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INDIA-US 2+2 MINISTERIAL DIALOGUE

SOURCE: [INDIAN EXPRESS](#)

WHY IN NEWS?

- India's Defense Minister Rajnath Singh and External Affairs Minister S Jaishankar **engaged in the fifth 2+2 Ministerial Dialogue with their US counterparts**, Secretary of Defense Lloyd Austin and Secretary of State Antony Blinken, in New Delhi. These meetings have been an **annual occurrence since 2018**, representing a **platform for high-level discussions**.

ABOUT 2+2 MINISTERIAL DIALOGUE:

Key aspects of the 2+2 Ministerial Dialogue include:

- **Participants:**
 - ✓ **Two high-level representatives from each country**, usually the **Foreign Minister and the Defence Minister**.
- **Objectives:**
 - ✓ Facilitate in-depth discussions **on strategic and security issues**.
 - ✓ Strengthen diplomatic **ties and mutual understanding**.
 - ✓ Enhance cooperation on **defense and security matters**.
- **Scope:**
 - ✓ Covers a wide range of topics, including **defense collaboration, security challenges, geopolitical developments**, and diplomatic initiatives.
- **Frequency:**
 - ✓ Typically held annually, these dialogues provide a **regular platform for high-level engagement**.
- **Countries Engaging in 2+2 Dialogues with India:**
 - ✓ **United States:** The U.S. was the first country with which India initiated the 2+2 format.
 - ✓ **Australia:** Engaged in 2+2 talks with India, reflecting the growing importance of their strategic partnership.
 - ✓ **Japan:** Dialogue aimed at enhancing bilateral security and defense cooperation.
 - ✓ **Russia:** Dialogue focuses on a wide range of regional and international issues to deepen mutual understanding.
 - ✓ **United Kingdom:** Inaugural 2+2 meeting took place in 2023.
- **Achievements:**
 - ✓ The 2+2 dialogues have led to **significant agreements and collaborations**, such as **foundational pacts on defense cooperation**.
- **Strategic Partnerships:**
 - ✓ Aims to **strengthen strategic partnerships and align national interests**.
 - ✓ In the case of India, these dialogues have **become an integral part of its diplomatic strategy**, providing a platform for engaging with **key partners on various fronts and addressing contemporary geopolitical challenges**.
 - ✓ The format allows for a comprehensive and nuanced **discussion on issues of mutual concern**, contributing to the development of **robust and multifaceted bilateral relations**.





MAJOR HIGHLIGHTS OF RECENT DIALOGUE:

- **India's Stance on Israel-Palestinian Crisis:**
 - ✓ Support for **Two-State Solution**
 - ✓ Call for **Humanitarian Pauses**
 - ✓ Emphasis on **Immediate Release of Hostages in Gaza Strip**
 - ✓ Joint Statement on India and U.S.'s **Stand Against Terrorism.**
 - ✓ Urging Adherence to **International Humanitarian Law.**
- **'2+2' Ministerial Meeting Highlights:**
 - ✓ Involvement of Foreign and Defence Ministers showcased **Evolving Strategic Partnership.**
 - ✓ Emphasis on **Mutual Trust, Shared Values, and Common Interests.**
 - ✓ Focus on Maritime Security in **Indo-Pacific Region.**
 - ✓ Collaboration in **Undersea and Space Technologies.**
- **Indo-Pacific and Quad:**
 - ✓ Commitment to a **free, open, and inclusive Indo-Pacific.**
 - ✓ Reaffirmed importance of the Quad; India to host **next Quad leaders' Summit in 2024.**
- **Defense Partnership:**
 - ✓ Deepening defence partnership through **dialogues and joint projects.**
 - ✓ Accelerated joint projects, including space and **artificial intelligence collaborations.**
 - ✓ **Satisfaction with pace of cooperation in Maritime Domain Awareness.**
- **Defense Industrial Cooperation:**
 - ✓ **Reaffirmation of commitment to the Roadmap** for India-U.S. Defence Industrial Cooperation.
 - ✓ Purchase of **MQ-9B Unmanned Aerial Vehicles.**
 - ✓ **Licensed Manufacture of F-414 Jet Engine** in India.
 - ✓ Significance in **Powering the LCA-MK2**
- **Science and Technology Collaboration:**
 - ✓ Progress under the India-U.S. **Initiative on Critical and Emerging Technology (iCET).**
 - ✓ Collaboration in emerging technologies like **quantum, telecom, biotechnology, AI, and semiconductors.**
- **Health and Trade Dialogues:**
 - ✓ Collaboration in **health, pandemic preparedness, and response.**
 - ✓ Growing trade and commercial partnership; potential for **bilateral trade to cross US\$ 200 billion.**
- **People-to-People Ties:**
 - ✓ Launch of a pilot program for visa renewals for certain Indian nationals.
 - ✓ Opening of **new Indian Consulate in Seattle.**
- **Multifaceted Cooperation:**
 - ✓ Diplomatic, Security, and Technological Collaboration.
 - ✓ **Not Limited to Concerns about China.**
 - ✓ Call for Adherence to International Humanitarian Law.
 - ✓ **Support for India's G20 Presidency; welcome for India's UNSC candidature.**





SIGNIFICANCE OF THE INDIA- US 2+2 MINISTERIAL DIALOGUE:

- **Diplomatic Significance:**
 - ✓ The meeting underscores the ongoing diplomatic engagement between India and the United States at the highest levels.
 - ✓ Such high-level dialogues highlight the commitment of **both countries to strengthen their strategic partnership.**
- **Regional and Global Relevance:**
 - ✓ The discussions are crucial in the context of regional and global security dynamics, **especially given the geopolitical challenges in the Indo-Pacific region.**
 - ✓ The emphasis on collaborations with **key partners like the U.S., Japan, Australia, the UK, and Russia reflects India's efforts to foster cooperative approaches** to shared challenges.
- **Addressing Security Concerns:**
 - ✓ The 2+2 format allows for comprehensive discussions on **defense and security issues, including the evolving threat landscape in the region.**
 - ✓ India's engagements with the U.S., Russia, and other partners **aim to address security concerns and promote stability in a rapidly changing global environment.**
- **Strengthening Defense Ties:**
 - ✓ The **ongoing negotiations and collaborations** discussed within the 2+2 framework, such as the purchase of military equipment and technology, showcase the intent to enhance defense ties.
 - ✓ **Agreements like LEMOA, COMCASA, and BECA with the U.S.** highlight the deepening military cooperation between the two nations.
- **Balancing Alliances:**
 - ✓ India's approach of **engaging with a diverse set of countries**, including **traditional allies and historical partners like Russia**, demonstrates a nuanced and balanced foreign policy.
 - ✓ The 2+2 meetings **contribute to building multifaceted alliances** in the face of evolving geopolitical challenges.
- **Focus on Quad and Indo-Pacific:**
 - ✓ References to the **Quadrilateral Security Dialogue (Quad)** and the Indo-Pacific region in the dialogues underscore the **shared commitment to a free, open, and prosperous Indo-Pacific.**
 - ✓ The collaboration within the **Quad framework is highlighted as a strategic pillar in addressing common challenges.**

WAY FORWARD:

- **Achievements and Future Prospects:**
 - ✓ Tangible Results: **2+2 meetings contribute to tangible and far-reaching outcomes**, enhancing India's strategic depth and bilateral relations.
 - ✓ **Ongoing Collaborations:** Negotiations and dialogues continue **with various partners**, reflecting **India's commitment to a multipolar and equitable world order.**
- **Conclusion:**
 - ✓ **India's 2+2 Ministerial Dialogues serve as a crucial diplomatic tool** to strengthen strategic partnerships, **foster understanding, and address regional and global challenges.**
 - ✓ The engagements **encompass a range of countries, reflecting India's commitment to a nuanced and balanced approach in international relations.**



Prelims Specific:

BECA (Basic Exchange and Cooperation Agreement):

- ✓ **Purpose:** Enables India to use U.S. geospatial maps for precise military accuracy.
- ✓ **Benefits:** Facilitates accurate targeting for automated hardware systems and weapons, including unmanned aerial vehicles like Predator-B.
- ✓ **Foundational Agreement:** One of the four key military communication agreements between India and the U.S.
- ✓ **National Security Concerns:** Initially, India had reservations about geospatial mapping, but concerns were addressed through mutual dialogue.

GSOMIA (General Security Of Military Information Agreement):

- ✓ **Purpose:** Allows sharing of intelligence between the militaries of India and the U.S.
- ✓ **Signing:** India signed GSOMIA in 2002.
- ✓ **Extension:** The Industrial Security Annex (ISA) was signed in 2019, extending the scope to classified military information exchange with Indian defense industries.

LEMOA (Logistics Exchange Memorandum of Agreement):

- ✓ **Purpose:** Grants access to designated military facilities for refueling and replenishment.
- ✓ **Signing:** India signed LEMOA in 2016.

COMCASA (Communications Compatibility and Security Agreement):

- ✓ **Purpose:** India-specific version of CISMOA, facilitates communication security equipment transfer.
- ✓ **Validity:** Signed in 2018, valid for 10 years.
- ✓ **Interoperability:** Aims to streamline and enhance interoperability between the armed forces of India and the U.S.





SEEDING CLOUDS TO CLEAN THE AIR

SOURCE: [INDIAN EXPRESS](#)

WHY IN NEWS?

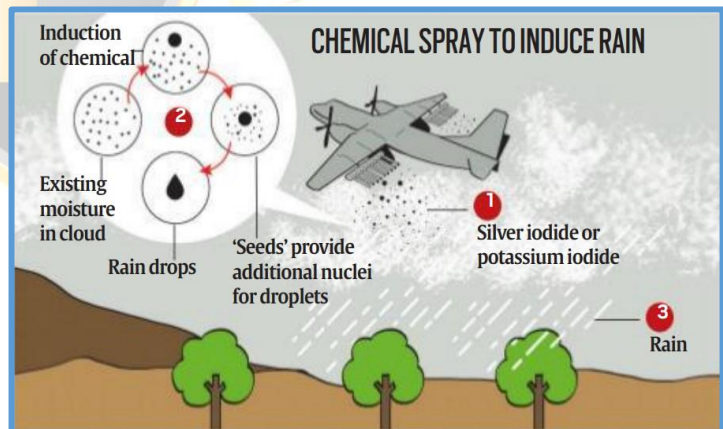
Delhi government considers cloud seeding or 'artificial rain' to combat air pollution. Proposal emerges amidst ongoing concerns about severe air quality in Delhi-NCR.

WHAT IS CLOUD SEEDING?

- **Natural Cloud Formation:**
 - ✓ **Water vapor condenses around small particles**, forming cloud droplets.
 - ✓ These **droplets collide, grow heavier, and, when the cloud is saturated**, precipitation occurs.
- **Cloud Seeding Process:**
 - ✓ Clouds injected with salts **like silver iodide, potassium iodide, or sodium chloride**.
 - ✓ These salts act as "seeds," providing nuclei for additional cloud droplets to form.
 - ✓ Dispersed into clouds via aircraft or ground-based generators.
- **Microphysical Acceleration:**
 - ✓ Seeding **accelerates cloud microphysical processes**.
 - ✓ Requires sufficiently **large droplets that can reach the Earth's surface without evaporating**.
- **Role of Different Salts:**
 - ✓ Substances dispersed need cloud condensation **nuclei and ice nuclei**.
 - ✓ Cloud condensation nuclei aid in forming cloud droplets, while **ice nuclei assist in ice crystal formation**.
- **Ice Crystal Growth:**
 - ✓ **Ice crystals, growing faster than drops, become large and fall**, leading to precipitation.

CONDITIONS FOR CLOUD SEEDING:

- **Adequate Cloud Presence:**
 - ✓ Cloud seeding requires a **sufficient number of clouds with specific characteristics**.
 - ✓ The **depth of clouds is crucial, and an adequate number of cloud droplets** inside are necessary.
- **Cloud Cover Type:**
 - ✓ Cloud seeding is effective with certain types of clouds, and their characteristics impact the success of the process.
 - ✓ Cloud cover should have an **adequate number of cloud droplets for the seeding to be impactful**.
- **Absence of Clear Sky:**
 - ✓ Cloud seeding is **not feasible with a clear sky**.
 - ✓ Clear skies lack the necessary cloud cover and **droplet conditions required for successful seeding**.
- **Winter Cloud Formation:**
 - ✓ In winter over Delhi, cloud formation is **influenced by western disturbances originating from the Caspian or Mediterranean Sea**.
 - ✓ Clouds form when a **western disturbance disrupts the stable winter atmosphere**.
- **Stable Atmospheric Conditions:**
 - ✓ Cloud seeding is challenging in a **stable atmosphere with no disruptions**.

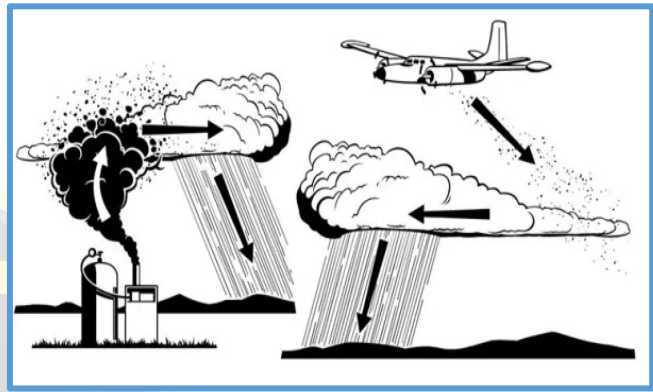




- ✓ Western disturbances play a **role in creating the necessary instability for cloud formation.**
- **Height and Water Content Analysis:**
 - ✓ Evaluation of **cloud height and liquid water content is crucial.**
 - ✓ Assessing these factors helps determine the suitability of existing clouds for seeding.
- **Meteorological Radar Predictions:**
 - ✓ Advance prediction through **meteorological radars helps anticipate cloud formation.**
 - ✓ Radar data aids in understanding cloud characteristics and planning for seeding activities.
- **Specific Weather Disturbances:**
 - ✓ Western disturbances serve as a **crucial factor in creating the atmospheric conditions suitable for cloud seeding.**
 - ✓ Disturbances disrupt the stable **winter atmosphere, facilitating cloud formation.**

CLLOUD SEEDING IN INDIA: CONDITIONS AND OUTCOMES

- **Monsoon Attempts:**
 - ✓ Cloud seeding has been **predominantly attempted during the monsoon in regions like Karnataka, Maharashtra, and Tamil Nadu.**
- **CAIPEEX-IV Experiment:**
 - ✓ The **Cloud Aerosol Interaction and Precipitation Enhancement Experiment (CAIPEEX-IV)** in 2018 and 2019 focused on **drought-prone Solapur, Maharashtra.**
 - ✓ Results indicated a **relative enhancement of 18% in rainfall**, showcasing potential benefits.
- **IIT Kanpur Trials:**
 - ✓ IIT Kanpur conducted cloud seeding trials in **April and May of 2018 (pre-monsoon months)** on their campus.
 - ✓ **Five out of six trials resulted in rain**, demonstrating some success in inducing precipitation.
- **Delhi Proposal (2018):**
 - ✓ In 2018, cloud seeding was **proposed in Delhi but faced challenges**, including permissions and the absence of seeding equipment on IIT Kanpur's aircraft.
- **Complex Nature of Cloud Microphysics:**
 - ✓ Cloud microphysics is a **complex and uncertain field.**
 - ✓ **Seeding doesn't guarantee rainfall from all clouds**, and natural rainfall can occur without seeding.
- **Uncertainties and Tropical Conditions:**
 - ✓ Many **uncertainties exist in cloud seeding outcomes**, particularly in **tropical conditions.**
 - ✓ Evaporation of rain on its way to the **surface adds to the complexities of the process.**
- **Winter Cloud Systems:**
 - ✓ Cloud seeding in **winter poses different challenges as cloud systems vary.**
 - ✓ Further research is needed to **explore the feasibility and effectiveness of cloud seeding during the winter season.**

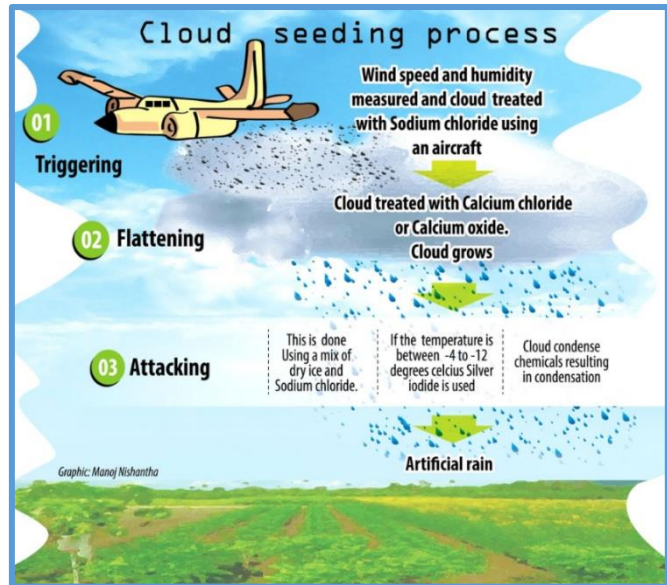


Cloud Seeding for Pollution Mitigation: Possibilities and Challenges

- **Historical Focus on Drought Conditions:**
 - ✓ Cloud seeding in India has historically been attempted to address drought-like conditions rather than pollution.
- **Lack of Pollution-Focused Studies:**



- ✓ Cloud seeding in India hasn't been explored for its impact on pollution levels.
- ✓ No dedicated investigations have been conducted in this aspect, and conditions in India differ from those in China where weather management options were explored.
- **Complexities of Cloud Processes:**
 - ✓ Clouds and their processes are intricate and non-linear, posing challenges in predicting outcomes.
 - ✓ Distinguishing between naturally occurring rain and seeded rainfall adds complexity to the evaluation.
- **First Attempt for Air Pollution:**
 - ✓ The current cloud seeding initiative in Delhi is the first attempt in India explicitly targeting air pollution mitigation.
- **Temporary Relief with Significant Rain:**
 - ✓ Success relies on generating a substantial amount of rain to wash away pollutants.
 - ✓ The impact is expected to be temporary, breaking the flow of pollutants in the affected area.





WAY FORWARD:

- **Need for Dedicated Studies:**
 - ✓ Given the **complexity and uniqueness of Indian conditions**, a dedicated study on the **effectiveness of cloud seeding for pollution reduction is essential**.
- **Gufran Beig's Perspective:**
 - ✓ Gufran Beig emphasizes that while the **method offers temporary relief**, its success hinges on **achieving significant rainfall to effectively cleanse** the atmosphere.
- **Breakthrough in Pollution Management:**
 - ✓ If successful, this **initiative could mark a breakthrough in using cloud seeding as a tool for managing air pollution**, providing a new perspective on its applications beyond drought conditions.



PRELIMS POINTERS:

Topic	Details
<p>PUSA 2090: A Potential Solution to Stubble Burning</p> 	<p>Background:</p> <ul style="list-style-type: none"> ▪ Pusa-44, a high-yielding rice variety, implicated in stubble burning due to its long maturity period. ▪ Pusa-2090 developed by IARI as an alternative with shorter maturity duration. <p>Pusa-2090 Attributes:</p> <ul style="list-style-type: none"> ▪ A cross between Pusa-44 and CB-501 (early-maturing Japonica rice line). ▪ Matures in 120-125 days, significantly shorter than Pusa-44 (155-160 days). ▪ Retains high yield potential, comparable to Pusa-44. <p>Comparison with PR-126:</p> <ul style="list-style-type: none"> ▪ PR-126, another variety in Punjab, matures in 125 days but with lower yields (30-32 quintals per acre). ▪ Pusa-44 yields 35-36 quintals per acre, making it a preferred choice. <p>Pusa-2090's Potential Impact:</p> <ul style="list-style-type: none"> ▪ If widely adopted, Pusa-2090 could offer a viable solution to stubble burning associated with Pusa-44. ▪ Shorter duration facilitates timely wheat crop sowing, reducing the need for stubble burning. <p>IARI's Claims:</p> <ul style="list-style-type: none"> ▪ Pusa-2090 tested in trials and farmer fields, officially approved for cultivation in Delhi and Odisha. ▪ Positive feedback from farmers on yield performance.
<p>World Intellectual Property Indicators 2023 Highlights</p> 	<p>WIPO (World Intellectual Property Organization):</p> <ul style="list-style-type: none"> ▪ Role: WIPO serves as the global forum for Intellectual Property (IP) services, policy, information, and cooperation. ▪ UN Agency: As a self-funding agency of the United Nations, WIPO has 193 member states. ▪ Objective: WIPO aims to lead the development of an equitable and efficient international IP system, fostering innovation and creativity worldwide for the collective benefit. ▪ Establishment: Established in 1967 by the WIPO Convention, it outlines WIPO's mandate, governing bodies, and procedures. <p>Key Highlights of the Index:</p> <ul style="list-style-type: none"> ▪ Global innovators submitted 3.46 million patent applications in 2022, a 1.7% increase from 2021. ▪ China led with the highest number of patents in force. ▪ Asia accounted for approximately 67.9% of the total patent applications worldwide. ▪ While patents can last up to 20 years, the average age varies by country. ▪ Notable examples: Brazil (11.6 years), India (11.4 years), Germany (11 years), and Mexico (11 years). <p>India-Specific Trends:</p>



- **India witnessed its sixth consecutive year of growth**, experiencing a remarkable **25% surge in patent filings in 2022** represents **the fastest growth since 2005**.
- Key initiatives driving growth include **fee concessions, such as a 10% rebate on online filing and an 80% fee concession** for Start-ups.
- Schemes like the **Scheme for Facilitating Start-Ups Intellectual Property Protection (SIPP)** and the **Patent Analysis and Management System (PAMS)** contributed to the surge.
- **India's active participation in the Patent Cooperation Treaty**.

