



Ethical Issues due to Weather Modifications

For Mains: Weather Modifications and related issues

Why in News?

China has conducted over half a million weather-modification operations between 2002 and 2012.

- In 2020, China announced its plan **to expand its weather-modification programme** to generate **artificial rain** or snowfall over an area exceeding 5.5 million square kilometres — more than 1.5 times the total size of India.
- Many countries have **researched and deployed cloud seeding to deal with water scarcity**, ecological crisis and food security.

What is Weather Modification?

- Weather modification (also known as weather control) which is a part of **geoengineering** is the **act of intentionally manipulating or altering the weather**.
 - The **most common form of weather modification** is [cloud seeding](#), which increases rain or snow, usually to increase the local water supply.
- Weather modification can also **have the goal of preventing damaging weather**, such as hail or hurricanes, from occurring; or of provoking damaging weather against the enemy, as a tactic of military or economic warfare like **Operation Popeye**, where clouds were seeded to prolong the monsoon in Vietnam.

What are the Ethical Issues due to Weather Modifications?

- **The tragedy of the Commons:**
 - The '**tragedy of the commons**' refers to the situation when individuals, acting **rationally in their own self-interest, nonetheless act irrationally** as a collective group by irreparably depleting a resource that is owned in common.
 - China's action is a potential example of 'the tragedy' on a global scale.
- **Skewed Vulnerabilities:**
 - For many of the most vulnerable countries and people who are not a part of China's actions regarding weather modification, appears to be seriously unfair and casts a notable shadow over the champions of environmental justice.
- **Intergenerational Ethics:**
 - A branch of ethics called **intergenerational ethics** examines whether present-day **humanity** has a moral obligation to strive for environmental sustainability for the benefit of future generations.

What are the Impacts of Weather Modifications?

- **Can Disrupt Monsoons:**
 - Injecting sulfate aerosols in the stratosphere above the Arctic to mimic volcano clouds, for

example, can disrupt the monsoons in Asia and increase droughts, particularly in Africa, endangering food and water sources for two billion people.

- Also, **excess snow produced from cloud seeding can result in deaths, triggering a human-induced disaster.**

- **Conflict of Interests:**

- Technological modernization is considered the best solution to environmental problems, but **in the absence of data, the technology acts as a precursor to man-made disasters.**
- The authoritarian regime in China can control the viewpoints of all scientists.
 - Some people regard **geo-engineering** as a quick solution to **climate change**. There is nothing wrong with looking at weather modification as an extension of geo-engineering, but we need more research to make it more precise.

What is Geoengineering?

- **About:**

- Geoengineering is a deliberate, large-scale intervention carried out in the Earth's natural systems to reverse the impacts of climate change, according to the Oxford Geoengineering Programme.
- This involves techniques to physically manipulate the global climate to cool the planet.

- **Categories:**

- These techniques fall primarily under **three categories:**
 - **Solar Radiation Management (SRM):** Solar geoengineering or 'dimming the sun' by spraying sulfates into the air to reflect sunlight back into space, cloud brightening or spraying saltwater to make clouds more reflective and more.
 - **Carbon Dioxide Removal (CDR):** ocean fertilisation or the dumping of iron or urea to stimulate phytoplankton growth to absorb more carbon.
 - CDR technologies such as **carbon capture and storage (CCS)**, direct air capture (DAC) and **bioenergy with carbon capture and storage (BECCS)** are being proposed as a means to achieve 'net zero' emissions
 - **Weather Modification.**

Way Forward

- **Need an International Organisation:**

- There is a **need for an international organisation** to govern weather-modification programmes.
 - Weather modification occurs in the air, where there are no boundaries. This impacts international politics and we need more imagination to deal with geopolitics.

- **More Research is needed:**

- It is not like conducting experiments in a laboratory. So, we need more research to make it more precise.
- Besides social consequences, **moral and ethical issues need to be discussed more.**

- **More Imagination is Needed:**

- **Weather modification occurs in the air**, where there are no boundaries, which impacts international politics, and more imagination is needed to deal with geopolitics.
- It is not just about a border in the air but a certain kind of power that no human can control.
- The Earth system force or geophysical politics need to recognise that the Earth system force can play a role in international politics.

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