DAILY CURRENT AFFAIRS

20 OCTOBER, 2023

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3.	WHY ARE EARTHQUAKES FREQUENT IN AFGHANISTAN?

INDIA WILL EXPLORE BUILDING LARGE LANGUAGE MODELS (LLM)

SOURCE: TH

WHY IN NEWS?

India will set up a "**high powered committee**" to explore the development of large language models or LLMs, tools that harness artificial intelligence to create applications that can understand and process human language

WHAT IS A LARGE LANGUAGE MODEL?

❖ LLM, is a deep learning algorithm that can recognize, summarize, translate, predict and generate text and other forms of content based on knowledge gained from massive datasets.

❖ **Modern LLMs emerged in 2017** and use transformer models, which are neural networks commonly referred to as transformers. With a large number of parameters and the transformer model, LLMs are able to understand and generate accurate responses rapidly, which makes the AI technology broadly applicable across many different domains.

> **What is the meaning of generative AI?**
> Generative AI refers to models or algorithms that create brand-new output, such as text, photos, videos, code, data, or 3D renderings, from the vast amounts of data they are trained on. The models 'generate' new content by referring back to the data they have been trained on, making new predictions.

HOW DOES LARGE LANGUAGE MODELS (LLMS) WORK:

1. **Data Acquisition and Training:**
   a. LLMs require extensive training on a massive dataset, often referred to as a corpus, which can be petabytes in size.
   b. The training process typically commences with unsupervised learning. During this phase, the model learns from unstructured and unlabelled data, allowing it to uncover relationships between words and concepts.

2. **Self-Supervised Learning:**
   a. Some LLMs proceed to a stage of training and fine-tuning using a form of self-supervised learning.
   b. In self-supervised learning, a limited amount of data labelling occurs, aiding the model in recognizing different concepts more accurately.

3. **Transformer Neural Network:**
   a. LLMs undergo deep learning as they pass through the transformer neural network process.
   b. The transformer model architecture equips LLMs to comprehend and identify the connections and associations between words and concepts.
   c. This is achieved through a self-attention mechanism within the transformer, which assigns scores or weights to tokens, aiding in understanding relationships.

4. **Practical Usage:**
   a. Once an LLM is fully trained, it can be utilized for practical applications.
   b. By providing the LLM with a prompt or query, the AI model generates responses, which may include answers to questions, newly generated text, summarized content, or sentiment analysis reports.

DIFFERENT TYPES OF LARGE LANGUAGE MODELS:

❖ **Zero-shot model:** This is a large, generalized model trained on a generic corpus of data that is able to give a fairly accurate result for general use cases, without the need for additional training. GPT-3 is often considered a zero-shot model.

❖ **Fine-tuned or domain-specific models:** Additional training on top of a zero-shot model like GPT-3 can lead to a fine-tuned, domain-specific model. One example is OpenAI Codex, a domain-specific LLM for programming based on GPT-3.

❖ **Language representation model:** One example of a language representation model is Bidirectional Encoder Representations from Transformers (BERT), which makes use of deep learning and transformers well suited for NLP.

❖ **Multimodal model:** Originally LLMs were specifically tuned just for text, but with the multimodal approach it is possible to handle both text and images. GPT-4 is an example of this type of model.

POTENTIAL OF LARGE LANGUAGE MODELS (LLMS):

▪ **Economic Transformation:** LLMs are anticipated to annually contribute between $2.6 trillion and $4.4 trillion to the global economy.

▪ **Enhanced Communication:** LLMs redefine interactions between humans and machines, enabling more natural and nuanced communication.

▪ **Information Democratization:** Initiatives like the Jugalbandi Chatbot demonstrate LLMs' ability to make information accessible across language barriers.

▪ **Industry Disruption:** LLMs can revolutionize various industries, including content creation, customer service, translation, and data analysis.

▪ **Efficiency Gains:** The automation of language-related tasks results in efficiency improvements, allowing businesses to reallocate resources to higher-value activities.

▪ **Educational Support:** LLMs offer educational potential by providing personalized tutoring, answering queries, and creating engaging learning materials.

▪ **Medical Advances:** LLMs assist medical professionals in tasks such as data analysis, research, and diagnosis, potentially transforming healthcare delivery.

▪ **Entertainment and Creativity:** LLMs contribute to the generation of creative content, enhancing sectors like entertainment and creative industries.

▪ **Positive Societal Impact:** LLMs hold the potential to enhance accessibility, foster innovation, and address various societal challenges.

CHALLENGES AND LIMITATIONS OF LARGE LANGUAGE MODELS:

▪ **Development costs:** To run, LLMs generally require large quantities of expensive graphics processing unit hardware and massive data sets.

▪ **Operational costs:** After the training and development period, the cost of operating an LLM for the host organization can be very high.

▪ **Bias:** A risk with any AI trained on unlabelled data is bias, as it's not always clear that known bias has been removed.

▪ **Explain ability:** The ability to explain how an LLM was able to generate a specific result is not easy or obvious for users.

▪ **Hallucination:** AI hallucination occurs when an LLM provides an inaccurate response that is not based on trained data.

▪ **Complexity:** With billions of parameters, modern LLMs are exceptionally complicated technologies that can be particularly complex to troubleshoot.

▪ **Glitch tokens:** Maliciously designed prompts that cause an LLM to malfunction, known as glitch tokens, are part of an emerging trend since 2022.

WAY FORWARD:

- ➢ **Identity Assurance Framework:**
  - o Establish a framework for identity assurance to validate the legitimacy of digital entities engaged in online interactions.
  - o Utilize digital wallets to enable controlled disclosure of identity information while preserving privacy.
- ➢ **Digital Identity Initiatives:**
  - o Harness existing digital identity initiatives in different nations, such as <u>India's Aadhaar and the EU's identity standard.</u>
- ➢ **Privacy Protection and Controlled Disclosure:**
  - o Prioritize privacy by employing mechanisms like digital wallets to facilitate regulated disclosure of identity information.
  - o Empower individuals to selectively share specific attributes while minimizing unnecessary exposure.
- ➢ **Global Collaboration and Leadership:**
  - o Promote collaboration among international leaders, governments, technology firms, researchers, and policymakers.
  - o Establish a cooperative endeavour to ensure the responsible deployment of AI technologies.
- ➢ **Balancing Values and Risks:**
  - o Address the inherent tensions between privacy, security, accountability, and freedom.
  - o Develop a balanced approach that upholds civil liberties while ensuring security and accountability.
- ➢ **Information Integrity:**
  - o Extend the principles of the identity assurance framework to ensure the integrity of information.
  - o Verify the authenticity of information sources, content integrity, and data validity.
- ➢ **Ethical Considerations:**
  - o Acknowledge and tackle ethical quandaries arising from the malevolent use of AI-generated content.
  - o Ensure that the development and implementation of AI technologies are guided by responsible and ethical practices.

## THE SHAPE OF CLIMATE JUSTICE IN A WARMING INDIA

SOURCE: THE HINDU

WHY IN NEWS?

The **G-20 summit** held in Delhi in September **proposed significant goals.** Agreement to **triple renewable energy capacity by 2030**. **Voluntary commitment to double the rate of energy efficiency** improvement **by 2030**.

CLIMATE JUSTICE

➢ **Meaning of Climate Justice:**
  ✓ Climate justice is about **viewing global warming as an ethical and political issue**, rather than **just an environmental problem**.
➢ **Recognizing Inequality:**
  ✓ It acknowledges that **climate change affects different groups unevenly**, leading to **social, economic, and health disparities**, particularly impacting marginalized communities.
➢ **Unequal Impacts:**
  ✓ The effects of climate change, like **extreme weather and rising sea levels**, often hurt historically **underserved groups more**, creating an unfair burden.
➢ **A Holistic Approach:**
  ✓ Climate justice seeks to address various **forms of injustice - social, gender, economic, intergenerational, and environmental** - as they are interconnected.
  ✓ For example, some **climate projects can unintentionally harm local communities**.
➢ **Advocating for Equity:**
  ✓ Climate justice advocates work towards **reducing these inequalities through long-term strategies** for both reducing emissions and adapting to climate changes.
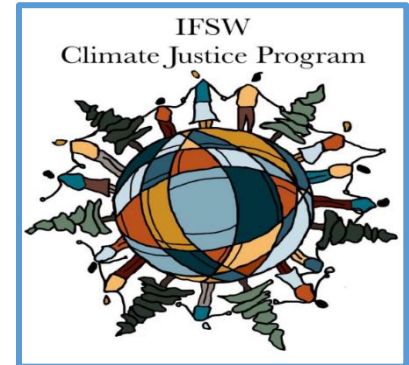
RECENT OBSERVATIONS OVER CLIMATE

➢ **Lack of Consensus on Fossil Fuel Phasing Out:**
  ✓ The G20 summit **did not reach a consensus on the contentious issue of phasing out fossil fuels**, a root cause of the climate crisis.
➢ **Normative Ideals for Energy Transition:**
  ✓ Two key principles for any **energy transition initiative**:
    a. *Internalizing Costs:* Emission producers should pay social and environmental costs.
    b. *Climate Justice:* Compensation for those harmed by climate change, focusing on addressing carbon injustice.
➢ **International vs. Domestic Perspective:**

- ✓ While these principles are discussed at the international level, **their implications at the domestic level are not adequately debated.**
- ✓ India's stance is framed through a foreign policy lens, **guided by the Common but Differentiated Responsibilities (CBDR) principle** in international negotiations.

- ➢ **Disproportionate Effects on the Poor:**
  - ✓ Climate change and energy transition **hit impoverished communities hardest**.
  - ✓ Climate-induced problems, **extreme weather, and agricultural challenges** exacerbate **poverty, causing income loss** among farmers.
- ➢ **Complex Relationship Between Inequality and Carbon Emissions:**
 - ✓ Addressing environmental and **socio-economic inequalities is crucial for equitable development.**
  - ✓ Less equitable societies tend to have **higher emissions per economic unit**, posing c**hallenges** for countries like **India with substantial inequality**.
- ➢ **Impact of Inequality on Climate Action:**
  - ✓ Inequality can **hinder societal responses to climate change**, affecting public action and state capacity.
  - ✓ **Greater inequality raises the societal cost of carbon emissions**, emphasizing the **need to address these barriers for a just and sustainable climate future.**
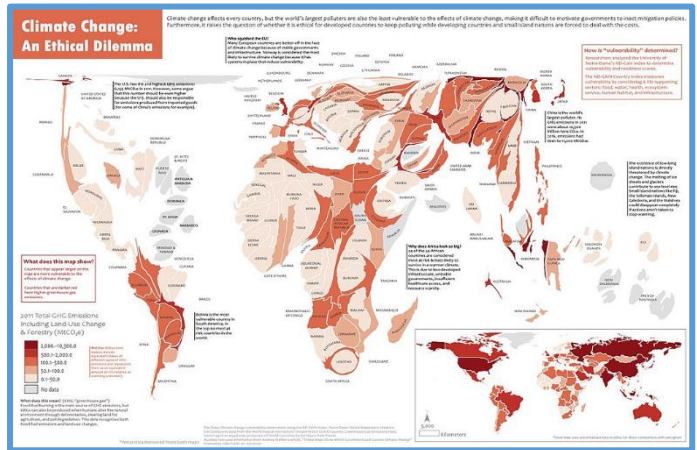
CHALLENGES IN ENSURING CLIMATE JUSTICE:

- ➢ **Weakening of Common but Differentiated Responsibilities (CBDR):**
  - ✓ **UNFCCC's Article 3 recognizes CBDR** based on differences between **developed and developing nations.**
  - ✓ Developed countries push for **higher commitments, like advocating coal phase-out**, imposing substantial costs on developing nations.
- ➢ **Lack of Binding Targets:**
  - ✓ The **Paris Agreement's Nationally Determined Contributions (NDCs)** are **voluntary,** not legally binding.
  - ✓ **Unlike the Kyoto Protocol**, which had **binding targets** for **developed countries**, the **voluntary nature of NDCs allows developed nations** to **evade responsibility** based on historical contributions.
- ➢ **Climate Finance Shortfall:**

- ✓ Despite a commitment **to provide $100 billion annually for Climate Finance**, developed countries have **fallen short.**
- ✓ However, **climate experts assert that $100 billion annually** is inadequate; **the IPCC estimates a need for $1.6-3.8 trillion annually to prevent warming beyond 1.5°C.**

INDIA'S STANCE AND INITIATIVE FOR CLIMATE JUSTICE

- ➢ **India's Historical Approach:**
    - ✓ India's approach **prioritizes economic growth** and **development over climate mitigation** due to lower historical emissions.
    - ✓ Economic growth takes **precedence over climate concerns**, raising concerns about climate justice within India.

- ➢ **Impact on Existing Inequalities:**
    - ✓ Climate change has the **potential to worsen existing inequalities, particularly affecting India's poor.**
    - ✓ Energy transition policies, while critical, could further **exacerbate disparities based on class, caste, and region.**
- ➢ **India's Nationally Determined Contributions (NDCs):**
    - ✓ India **aims to achieve 40% clean energy** in total installed power generation capacity.
    - ✓ A pledge to **achieve net-zero emissions by 2070.**
    - ✓ **Coal and crude oil** are major contributors to **India's energy supply**.
- ➢ **Sectoral Energy Consumption**:
    - ✓ The **industrial sector consumes the most energy (51%),** followed by **transport (11%), residential (10%), and agriculture (3.6%).**
    - ✓ Manufacturing is **more energy- and carbon-intensive** compared to agriculture and services.
- ➢ **Considerations for Renewable Energy:**
    - ✓ Transitioning to **renewables must protect livelihoods**, offer **alternative job opportunities**, and prevent adverse impacts on vulnerable communities.
    - ✓ The **Paris Agreement** emphasizes a just **transition and the creation of decent work** and **quality jobs aligned with national development** priorities.
- ➢ **Strategies for Equitable Transition:**
    - ✓ To ensure an **equitable and sustainable transition**, strategies must focus on **reducing inequality and promoting green investment** simultaneously.

ADDRESSING CLIMATE JUSTICE:

- ➢ **International Collaboration:**
    - ✓ Strengthen global partnerships, such as the binding Paris Agreement, endorsed by 194 nations to enforce commitments and provide financial backing to curb global warming.
- ➢ **Enhancing Adaptation and Resilience:**
    - ✓ Invest in climate adaptation measures and support at-risk communities, including coastal regions and small island nations, with resilient infrastructure and community-driven projects.
- ➢ **Strategies for Equitable Transition:**

- ✓ To ensure an **equitable and sustainable transition**, **strategies must focus on reducing inequality and promoting green investment** simultaneously.
- ➤ **Facilitating Technology Transfer and Capacity Building:**
  - ✓ Simplify the transfer of clean technologies to developing nations.
  - ✓ Encourage knowledge-sharing platforms to facilitate transitions to low-carbon solutions.
- ➤ **Mobilizing Climate Finance:**
  - ✓ Raise funds to support climate justice initiatives.
  - ✓ Fulfil the objective of providing $100 billion annually in climate finance to aid developing countries.
- ➤ **Inclusive Decision-Making:**
  - ✓ Guarantee the meaningful participation of marginalized communities, indigenous populations, and vulnerable groups in shaping climate policies.
- ➤ **Education and Awareness:**
  - ✓ Promote climate justice through educational initiatives, awareness campaigns, and capacity-building programs to enhance understanding and foster collective action.

WAY FORWARD

- ➤ **Regional Impact on Coal-Reliant Areas:**
  - ✓ **Regions heavily dependent on coal production** may suffer economic losses and job displacement.
  - ✓ The regional economic **inequality in India is closely tied to the divide in energy sources**.
- ➤ **Revenue and Employment from Coal:**
  - ✓ Despite pollution concerns, the **coal sector, primarily publicly owned (85%),** is a significant **revenue source for state governments**.
  - ✓ Taxes, royalties, mining fees, and employment generated by coal mining are vital for states like Odisha, Jharkhand, and Chhattisgarh.
- ➤ **Energy Transition Strategy:**
  - ✓ India's energy transition strategy **needs to address these regional inequalities**.
  - ✓ It should involve fund transfers to states heavily reliant on coal and state-specific programs for reskilling and local rehabilitation.
- ➤ **Role of Sub-National Governments:**
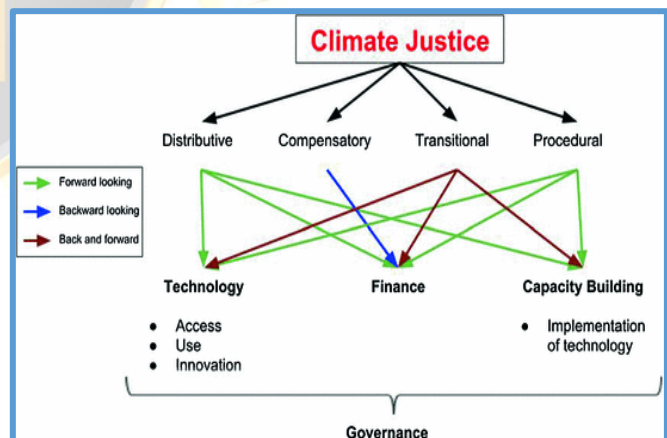
- ✓ India's **federal governance structure** means that **sub-national governments** play a significant role in **addressing climate concerns**.
- ✓ However, **their priorities may differ from those of the central government**.

➢ **Policy alignment:**
- ✓ State governments often **implement policies related to climate justice, climate adaptation**, and disaster management that **do not align with the central government's development aspirations**.
- ✓ Establish **regular communication channels** between **state and central governments** to discuss policy objectives.
- ✓ Encourage a **collaborative approach to align climate justice, adaptation, and disaster** management policies with broader development goals.

➢ **Fiscal Federalism and Climate Mitigation:**
- ✓ Examining the **interactions between fiscal federalism and climate mitigation** is crucial for achieving policy alignment and cooperation across government levels.

➢ **Support for Vulnerable Nations:**
- ✓ Provide financial and technical support to vulnerable, poorer, and developing nations.
- ✓ Help these nations adapt to climate change and transition to sustainable, low-carbon development.

➢ **Transparent Accountability:**
- ✓ Implement transparent accountability mechanisms to ensure that countries meet their commitments.
- ✓ Hold nations accountable for their pledges under international climate agreements.
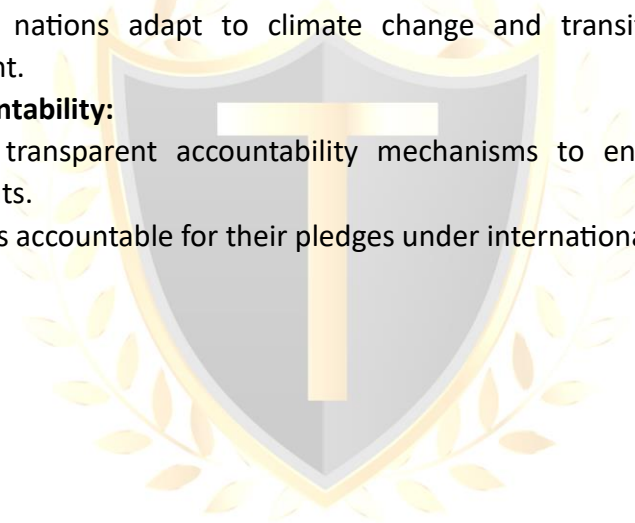
Prelims Specific

United Nations Framework Convention on Climate Change (UNFCCC):

- ➢ **Origin at Earth Summit:**
  - ✓ The **UNFCCC was initially signed in 1992** during the **United Nations Conference on Environment and Development,** often referred to as the *Earth Summit* or the *Rio Conference*.
- ➢ **UNFCCC Secretariat:**
  - ✓ The UNFCCC secretariat, also **known as UN Climate Change**, is a United Nations entity situated in **Bonn, Germany.**
  - ✓ It is responsible for **supporting global efforts to combat climate change.**
- ➢ **India's Role:**
  - ✓ India has hosted the **Conference of the Parties (COP)** for three Rio conventions, covering **climate change (UNFCCC), biodiversity (CBD), and land (United Nations Convention to Combat Desertification**).
- ➢ **Ratification and Implementation:**
  - ✓ The **UNFCCC came into force in 1994** and has been ratified by 197 countries worldwide.
- ➢ **Parent Treaty:**
  - ✓ It serves as **the foundational treaty** for significant climate agreements, including the **2015 Paris Agreement and the 1997 Kyoto Protocol.**

UPSC PYQs

Prelims

Q. With reference to 'Global Climate Change Alliance', which of the following statements is/are correct? (2017)
It is an initiative of the European Union.
It provides technical and financial support to targeted developing countries to integrate climate change into their development policies and budgets.
It is coordinated by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).
Select the correct answer using the code given below:
(a) 1 and 2 only
(b) 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans: (a)

Mains

Q. Describe the major outcomes of the 26th session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC). What are the commitments made by India in this conference? (2021).

Q. 'Climate change' is a global problem. How India will be affected by climate change? How Himalayan and coastal states of India will be affected by climate change? (2017).

WHY ARE EARTHQUAKES FREQUENT IN AFGHANISTAN?

SOURCE: THE HINDU

WHY IN NEWS?

On October 15, **a magnitude 6.3 earthquake struck western Afghanistan**. A few days earlier, **multiple earthquakes of similar strength** had killed over a thousand people in the **Herat province**.

HISTORICAL EARTHQUAKES IN AFGHANISTAN

> ➤ Afghanistan has a **history of widespread destruction from intense earthquakes**.
> ➤ In June 2022, a **magnitude 6.1 earthquake in Khost and Paktika provinces** killed over 1,000 people.
> ➤ In 2015, a **major earthquake in the northeast caused over 200 casualties** in Afghanistan and neighboring northern Pakistan.
> ➤ A **magnitude 6.1 earthquake in 2002** resulted in about **1,000 deaths in northern Afghanistan.**
> ➤ In 1998, another earthquake in northeast Afghanistan, along with **subsequent tremors, claimed at least 4,500 lives**.
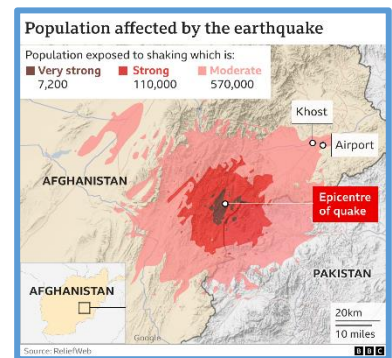
EARTHQUAKES

> ➤ **Earthquakes Definition:**
>> ✓ An earthquake is the **shaking or trembling of the Earth's surface**.
>> ✓ It occurs when seismic waves, generated by a **sudden release of energy, move through the Earth**.
>> ✓ This energy release **happens in the Earth's crust (for shallow-focus earthquakes)** or **upper mantle (for some shallow-focus and all intermediate and deep-focus earthquakes).**
> ➤ **Detecting Earthquakes with Seismographs:**
>> ✓ A seismograph, also called a **seismometer,** is a device used to **detect and record earthquakes**.
>> ✓ It measures the **motion of the ground caused by seismic waves.**
>> ✓ Seismographs are crucial for **understanding and monitoring earthquake activity**.
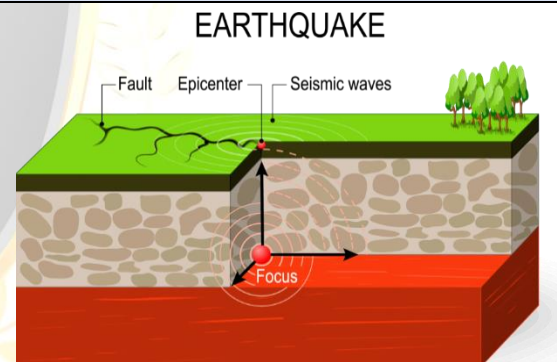
CAUSES OF EARTHQUAKES:

> ➤ **Fault Zones:**
>> ✓ Most **shallow earthquakes** result from **sudden stress release along fault ruptures** in the Earth's crust.
>> ✓ This occurs due to changes in **rock volume and density caused by temperature** and **pressure variations** in the Earth's interior.
> ➤ **Deformation and Rupturing:**
>> ✓ Larger faulted areas **lead to more significant magnitude earthquakes.**
>> ✓ Thrust faults at **convergent boundaries have the longest rupture lengths** (about 1,000 km).
>> ✓ **Strike-slip faults (e.g., San Andreas Fault)** can produce major **earthquakes up to magnitude 8**.
>> ✓ Normal faults at divergent boundaries generally result in **earthquakes below magnitude 7.**
> ➤ **Plate Tectonics:**
>> ✓ Earthquakes are caused by the **shifting of land along fault lines at convergent, divergent, and transform boundaries.**

- ✓ Megathrust **earthquakes occur at subduction zones (e.g., 2004 Indian Ocean earthquake).**
- ➤ **Volcanic Activity:**
  - ✓ Volcanic earthquakes are **generally less severe and tied to volcanic regions.**
  - ✓ They result from elastic **strain release, tectonic faults, and magma movement.**
  - ✓ They can serve as early warnings of volcanic eruptions.
- ➤ **Human-Induced Earthquakes**:
  - ✓ These minor earthquakes stem from human activities such as **mining, large-scale petroleum extraction, reservoirs, and nuclear tests.**
  - ✓ Reservoir-induced seismicity can be caused by water **pressure changes in large, deep artificial lakes**.
  - ✓ The loading and **unloading of water** can alter stress along **faults and trigger earthquakes.**
- ➤ **Notable Examples:**
  - ✓ The **1967 Koynanagar earthquake** near the **Koyna Dam reservoir**.
  - ✓ The **2008 Sichuan earthquake**, possibly triggered by the construction and **filling of the Zipingpu Dam**.
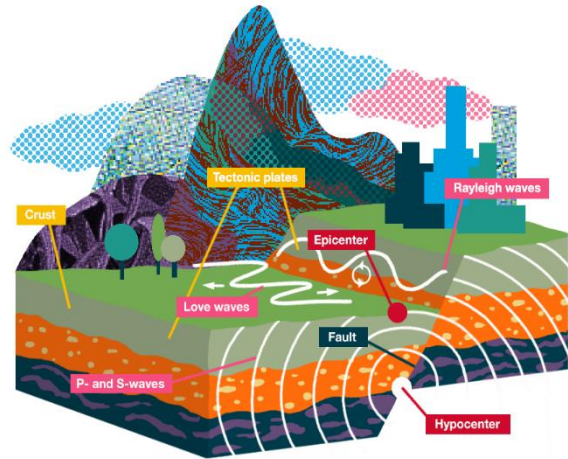
GEOLOGICAL FACTORS FOR FREQUENT EARTHQUAKES IN AFGHANISTAN

- ➤ Afghanistan **lies over multiple fault lines** at the **convergence of the Indian and Eurasian tectonic plates**.
- ➤ The **Indian Plate subducts under the Eurasian Plate** both in **western and eastern Afghanistan**.
- ➤ Southern Afghanistan sees the **adjoining of the Arabian and Indian plates**, leading to **northward subduction** under the Eurasian Plate.
- ➤ The **Hindu Kush Mountain range and Pamir Knot are complex geological regions** where these **tectonic plates meet.**
- ➤ The **collision and convergence** of these plates cause folding and faulting of the **Earth's crust, contributing to frequent earthquakes.**
- ➤ The **northward movement of the Indian Plate toward the Eurasian Plate results in compression**, uplifting the **Himalayas and transmitting tectonic** stress.
- ➤ Compression **causes crust deformation, fault formation, and earthquake generation**.
- ➤ Afghanistan is intersected by **active fault systems, including the Chaman Fault and the Main Pamir Thrust**, which are sources of many earthquakes in the region.
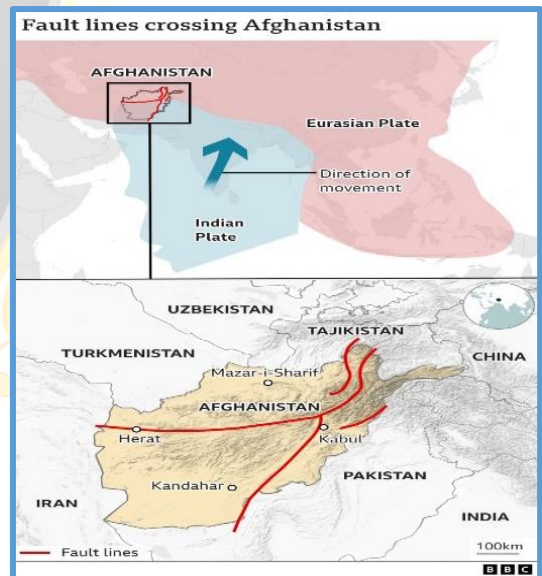
DISTRIBUTION OF EARTHQUAKES:

- ➤ Earth's major earthquakes **primarily occur along the margins of tectonic plates**.
- ➤ **Pacific Region:**
  - ✓ The most significant **earthquake belt is the Circum-Pacific Belt, encircling the Pacific Ocean**.
  - ✓ It **affects coastal regions of New Zealand, New Guinea, Japan, the Aleutian Islands, Alaska, and western North and South America**.
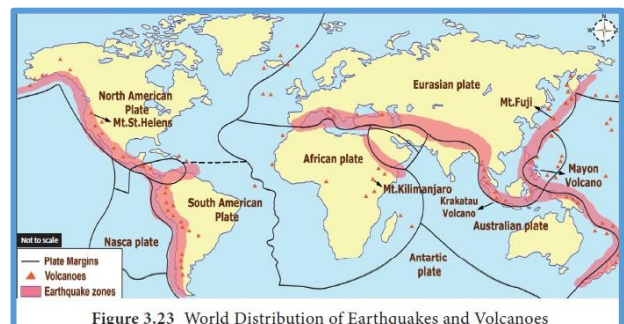
Figure 3.23 World Distribution of Earthquakes and Volcanoes

- This belt is often **called the "Pacific Ring of Fire"** due to its **association with volcanic activity** and accounts for about **68% of all earthquakes**.

- **Alpine Belt (Himalayas and Alps)**
  - ✓ **It responsible for about 15% of global earthquake** energy release.
  - ✓ It stretches along the equator from **Mexico across the Atlantic Ocean, the Mediterranean Sea, the Alpine-Caucasus ranges, the Caspian Sea**, the Himalayan mountains, and adjacent regions.
  - ✓ Connected seismic belts also exist along oceanic ridges in the **Arctic Ocean, Atlantic Ocean, and the western Indian Ocean, as well as along the rift valleys of East Africa.**

- **Earthquake in India**
  - ✓ India is one of the **highly earthquake affected countries because of the presence of technically active young fold mountains - Himalaya.**
  - ✓ India has been **divided into four seismic zones (II, III, IV, and V) based on scientific inputs** relating to seismicity, **earthquakes occurred in the past and tectonic setup of the region**.
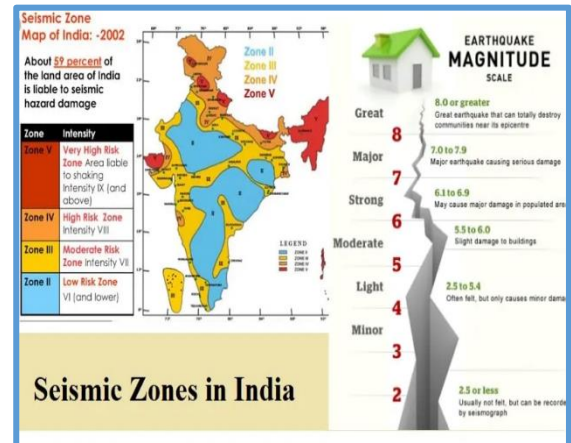
Prelims Specific

Focus and Epicentre

- The point where the energy is released is **called the focus or the hypocentre of an earthquake**.
- The point on the surface directly above the focus is **called epicentre (first surface point to experience the earthquake waves).**
- A line connecting all points on the surface where the **intensity is the same is called an isoseismic line.**