



## **DAILY CURRENT AFFAIRS 23-02-2024**

### **GS-1**

1. La Nina impacted air quality in India in the winter of 2022: What a new study says

### **GS-2**

2. Article 142
3. India-Middle East Economic Corridor (IMEC)

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## **La Nina impacted air quality in India in the winter of 2022: What a new study says**

**Syllabus: GS-1; Physical Geography, GS-3; Climate change**

### **Context**

- **Monsoon rainfall** over India is known to be strongly influenced by El Nino and La Nina events, the alternating warming and cooling of the eastern Pacific Ocean that impacts weather across the world. A new study by Indian researchers has now suggested that **even air quality in the country could be influenced by the two weather events.**

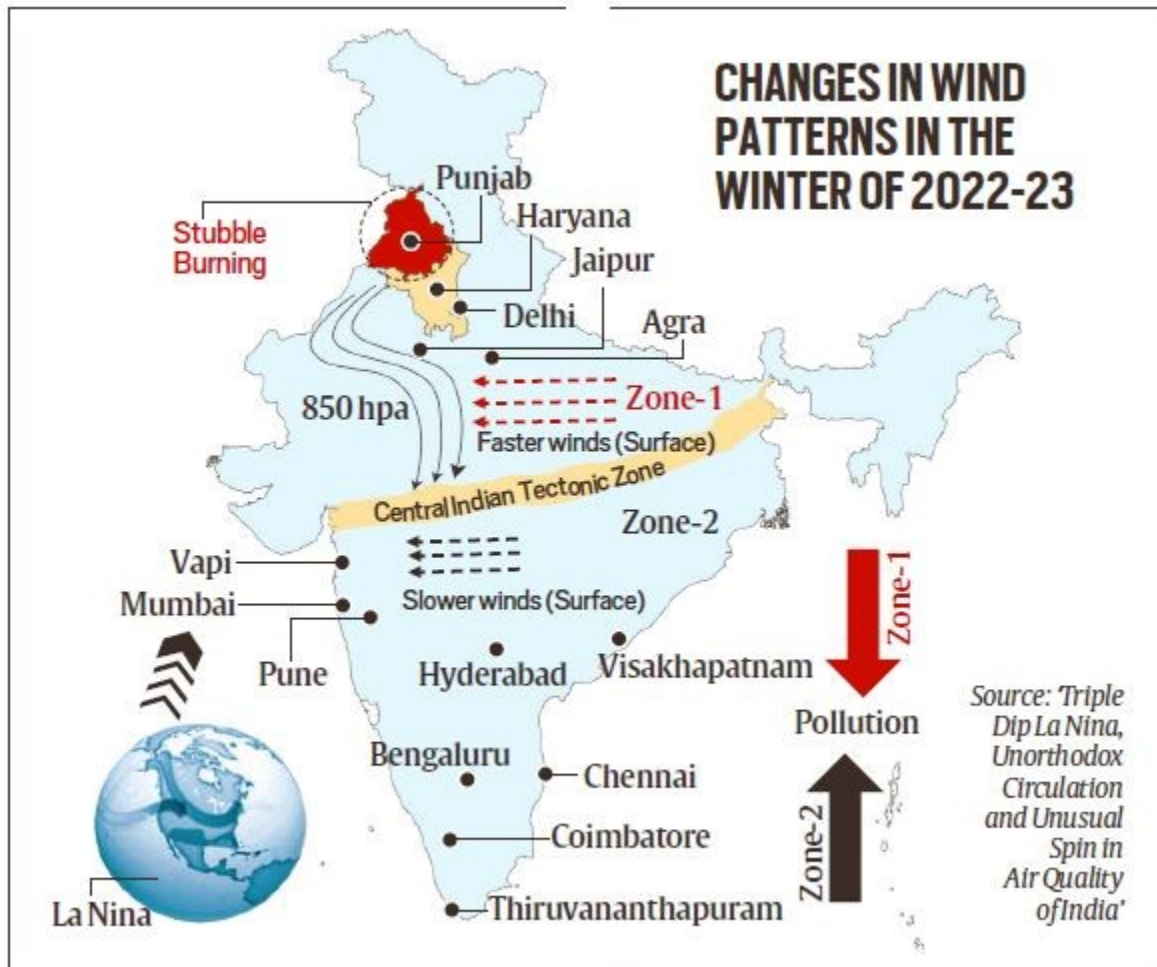
### **What is the link between pollution and winter months in India?**

- **During October to January**, northern Indian cities, particularly Delhi, experience very high concentrations of **PM2.5**. A variety of meteorological factors — temperature, moisture, heaviness in air, wind speed and direction — play a role in trapping pollutants in the lower levels of the atmosphere.
- These factors are also responsible for transporting pollutants from other regions, particularly those generated by agriculture waste burning in Punjab and Haryana, to Delhi and adjoining areas.
- **The western and southern parts of the country have always had relatively lower levels of pollution, because of their proximity to oceans.**
- The winter of 2022, however, showed a significant deviation from this normal. Northern Indian cities, including Delhi, were cleaner than usual, while cities in the west and the south, like Mumbai, Bengaluru and Chennai, experienced worse-than-usual air quality.
- The study said PM2.5 concentrations in Ghaziabad that winter saw a reduction of about 33% from normal, while in Noida, the concentration was 28% below normal. Delhi saw a reduction of about 10%. Simultaneously, the concentrations in Mumbai rose by 30%, while Bengaluru registered a 20% rise.
- It was this anomalous behaviour that the researchers had set out to study when they found themselves led to the possible effects of La Nina.

### **Wind direction**

- The most crucial factor in explaining the anomaly of winter 2022 was a change in the normal **wind direction.**
- During this time, wind usually blows in the **northwesterly direction**: for example, from Punjab towards Delhi and further into the Gangetic plains.

- This is one of the main reasons why agricultural waste pollutants in Punjab and Haryana flow into Delhi.



- In the winter of 2022, however, the wind circulation was in the **north-south direction**. The pollutants being carried from Punjab and Haryana bypassed Delhi and surrounding areas and flew over Rajasthan and Gujarat to southern regions.
- The local circulation of wind near Mumbai also had an anomalous behaviour that year.
- Wind currents alternate between blowing from the land to the sea every few days. When blowing from the land towards the sea, the winds carry pollutants out of the city.
- In 2022, however, instead of changing direction every four to five days, the winds persisted in one direction for more than a week or 10 days, leading to greater accumulation of pollutants in Mumbai.

## La Nina and climate change

- *The wind behaviour in both cases had something to do with the extended La Nina which, by the winter of 2022, had been persisting for an unusually long three years.*
- *By using the global air circulation data as a result of La Nina in our computer models, it is found that the emergence of wind patterns over the Indian region that were very similar to the observed changes.*
- *When they ran the models with data from previous years, **when a strong La Nina was not present, these anomalous wind patterns disappeared.***
- *The study did add that changes in wind patterns were not the only reasons for the unusual trends in air quality that year.*
- *It mentioned local meteorological conditions, unrelated to La Nina, that could also have resulted in the reduction of pollutant concentrations over northern India.*

## Article 142

### Syllabus: GS-2; The constitution of India, Judiciary

#### Context

- *The **CJI Chandrachud-led bench** said Supreme Court must step in where **exceptional situations develop to ensure basic mandate of electoral democracy is preserved.***
- *Recently, The Supreme Court nullified the outcome of the January 30 2024 Chandigarh mayoral polls, overturning the initial result of the BJP candidate's victory and instead declared the AAP-Congress candidate the rightful winner.*
- *The court invoked its plenary power under Article 142 of the Constitution to ensure "complete justice", saying that the returning officer's announced result was clearly in violation of the law.*

#### What is Article 142?

- *Article 142(1) of the Constitution bestows the Supreme Court with **extraordinary authority to ensure "complete justice" in situations where existing laws or statutes may lack adequate remedies.***

#### How does Article 142 give unique power to the Supreme Court?

- In 2017, the Supreme Court utilised Article 142 to transfer the **Babri Masjid case**, defining the broad scope of its power. It said the Latin maxim 'fiat justitia ruat caelum' (Let justice be done though the heavens fall) encapsulates the essence of Article 142.
- The court said Article 142(1) grants it a distinctive power not found in the **Government of India Act, 1935**, or any other global constitution.
- It empowers the court to ensure complete justice, ultimately concluding the legal dispute between the parties.
- The Article contradicts the traditional equity principle that follows the law, making it a unique provision.
- The Supreme Court, while moulding relief, can deviate from strict legal applications based on the peculiar circumstances of each case. Article 142 allows the court to relax the application of law or entirely exempt parties from legal rigours during the process of delivering justice.
- It empowers the court to ensure complete justice when deemed necessary.
- Despite its expansive power, the Supreme Court clarified in a 2023 ruling that Article 142 is not universally applicable and may not be invoked in every case.

## **India-Middle East Economic Corridor (IMEC)**

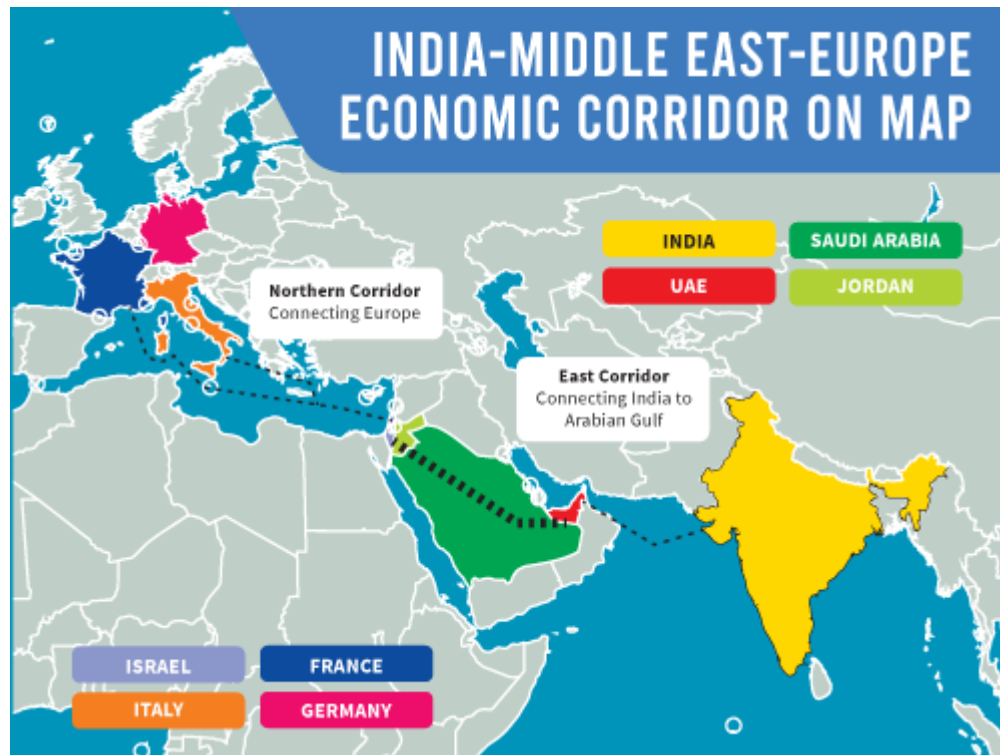
**Syllabus: GS-2; International Relations, GS-3; Infrastructure**

### **Context**

- Despite the Israeli war in Gaza “destabilising” plans for the India-Middle East Economic Corridor (IMEC), India and Greece should persevere with the “peace project”, said Greek Prime Minister Kyrios Mitsotakis in New Delhi.
- Mr. Mitsotakis, who discussed the project amongst other plans to **strengthen bilateral ties in trade and migration** with Prime Minister Narendra Modi during his State visit to India, also inaugurated the annual **Raisina Dialogue** in New Delhi.

### **About**

- Thousands of kilometres from India, a corridor that is supposed to connect **Alexander’s Greece with Porus’ India** in the 21st century is causing tension between two major Mediterranean powers—Greece and Türkiye.



- The India-Middle East-Europe-Economic Corridor (IMEC) was announced on the sidelines of the **G20 meeting** in New Delhi when a memorandum of understanding was signed **between the European Union and seven countries, namely India, the US, Saudi Arabia, the United Arab Emirates (UAE), France, Germany, and Italy.**
- According to the information, the corridor will include a **shipping route** connecting Mumbai and Mundra (Gujarat) with the UAE, and a **rail network** connecting the UAE, Saudi Arabia, and Jordan with the Israeli port of Haifa to reach the shores of the Mediterranean Sea.
- Haifa will then be connected by sea to the port of Piraeus in Greece to eventually be connected to Europe.
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### Significance

- Increase trade accessibility
- Increase efficiency
- Reduce costs
- Secure regional supply chains
- Enhance economic cooperation
- Generate jobs
- Lower greenhouse gas emission
- Boost economic growth

## Challenges

- **Political and security dynamics**
  - *The war in the Middle East is the biggest roadblock to the IMEC. It's expected to delay the project and hurt progress in thawing diplomatic relations between Israel and Saudi Arabia.*
- **Infrastructure**
  - *It's unclear who will pay the tens of billions of dollars needed to improve existing infrastructure and fill in the gaps. The corridor requires more than 2,000 kilometers of railroad, and large parts of it still need to be constructed in the challenging terrain of the Middle East.*
- **Coordination**
  - *Coordination among multiple countries is a challenge.*
- **Transparency and governance**
  - *The IMEC will have to adopt thorough transparency and governance measures to avoid similar public and diplomatic backlash.*
- **Other challenges include:**
  - *Logistics and connectivity issues*
  - *Missing rail links and construction*
  - *Potential opposition and competition*
  - *Cost and financing*

## **GM Mustard**

**Syllabus: GS-3: Biotechnology – GM crops.**

**Context:**

- *The Supreme Court raised questions on January 11 about why the reports from the court-appointed **Technical Experts Committee (TEC)** on genetically modified (GM) crops were not reviewed by the **Genetic Engineering Appraisal Committee (GEAC)**.*

**About Mustard Hybrid DMH-11:**

- *The **transgenic mustard hybrid DMH-11** has been developed by the Centre for Genetic Manipulation of Crop Plants (CGMCP) at Delhi University.*



### Hybridization Process:

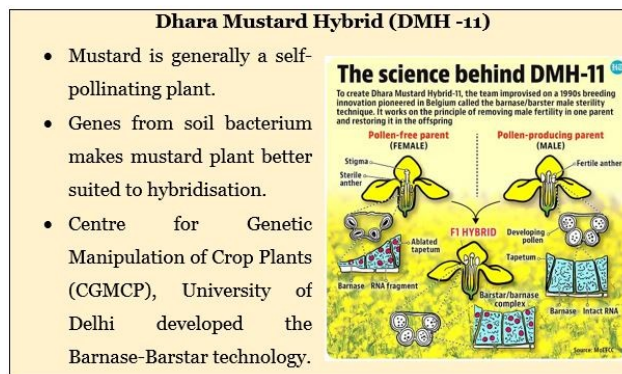
- Hybridization involves **crossing two genetically dissimilar plant varieties**, which can be from the same species.
- The first-generation (F1) offspring resulting from such crosses typically exhibit higher yields than either parent can individually provide.

### Challenges in Mustard Hybridization:

- Hybridization in mustard presents challenges because its flowers have both female (pistil) and male (stamen) reproductive organs.
- Mustard plants are **largely self-pollinating**, meaning the eggs of one plant cannot be fertilized by the pollen grains from another.
- These characteristic limits the scope for developing hybrids in mustard compared to crops like cotton, maize, or tomatoes, where hybridization can be achieved through simple emasculation or the physical removal of anthers.

### Hybridization Method in Mustard (DMH-11):

- **Genetic modification (GM)** was employed for hybridization in mustard, specifically in the **creation of the hybrid mustard DMH-11**.
- Scientists at Delhi University's Centre for **Genetic Manipulation of Crop Plants (CGMCP)** developed DMH-11 using GM techniques.



### Genes Used in GM Process:

- The hybrid mustard DMH-11 contains **two alien genes isolated from a soil bacterium called Bacillus amyloliquefaciens**.
- **The first gene, 'barnase,'** codes for a protein that impairs pollen production, resulting in **male sterility** when incorporated into the plant.
- The plant with the 'barnase' gene is then crossed with a fertile parental line containing the **second gene, 'barstar,'** which blocks the action of the 'barnase' gene.
- The resulting F1 progeny is both high-yielding and capable of producing seeds/grains, thanks to the 'barstar' gene in the second fertile line.
- The 'bar' gene renders the plant resistant to a herbicide family.



### GM Technology for Hybridization:

- *The CGMCP scientists used the **barnase-barstar GM technology** to establish a robust and viable hybridization system in mustard.*

### Development of DMH-11:

- *DMH-11 was developed by crossing a popular Indian mustard variety, 'Varuna' (containing the barnase gene), with an East European 'Early Heera-2' mutant (containing the barstar gene).*

### Yield Increase and Trials:

- *DMH-11 is claimed to have shown an average 28% yield increase over the Varuna variety in contained field trials conducted by the **Indian Council of Agricultural Research (ICAR)**.*

### Issue Surrounding GM Mustard:

- *GM Mustard, the initial genetically modified food crop approved for commercial release, **demands scrutiny due to its potential implications on the environment, agriculture, and public health.***
- *The government's endorsement of GM mustard is progressing despite concerns, raising questions about **adherence to both scientific principles and legal frameworks.***
- ***Lack of transparency is evident as the complete biosafety database of GM mustard is not made publicly accessible, hindering independent evaluation and analysis.***
- ***Criticisms regarding the superiority of existing non-GM mustard hybrids in terms of yield compared to GM mustard have not been adequately addressed by proponents.***
- *Emerging evidence suggests potential **long-term ecological and health risks associated with Herbicide-Tolerant (HT) crops**, further intensifying the debate surrounding GM mustard.*
- ***GM Mustard, specifically DMH-11, isn't classified as Herbicide Tolerant (HT) despite containing the 'bar' gene conferring resistance to herbicides.***
- *The **'bar' gene renders the plant resistant to a herbicide family**, making the herbicide tolerance aspect a contentious issue.*
- *Activists argue that **this non-classification may lead to increased use of glyphosate, a weedicide linked globally to being a 'probable carcinogen.'***
- ***Glyphosate is commonly used in tea plantations to reduce labor costs, but its global implications have prompted regulatory restrictions by the Union agricultural ministry.***
- *The minister clarified that the 'bar' gene's use is approved by the Genetic Engineering Appraisal Committee (GEAC) **only during the hybrid seed production phase.***
- *During commercial cultivation, **farmers will not employ the 'bar' gene**, as it is reserved for maintaining genetic purity in hybrid seed production plots by eliminating male fertile plants in female rows.*

### GEAC's Response in 2022:

- *The Genetic Engineering Appraisal Committee (GEAC) recommended the environmental release of the transgenic mustard hybrid DMH-11 in 2022.*
- *This release was specifically endorsed for its **seed production and testing**, marking the initial step before its commercial release.*

### **Commercial Cultivation Approval:**

- *GEAC's recommendation implies a green signal for farmers to engage in the commercial cultivation of DMH-11, with the production of seed material being the initial phase.*

### **Parental Lines Approval:**

- *GEAC also recommended the **environmental release of DMH-11's parental lines**, which carry the **barnase and barstar genes**.*
- *This release is intended for use in developing new hybrids, **potentially yielding even higher crop productivity than DMH-11**.*

### **Expanding Genetic Diversity:**

- *The **barnase-barstar system** enables the breeding of hybrids from a broader range of mustard varieties, including those of **East European origin** such as 'Heera' and 'Donskaja.'*

### **Introduction of New Traits:**

- *The technology also allows for the introduction of new traits in mustard varieties, such as **resistance against diseases like alternaria blight and stem rot fungus**.*
- *Additionally, traits related to **canola oil quality**, such as **zero or low levels of erucic acid and glucosinolates** (considered negative from a health standpoint), can be introduced.*

### **Leadership and Origin:**

- ***Deepak Pental**, former Delhi University vice chancellor, led the CGMCP team that bred DMH-11 in 2002.*

### **Opposition to GM Crops:**

- *General opposition to GM crops has existed from various green groups and the **RSS-affiliate Swadeshi Jagran Manch**.*

### **Bar Gene as a Marker:**

- *Developers of DMH-11 argue that the 'bar' gene is a marker gene, used to identify genetically modified plants necessary for large-scale seed production.*
- *The gene makes GM mustard plants **tolerant to glufosinate ammonium**, a herbicide.*

### **GEAC Recommendations on Herbicide Usage:**

- *GEAC recommended the usage of herbicide formulations exclusively for hybrid seed production, **not for cultivation in farmers' fields**.*

### Concerns About Honey Bees Addressed:

- GEAC cited a report by an expert committee, stating that the bar, barnase, and barstar system is **unlikely to adversely impact honey bees and other pollinators**.
- **Recommended field demonstration studies** post-environmental release to generate scientific evidence in the Indian agro-climatic situation.

### Motive for Acceptance of GEAC Recommendations:

- One potential motivation for accepting GEAC recommendations could be **India's significant edible oil import bill**.
- With only 8.5-9 million tonnes of edible oil produced annually and 14-14.5 million tonnes imported, **there is a substantial foreign exchange outgo of \$18.99 billion** (as of the fiscal year ending March 31, 2022).
- GM mustard could **contribute to domestic oil production**, potentially reducing the need for imports and addressing economic concerns.

### Other GM crops in India:

Crop	Cultivation Status
<i>Bt cotton</i>	<i>Commercially cultivated</i>
<i>Bt brinjal</i>	<i>Field trials (commercial approval pending)</i>
<i>Mustard</i>	<i>Field trials (approval received, legal challenges pending)</i>
<i>Maize</i>	<i>Field trials</i>
<i>Tomato</i>	<i>Field trials</i>
<i>Chickpea</i>	<i>Development stage</i>

### What are the regulatory and approval authority for GM crops in India?

- The Acts and rules that regulate GM crops in India include:
- Environment Protection Act, 1986 (EPA)
- Biological Diversity Act, 2002
- Plant Quarantine Order, 2003

- *GM policy under Foreign Trade Policy*
- *Food Safety and Standards Act, 2006*
- *Drugs and Cosmetics Rule (8th Amendment), 1988*

### Genetic Engineering Appraisal Committee (GEAC):

- *Responsible for evaluating proposals regarding the release of genetically modified (GM) organisms and products into the environment.*
- *Operates within the **Union Ministry of Environment, Forest and Climate Change.***
- **Functions in accordance with the Rules of 1989, under the Environment Protection Act of 1986.**
- *Specifically addresses the **large-scale utilization of hazardous microorganisms and recombinants, considering the environmental impact.***

Mandate of Ministries/Departments	
Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> <li>• Primarily responsible for conservation and protection of environment, ensuring environmental and human health safety before release of GMOs / LMOs.</li> <li>• Nodal agency for implementing Rules, 1989 and the Cartagena Protocol on Biosafety</li> </ul>
Department of Biotechnology (Ministry of Science & Technology)	<ul style="list-style-type: none"> <li>• Nodal department for promoting biotechnology programs</li> <li>• Provides scientific support in implementation of biosafety regulations</li> <li>• Provide services in areas of research, infrastructure, generation of human resource</li> </ul>
Ministry of Agriculture	<ul style="list-style-type: none"> <li>• Policies aimed at agriculture growth.</li> <li>• Indian Council of Agricultural Research (ICAR) responsible for monitoring agronomic benefits of GM technology.</li> <li>• Monitoring post-release performance of GM crops.</li> </ul>
Ministry of Health and Family Welfare	<ul style="list-style-type: none"> <li>• Policies aimed at protecting and monitoring human health.</li> <li>• Food Safety and Standards Authority of India responsible for regulating genetically engineered foods.</li> </ul>
Ministry of Commerce and Industries	<ul style="list-style-type: none"> <li>• Enhance trade with other countries through export/import policies.</li> <li>• Nodal agency for implementing DGFT notification on GMOs</li> </ul>
Central Board of Excise and Customs, Department of Revenue, Ministry of Finance	<ul style="list-style-type: none"> <li>• Enforcement of regulation pertaining to transboundary movement of GMOs/LMOs at point of entry</li> </ul>

## **EXOPLANETS**

### **Syllabus: GS-3; Science and Technology**

#### **Context**

- *Recently, **The two giant exoplanets anywhere from several to tens of Earth masses crashed into one another, creating both the infrared spike and the cloud that was picked up by astronomers on Earth.***

#### **More to know**

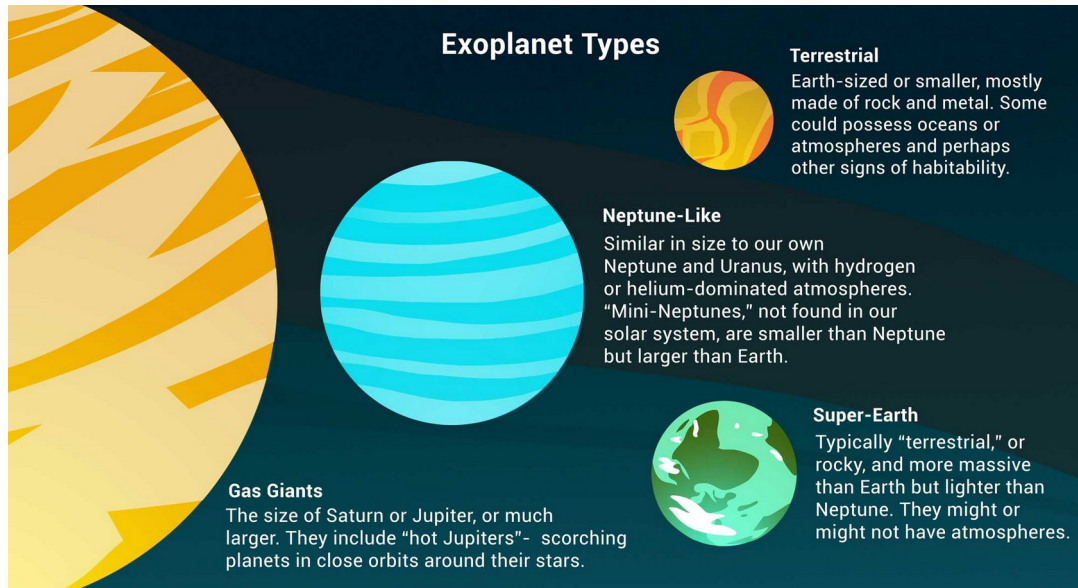
- *Astronomers, who noticed the bang, said that a crash like this would completely liquify the two planets, leaving behind a single molten core surrounded by a cloud of gas, hot rock, and dust.*
- *Surprisingly, this cloud was still orbiting the star, like the glowing remains of the two worlds.*

#### **About**

- *An exoplanet, or extrasolar planet, is a **planet that exists outside of our solar system.***
- *The first possible evidence of an exoplanet was noted in 1917, but it wasn't recognized as such. The first confirmed detection of an exoplanet occurred in 1992.*
- *Most exoplanets orbit other stars, but some are **free-floating** and untethered to any star. These free-floating exoplanets are called **rogue planets.***
- *NASA has confirmed more than **5,200 exoplanets**, but scientists believe billions more exist. On average, it's estimated that there's at least one planet for every star in the galaxy.*
- *Astronomers can determine how far away an exoplanet is from its star by **studying the time between transits.***
- *This can provide information about the planet's temperature. If a planet is at the right temperature, it could contain liquid water, which is an important ingredient for life.*
- ***In July 2022, water was detected on the exoplanet WASP-96b using the James Webb Space Telescope.***



### Exoplanet Types



**Gas Giants**  
The size of Saturn or Jupiter, or much larger. They include "hot Jupiters"- scorching planets in close orbits around their stars.

**Neptune-Like**  
Similar in size to our own Neptune and Uranus, with hydrogen or helium-dominated atmospheres. "Mini-Neptunes," not found in our solar system, are smaller than Neptune but larger than Earth.

**Terrestrial**  
Earth-sized or smaller, mostly made of rock and metal. Some could possess oceans or atmospheres and perhaps other signs of habitability.

**Super-Earth**  
Typically "terrestrial," or rocky, and more massive than Earth but lighter than Neptune. They might or might not have atmospheres.