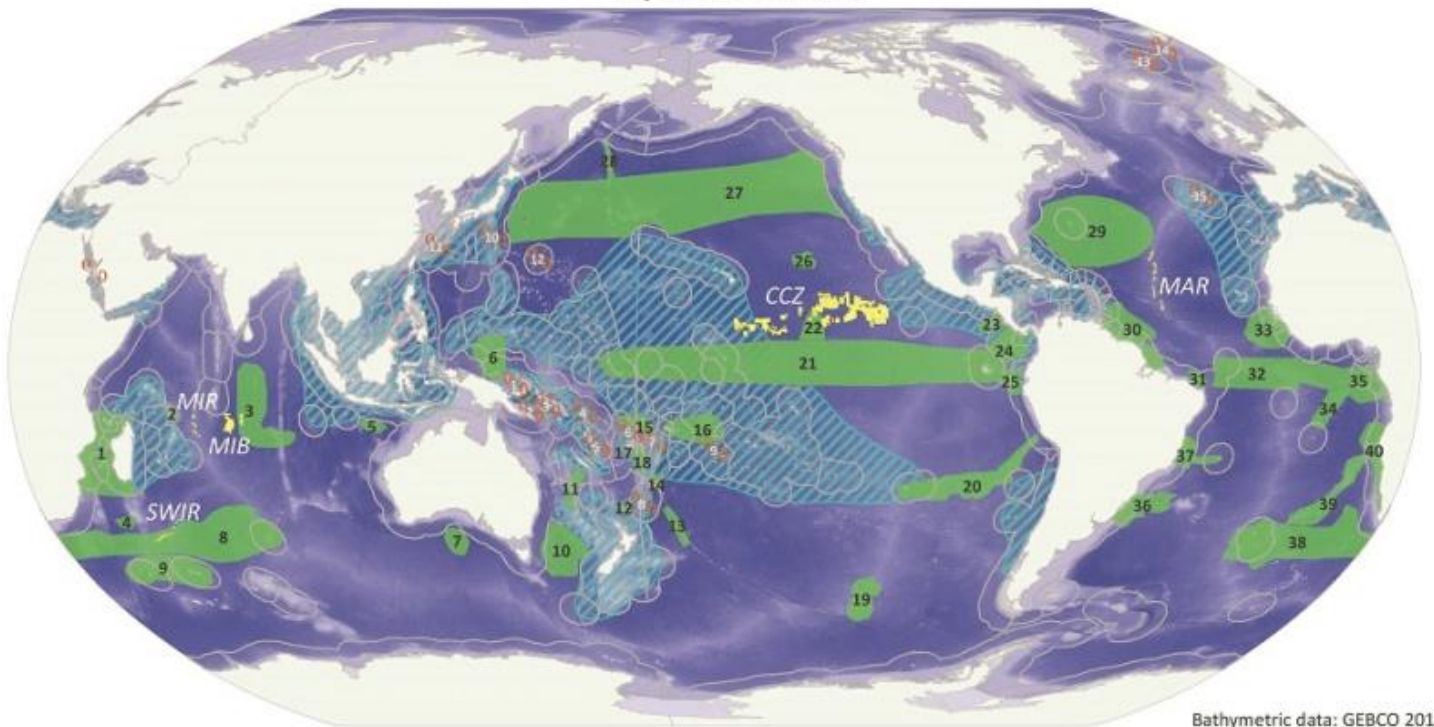
- The deep sea's biodiversity and ecology remain poorly understood, making it difficult to assess the environmental impact and frame adequate guidelines.
- According to IUCN, these deep locations can be home to unique species that have adapted themselves to conditions such as poor oxygen and sunlight, high pressure and extremely low temperatures.
- Such mining expeditions can make them go extinct.
- Environmentalists are also worried about the sediment plumes that will be generated as the suspended particles can rise to the surface harming the filter feeders in the upper ocean layers.

### **Challenges**

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- Difficulty and expense of developing and operating mining technology that could economically remove the nodules from depths of five or six kilometres.
- Continuing availability of the key minerals from land-based sources like **nickel** at market prices.
- The latest estimate from the ISA says it will be commercially viable only if about three million tonnes are mined per year.

## Exploration Activities

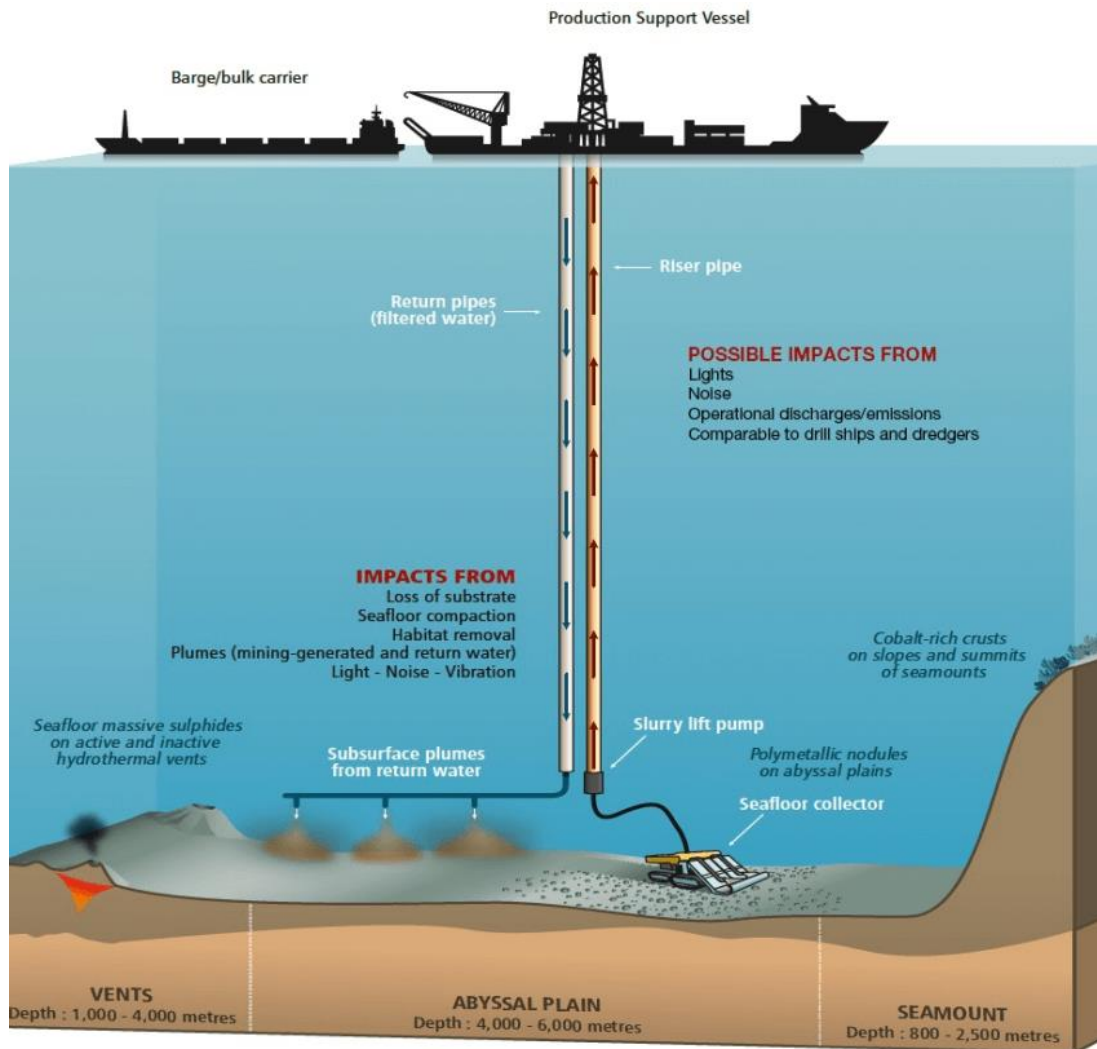


Bathymetric data: GEBCO 2014

- Ecologically or biologically significant areas (EBSA)
- Biodiversity Hotspots
- Exclusive Economic Zones (EEZ)
- % Exploration activities within EEZ
- ISA contract zones
- MAR* Abbreviation for ISA contract zone

### Exploration activities within EEZ:

- |  |  |
|--|--|
| 1 - Papua New Guinea – Bismarck Sea    | 9 - Cook Islands                       |
| 2 - Papua New Guinea - Solomon Sea     | 10 - Japan - Izu-Ogasawara sea         |
| 3 - Solomon Islands - Western Province | 11 - Japan - Okinawa Trough            |
| 4 - Solomon Islands - Temotu Province  | 12 - Japan - Minami-Tori-shima         |
| 5 - Vanuatu                            | 13 - Norway - Jan Mayen                |
| 6 - Fiji                               | 14 - Norway - Norwegian Atlantic Ridge |
| 7 - Kingdom of Tonga                   | 15 - Portugal - Azores                 |
| 8 - New Zealand - Kermadec arc         | 16 - Sudan/Saudi Arabia - Red Sea      |



Source and Credits: [IUCN](#)

For related topics like polymetallic sulphides, marine gas hydrates and other ocean resources, refer to Pmfias Oceanography 2019 edition.

## {EG – Minerals – 19/08/01} KABIL Set up to Ensure Supply of Critical Minerals

[PIB](#) | 01-08-2019

- A joint venture company namely **Khanij Bidesh India Ltd. (KABIL)** is to be set up with the participation of three Central Public Sector Enterprises namely,
  - ✓ **National Aluminium Company Ltd. (NALCO),**
  - ✓ **Hindustan Copper Ltd. (HCL) and**
  - ✓ **Mineral Exploration Company Ltd. (MECL).**
- The equity participation between NALCO, HCL and MECL is in the ratio of 40:30:30.
- Objective of constituting KABIL is to ensure a consistent supply of critical and strategic minerals to Indian domestic market.

## KABIL functions

- The KABIL would carry out identification, exploration, development, mining and processing of strategic minerals **overseas** for commercial use and meeting country's requirement of these minerals.
- The new company will help in building partnerships with other mineral rich countries like Australia and those in Africa and South America.

## The Need for KABIL

- Indian is betting big on Electric Vehicle Mobility therefore it is important to ensure energy storage through batteries.
- Aviation, Defence and Space Research also require minerals with lower weight and high mechanical strength.
- Among such twelve minerals identified as strategic minerals, which have meagre resource base, **Lithium** and **Cobalt** are significant.

## **{EG – Renewable Energy – 19/08/09} PM-Kusum scheme**

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[D2E](#) | 09-08-2019 | General Science, Economic Geography > Energy Sources > [Renewable Energy](#)

- PM-Kusum: Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan
- PM-Kusum scheme consists of three components:
  1. **10 GW of Decentralized Ground Mounted Grid Connected Renewable Power Plants.**
  2. **Installation of 17.50 lakh standalone (off grid) Solar Powered Agriculture Pumps.**
  3. **Solarisation of 10 Lakh Grid-connected Solar Powered Agriculture Pumps.**
- All three components combined, PM-Kusum aims to add a solar capacity of **25.75 GW by 2022**.
- The total central financial support provided under the scheme would be Rs. 34,422 crores.
- Besides reducing emissions, the scheme aims to address challenges of irrigation supply, subsidy burden on discoms (~Rs 50,000 crores) and farmer income (sale of surplus power).

## Criticism of PM-Kusum scheme

- The scheme might result in over-exploitation of groundwater, according to CSE.
- PM-Kusum may also not help reduce discoms' subsidy burden because the installation of pumps is not mandatorily tied to decrease in subsidised agricultural power supply.
- PM-Kusum's proposed scheme of installing solar plants on farmland might benefit only the wealthy farmers, as it requires large investment or the ability to lease land for 25 years.

## The CSE report recommends

- Solar pump schemes should accompany strict measures of control to manage groundwater extraction.
- The focus should be on on-grid solar pumps as they are economically superior to off-grid pumps as excess electricity can be injected into the grid.
- Off-grid pumps should be considered only for unelectrified regions with relatively high water-table.
- Clear targets must be set to provide solar pumps to small and marginal farmers.

## **{EG – Renewable Energy – 19/08/19} Renewable hybrid energy systems**

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[Livemint](#) | 19-08-2019 | General Science, Economic Geography > Energy Sources > [Renewable Energy](#)

- Hybrid systems of power generation and supply have the potential to bring down the costs by efficiently utilizing the existing infrastructure.

### **Renewable energy has inherent challenges:**

1. Renewable energy **relies on intermittent sources** like sun, wind, tides, etc. and hence its **output is constrained to specific hours of the day**. This can create issues in matching peak power demand.
    - For example, solar output is maximum between 11am and 3pm, while wind output is highest in late evening and early morning. However, peak demand for power is reached in the evening hours of 6-9 pm, which cannot be catered to by either wind or solar.
  2. Its usage leads to **lower utilization of transmission lines** and hence **relatively increased costs of transmission**.
- Because of these inherent shortcomings, there is a need to focus on hybrid systems of energy storage and supply to cut down costs and to ensure continuous supply of electricity even during peak hours.

### **What does hybrid systems constitute?**

- Hybrid systems of energy storage and supply include **flexible energy resources** which can **rapidly ramp up or down power supply as needed**.
- These could include hydro or gas-based power, or energy storage solutions (**batteries**).

### **How they work?**

- Hybrid systems store excess energy during renewable generation hours and release it into the grid during peak demand hours. In this way, it can provide both baseload and flexible 24x7 clean energy.

### **The cost advantages**

- Hybrid systems are becoming increasingly cost competitive, driven by reducing costs of battery storage.

- An optimal combination of solar, wind and storage can deliver stable round-the-clock power even at today's costs of around ₹6-7/kWh. Compared to baseload coal plants, this is significantly higher.
- Also, Li-ion battery costs are expected to fall from current \$220-240/kWh to below \$100 in next 3-4 years.
- Similarly, costs of solar energy have plummeted from ₹4.63/kWh in 2016 to ₹2.50/kWh in the latest auctions.

### **Can hybrid systems substitute coal-fired power plants?**

- The hybrid systems can potentially be competitive with 30-40% of existing coal-fired stations in India.
- McKinsey's modelling suggests that that wind-solar storage hybrid systems could generate 24/7 power with cost as well as reliability levels comparable to existing coal-fired power plants in the next 4-5 years.

### **Measures by the government: National Wind-solar Hybrid Policy**

- India's ministry of new and renewable energy released a solar-wind hybrid policy in 2018.
- The Policy seeks to promote new hybrid projects as well as hybridisation of existing wind/solar projects.
- The Policy provides for
  - ✓ integration of wind and solar at AC as well as DC level.
  - ✓ flexibility in share of wind and solar components in hybrid projects.
  - ✓ procurement of power from a hybrid project on tariff based transparent bidding process.
- For a project to be recognized as hybrid project, rated power capacity of one resource should be at least 25% of the rated power capacity of other resource.
- The objective of the policy is to provide a framework for promotion of large grid connected wind-solar hybrid system for **efficient utilization of transmission infrastructure and land**.
- It also aims at **reducing the variability in renewable power generation** and achieving better grid stability.

### **{EG – Renewable Energy – 19/08/22} In News**

[PIB](#) | [PIB](#) | 22-08-2019 | General Science, Economic Geography > Energy Sources > [Renewable Energy](#)

### **Ocean energy such as tidal, wave, shall be considered as Renewable Energy**

- MNRE has clarified that energy produced using various forms of ocean energy such as tidal, wave, ocean thermal energy conversion etc. shall be considered as Renewable Energy and shall be eligible for meeting the non-solar Renewable Purchase Obligations (RPO).

### **MoEF relaxed the lease rent norms for wind power projects**



- Currently, to establish wind power project over forest land, the existing procedure requires payment of **mandatory charges for compensatory afforestation and Net Present value (NPV)**.
- In addition to these charges, the companies had to pay additional lease rent of Rs. 30,000/- per MW.
- MoEF has now relaxed the mandatory charging of lease rent of Rs. 30,000/- per MW for wind power projects.
- It is expected that this step will boost the investment in wind power projects and make wind power cheaper.
- Promotions of such projects strengthen commitments towards **National Commitment pledged in Paris in 2015** was to have **40% of the power from renewable resources by 2030**.

## **{EG – Renewable Energy – 19/08/22} MNRE issues phase-2 norms for rooftop solar**

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[D2E](#) | 22-08-2019 | General Science, Economic Geography > Energy Sources > [Renewable Energy](#)

- The Union Ministry of New and Renewable Energy (MNRE) issued guidelines to implement the second phase of grid-connected rooftop solar photovoltaic programme.
- Under the second phase, **22 GW** of rooftop solar PV projects must be set up.
- Karnataka ranked the best for setting up a rooftop solar (RTS) project, according to the state rooftop solar attractiveness index (SARAL) released by the Centre.
- Telangana, Gujarat and Andhra Pradesh scored a rating of A++, while Jammu and Kashmir was placed at the bottom.
- India targets to produce **40 per cent** of its installed electricity capacity based on clean sources by **2030**, in line with its commitment towards the Paris Climate agreement.
- As part of this, **175 gigawatt (GW) of renewable energy capacity — 100 GW from solar, 60 GW from wind, 10 GW from bio-power and 5 GW from small hydro power — will be installed by 2022**.
- The MNRE had, in December 2015, approved a programme 'grid connected rooftop and small solar power plants programme', which aimed to install 4,200 MW rooftop solar plants in the country by year 2019-20.
- But, in the first phase only 2,158 megawatt (MW) of rooftop solar (RTS) systems could be installed.
- In the second phase, the electricity distribution companies (discoms) will play a key role in expansion of RTS.
- This is to ease the consumer's challenge of approaching multiple agencies for getting an RTS plant installed.
- The discoms and its local offices would be the nodal points for implementation of the RTS programme.
- To install the grid connected RTS projects in residential sectors, a central financial assistance (CFA) of 4,000 MW will be provided to government-owned discoms.
- The discoms will be provided incentives because they will incur additional expenses in terms of more manpower, creating infrastructure, capacity building, awareness, etc, to implement the project.

## {EG – Resources – 19/08/22} Draft National Resource Efficiency Policy

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[PIB](#) | 19-08-2019 |

- India has increased its material consumption from 1.18 billion tonnes (BT) in 1970 to 7 BT in 2015.
- Enhancing resource efficiency and promoting the use of secondary raw materials is important to minimize the trade-off between growth and environmental well-being.
- The Draft National Resource Efficiency Policy (NREP) envisions a future with environmentally sustainable and equitable economic growth and resource security.
- The Draft National Resource Efficiency Policy is guided by the principles of
  - ✓ reduction in primary resource consumption to 'sustainable' levels & staying within the planetary boundaries,
  - ✓ creation of higher value with less material through resource efficient and circular approaches,
  - ✓ waste minimization, and
  - ✓ material security, and creation of employment opportunities and business models beneficial to the cause of environment protection and restoration.

## {Geo – Climatology – 19/08/21} Grasslands

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[D2E](#) | 21-09-2019 | Geography > Climatic Regions > Grasslands

- Grasslands occupy ~25% of total land area and more than 40% of all the ice free land in the world.
- According to a study, climate change, pollution, etc. are changing grassland ecosystems.
- According to the study, grasslands showed resilience to factors like rising carbon dioxide (CO<sub>2</sub>), hotter temperatures and drought in the first 10 years of exposure.
- After that there were significant changes in individual plant species.

### Grasslands

- Grass is the naturally dominant vegetation in grasslands.
- Most of the grasslands are the **transition zones (ecotone)** between forests and deserts.

### Importance of Grasslands

- Grasslands provide important services such as water catchments, biodiversity reserves, etc.
- Thirty per cent of the world's carbon is stored in these grasslands (**carbon sink**).
- They are one of the **most agriculturally productive lands** in the world as they tend to have **deep and fertile soils** (frequent fires add to fertility), perfect for cropland or pastures (e.g. **Prairies, Pampas, Steppes**).

- Much of the North American Prairies have been converted into one of the richest agricultural regions.
- Most of the **world's supply of meat and milk** comes from temperate grasslands (**Prairies, Canterbury (merino wool), Pampas, Steppes**, etc.).



- Tropical grasslands are important to the livelihoods of the most impoverished populations of the earth.
- African savanna is home to some of the world's most recognizable wildlife that includes large mammals (herbivores: elephants, giraffes, rhinos, zebras; carnivores: lions, leopards, etc) and reptiles (crocodiles).

More info: Geography > Climatology > Climatic Regions > Grasslands (Tropical and Temperate).

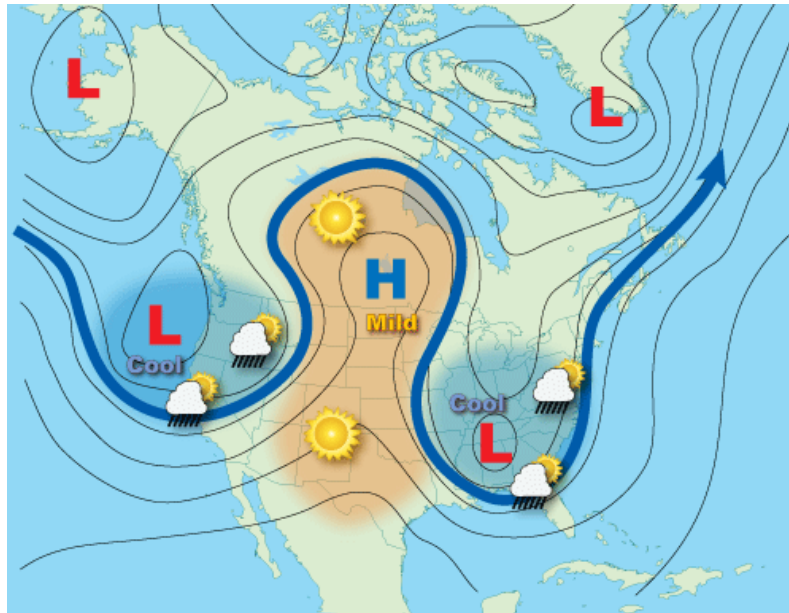
## {Geo – Climatology – 19/08} Heat domes

[Source](#) | Climatology > Jet Streams and Rossby Waves | Very low probability of asking this in exam.

Jet Streams greatly influence the day to day weather patterns of the temperate region (USA, Europe). They are not of much concern to India.

- This summer (June & July) extreme heat waves have scorched both the United States and Europe due to stagnant zones of high pressure known as **heat domes**.
- They are known to produce high temperatures, violent thunderstorms and dangerous wildfires.
- The heat domes form several miles high in the atmosphere and their air sinks down toward the ground, heating up because of compression.

- Heat domes often form what are known as blocking patterns in the atmosphere, which halt the west-to-east movement of weather.
- One of the blocking patterns is called **omega block**.
- Omega blocks have been the main culprit for the record-breaking heat in Europe this summer.
- As the name suggests, the omega block takes on the shape of the Greek letter omega on a weather map.
- It is anchored by zones of low pressure on its west and east sides, flanking the high-pressure zone or heat dome in the middle.



Omega Block

## **{Geo – Critical Features – 19/08/29} Rainforests**

[IE](#) | 29-08-2019 | GS1 > changes in critical geographical features (including water-bodies and ice-caps) and in flora and fauna and the effects of such changes.

Amazon Rainforests, The Taiga Forests, The Great Barrier Reef, The Himalayas and the Cryosphere, etc. are the examples for “critical geographical features” — meaning any adverse changes in these geographic features will have a significant repercussion on the world’s climate and other natural processes.

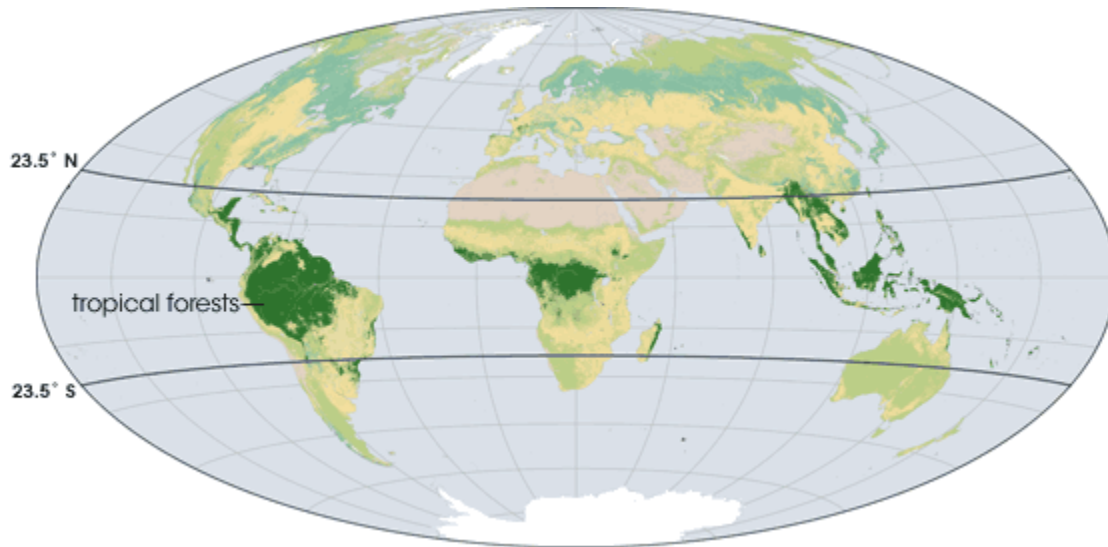
### **Importance of rainforests**

#### **Major oxygen producers**

- Rainforests produces about 20 percent of the earth’s oxygen.

#### **Carbon sink**

- Rainforests are our best defense against climate change as they can [sequester](#) a lot of carbon released by human activities.



### **Precipitation**

- Through evapotranspiration, the rainforests are responsible for creating 50-75 percent of their own precipitation.

### **Source to many rivers**

- They are the source to many of the world's largest rivers.
- Amazon, Mekong, and Congo (Zaire) are some of the important rivers fed by the rainforests.

### **Climate**

- Tropical forests exchange vast amounts of water and energy with the atmosphere and are thought to be important in controlling local and regional climates.
- Water released into oceans by the rainforest rivers influences the circulation of ocean currents.
- This works as a feedback mechanism, as the process also sustains the regional climate on which it depends.

### **Biodiversity**

- Tropical rainforests contain over 30 million species of plants and animals. That's half of the Earth's wildlife and at least two-thirds of its plant species!

### **Commercial Agriculture**

- Rainforests offer a conducive climate for the cultivation of commercial crops such as coffee, cocoa (chocolate), palm, rubber, etc. (they require 100-200 cm of rainfall).

## Indigenous communities

- Many indigenous people have been living in harmony with the rainforest for thousands of years, depending on it for their food, shelter, medicines and subsistence agriculture (slash and burn agriculture).

## Factors responsible for the destruction of the rainforests

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- Logging for tropical hardwood.
- Clearing the forests for pastures for cattle-ranching and commercial agriculture.
- Petroleum extraction (Ecuador, Venezuela).

## Plantation boom

- The rainforest climate is very favourable for the cultivation of certain plantation crops that are highly valued.
- The plantations destroyed nearly half of equatorial forests and continue to destroy them even today.

Plantations	Region(s)	 <p><i>Palm plantations in Indonesia</i></p>
<b>Palm</b>	<b>Malaysia, Indonesia</b>	
<b>Sugarcane</b>	<b>Brazil</b>	
<b>Coffee</b>	<b>Brazil</b>	
<b>Rubber</b>	<b>Malaysia, Indonesia</b>	
<b>Cocoa</b> (used to make chocolates)	<b>Ghana, Nigeria</b>	

## Effects of destroying rainforests

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### Soil Degradation

- Soil in the rainforest is very poor in nutrients (because of the [leaching of the nutrients](#) from the top layer).
- This is because the nutrients are stored in the vast numbers of trees and plants rather than in the soil.
- Tree roots bind the soil together, while the canopy protects the soil from heavy rains.
- When a tree dies and its trunk falls to the forest floor, it decays and the nutrients it contains are recycled.
- However, if trees are removed from the forest, the nutrients are removed with it.
- The unprotected soil is then simply washed away in heavy rains.

### Droughts and famine

- Without rainforests continually recycling huge quantities of water, feeding the rivers, lakes and irrigation systems, droughts would become more common, potentially leading to widespread famine and disease.

### Even commercial planation crops would fail in the long run

- The plantation crops thrive in the tropics because of the conducive climatic conditions created by the rain-forests.

### **Extinction of indigenous communities**

- When oil and logging companies come to remove vast areas of forest, they bring diseases which the indigenous people have no resistance to, threatening their survival.
- Often, they are also forced to move away from their homes to unfamiliar places, sometimes even being killed in the process.

## **{Geo – Critical Features – 19/08/29} Forest Fires in the Amazon**

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[D2E](#) | [IE](#) | 29-08-2019 | GS1 > changes in critical geographical features (including water-bodies and ice-caps) and in flora and fauna and the effects of such changes.

### **What is causing the Amazon fires?**

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#### **Prolonged droughts due to climate change**

- Amazonian forests and other tropical rainforest regions are usually immune to fires due to the high moisture content of the undergrowth beneath the protection of the canopy tree cover.
- But the severe droughts of 1997-98, 2005, 2010, and 2019 have forever changed this perception.
- These severe 'mega-droughts' in the Amazon were most likely driven by large-scale climatic events, with the warming of the Atlantic and the drying effects of El Niño Southern Oscillation (ENSO) events in the Pacific.
- These droughts are clearly becoming far more frequent and more severe and are generating the conditions conducive for either man-made or natural wildfires.

#### **Slash and burn agricultural practise**

- People clear the land by cutting down the vegetation during the rainy season, letting the trees dry out and burning them during the dry season.
- Fully clearing the dense forest for agricultural use can take several years of slashing and burning.

#### **Intentional fires caused by land grabbers**

- They are manmade and are mostly set illegally by landgrabbers who are clearing the forest for cattle ranching and crops.

#### **Political discourse**

- President Jair Bolsonaro has decreased the power and autonomy of forest protection agencies.

- He leads on of the most anti-environment regimes in the world.

## **How does the fires in Amazon affect the world?**

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### **Carbon sink to carbon source and global warming**

- The Amazon is a critical **carbon sink**.
- Currently, the world is emitting around 40 billion tons of CO<sub>2</sub> into the atmosphere every year.
- The Amazon absorbs 2 billion tons of CO<sub>2</sub> per year (or 5% of annual emissions).
- The fires have not only turned the Amazon into a **temporary carbon source**, but also **reduced its potential to lock carbon in the future**.

### **Forest fires intensify droughts**

- The rainforest recycles its own water to produce a portion of the region's rain, so deforestation makes rains less frequent, extending the dry season.

### **The Role of Forest fires in Pollution and Global Warming**

- Forest fires cause 15% of GHG emissions, more than 30% of global carbon monoxide emissions, 10% of methane emissions and more than 85% of global soot emissions.
- They contribute greatly to global warming, which in turn leads to forests becoming increasingly dry and weak. This destructive cycle often makes it easy for new fires to develop.

## **Impact of forest fires on Rainforests: Forest fires and droughts make way for Grasslands**

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- Scientists describe tropical rainforests as "fire-sensitive ecosystems."
- About a third of all ecosystems worldwide are considered "fire-sensitive."
- The plants and animals lack a natural ability to resist and recover from fires.
- In a rainforest-like the Amazon, massive forest fires are a disaster.
- Despite the lush vegetation, the soils are particularly barren and poor in nutrients.
- If the rainforest burns down, all nutrients are **permanently lost (no recycling of nutrients)** because they are stored in the plants themselves and not in the soil.
- The fires combined with prolonged droughts and human encroachments can turn the jungle into a tropical savannah (tropical grassland).
- Grass is a dominant species that can grow even in poorer soil. It doesn't make way for trees so easily.

## **Fore fires are essential for other ecosystems**

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- While forest fires are a disaster to rainforests, they are necessary for the preservation of other ecosystems.
- This is true for about three-quarters of all habitats worldwide, including the Siberian taiga, the African savannahs, the South Asian monsoon and dry forests, the Californian coniferous forests, the Australian eucalyptus forests and the Mediterranean region.
- In these ecosystems, parts of the natural fauna and flora develop only due to fires.
- Animals and plants often have a natural capacity for resistance in such fire-dependent ecosystems.
- In grasslands, savannahs, some forests and wetlands, only a moderately intense ground fire sweeps through, ensuring that the open landscape structure is maintained.
- Rare but very intense fires are characteristic of bush landscapes or forests. They consume old and diseased trees, create new habitats and ensure an **ecological rejuvenation** of the tree population.
- Preventing small fires in these ecosystems can have fatal consequences.
- This is because of accumulation of more combustible material which converts even harmless fires into destructive walls of flames.
- This happens time and again in Australia or in the dense pine forests in the southwest of the United States.

### **Fires give new life**

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- The Douglas fir, a conifer, survives most fires thanks to its thick bark — after a fire, it will sprout new shoots.
- The North American lodgepole pine also needs the heat of the fire to open its cones and release seeds.
- The Australian grass tree needs smoke to open its seed pods.
- After a fire, without the usually dense canopy, more sunlight reaches the forest floor and the seedlings find enough nutrients to sprout. (**Small fires are good for even rainforests**).
- Even some insect species need the fire to survive.

### **{Geo – EG – 19/08/09} Biodiesel from Used Cooking Oil**

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[PIB](#) | [The Hindu](#) | 09-08-2019 | Economic Geography > [Energy Sources](#)

- World Biofuel Day is observed every year on 10th of August to create awareness about the importance of non-fossil fuels as an alternative to conventional fossil fuels.
- This year the theme of the World Biofuel Day is “**Production of Biodiesel from Used Cooking Oil (UCO)**”.
- Ministry of Petroleum and Natural Gas is working on a four-pronged strategy by **promoting ethanol, second-generation ethanol, compressed biogas and biodiesel**.
- Biodiesel is low hanging fruit in the scheme of alternate source of energies.

### **Issues with Used Cooking Oil (UCO)**

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- When used multiple times, cooking oil becomes **acidic** and darkens in colour.
- This may **alter the [fatty acid composition](#)** of the oil leading to formation of **polar compounds**.
- These polar compounds are associated with diseases such as hypertension, atherosclerosis, etc.
- UCO is either not discarded at all or disposed off in an environmentally hazardous manner choking drains.

## **Initiatives by GOI to reduce the adverse impacts of UCO**

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- The **National Policy on Biofuels 2018** envisages production of **biofuel from UCO**.
- FSSAI is implementing a strategy to divert UCO from the food value chain.
- At present, ~850 crore litres of High Speed Diesel (HSD) is consumed on a monthly basis in India.
- The National Policy on Biofuels 2018 envisages a target of **5% blending of Biodiesel in HSD by 2030**.
- In order to achieve the blending target, 500 crore litres of Biodiesel is required in a year.
- Conversion of UCO will give approximately **110 crore litres of Biodiesel in one year**.

## **Collection and processing**

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- Presently there is no established collection chain for UCO.
- Oil Marketing Companies will take measures for procurement of Biodiesel from UCO across 100 cities.
- OMCs will encourage the applicants to set up biodiesel production and processing plants from UCO.
- Repurpose Used Cooking Oil (RUCO) sticker and an app to facilitate UCO collection will be released by FSSAI.
- FSSAI has ordered food business operators (FBOs) consuming more than 50 litres of oil a day for frying to **strictly maintain the usage records** and **stop reusing the oil more than three times**.
- FSSAI will also ask cooking oil manufacturers to come out with **colour charts** that will help people to identify if the oil is fresh or re-used.

## **Assured procurement of biofuel**

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- Biodiesel plants using used cooking oil as their raw material will be assured that their entire production will be procured by the oil marketing companies to be blended with normal diesel.
- Under the scheme, the OMCs will pay biodiesel producers ₹51 per litre in the first year, ₹52.7 per litre in the second, and ₹54.5 per litre in the third year.
- The oil companies will also bear the cost of transportation and GST for the first year.

## **Benefits of using biofuels**

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- Reduction of import dependence.
- Cleaner environment.

- Additional income to farmers.
- Infrastructural investment in rural areas.
- Employment generation.
- Health benefits as there would be no recycling of the UCO.

**Mus read:**

1. **{Geo – EG – 19/05/08} Clean Fuels (Alternate Fuels) for information related to 'Biodiesel'**
2. **{Geo – EG – 19/06/24} Clean Fuels: National Policy on Bio-Fuel 2018**

**{Geo – Floods – 19/08/24} Flood control measures**

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[IE | Livemint](#) | 24-08-2019 | Geography > Natural Calamities > Floods Control Measures

- Extreme rainfall in the catchment areas of Sutlej river followed by breaches in Dhussi Bandhs (kutchha embankments) caused heavy flooding in Punjab.
- Dhussi Bandhs are elevated structures on both the sides of a river.
- A large portion of rivers like Sutlej, Beas, Ravi and Ghaggar lack embankments at several places.
- Besides these rivers, several rivulets criss-cross Punjab which also create huge destruction.
- Apart from this, people too puncture Dhussi Bandha for installing underground pipelines or irrigation.
- The Punjab government has announced a plan to canalize all rivers of the state to avert flooding in future.
- Only the perennial rivers in Punjab — Sutlej, Beas and Ravi (Ghaggar is non-perennial) — are canalised by making dams.

**Bhakra dam on Sutlej, Pong dam (Maharana Pratap Sagar) on Beas and Ranjit Sagar dam on Ravi**

- There is hardly any canalisation system for the rivulets, and they are easily flooded during the monsoons.

**What is canalising?**

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- Canalising involves regulating the water of a river by directing it into specific channels and mini dams, realigning river streams, strengthening and widening of the river embankments and other measures.

**Is canalisation a good idea?**

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- Flood is a natural phenomenon, but canalisation & concretization have converted it into a disaster in some places. E.g. Embankments along river Yamuna could not prevent floods in Delhi.
- Permanent embankments would lead to more human settlements along the flood plains, causing more damage once the breach takes place. E.g. **Kosi River (Sorrow of Bihar)**.

- UP undertook a project to straighten the **Gomti river** channel and control the width of its riverbed. But this led to decline in freshwater species, deposition of silt in flood plains and lowered the groundwater tables.

### What should be done instead?

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- With extreme rainfall events on the rise, the disaster potential for flooding in major rivers has only increased.
- Experts highlight that overreliance on concrete based solutions creates new challenges.
- Instead of focusing on embankments, focus must be on protecting the catchment area of major rivers.
- Natural drainage patterns need to be restored.
- Wetlands and small rivers which have gone dry must be rejuvenated.
- Desilting of rivers must be taken on a priority basis.
- Also, there is need to check underground pipelines from rivers, and encroachment of the riverbed.

### Bhakra dam

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- The Bhakra dam (207 m) is the **second tallest dam in Asia** after **Tehri dam** (261 m – Uttarakhand).
- It is located on the **Sutlej River** in Bilaspur, Himachal Pradesh, very close to the border of Punjab.
- The **Gobind Sagar reservoir** of the Bhakra dam is the third largest reservoir in India in terms of capacity.
- The first being Indira Sagar dam in Madhya Pradesh and second Nagarjuna Sagar dam in Telangana-AP.
- Nangal Dam is another dam in Punjab downstream of Bhakra Dam.
- However, sometimes both the dams together are called Bhakra-Nangal Dam.
- With extreme rainfall events on the rise, the disaster potential for flooding in major rivers has increased.

### {Geo – IG – 19/08/10} Impact of irrigation on monsoon patterns

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[The Hindu](#) | 10-08-2019 | Geography > Indian Geography > [Monsoons](#)

- Land-surface processes including irrigation affect the **heat fluxes (flow of heat)** and **evapotranspiration**.
- Modified heat fluxes along with changes in atmospheric moisture result in a **shift in monsoon patterns**.

#### Impact of irrigation on monsoon patterns in NW India in the month of September

- Researchers from IIT Bombay have found that a change in irrigation policy has the potential to shift monsoon rainfall and intensify extreme rainfall in India through **soil to atmosphere feedback**.
- The researchers found that as a result of excess irrigation over northern India, the summer monsoon rainfall in September shifts towards the north-western part of the country.
- There is also intensification of extreme rainfall over central India during September.
- During the month of September, agriculture lands are highly irrigated, and the crops are matured.

- As a result, there is maximum **evapotranspiration** taking place leading to highest contribution of moisture from the land to the atmosphere.
- The study has not looked at how irrigation and agriculture influence monsoon in southern India.