

## ENERGY TYPES CONVERSION TO ARTIFICIAL RAIN IN DUBAI URBAN SPACE AND RESIDENTIAL ARCHITECTURE BASED ON ENVIRONMENTAL CLIMATE

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**Abstract-** The factors that influence the general ecological situation of the Arid Region (AR) territory are revealed and the ways of improvement and development of the environmental conditions which improving the living conditions of the population are proposed in the article. The article is urgent for countries having hot climatic conditions proposing ways to cause rain in any definite time, for people different needs provide comfortable microclimatic conditions for living environment, humidity for feeding agricultural lands, for creating greenery for recreational areas for their leisure arrangement- not waiting the natural rain. Thus, the urgency of the problem is obvious in (for) hot countries. For implementation of mentioned ideas for definite spaces in Iran a few methods for the artificial rain creation world experience is studied giving ways of their application in the resold of multifactor analysis and complex estimation. Some of them are described more detailed below.

**Keywords:** Architectural Landscape by Artificial Rain, Solar Thermal Power, Green Energy, Environmental Sustainability Design.

### I. HISTORICAL REVIEW

The first stage is agitation. That is using chemicals to stimulate the air mass upwind of the target area to rise and form rain clouds. The chemicals used during this stage are calcium chloride calcium carbide, calcium oxide, a compound of salt and urea, or a compound of urea and ammonium nitrate. These compounds are capable of absorbing water vapor from the air mass, thus stimulating the condensation process. The second stage is called building-up stage.

Here the cloud mass is built up using chemicals (kitchen salt, urea, ammonium nitrate, dry ice, and occasionally also calcium chloride) to increase nuclei which also increase the density of the clouds. In the third stage of bombardment chemicals such as super-cool agents: silver iodide and dry ice are used to reach the most unbalanced status which builds up large beads of water (Nuclei) and makes them fall down as raindrops.

The process is called seeding. In planning, every stage a high degree of expertise and experience is required,

in selecting the types and amounts of chemicals to be used, while taking into consideration weather conditions, topographical conditions, wind direction and velocity as well as the location or delimitation of the area for chemical seeding. Several other ideas are also involved in rainmaking. Rockets containing rainmaking chemicals can be fired into clouds either from the ground or from aircraft.

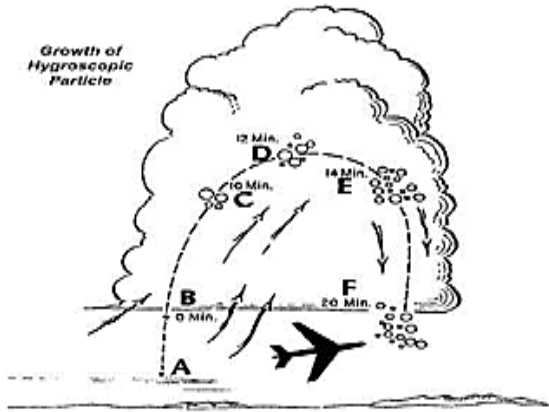
A jet of rainmaking chemicals is shot from a highly pressurized canister directly into the cloud base, so as to coerce clouds which normally hang above mountain tops to cluster up and rain on the mountain or their slopes. Rainmaking chemicals are added to super cooled clouds, i.e., those at altitudes above 18,000 meters, to stimulate the formation of ice crystals in the cloud or cloud cluster [1].

### II. EXISTING EXAMPLES DESCRIPTION

The apparatus includes a substantially planar collection sheet having a plurality of pointed teeth along its lower edge. Water tank supplies water under pressure to an overhead manifold, which feeds water to a plurality of spray nozzles adapted to spray a horizontal fan of water onto the collection sheet.

As the water collects on the pointed teeth, it eventually falls off in droplet form when the volume and weight of the water overcomes its surface tension. An overspray sheet also having a plurality of pointed teeth may be positioned in spaced, parallel relation to the collection sheet to collect any overspray and convert it to drops of artificial rain.

A control system regulates water pressure in the apparatus during use conditions. When the apparatus is deactivated, water is recycled in the tank while maintaining a balanced head pressure in the apparatus so that activation and deactivation takes only a few seconds. The process structure is shown in Figure 1 [2]. An amusement ride system, and method are described. In some embodiments, an amusement ride system may be generally related to water amusement attractions and rides. Further, the disclosure generally relates to water powered rides and to a system and method in which participants may be more involved in a water attraction.



- A - Hygroscopic particle released (0.0008 inch diameter)
- B - Particle grown by condensation to 0.003 inch diameter
- C - Particle grown by coalescence to 0.2 inch diameter and breaks up into smaller drops
- D & E - Drops formed at C grow and break up again when diameter = 0.2 inch
- F - Drops fall out the base of cloud

Figure 1. Growth of hygroscopic particles

An amusement ride system may include an elevation system for conveying a participant from a first source of water to a second source of water. An elevation system may assist in adjusting and/or controlling a participant flow rate through at least a portion of a water amusement park. An elevation system may include two or more conveyor belt systems. An elevation system for adjusting a participant flow rate may include one or more floating queue lines. An elevation system may include a control system. A control system may be automated, semi-automated, or manual in Figure 2 [3].

The project consists in using a small mesoscale solar absorber surface at the ground to collect solar energy and produce a strong upward heat ux in order to generate rainfall. Main mechanisms:

- Ground heat ux warms up lower atmosphere.
- Lower atmosphere dilates and rises under buoyancy force convection is generated.
- Low altitude moisture is also lifted along with air rising motion.
- Water vapor condensation altitude is reached and cloud is forming Rainfall may start.

### III. DIFFERENT WAYS OF ARTIFICIAL RAIN MAKING STUDY

#### A. Artificial Rain in China

The largest cloud seeding system in the world is that of the China, which believes that it increases the amount of rain over several increasingly arid regions, including its capital city, Beijing, by firing silver iodide rockets into the sky where rain is desired. There is even political strife caused by neighboring regions, which accuse each other of 'stealing rain' using cloud seeding. About 24 countries currently practice weather modification operationally China used cloud seeding in Beijing just before the 2008 Olympic games in order to clear the air of pollution, but there are disputes regarding the Chinese claims. The brief

information about China experience is shown in Table 1 [4-9].

#### B. Artificial Rain in Dubai

Dubai is experimented producing artificial rain to reduce pollution. It's used cloud seeding in the 2009 and 2010 in Dubai. The process involved in artificial rainmaking involves three easy to understand stages. The first stage is agitation. The second stage is called building-up stage. In the third stage of bombardment chemicals such as super-cool agents, silver iodide and dry ice are used to reach the most unbalanced status which builds up large beads of water (Nuclei) and makes them fall down as raindrops [11].

Table 1. Artificial rain (AR) in China

Name of country	kind of artificial rain	Picture of AR over there
China	Seeding cloud system	

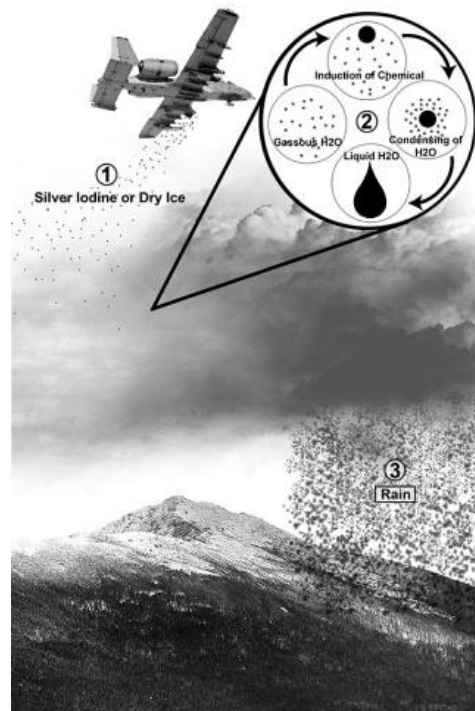


Figure 1. Cloud seeding system [10]

Table 2. Artificial rain (AR) in Dubai

Name of country	kind of artificial rain	Picture of AR over there
Dubai	Seeding cloud system	

Several other ideas are also involved in rainmaking. Rockets containing rainmaking chemicals can be fired into the clouds either from the ground or from aircraft. A jet of rainmaking chemicals is shot from a highly pressurized canister directly into the cloud base, so as to coerce clouds which normally hang above mountain tops to cluster up and rain on the mountain or their slopes [1].

**C. Artificial Rain in India**

In India, cloud seeding operations were conducted during the years 2003 and 2004 through U.S. based weather modification Inc. in state of Maharashtra. In 2008, reference [12], there are plans for 12 districts of state of Andhra Pradesh. Reference [13] cloud seeding is the process of introducing chemicals into the upper part of clouds to try to stimulate the precipitation process and get rain via an experiment carried out in three phases [14].

**C.1. First Phase**

Different monsoon clouds observation over the country using an aircraft with special equipment (a special instrument to measure cloud parameters, temperature, wind, liquid water droplets, and aerosol background). This data will provide us with properties of clouds in different parts of the country [1].


**C.2. Second Phase**

Random cloud seeding experiments will be carried out, using the aircraft equipped for seeding and the one containing the special equipment. Based on the properties of clouds, we will start the seeding program across India. The seeding aircraft will spray hygroscopic particles that can broaden water droplets in clouds and hasten the onset of precipitation formation.

**C.3. Third Phase**

Measuring and analyzing the seeding impact. A dense network of automatic rain gauges will be installed in the experimental area to measure the rainfall. Rainwater samples will be collected from the seeded and non-seeded clouds. The chemical analysis of rainwater samples will be carried out to understand the effect of seeding on the precipitated water [14, 15]. The described rain indicators and view is shown in Table 3.

Table 3. Artificial rain (AR) in India

Name of country	kind of artificial rain	Picture of AR over there
India	Seeding cloud system	

Making a complex estimation of the discussed 3 examples the results should be introduced in the united Table 4.

Table 4. The comparison of AR between 3 countries

Country name	Time and kind of artificial rain	Reason of usage
Dubai	2009-2010 Seeding cloud system	To reduce pollution
China	2008 Seeding cloud system	In order to clean the air pollution
India	2003-2004, 2008 Seeding cloud system	Improve the air quality and agricultural usage

**IV. CONCLUSIONS FROM EXISTING EXPERIENCE STUDY**

In the result of above mentioned studies the following conclusions have been done:

- Based plan to create better living conditions of mental Economic and environmental sustainability.
- Use of existing local facilities and climatic conditions in certain areas with following specifications:
  - Lack of sufficient water
  - There is enough moisture in the region’s air.
  - There is enough sun for solar gain in providing the energy for the project.
- Thus, areas chosen below need artificial rain localization via following reasons, reasons selected such areas for plan is as follows:
  - These areas cover large parts of the Middle East in countries such as Iran, Saudi Arabia, and Kuwait etc.
  - Population in these areas is increasing rapidly due to economic development and industrialization.
  - Area residents want better biological conditions and more suitable situation requires supplying sufficient water.
  - Water supply is not possible with traditional methods in these areas and there is a need to use modern technology to supply available water to the pollution.
  - According to the research, objectives (environmental sustainability) with consideration of high international standards in keeping the atmosphere in suitable biological conditions by solar energy usage projects are based on:
    - Using water as better psychological mental conditions As well as use in irrigation of green spaces and create a treatment system for other uses.
    - Landscape architecture methods in couple with the artificial rain opportunities applications for green spaces development in areas formally, having no opportunities for vegetation in natural conditions, thus supporting sustainable environment formation.
    - Formation of new ‘climate’ by artificial rain improves the environment providing favorable air conditioning in urban, suburban environments changing their value to higher level thus formatting for biodiversity improvement (attracting a variety of butterflies, birds, and other living organisms).



Figure 3. Poetic environment design, circumstances change and regional air stylized

## **V. EXPERIMENT OF MAKING ARTIFICIAL RAINS**

Some experience in the field of making different projects where sun was used to evaporate seawater and fans blew it to produce artificial rain! Solar thermal power is one of the two forms, in which solar energy arrives at earth (electromagnetic radiation and thermal power). When sun's rays hit earth, they provide warmth to the planet. Solar thermal power is considered to be green energy because it does not emit any harmful gases during its collection or use. Being a free green form of energy makes it extremely promising and popular around world. Since ancient times, humans achieved to harvest the solar thermal energy and use it in different ways.

Today, when technology has become more sophisticated, it provides much more efficient solutions. Some of the main applications currently available are:

- Water heating
- Space Heating, cooling, ventilation
- Cooking, melting
- Drying, evaporation
- Drinking water production
- Other uses [16]

Taking into account that there are a lot of spaces on earth needing improvement and construction of milder microclimatic conditions for living, landscape improvement as a way for environmental sustainability provision in area with unhealthy environmental in Fringe Persian Gulf (Dubai, Abu Dhabi, Qatar, Oman, South of Iran and...).

## **VI. DISCUSSIONS, CONCLUSIONS AND PRACTICAL APPLICATION CREATES AN APPROPRIATE ATMOSPHERE**

- 1- Poetic environment and different conditions with tropical weather conditions
- 2- Creating a natural moisture and condensation creation
- 3- Build tourist accommodation
- 4- Green space and water supply for drinking and agricultural water
- 5- Possibility of energy supply
- 6- Use of solar energy in place
- 7- Think about improving waste of energy and environment friendly
- 8- Improve the living environment
- 9- Environment design and circumstances change and regional air stylized
- 10- This project is depend on sustainability architectural methods because of following issues:
  - Because of the methods of the energy producing this project don't make damages to the environment (like producing, CO<sub>2</sub>, CH<sub>4</sub>, NO<sub>x</sub>)
  - Because of the methods of producing water, in this project we have not any problem to the environment, such as surface down lift in deserts or forcing the brine waters because of extracting inordinate underground waters
  - Changes of microclimatic conditions of deserts making favorable for living

By using solar energy we produced electricity by solar cells, and electricity used to compressed gas in the cooling pipes, then the moisture exist in the air, changes to the liquid, on the outer space of the pipes, and then water produced. In these conditioners, the cooling pipes cooled by evaporating gas created coldness to convert the moisture (which exists in the air) to liquid drops (water).

- Produced water directed to reservoir tanks, collected water goes in two directions, first, is for drinking and healthy purposes and the second, used to making artificial rain.

- The part of this water used to produce the artificial rain creates an appropriate atmosphere.

After down fall this drops (as a rain) on the earth irrigated planets in the park area and the overflow water guidance to settlement water system and after it used for healthy purposes. This system makes a closed cycle in which has a minimum waste water because in such warm areas, water is the most important element to create the life for people, planets and also artificial rain [17, 18].

A proposal for Dubai Al Maha desert resort, district having lack of favorable spaces for recreational arrangement. However, needs this because of nearby settlements human demands in recreation a sketch for poetic environment creation using artificial rain Formation if introduced in Figure 3.

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**BIOGRAPHIES**



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