

**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION No. 1290
TO BE ANSWERED ON FRIDAY, JUNE 28, 2019**

CLOUD SEEDING

1290. SHRI SANJAY SETH:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) the number of States that have approved the plans for cloud seeding to produce rain artificially in the coming year and the budget allocated therefor, State/ UT-wise;**
- (b) the status of standardized scientific evaluation done on cloud seeding to gather full information of the process and its possible efficient usages;**
- (c) the details of major benefits of cloud seeding and its side-effects; and**
- (d) the details of the different methodologies of cloud seeding and the preferred mode for cloud seeding likely to be adopted by the Government?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF HEALTH AND
FAMILY WELFARE
(SHRI ASHWINI KUMAR CHOUBEY)**

- (a) Ministry of Earth Sciences (MoES) does not have any information in this regard.**
- (b) A detailed experiment is being carried out by the Indian Institute of Tropical Meteorology (IITM), an autonomous organization under the Ministry of Earth Sciences (MoES) from 2018 with airborne cloud seeding and its scientific and statistical evaluation. Scientific study and evaluation have brought out that warm phase of clouds is determining the mixed-phase cloud process and rainfall. About 82 randomized samples were collected for statistical evaluation in 2018. After the randomization experiment with enough samples, protocols for cloud seeding in the rain shadow region of Western Ghats will be prepared.**
- (c) The cloud seeding is used for weather modification such as rain enhancement, reduction in the rain and for fog dispersal. Systematic scientific evidence could be found only in rain enhancement projects with a scientific basis. Some projects have reported rain enhancement of 5-10 %. The major benefit is the expected increase in precipitation for water resources. There is no documented evidence for the side effects of seeding. However, Silver Iodide is harmful for aquatic life.**

- (d) In clouds having a base at warm temperatures (warmer than zero degrees centigrade), hygroscopic seeding with salt or potassium chloride or calcium chloride is used. In clouds with colder than zero degree centigrade temperatures, glaciogenic seeding, whereby ice forming particles such as silver iodide is used. Both types of seeding are important for clouds over the Indian region.

Usually, these seed particles are introduced into clouds by burning a flare, which releases cloud forming seed particles. The introduction of these seeding particles is expected to increase chances for rain formation through quick pathways within the cloud. The airborne (using an aircraft) seeding is found to be more effective to dispense the seed material in the cloud.

The protocol for effective implementation of the seeding type depends on the types of clouds and their geographical occurrence. The impact of weather modification also depends on the environment in which clouds are growing. Thus observational facilities such as radars are required for any cloud seeding program. The numerical models and radars together are used to help decide on areas suitable for seeding and timing and type of seeding.
