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Subject :

The United Arab Emirates (UAE) gives a growing importance to water supplies by encouraging research and innovation in its new technologies. The UAE is ranked among the ten driest countries worldwide with an annual precipitation rate of 78 mm, not to mention that a large amount of this rain evaporates because of the extreme heat. Moreover, the UAE's water consumption rate per capita is among the highest worldwide, where the daily water consumption per capita exceeds 500 cubic meters, higher than the global rate that is no more than 200 cubic meters daily. The UAE has pursued many solutions to provide water including, water desalination that is highly costly. With 14% of the world's desalinated water production, the UAE is the second largest producer of desalinated water after the Kingdom of Saudi Arabia. The Emirates also largely depends on ground water and the dissemination of awareness campaigns as it has launched several programs to encourage people to ration their water usage. As part of an attempt to seek unconventional solutions to increase its water resources with the lowest possible costs, the UAE has moved towards utilizing modern technologies, through investment cloud-seeding operations. Global Rainmaking Rainmaking takes place when small aircraft fly into clouds firing off tens of flares loaded with tiny particles of potassium chloride and sodium chloride to seed clouds, in order to increase the quantities of water inside clouds, not to create or form clouds. Research and studies show that summer is the best time for rainmaking due to the vertical extension of the cloud structure in the aerosphere caused by the upward lift of air currents. However, the optimal application of rainmaking techniques is hindered by some challenges such as the collection and analysis of data on cloud formation, selection and application of the materials needed for cloud-seeding, and the identification and tracking of the clouds that can be seeded. Scientific interest in rainmaking started in the 1940s by an American scientist named Vincent Schaefer who, in 1946, managed to modify clouds on the Berkshire Mountains in Massachusetts in the US by seeding them with dry ice. In recent years, the US has resorted to rainmaking techniques and cloud-seeding to increase the precipitation rate in areas experiencing drought. China is also considered among the countries that are most interested in this field in order to fulfill its increasing need for water. During the 2008 Olympics in Beijing, rainmaking technology was also used. In preparation for the expected rainfall during the opening ceremony, rockets containing silver iodide were fired from 21 stations around the city at dense clouds that were expected to cause the rainfall in an attempt to accelerate the rainfall prior to reaching the opening ceremony's location. Aircrafts were also used to also spray chemical catalysts to release rain from the clouds. India has also begun applying rainmaking techniques in recent years with a view to enhance precipitation in the states of Andhra Pradesh and Maharashtra. UAE's Interest in Rainmaking The UAE's interest in weather research, cloud physics, and scientific and methodical wind movement studies dates back to the 1990s. The Emirates have cooperated with NASA and some US corporations to increase its precipitation rate and groundwater inventory. Research faced some challenges including the amount of dirt and pollutants accumulated inside the clouds by the oil industry that hinders the stimulation process. Nevertheless, research and development efforts have continued and gradual progress has been achieved. One factor that encouraged the UAE to continue developing its rainmaking operations is the fact that it is less costly than other available options such as water desalination. Moreover, rainmaking does not have a long-term impact on the climate, for the UAE uses no harmful chemicals in any of these processes, and only uses natural minerals such as potassium chloride and sodium chloride. UAE Efforts to Develop Rainmaking As part of efforts to conduct and develop cloud-seeding and stimulation in UAE, 74 weather stations have been built across the Emirates to measure dry temperature, dew, air pressure, wind speed and direction, solar radiation, and rain. This infrastructure also contains fixed aerial radars and other mobile radars to monitor rain clouds, which are used to direct rainmaking aircrafts and place them in the right spot inside clouds. Last year, six aircrafts of the National Center for Meteorology and Seismology (NCMS) have flown 186 times for cloud-seeding and rainmaking purposes. They have also flown 24 times for cloud-seeding purposes from the beginning of this year until last February. The seeding processes were 100 per cent successful according to NCMS rainmaking and weather forecast expert, Sofian Jarrah. The UAE is also looking for methods to collect rainwater rather than having the rainfall evaporate or swept away to the sea. Hence, the UAE established dams to store rain water that flows into valleys. The state is also looking acquire more dams; currently there are 130 dams with the capacity of 120 million cubic meters. In the past year, the Ministry of Presidential Affairs (MOPA) launched an ambitious initiative to promote investment and scientific research in the field of rainmaking. The UAE Research Program for Rain Enhancement Science was launched under the supervision of NCMS. This program contributes to rainmaking science through innovating utilized techniques and technologies, and studying wind motion and direction to increase rainfall amounts in arid and semi-arid areas. To promote investment in this field, the UAE Research Program for Rain Enhancement Science provided three awards totaled at US\$5 million in its first round. Research teams from Japan, UAE, and Germany won the awards with studies focusing on improving rainfall in arid and semi-arid areas, through monitoring systems that identify suitable clouds for rainmaking. The studies also focused on using Nano-technology in artificial catalysis to accelerate condensation and increase rainfall amounts, in addition to studying wind features that affect clouds and rainfall. Rainmaking studies and research are critical, considering global climate change resulting from increasing Earth temperatures, water resource shortage, and high population density. Hence, it is necessary to invest in rainmaking science to increase water resources. Utilized technologies should be developed to reduce cost and increase rainmaking rates. The UAE has taken the lead through development and innovation in the rainmaking field. As the top Gulf country in the field of rainmaking, the UAE is working hard to encourage the scientific society to explore this field and provide practical solutions to face water safety challenges and increase available water.