

WEAPONISATION OF WEATHER

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BACKGROUND

The nation which first learns to plot the paths of air masses accurately and learns to control the time and place of precipitation will dominate the globe.

— General George C Kenney, Commander of the Strategic Air Command, on future weapon systems, in 1947.

It is well known that people have long altered atmospheric phenomena such as clouds, rain, snow, hail, lightning, thunderstorms, tornadoes, hurricanes and cyclones either by purpose or accidentally. The work of Vincent J. Schaefer and Irving Langmuir launched the modern era of scientific weather modification in 1946.¹

The manipulation of technology towards weather started approximately between the years 1950–53. Weather modification applications were quickly weaponised to influence war and protest as done by the US Air Force (USAF) in Operation Sober Popeye (Project Controlled

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1. "The Climate Engineers", *Wilson Quarterly*, The nation which first learns to plot the paths of air masses accurately and learns to control the time and place of precipitation will dominate the globe, <http://archive.wilsonquarterly.com/essays/climate-engineers>. Accessed on August 31, 2023.

Numerous nations, including the United States, the former Soviet Union, Australia, China, and France have conducted extensive scientific research and implemented operational climate change measures. There are now 764 active geo-engineering projects worldwide.

Weather Popeye/Motorpool/Intermediary-Compatriot).² The USAF in 1967–72 carried out a project to prolong the monsoon season over Ho Chi Minh City during the Vietnam War by controlling the weather in order to achieve military goals, causing landslides and washing out river crossings to obstruct the movement of North Vietnamese troops. This operation set the impetus of successful use in the weather control technology in combat.

Be it the war of 1812, in which a thunderstorm rescued Washington from the British, the Battle of the Bulge (December 1944–January 1945),^{3;4} the Crimean War,⁵ the Korean War,⁶ the Gulf War or the US switching the location of the atomic bomb drop from Kokura to Nagasaki on August 9, 1945, due to cloudy skies and poor visibility, weather has played a crucial role and altered the course of war.

During the opening and closing ceremonies of the Beijing Olympic Games, China utilised nearly 11,000 cloud-seeding weapons, including rocket launchers and artillery guns, to control the rain and clear the skies.⁷ The People's Republic of China's (PRC's) 70th anniversary was commemorated in October 2019 using the same procedure. Numerous nations, including the United States, the former Soviet Union, Australia, China, and France have conducted extensive scientific research and implemented operational climate

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2. "Operation Popeye", https://en.wikipedia.org/wiki/Operation_Popeye. Accessed on August 31, 2023.
 3. "Operation Bulge", https://en.wikipedia.org/wiki/Battle_of_the_Bulge. Accessed on August 31, 2023.
 4. Also see n.2.
 5. "The Crimean War", https://en.wikipedia.org/wiki/Crimean_War. Accessed on August 31, 2023.
 6. "The Korean War", https://en.wikipedia.org/wiki/Korean_War. Accessed on August 31, 2023.
 7. "Beijing Olympic Games", https://en.wikipedia.org/wiki/Beijing_Weather_Modification_Office. Accessed on August 31, 2023.

change measures. There are now 764 active geo-engineering projects worldwide.

The results of these in-the-moment experiments imply that weather modification may be made for a weapon for use in warfare. The hostile use of environmental modification technologies is prohibited under international agreements like the United Nations Convention on the Prohibition of Military and Environmental Modification Techniques (ENMOD), signed in 1977.

Definition: Understanding weather modification or geo-engineering techniques is crucial before defining the concept of weaponising the weather. Geo-engineering is the large-scale modification of atmospheric processes with the objective of manipulating the climate of the planet and directing the planet's resources such as its oceans, rivers, soil and atmosphere for the purpose of attaining a specific benefit. These technologies are referred to as weather modification techniques when they are employed to achieve more localised or regional goals.

The concept of "Weaponisation of Weather (WoW)" commonly refers to a fictional scenario in which technology for modifying or manipulating the weather is employed in conflict or to further it, for national strategic/tactical goals. In other words, weather warfare is a tactic used in modern warfare whereby weather modification and geo-engineering techniques deliberately alter the flow of the weather in order to use this changing weather against the enemy nation which can be defeated economically, strategically, covertly and with the maximum amount of damage possible. In these unfavourable weather conditions, the adversary cannot wage combat.

CHINESE WEATHER-RELATED ACTIVITIES: A THREAT TO INDIA

Between 2002 and 2012, China conducted over half a million weather modification operations. In 2020, China declared its weather modification

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programme to generate artificial rain or snowfall over an area exceeding 5.5 million sq km, which is more than one and a half times the total size of India. China has indicated deepened interest in using weather modification, especially for tackling water scarcity, ecological crises and food security.

According to some claims, China is also conducting extensive research on solar geo-engineering, including solar radiation management. Although this will have an impact on the global climate, the nearby Indian border area may experience negative long-term effects on the weather patterns.

What are of major concern for India are China's activities in the Tibetan Plateau. The effects of the alarming large-scale nature of the cloud seeding system in the Tibetan Plateau will be both intense and grave if the parameters are not in control. The project is already on the move. This hints at the possibility of China engaging in cloud seeding activities in a continuous manner. This will affect India's weather also to a large extent.

India being surrounded by adversary nations faces threats to its security all the time but the main threat in the present scenario is indisputably China. Is there a possibility that China can use weather as a weapon of warfare?

The weather modification techniques of China are not limited to rain or snow enhancement or preventing damaging weather but can act as a strategic tool to induce damage or destruction on India. This suggests that weather control holds obvious military implications. It can be used as a military tactic as witnessed in the Vietnam War. What calls for more concern is the fact that China is not a signatory to the ENMOD. Here, the query is: "What restricts China from ENMOD compliance if its intentions are benevolent, as it projects them to be?" This underlines the discrepancy in China's theory and the implications of its weather modification practice. It is thought provoking that what China is doing for the benefit of its own interests may have an undesirable impact on others, as weather has no boundaries. The intrinsic inclinations of China's policy and practices lack transparency and add to the worries about unanticipated outcomes and cascading impacts. Therefore, one cannot ignore the fact that, if need be, China can use weather modification

systems to inflict damage on its adversary. The use of technology then becomes a means of waging war without engaging in actual combat.

GEO-ENGINEERING/WEATHER MODIFICATION METHODS

Geo-engineering is the large-scale modification of atmospheric processes with the goal of regulating the climate of the planet and directing the planet's resources such as its oceans, rivers, soil and atmosphere for the purpose of gaining a particular advantage. It is also referred to as a strategy for altering the weather (weather modification). Modification of weather can happen in a number of ways:

- Altering the available solar energy by introducing materials to absorb or reflect sunshine.
- Adding heat to the atmosphere by artificial means from the surface.
- Altering the air motion by artificial means.
- Influencing the humidity by increasing or retarding evaporation.
- Changing the processes by which clouds form and causing precipitation by using chemicals or inserting additional water into the clouds.

Some of these techniques are discussed in the following paragraphs.

CLOUD SEEDING/ PRECIPITATION MODIFICATION TECHNIQUES

Cloud seeding is one of the best-known techniques; it is a process which attempts to bring favourable conditions for the occurrence of rain on parched farmland by dispersing particles of silver iodide or solid carbon dioxide into rain-bearing clouds. Cloud seeding has also been used to weaken tropical storms. Cloud seeding works on a regional scale only and seeks to influence weather systems for the benefit of agriculture specifically.

FOG DISSIPATION

For an airplane to take off and land, the ceiling (the height of the cloud base above the ground) and visibility both need to be higher than a certain threshold. These two elements have a significant impact on military

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operations. A method known as FIDO (Fog Investigation Dispersal Operations) was employed to clear airport runways in the middle of the 1940s by placing kerosene burners there.⁸ It was found that the ceiling and visibility thus improved to a point where airplanes could land or take off.

For many years, supercooled fogs have been dissipated using ice nuclei. Two pounds every flight kilometre might be the average seeding rate, which, however, is too expensive. Additionally, research is being done on the use of acoustical methods to clear fog.

ELECTRICITY IN CLOUDS

Numerous techniques have been developed to modify the electric properties of clouds and the frequency of cloud-to-ground lightning. Research has demonstrated that releasing ions close to the ground can change the electric characteristics of small cumulus clouds.

SUPPRESSION OR ENHANCEMENT OF HAIL

The goal of cloud-seeding initiatives has been to lessen hail damage by introducing many nuclei into the super-cooled regions of the cumulonimbus. However, in a similar vein, it is also possible to intensify hail, which might be used in military operations to restrain the mobility of the adversary.

HIGHER SOLAR REFLECTANCE

Injecting sulfate particles into the stratosphere, whitening marine clouds and delivering millions of tiny orbital mirrors or sunshades are examples of geo-engineering techniques that increase the reflectance of incoming solar

8. "Fog Investigation Dispersal Operations", https://en.wikipedia.org/wiki/Fog_Investigation_and_Dispersal_Operation. Assessed on September 1, 2023.

radiation. Raising the ground-level albedo by using aircraft to scatter pulverised glass or tiny hollow glass beads across sea ice can increase the amount of reflected inbound radiation in the region from about 70 percent to 90 percent. It should be highlighted that the viability of each of these strategies is up for debate and is very difficult to determine.

CARBON REMOVAL PROPOSALS

Through the process of artificial “scrubbing” or photosynthesis, the carbon removal process separates carbon dioxide (CO₂) from the other gases in the atmosphere and converts it into other forms of carbon (such as carbonate). These include carbon burial, ocean fertilisation, the creation of biochar and cleaning towers, also known as ‘artificial trees’. Either biomass at the surface would sequester the separated carbon or it would be transported elsewhere to be stored in the ocean.

OCEAN FERTILISATION

In order to encourage the growth of phytoplankton where primary production is thought to be low, ocean fertilisation—also known as bio-geo-engineering—involves dissolving iron or nitrates into the surface water of specified maritime locations.⁹ Therefore, consistent efforts by a fleet of ships spanning most of the ocean would be necessary for the plan to be successful.

GEO-ENGINEERING / WEATHER MODIFICATION METHODS: USAGE IN MODERN WARFARE

Geo-engineering techniques are rapidly developing in order to accomplish sustainable development in the areas of agriculture, water resource

Geo-engineering techniques are rapidly developing in order to accomplish sustainable development in the areas of agriculture, water resource management, energy generation, navigation, connectivity, and climate change mitigation.

9. “Ocean Fertilisation”, <https://www.britannica.com/technology/ocean-fertilization>. Assessed on September 2, 2023.

management, energy generation, navigation, connectivity, and climate change mitigation.

Regretfully, the use of these geo-engineering techniques is not limited to only noble objectives; they can also be used to dominate or subjugate other countries. Technology development has increased the likelihood that weather modification may be used as a weapon in a clandestine or open war. This will generate turmoil that will have widespread side effects and also a long-lasting effect on the ecosystem of the enemy. It will also cause massive harm to agriculture, which is a nation's main source of income.

Weather warfare refers to the employment of weather modification strategies like cloud seeding, generating unexpected downpours, robbing the enemy of rain, inducing drought, etc.¹⁰ Military aviation is involved in multifaceted operations. Operational missions in war-like scenarios differ depending on the kind of aircraft (fixed wing vs rotary wing). Therefore, it is crucial to keep in mind that if the aircraft's weather minima is breached, this might cause a delay in the conduct of activities which could prove to be a turning point and shift the entire situation in favour of the adversary. Combat intelligence should include weather data just as much as adversary and terrain data. It is equally important to understand the objectives of the enemy's operational plan. The two warring parties' behaviour and decisions are undoubtedly influenced by the weather. An adverse weather situation directly impacts the mobility of assets, compromises the ability to see targets or important locations, and to attack deep. It degrades electro-optical weapon systems, increases the need for thoroughly integrated air and ground operations, and slows down the movement of supplies and reinforcements. These effects are felt by military operations of all kinds, whether they take place on land, in the air, or at sea.¹¹

Weather and war – these two concepts are closely linked to each other. Through the ages, warriors have used weather to their advantage and some have taken the brunt of the attack when the enemy did the same.

10. "Weather Warfare", https://en.wikipedia.org/wiki/Weather_warfare. Assessed on September 2, 2023.

11. Ibid.

When analysing the military's use of weather modification, the most important issue is whether such methods are useful from a military standpoint. Even local weather system manipulation holds enormous potential for sabotaging an enemy's efforts at crucial moments. In fact, it is evident that the capacity to alter the weather would provide any army with even a basic capability a great advantage when one considers the vital role that weather has played in numerous conflicts.¹²

A wide range of physiological impacts and illnesses are brought on by low oxygen levels. The environment damages the soldiers' capacity to conduct and maintain military operations, and causes casualties. Low air pressure also has an impact on men and affects the accuracy of weapons and planes. Mountainous terrain restricts ground manoeuvrability and makes all facets of the battle more difficult.

DEFENSIVE AND OFFENSIVE TECHNIQUES

As one explores deeper into this issue of weather modification for military purposes, it becomes evident that the techniques and methods fall into two broad categories of meteorological interventions i.e. defensive and offensive techniques. A different perspective would be to categorise the strategies as either suppressing or escalating bad weather. The employment of palliative methods to prevent damage to infrastructure and equipment as well as to facilitate operations that would otherwise be hampered by the weather is known as suppressed weather modification. Examples of this sort of action include the clearing of fog over clouds, the squelching of hail and lightning, and the calming of violent storms. In contrast, the deliberate intensification or alteration of weather systems in order to disrupt the enemy's operations and destroy or damage his facilities or equipment is called offensive weather modification. This involves the use of the weather as a weapon and encompasses the production of fog, storm intensification and guidance, enhanced precipitation, and hail.

12. "Alteration of Weather Systems", <https://apps.dtic.mil/sti/pdfs/ADA333462.pdf>. Assessed on September 2, 2023.

Therefore, weather modification unquestionably impacts both soldiers and military equipment by its high potential. The techniques and technologies must be usable, though, if that potential is to be realised.

RESEARCH AND PROGRESS OF WEATHER MODIFICATION IN INDIA

For almost a decade in the 1960s, research on the method of cloud seeding was being conducted in India. In accordance with this plan, a number of warm cloud seeding experiments were conducted, particularly during the monsoon season, in Delhi, Agra and Jaipur of North India and in Munnar of South India.¹³

States including Tamil Nadu, Karnataka, Andhra Pradesh and Maharashtra tried cloud-seeding as a strategy to combat drought conditions in the late 20th and early 21st centuries. The Pune-based Indian Institute of Tropical Meteorology (IITM) has made substantial progress in its comprehension of the ideal conditions for cloud seeding. India needs to act rapidly and assess the potential of using various weather modification techniques as a tool of warfare, like China has done.

EFFECTS ON INDIA OF ENEMY ADVANCEMENT IN WEATHER WARFARE TACTICS, PARTICULARLY BY CHINA

According to a report by CNN, China spent \$1.34 billion on weather modification programmes over five years, which helped it reduce 70 percent of hail damage in key agricultural districts. China has chosen to use hybrid warfare against nations that it views as being unfriendly or potentially hostile. As of 2020, China had conducted 5,60,000 weather modification operations for cloud seeding experiments and fired 9 million missiles and 885 million artillery shells. These operations brought in 490 billion tons of rain.

Weather modification techniques by China can also be used to sabotage troop movements and logistical operations in border regions. This would

13. "Research and Progress of Weather Modification in India", <https://apps.dtic.mil/sti/pdfs/ADA333462.pdf>. Assessed on September 2, 2023.

slow down the enemy's tactical movement, which would have an impact on its operational capabilities.

There are various geo-engineering techniques that have boosted China's hybrid warfare capabilities:

Blockage of River Water

Tibet is the source of Asia's most important rivers, including the Indus, Ganges, Brahmaputra, Irrawaddy, Salween and Mekong. Nearly 3.4 billion people or 46 percent of the world's population depend on the rivers that flow through China, Laos, Myanmar, Nepal, India, Pakistan and Bangladesh. Human involvement with the fragile ecology there would have major repercussions not only for lower riparian India but also for other surrounding South and Southeast Asian countries since the plateau may be seen as a shared ecological frontier. These rivers support navigation and tourism in the Southeast Asian nations in addition to providing fresh water for agriculture and fisheries.

China has constructed multiple enormous reservoirs with large water storage and power generation capacities on the upper sections of the Brahmaputra and Mekong rivers.¹⁴ Because of its ability to manage the water flow, China has a strategic edge over the countries in lower positions. Large amounts of river water that have been kept could suddenly run out, resulting in flash floods that could have an adverse effect on the lives and food security of the lower-ranked nations.

Construction of Artificial Islands

More than 60 percent of all marine traffic in the globe transits through the South China Sea, which is a source of contention due to China's illegitimate occupation. China has constructed man-made islands on reefs and, most recently, the People's Liberation Army Navy (PLAN) has

14. "Blockage of River Water", <https://www.orfonline.org/expert-speak/43534-weather-war-a-latest-addition-to-the-sino-india-conundrum/>. Assessed on September 2, 2023.

begun transforming these islands into military outposts.¹⁵ These islands' unimpeded construction in recent years demonstrates Beijing's flagrant contempt for the 2016 International Court of Justice (ICJ) decision that rejected China's claim to the South China Sea.

China's Weather Modification Project "TIANHE"

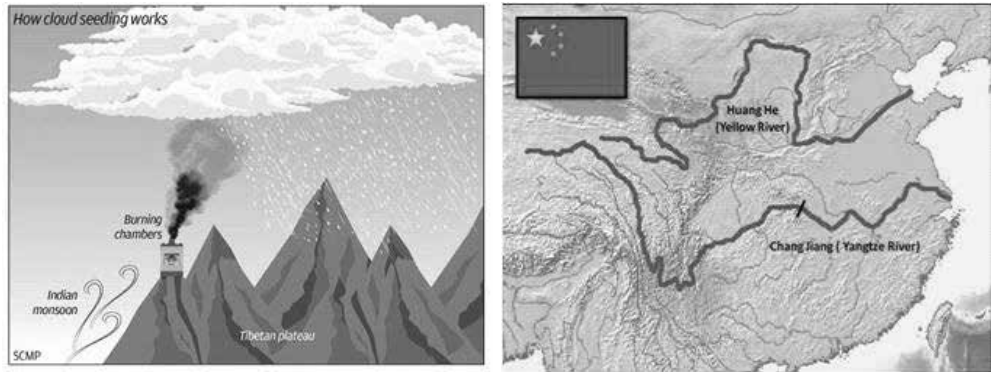
The ambitious Tianhe (sky river) project, which the Chinese are working on, aims to redirect water vapour from the Yangtze river basin to the Yellow river basin by moving it north.¹⁶ A significant portion of this process entails cloud seeding. An extensive use of aircraft such as the An-26, Cheyenne IIIA, MA-60, IL-14, Y-7, Y-8 and Y-12 is done for the cloud seeding process by China. China is using Unmanned Aerial Vehicles (UAVs) (outdated and not in use) also for this purpose. Ganlin-1 was China's first weather modification UAV that conducted its maiden flight in Gansu province in January 2021. The UAV's use proved to be more efficient than manned aircraft for cloud seeding as it has longer endurance and lower cost. It can also be equipped with weather sensors.

Construction of long-term chambers to generate an upward air current and sweep particles into clouds to produce snow and rain can have a significant negative effect. This affects neighbouring nations such as India, Myanmar, Vietnam and others as well because it may interfere with their regular monsoon season. The agriculture in these nations would suffer as a result, possibly to the point of rain stealing.

15. "Construction of Artificial Islands", <https://www.jstor.org/stable/24757682>. Assessed on 02 September 2, 2023.

16. "Tianhe Project" (skyssktyrriver), <https://smartwatermagazine.com/news/smart-water-magazine/china-will-expand-weather-modification-practices>. Assessed on September 2, 2023.

Fig 1: Cloud Seeding Process to Transfer Water Vapour from the Yangtze to the Yellow River



Launch of Helium Filled Airship-JIMU NO.1 Model III

China has developed the helium filled airship- JIMU NO. 1 MODEL III which ascended to an altitude of over 9,000 m near Mount Everest on May 22.¹⁷ This balloon captures the data on atmospheric changes over the Qinghai-Tibet Plateau.

High Power Incoherent Scatter Radar

This category of radar is capable of manipulating the ionosphere and disrupting weather conditions and communication systems. It can influence sub-atomic particles as far as 2,000 km. The project was started by China in 2015. It has already been installed at Sanya, Hainan province. Two remote receivers at Fuke and Qingshang are planned to be built by 2024, with close ties to the military.¹⁸ This type of radar is definitely going to affect the communication system if operated during warfare.

Ionospheric Research Facility

China is extensively involved in developing ionospheric research facilities like the High-frequency Active Auroral Research Programme (HAARP).

17. "Helium Filled Airship", <https://english.cas.cn/newsroom/.shtml>. Assessed on September 2, 2023.

18. n.16.

China has already deployed this Ionospheric Research Instrument (IRI) system at various airfields. The following are the outcomes of this system:

Detection of underground objects by means of wide-area Earth penetrating topography.

Long distance communication with underwater and underground facilities.

Generation of infrared and optical emissions by heating ionosphere. Space weather monitoring.

Generation of travelling ionospheric disturbances affecting radio communication.

Creating tillable artificial ionospheric mirrors.

Detection of low-level aircraft and cruise missiles. Manipulation of the weather by creating natural disasters.

Wireless Electromagnetic Method Project

In this project, which is possibly located in the Huazhong region in central China, the antennae are capable of emitting extremely low frequency (0.1-300hz) signals which can travel up to 3,500 sq km. It can disturb the properties of the ionosphere and local weather. It has an increased signal coverage to thousands of kilometres and detection depth of 10 km. This project is over spread in 3,700 sq km; the transmitters generate a strong current and electrify the ground, turning the Earth underfoot into an active source of Electro Magnetic (EM) radiation.

This can cause serious damage to aircraft flying in the vicinity. Flight operations are temporarily suspended in the area when this system is "ON".

The abovementioned weather modification techniques, apart from improving weather forecasting, can be utilised by China to degrade enemy/ enhance own operations by precipitation enhancement/avoidance, storm modification, etc. The HAARP/ EM method facility can have a serious impact on communications and Intelligence, Surveillance, Reconnaissance (ISR). It can degrade the effectiveness of precision weapons and impact severely the flying operations.

Counter-Measures, the Way Forward and Strategic Planning by India

India should endeavour to strengthen its geospatial technology, particularly the Global Positioning System (GPS), Geographic Information System (GIS), and remote sensing technologies for precise and data collection, in the north/northeast, especially along the border areas. India's sole options would be to keep a close eye on Chinese activity and prepare for a successful counter-attack. Every year, the monsoon's average rainfall causes rivers like the Brahmaputra in China to overflow, triggering deadly floods in India's northeast.

Regular review of river flow data from its own hydro-meteorological stations, including both flood season and non-monsoonal flow data, would improve India's ability to identify any suspicious activity upstream that could potentially cause a natural disaster in India.

In spite of the fact that India continues to receive flood warning information from China, it needs to create its own hydrological models for flood prediction in order to protect its 3.5 million inhabitants in the vulnerable Brahmaputra ecosystem in the wake of China's intention to sow clouds in Tibet. Regular review of river flow data from its own hydro-meteorological stations, including both flood season and non-monsoonal flow data, would improve India's ability to identify any suspicious activity upstream that could potentially cause a natural disaster in India. Building India's Environmental Intelligence (EI) skills is a crucial step forward. Integration of research across the cloud seeding's components, as well as its interactions with the areas and subsequent ecology, is essential because any kind of decision-making calls for a comprehensive viewpoint. In cooperation with meteorological and defence organisations, the Ministry of Environment and Forests (MoEF) should take the lead in developing a platform for working across observation, modelling and data management. Experts in geo-engineering must warn against using weather manipulation to produce rain in one area, if it may have unintended consequences, like low rainfall, elsewhere.

The “monsoon season” at both the northern and eastern fronts is the best time of the year for China to take advantage of the global wind patterns in order to realise its dream of using weather as a weapon.

Therefore, it would be in the best interest of both China and India to collaborate on a thorough scientific investigation to gather trustworthy evidence from the area. Before tens of thousands more chambers are built across the Tibetan Plateau to implement the project over an area of about 1.6 million sq km, Beijing and New Delhi will need to conduct seeding trials that could guide the use of technology, and a framework for the conduct of Environmental Impact Assessments (EIAs).

India should appropriately prepare its own cadres in light of the fact that China is using such unconventional methods of diplomacy in the region on a more frequent basis. India must investigate the viability of constructing cloud seeding chambers in Jammu and Kashmir (J&K)/ Ladakh and the northeast region to at least send a signal to China that it will not hesitate to use weather as a weapon if China uses the same in an actual conflict. India must investigate the viability of constructing cloud seeding chambers in J&K/Ladakh and the northeast region. India does not currently have a dedicated strategy for weather weaponisation, but we must learn from our mistakes and advance in this field to thwart the goals of our enemies. The “monsoon season” at both the northern and eastern fronts is the best time of the year for China to take advantage of the global wind patterns in order to realise its dream of using weather as a weapon. As a result of the cloud seeding activities, rain-bearing clouds will drift towards the northern border, resulting in flash flood-like conditions and making it difficult for troops and logistical supplies to reach far-flung areas. In a similar vein, the development of flood conditions over the Brahmaputra may lead to flash flood conditions over the border region of northeast India, impeding army mobility and logistical supplies in the border areas. As the global wind pattern would be in our favour if we were inclined to use weather as a weapon, the remaining months of the year (October to May) would not be ideal for China to employ weather, specifically cloud

seeding techniques against India. The northeastern states are still at the risk of flash floods during this period, though, because of the Brahmaputra flow. India too needs to plan construction and divergence of the Brahmaputra river after it enters India, especially in the places where troop deployment will be planned. To have a long-term plan, the defence organisations must work in close coordination with the government planners or, may be, a special cell with top dignitaries may be opened for strategic planning of this. India must establish a weather modification group comprising professionals from the Defence Research and Development Organisation (DRDO), the Meteorology Department, and scientists from diverse fields. The national security policy and strategy must take this into account.

These policy decisions should be hastened at the highest level and in the interim, the defence organisation may plan for installation of weather modification techniques in Ladakh and the northeast sector, in collaboration with civil agencies like the Indian Meteorology Department/Indian Institute of Tropical Meteorology (IITM), etc to signal to China that India is not lacking in weather modification technology. The Indian Air Force (IAF) must also plan to counter the various strategic plans of China like installation of EM projects which can restrict flying operations in the deployed areas where China may plan a major armament /logistic depot in the long term.

CONCLUSION

The mainstream scientific community has largely ignored the potential of the “Weaponisation of Weather (WoW)” phenomenon, which resembles a Unidentified Flying Object (UFO) scenario to them. However, WoW and its impacts have been quite noticeable in the past, and so, must be considered seriously.

The ongoing boundary dispute, discontent with trade imbalances, and military standoffs between the two countries have all contributed to the hostile bilateral relationship between China and India in recent years. China may deploy weather manipulation technology as a strategic weapon against India to manipulate the weather and bring on floods and droughts while

a conflict is ongoing. China could use weather modification methods like cloud seeding and strategically placing reservoirs along the Brahmaputra to increase rainfall and create flash flood conditions during actual combat. There is no question that weather manipulation systems would have unforeseen effects on local and trans-boundary ecosystems, as well as the long-term regional climate. These actors may emphasise the value of information and data sharing (transparency), which is occasionally threatened by geopolitical dynamics. For example, during the 2017 Doklam military standoff between India and China, the latter refused to share water flow data with the former, citing “technical” justifications.

As a result, it is more crucial than ever for India to be ready, not only to counter China’s strategic planning of using weather as a weapon but also to strive towards achieving the same as soon as possible to warn the adversary and alert it that India is ahead in the race to modify the weather. The Ministry of Environment and Forests (MoEF), and the meteorological and defence agencies must take the lead in developing a platform for working across observation, modelling, data management and the development of various geo-engineering techniques.