BUILDING ARTIFICIAL MOUNTAINS TO INCREASE PRECIPITATION IN UAE

Rami Mohammed 55836 | Hatem Sharaf 55990 | Ghaith Ataya 55595 | Mohammad Reza 52851 | Mohamed Khalid 47291

Professional Communication for Engineers - Section : 04

Situation :

In the recent years temperature has been rising noticeably in the UAE. The raise of temperature has been causing a raise of humidity level. Artificial mountains can be built to decrease the humidity level and promote precipitation. Orographic precipitation is the type of precipitation used with artificial mountains. How can building artificial mountains increase orographic precipitation and how to build such mega structure.

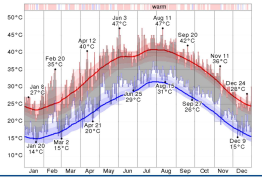

Figure 1: UAE monthly temperature radiant in 2015

Process :

Problems and Solutions :

Location and Fohn effect

Problem

| The location has to be close to the city as well as facing the prevailng wind direction.
| The Fohn effect on the leewards side of the mountain.

Solution

| Leaving gaps between the mountain series

Height and Slope

Problem

| The height of a mountain is significant in the precipitaion process in order to have the temprature and pressure drop needed .

Solution

| The height is calculated by hydrostatic equation.

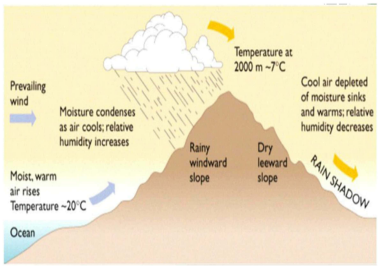

Figure 2: Orographic Precipitation and Rainshadow

Structure and Materials

Problem

| Construct range of inflatable mountains using ETFE as the main material.
| Supported by steel cables and basic concrete foundation.
| Remains stable by maintaining greater internal pressure than the air pressure and the weight of the ETFE layer.

Solution

| Dome shape and recycled materials

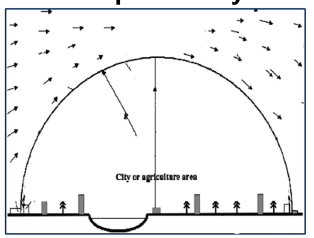

Figure 3: Elevation View

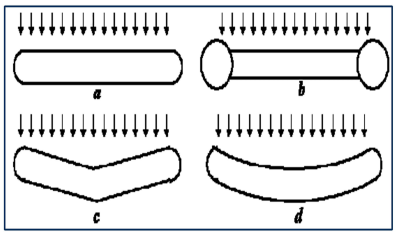

Figure 4: Plan View

Evaluation :

The surface area of the ETFE layer :

$S = \pi rL + \pi r^2$

$S = (3.14)(3,000)(10,000) + (3.14)(3,000)^2$

$S = 112.46\ Km^2$ or $112.46 \times 10^6\ m^2$

10$ x 112.46 Km = $1.125 Billion.

+ steel cables, concrete foundation, labor cost and ventilators

Cost → $2 Billion

Solution

| Remolding old EFTE elements into new ETFE products

| Recycling construction wastes

References :

[1]: WeatherSpark, "Historical Weather For 2015 in Dubai, United Arab Emirates", N.D. [Online]. Available: https://weatherspark.com/history/32855/2015/Dubai-United-Arab-Emirates [Accessed: Nov. 15, 20.

[2]: J. Share, "Flying the Geology of the Island of Hawai'i: Part II - From the Waimea Plains to the Humu Saddle" February 2016. [Online]. Available: http://written-in-stone-seen-through-my-lens.blogspot.ae/2016/02/flying-geology-of-island-of-hawaii-part.html [Accessed: Nov. 15, 2016].

[3]R. Houze, 2016. [Online]. Available: http://search.proquest.com.ezproxy.aus-.edu/docview/1026760764?OpenUrlRefId=info:xri/sid:wcdiscovery&accountid=16946# . [Accessed: 28- Sep- 2016].

[4] E. Samoglou. Cloud seeding operations over UAE 'played a part in record march rainfall' . The National 2016. Available: http://ezproxy.aus.edu/login?url=http://search.proquest.com/docview/1779558652?accountid=16946.