



Drought in Europe

For Prelims: Drought, Heat waves, Land degradation, Climate Change

For Mains: Drought - Impacts, Causes and Ways to tackle it

Why in News?

After the **record-breaking summer heat**, 2022 may be the **worst [drought](#) year in Europe in 500 years**. Large rivers have been reduced to shallow streams, hitting power generation.

- **China and the US too are facing drought situations.**

What is a Drought?

- **About:**
 - Drought is generally considered as a **deficiency in rainfall /precipitation over an extended period**, usually a season or more, resulting in a **water shortage causing adverse impacts on vegetation, animals, and/or people**.
- **Causes:**
 - **Variability in rainfall**
 - **Deviation in the route of monsoon winds**
 - **Early withdrawal of the monsoon**
 - **[Forest fires](#)**
 - **[Land degradation](#)** in addition to **[Climate change](#)**
- **Types:**
 - **Meteorological Drought:** It is based on the degree of dryness or rainfall deficit and the length of the dry period.
 - **Hydrological Drought:** It is based on the impact of rainfall deficits on the water supply such as stream flow, reservoir and lake levels, and ground water table decline.
 - **Agricultural Drought:** It refers to the impact on agriculture by factors such as rainfall deficits, soil water deficits, reduced groundwater, or reservoir levels needed for irrigation.
 - **Socioeconomic Drought:** It considers the impact of drought conditions (meteorological, agricultural, or hydrological drought) on supply and demand of some economic goods such as fruits, vegetables, grains and meat.

How bad is the Drought Situation in Europe?

- **Present Scenario:**
 - The drought is considered the worst in 500 years. The European summer was this dry last in **1540**, when **a year-long drought killed tens of thousands of people**.
 - However, earlier European droughts such as those in **2003, 2010, and 2018** too were compared to the 1540 event.
 - Some of Europe's biggest rivers — **[Rhine](#), [Po](#), [Loire](#), [Danube](#)** — which are usually

formidable waterways, are unable to support even mid-sized boats.

- As per an analytical report by the **Global Drought Observatory (GDO)**, an agency of the [European Commission](#), about **64% of the continent's landmass was experiencing drought** conditions.
 - Nearly **90% of the geographical area in Switzerland and France**, about **83% in Germany**, and close to **75% in Italy**, was facing **agricultural drought**.
 - The **situation is unlikely to improve** substantially in the coming months.

▪ **Causes:**

- Droughts are part of the natural climate system and are not uncommon in Europe. The extraordinary dry spell has been the result of a **prolonged and significant deviation from normal weather patterns**.
 - It is the **record-breaking [heat waves](#)** that have resulted in temperatures in many countries rising to historic highs.
 - Unusually high temperatures have led to **increased evaporation of surface water and soil moisture**.
- The severity of the current drought can also be attributed, to an extent, to the fact that it occurred **so soon after the 2018 drought**.
 - **Many areas in Europe were yet to recover from the last drought**, soil moisture had also not been restored to normal.

What is Understood by Heat Waves?

- A heat wave is a **period of abnormally high temperatures** typically occurring between the months of March and June, and in some rare cases even extending till July.
- According to [India Meteorological Department \(IMD\)](#), a heat wave is declared when the **maximum temperature of a station reaches at least 40°C for Plains** and at least **30°C for Hilly regions**.

▪ **Impacts:**

- **Transportation:** Europe depends heavily on its rivers to move cargo in an economical manner, including coal to power plants. With water levels down to less than a metre in some stretches, **most large ships have been rendered unusable**.
- **Power:** Power production has been hit, leading to **electricity shortages** and a further **increase in energy prices** which were already high due to the [war between Russia and Ukraine](#).
 - Lack of adequate water has **affected the operation of [nuclear power plants](#)**, which use large amounts of water as coolant.
- **Food Security:** Food has become **sharply more expensive** in many countries, and **drinking water is being rationed** in some regions. **Agriculture** has also been affected badly.

What about the Drought Situations in the US and China?

▪ **Drought in China:**

- Many parts of China too are headed towards a serious drought, **being described as the worst in 60 years**.
- The country's **longest river, [Yangtze](#)**, which caters to about a third of the Chinese population, is seeing water levels drop to record lows.
- Two of the country's biggest freshwater lakes, **Poyang and Dongting, have reached their lowest levels since 1951**.
- The water scarcity is leading to problems similar to those in Europe.
 - The drought has posed a **"serious threat" to China's autumn grain production** which makes up about 75% of the country's annual grain output.
 - Power shortages in some areas have begun to **force factories to shut**, adding to the **strain on global supply chains**.

▪ **Drought in the US:**

- According to the US government, **over 40% of the area in the United States too is under drought conditions** currently, affecting about 130 million people.

How Drought is Declared in India?

- In India, there is **no single, legally accepted definition** of drought. The **State Government is the final authority** when it comes to declaring a region as drought affected.
- The Government of India has published two important documents in respect of managing a drought.
 - The first step is to **look at two mandatory indicators - rainfall deviation and dry spell.**
 - Depending on the extent of the deviation, and whether or not there is a dry spell, the manual specifies various situations that may or may not be considered a drought trigger.
 - The second step is to **look at four impact indicators — agriculture, vegetation indices** based on remote sensing, **soil moisture, and hydrology.**
 - The **States may consider any three of the four types** of the Impact Indicators (one from each) for assessment of drought, the intensity of the calamity and make a judgement.
 - If all three chosen indicators are in the 'severe' category, it amounts to **severe drought**; and if two of the three chosen impact indicators are in the 'moderate' class, it amounts to **moderate drought.**
 - The third step comes in after both previous triggers have been set off. In that event, **"States will conduct sample surveys for ground** in order to make a final determination of drought.
 - The finding of field verification exercise will be the final basis for judging the intensity of drought as 'severe' or 'moderate'.
- Once a drought is determined, the state government needs to **issue a notification specifying the geographical extent.** The **notification is valid for six months unless de-notified earlier.**

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. Consider the following pairs: (2014)

| | Programme/Project | Ministry |
|----|---|---|
| 1. | Drought-Prone Area | Ministry of Agriculture & Farmers Welfare |
| 2. | Desert Development Programme | Ministry of Environment, Forests & Climate Change |
| 3. | National Watershed Project Development for Rainfed Areas | Ministry of Rural Development |

Which of the above pairs is/are correctly matched?

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

Ans: (d)

Mains

Q. The process of desertification does not have climate boundaries. Justify with examples. (2020)

Q. In what way micro-watershed development projects help in water conservation in drought-prone and semi-arid regions of India? **(2016)**

Source: [IE](#)

Geothermal Power in Ladakh

For Prelims: Geothermal Energy, Geography of Ladakh

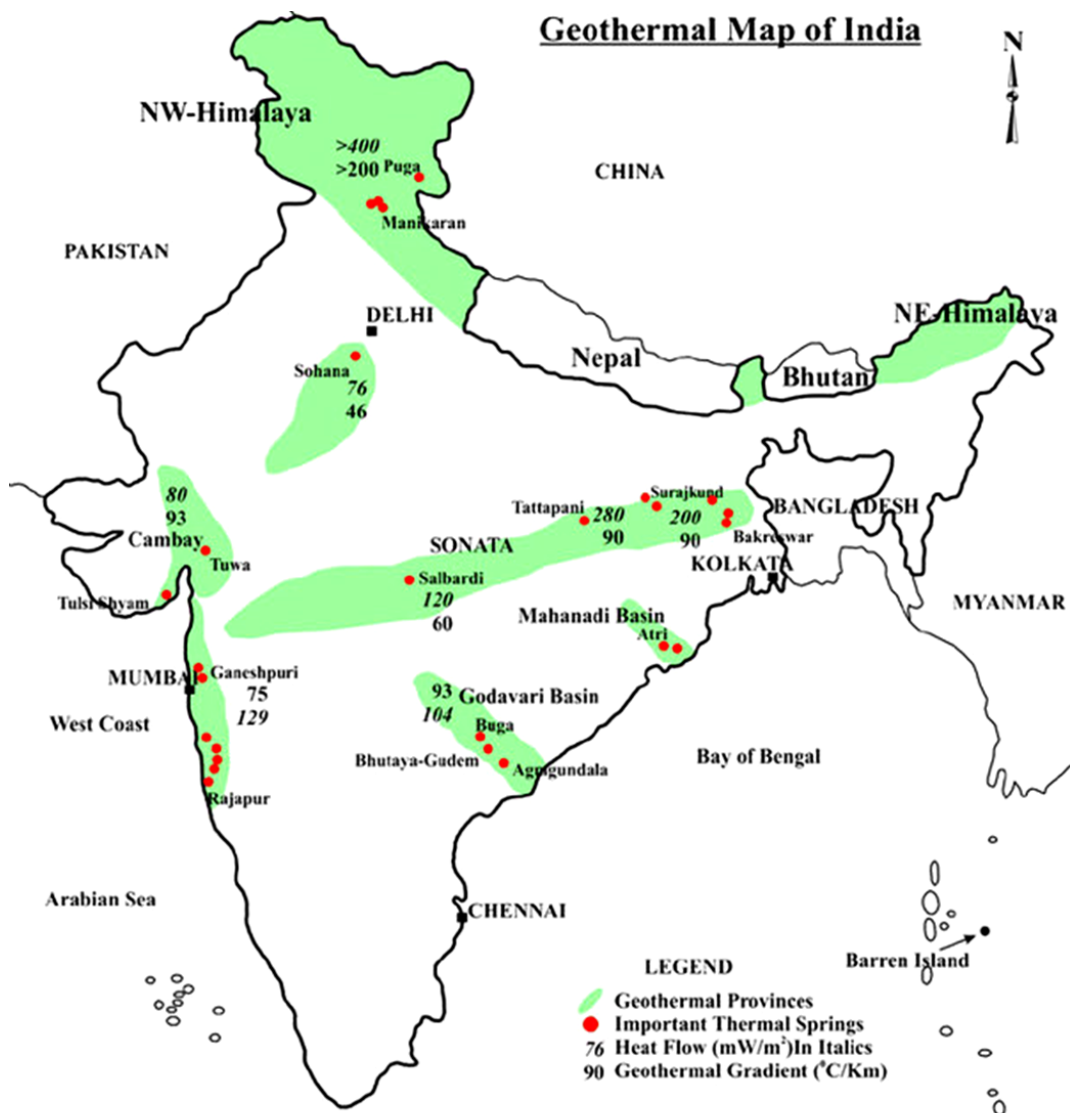
For Mains: Geothermal Energy, It's Uses & Benefits, Significance of Geothermal Energy for India

Why in News?

State-run explorer [Oil and Natural Gas Corporation \(ONGC\)](#) will be participating to generate electricity through [Geothermal Energy](#) at Puga, a remote valley located in Ladakh, off the road to Chumar on the de-facto border with China.

What do we need to know about the Puga Project?

[//](#)



▪ **About Puga Valley:**

- Puga Valley is situated in the **Changthang Valley** in the south-eastern part of Ladakh, about 22 km away from the **Salt Lake Valley**.
- It is a region of great significance known for its **natural beauty and geothermal activities**.
- Puga is also visited for its **hot sulphur spring**.

▪ **About Geothermal Project:**

- It will be India's **first geothermal energy project** and also the **world's highest at 14,000ft**.
- ONGC has started drilling its first well for the project and encountered **high-pressure steam at 100 degrees Celsius** with a discharge rate of 100 tonne geothermal energy per hour, **considered as a good sign for the project**.

▪ **Phases:**

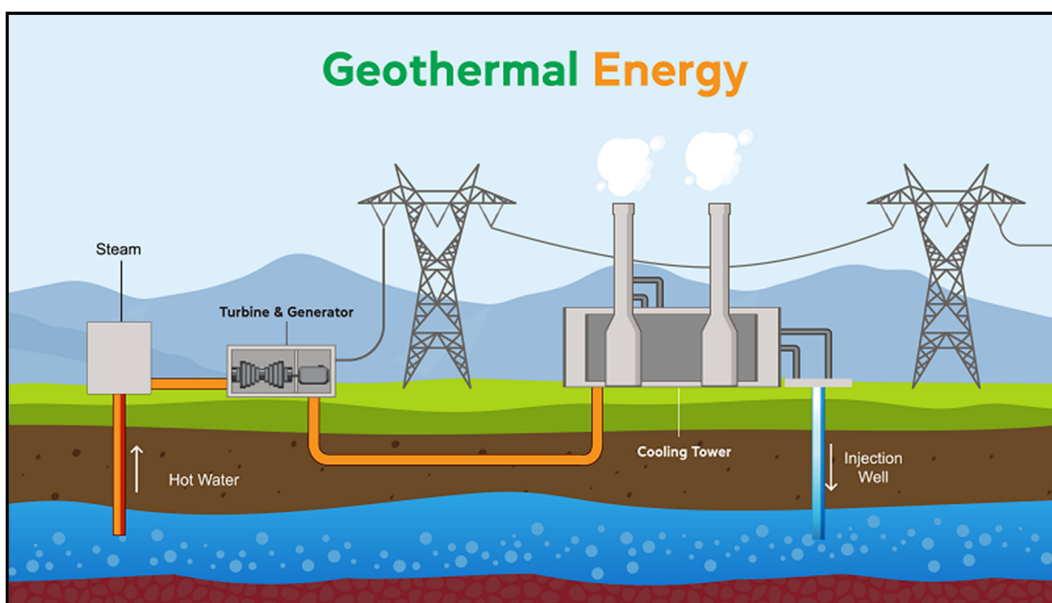
- In the first phase, the company will drill 1,000-metre-deep wells to run a **one-megawatt power plant as a pilot**.
- The second phase envisages a **deeper exploration of the geothermal reservoir** and a higher capacity demonstration plant.
- The third phase would involve commercial development of the geothermal plant.

▪ **Benefits:**

- It will **boost Ladakh's potential to emerge as one of the country's [clean energy bowl](#)** by expanding the area's horizon beyond [solar](#) or [wind power](#).
- The pilot plant provides **power and heating needs** of the nearby settlements of Tibetan pastoralist refugee settlements at Sumdo and nearby areas.

- A bigger plant will provide **24X7 supply for the far-flung settlements and the large defence establishment in the eastern sector**, reducing their dependence on **diesel for running generators**.
- The plant can also play a vital role as a **stabiliser for the 15-gigawatt solar/wind project** being planned in the nearby Morey plains in the southwest.
- **Status of Geothermal Energy:**
 - **National:**
 - Geological Survey of India has identified about 340 geothermal hot springs in the country. Most of them are in the low surface temperature range from 370C to 900C, which is suitable for direct heat applications.
 - The potential for power generation at these sites is about 10,000 MW.
 - The hot springs in the country are grouped into seven geothermal provinces:
 - Himalayan, Sahara Valley, Cambay Basin, San-Narmada -Topi lineament belt, West Coast, Godavari Basin and Mahanadi Basin.
 - **Some of the prominent places where a power plant can be established based on geothermal energy are:**
 - Manikaran in Himachal Pradesh
 - Jalgaon in Maharashtra
 - Tapovan in Uttarakhand
 - Bakreshwar in West Bengal
 - Tuwa in Gujarat
 - **Global:**
 - Gigawatt-Size Geothermal Capacities:
 - The US:
 - The US leads the world in the amount of geothermal electricity generation.
 - Indonesia:
 - Indonesia was the second-largest geothermal electricity producer.
 - Philippines
 - Turkey
 - New Zealand
 - Mexico and Italy have 900 megawatt-plus capacity, while Kenya has over 800 mw, followed by Iceland, Japan and others.

What is Geothermal Energy?



- **About:**
 - Geothermal energy is the **heat from the earth**. This heat is used for bathing, to heat buildings, and to generate electricity.
 - The word geothermal comes from the Greek words **geo (earth)** and **therme (heat)**, and

geothermal energy is a [renewable energy source](#) because heat is continuously produced inside the earth.

▪ **Sources:**

- **Hot water or steam reservoirs** deep in the earth are accessed by **drilling**.
- Geothermal **reservoirs located near the earth's surface**, mostly located in the western U.S., Alaska, and Hawaii.
- The **shallow ground near the Earth's surface that maintains a relatively constant temperature** of 50-60°F.

▪ **Uses:**

- Hot water and steam from reservoirs can be used to **drive generators and produce electricity for consumers**.
- Other applications apply the **heat produced from geothermal directly to various uses** in buildings, roads, agriculture, and industrial plants.
- The heat can also be used directly from the ground to provide **heating and cooling in homes and other buildings**.

▪ **Benefits:**

◦ **Renewable Source:**

- Through **proper reservoir management**, the rate of energy extraction can be balanced with a reservoir's natural heat recharge rate.

◦ **Continuous Supply:**

- Geothermal power plants **produce electricity consistently, running 24 hours per day/7 days per week**, regardless of weather conditions.

◦ **Reduced Import Dependency:**

- Geothermal resources **can be harnessed for power production** without importing fuel.

◦ **Small Footprint:**

- Geothermal power plants are **compact and use less land per GWh** (404 m²) than coal (3642 m²) wind (1335 m²) or solar PV with center station (3237 m²). *

◦ **Clean Energy:**

- Modern **closed-loop geothermal power plants** emit **no greenhouse gasses**; life cycle GHG emissions (50 g CO₂ eq/kWhe) are four times less than solar PV, and six to 20 times lower than natural gas.
- Geothermal power plants **consume less water** on average over the lifetime energy output than the most conventional generation technologies.

▪ **Disadvantage:**

- If harnessed incorrectly, it can sometimes produce pollutants.
- Improper drilling into the earth can release hazardous minerals and gases deep inside the earth.

What is ONGC?

- ONGC is a **public sector petroleum company**.
- **Under the leadership of Pandit Jawaharlal Nehru**, the foundation stone of ONGC was laid in 1955 as the Oil and Gas Division under the [Geological Survey of India](#).
- It may be noted that on 14th August 1956, it was renamed as the Oil and Natural Gas Commission and in 1994 the Oil and Natural Gas Commission was converted into a corporation.
- In the year 1997 it was accepted as one of the Navaratnas by the Government of India, while in the year 2010 it was given the status of [Maharatna](#).

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. Consider the following: (2013)

1. Electromagnetic radiation
2. Geothermal energy

3. Gravitational force
4. Plate movements
5. Rotation of the earth
6. Revolution of the earth

Which of the above are responsible for bringing dynamic changes on the surface of the earth?

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

Ans: (d)

Explanation:

- The Earth's surface is dynamic. The Earth's surface is being continuously subjected to by external forces (exogenic forces) originating above the earth's surface, mainly induced by the energy of the Sun and by internal forces (endogenic forces) from within the earth.
- Endogenic Processes
 - The energy emanating from within the earth is the main force behind endogenic geomorphic processes.
 - This energy is mostly generated by radioactivity, release of electromagnetic energy, rotational and tidal friction and primordial heat from the origin of the Earth.
 - This energy is due to geothermal gradients and heat flow from within the earth.
 - Endogenic process has induced volcanism and associated geothermal phenomena like geysers, hot water springs, etc.; earthquakes; plate movements resulting in the creation of different landforms (mountains, hills, plateaus, etc.) and water bodies (sea, ocean, lake, etc.).
- Exogenic Processes
 - The exogenic processes derive their energy from atmosphere determined by the ultimate energy from the Sun, e.g., weathering and erosion.
 - Temperature and precipitation are the two important climatic elements that control various processes.
- Seasonal and diurnal variation on Earth is due to revolution and rotation of Earth respectively.
- **Therefore, option (d) is the correct answer.**

[Source: TOI](#)

Gold Jewellery Exports to UAE up 42%

For Prelims: Types of Trade Agreements, Different forms of Trade Agreements

For Mains: India-UAE CEPA

Why in News?

India's gold jewellery exports to the **United Arab Emirates (UAE)** rose by a sharp **42%** in two months

of a [Free Trade Pact](#) coming into effect in May 2022.

- Overall exports to the UAE in May-June, 2022 touched USD 5.4 billion, a 17% growth from a year ago.

What benefited the Growth of Jewellery Export?

- Indian exporters were facing **tough competition in gold jewellery from countries like Turkey**, and Indian exports were showing a decline before the FTA.
- The free trade pact came into effect in May 2022 with its **offer of duty-free access on jewellery to the Gulf nation**. This removal of **duties has benefited exports**.
- India got zero duty access to the UAE market for jewellery exports, **which attracted 5% duty earlier**, potentially **facilitating entry of Indian products in the North Africa, West Asia and Central Asia** markets.
- India in turn **allowed 1% duty concession on gold imports from the UAE for up to 200 tonnes of shipments** under the [Comprehensive Economic Partnership Agreement \(CEPA\)](#).

What will be the Benefits of India-UAE CEPA?

- **Trade-in Goods:**
 - India will benefit from preferential market access provided by the UAE, especially for all labour-intensive sectors.
 - Such as **Gems and Jewellery**, Textiles, leather, footwear, sports goods, plastics, furniture, agricultural and wood products, engineering products, medical devices, and Automobiles.
- **Trade-in Services:**
 - Both India and UAE have offered each other market access to the broad service sectors.
 - Such as 'business services', 'communication services', 'construction and related engineering services', 'distribution services', 'educational services', 'environmental services', 'financial services', 'health-related and social services', 'tourism and travel-related services', 'recreational cultural and sporting services' and 'transport services'.
- **Trade-in Pharmaceuticals:**
 - Both sides have also agreed to a separate Annex on Pharmaceuticals to facilitate access to Indian pharmaceuticals products, especially automatic registration and marketing authorisation in 90 days for products meeting specified criteria.

What is CEPA?

- It is a **kind of free trade pact that covers negotiation on the trade** in services and investment, and other areas of economic partnership.
- It may **even consider negotiation in areas such as trade facilitation** and customs cooperation, competition, and IPR.
- Partnership agreements or cooperation agreements are more comprehensive than Free Trade Agreements.
- CEPA also looks into the regulatory aspect of trade and encompasses an agreement covering the regulatory issues.
- India has signed **CEPAs with South Korea and Japan**.

What are other Types of Trade Agreements?

- **Free Trade Agreement (FTA):**
 - It is an agreement in which two or more countries agree to provide preferential trade terms, tariff concession etc. to the partner country.
 - India has negotiated FTA with many countries e.g. Sri Lanka and various trading blocs as well e.g. [Association of Southeast Asian Nations \(ASEAN\)](#).
 - [Regional Comprehensive Economic Partnership \(RCEP\)](#) is a Free Trade Agreement (FTA) between the ten member states of the ASEAN and the five countries (Australia, China, Japan, South Korea, and New Zealand) with which ASEAN has existing FTAs.

- **Preferential Trade Agreement (PTA):**
 - In this type of agreement, two or more partners give preferential right of entry to certain products. This is done by reducing duties on an agreed number of tariff lines.
 - Tariffs may even be reduced to zero for some products even in a PTA. India **signed a PTA with Afghanistan.**
- **Comprehensive Economic Cooperation Agreement (CECA):**
 - CECA generally covers negotiation on trade tariff and TRQ (Tariff Rate Quotas) rates only. It is not as comprehensive as CEPA. **India has signed CECA with Malaysia.**
- **Bilateral Investment Treaty (BIT):**
 - It is a bilateral agreement in which two countries sit together and decide the conditions for private investments by citizens and firms of the two countries.
- **Trade and Investment Framework Agreement (TIFA):**
 - It is a trade pact between two or more countries which establishes a framework for expanding trade and resolving outstanding disputes between countries.

What are the Trade Agreements India had signed with other countries?

| S. No. | Name of the Agreement |
|--------|---|
| 1 | India-Sri Lanka Free Trade Agreement (FTA) |
| 2 | Agreement on South Asian Free Trade Area (SAFTA) (India, Pakistan, Nepal, Sri Lanka, Bangladesh, Bhutan, the Maldives and Afghanistan) |
| 3 | India-Nepal Treaty of Trade |
| 4 | India-Bhutan Agreement on Trade, Commerce and Transit |
| 5 | India-Thailand FTA - Early Harvest Scheme (EHS) |
| 6 | India-Singapore Comprehensive Economic Cooperation Agreement (CECA) |
| 7 | India-ASEAN CECA - Trade in Goods, Services and Investment Agreement (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam) |
| 8 | India-South Korea Comprehensive Economic Partnership Agreement (CEPA) |
| 9 | India-Japan CEPA |
| 10 | India-Malaysia CECA |
| 11 | India-Mauritius Comprehensive Economic Cooperation and Partnership Agreement (CECPA) |
| 12 | India-UAE CEPA |
| 13 | India-Australia Economic Cooperation and Trade Agreement (ECTA) |

In addition, India has signed the following 6 limited coverage Preferential Trade Agreements (PTAs):

| S.No. | Name of the Agreement |
|-------|--|
| 1 | Asia Pacific Trade Agreement (APTA) |
| 2 | Global System of Trade Preferences (GSTP) |
| 3 | SAARC Preferential Trading Agreement (SAPTA) |
| 4 | India-Afghanistan PTA |
| 5 | India-MERCOSUR PTA |
| 6 | India-Chile PTA |

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. The term 'Regional Comprehensive Economic Partnership' often appears in the news in the context of the affairs of a group of countries known as (2016)

(a) G20

- (b) ASEAN
- (c) SCO
- (d) SAARC

Ans: (b)

Q. With reference to the 'Trans-Pacific Partnership', consider the following statements: (2016)

1. It is an agreement among all the Pacific Rim countries except China and Russia.
2. It is a strategic alliance for the purpose of maritime security only.

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

Ans: (d)

Exp:

- In 2005, trade agreement between a small group of Pacific Rim countries comprising Brunei, Chile, New Zealand, and Singapore led to the formation of Trans-Pacific Partnership (TPP) consisting of 12 nation states.
- TPP is an economic partnership **covering elimination or reduction of tariffs, liberalization of services trade, investment rules, e-commerce guidelines, intellectual property protections, and labour and environmental standards** and many other aspects of global trade. **Hence, statement 2 is not correct.**
- TPP includes **Japan, Vietnam, Brunei, Malaysia, Singapore, Australia, New Zealand, Canada, Mexico, Peru, Chile, and the USA (withdrew from TPP in early 2018).** **Hence, statement 1 is not correct.**
- After withdrawal of US, remaining eleven signatories, known as the TPP-11, continued talks and their efforts led to the formation of Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), which was signed in March 2018. It has already been ratified by a majority of members and entered into force for those countries on December 30, 2018.
- **Therefore, option (d) is the correct answer.**

[Source: MINT](#)

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